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DESIGN OF SOLAR PLANT TO MEET ELECTRICITY NEEDS OF COMMON AREA

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ABSTRACT In this paper calculation of total electricity need for an area and design of solar power plant for that need is studied. In this paper design of solar power plant for PCCOE&R, Ravet is given as a case study. Details about calculating total electricity need and generation of total electricity are also given. Details about calculation of payback period are also given.

I. INTRODUCTION

We know that fuels will finish someday. So it's our responsibility that we should convert natural energy into usable form. So we are in search of some abundantly available energy sources. But some processes of converting some forms of energy into electricity are costly and some are limited. E.g. converting atomic energy to electricity is very costly and producing solar energy from coal is limited. But some sources are cheaply available and unlimited. Solar energy is one of that. Solar powered photovoltaic panels convert sun's rays into electricity by existing electrons in silicon cells using the photons of light from the sun. So here we are planning to utilize solar energy as a power source for common use by using the solar panels.

II. LITERATURE REVIEW

1) **Role of renewable energy sources in environmental protection: A review**
N.L. Panwar S.C. Kaushik Surendra Kothari

Renewable technologies are considered as clean sources of energy and optimal use of these resources minimize environmental impacts, produce minimum secondary wastes and are sustainable based on current and future economic and social societal needs. Sun is the source of all energies. The primary forms of solar energy are heat and light. Sunlight and heat are transformed and absorbed by the environment in a multitude of ways. Some of these transformations result in renewable energy flows such as biomass and wind energy. Renewable energy technologies provide an excellent opportunity for mitigation of greenhouse gas emission and reducing global warming through substituting conventional energy sources. In this article a review has been done on scope of CO2 mitigation through solar cooker, water heater, dryer, biofuel, improved cookstoves and by hydrogen.

2) **The Effect of Temperature on Photovoltaic Cell Efficiency**
V.Jafari Fesharaki, Majid Dehghani, J. Jafari Fesharaki
Department of Electrical Engineering, Najaf Abad Branch, Islamic Azad University, Najaf Abad,
Iran.

As a great potential renewable energy source, solar energy is becoming one of the most important energies in the future. Recently, there has been an enormous increase in the understanding of the operational principle of photovoltaic devices, which led to a rapid increase in the power conversion efficiencies of such devices. Solar cells vary under temperature changes; the change in temperature will affect the power, output from the cells. In this paper a relation between efficiency, sun radiation and temperature is proposed and under cloudy climate is simulated and temperature ambient PV module for a desired efficiency can be obtained.

A solar cell basically is a p-n semiconductor junction. When exposed to light, a dc current is generated. PVs offer several advantages such as: high reliability, low maintenance cost, no environmental pollution, and absence of noise. The solar cells vary under temperature changes. The change in temperature will affect the power output from the cells. The voltage is highly dependent on the temperature and an increase in temperature will decrease the voltage.

3) **Impact of solar panels on global climate**
Aixue H, Samuel Levis, Gerald A. Meehl, Weiqing Han, Warren M. Washington, Keith W. Oleson, Bas J. van Ruijven, Mingqiong He3 and Warren G. Strand

Regardless of the harmful effects of burning fossil fuels on global climate other energy sources will become more important in the future because fossil fuels could run out by

the early twenty-second century given the present rate of consumption. This implies that sooner or later humanity will rely heavily on renewable energy sources. Here we model the effects of an idealized large-scale application of renewable energy on global and regional climate relative to a background climate of the representative concentration pathway scenario. We find that solar panels alone induce regional cooling by converting incoming solar energy to electricity in comparison to the climate without solar panels. The conversion of this electricity to heat, primarily in urban areas, increases regional and global temperatures which compensate the cooling effect. However, there are consequences involved with these processes that modulate the global atmospheric circulation, resulting in changes in regional precipitation.

4) **Concentrating solar power: A review of the technology**

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In general, solar thermal technologies are based on the concept of concentrating solar radiation to produce steam or hot air which can then be used for electricity generation using conventional power cycles. Collecting the solar energy, which has relatively low density, is one of the main engineering tasks in solar thermal power plant development. For concentration, most systems use glass mirrors because of their very high reflectivity. Other materials are under development to meet the needs of solar thermal power systems. Point focusing and line focusing systems are used. These systems can use only direct radiation, and not the diffuse part of sunlight because this cannot be concentrated. Line focusing systems are easier to handle, but have a lower concentration factor and hence achieve lower temperatures than point focusing system.

5) **Modelling of electric characteristics of 150-watt peak solar panel using Boltzmann sigmoid function under various temperature and irradiance**

A A N G Sapteka, A A N M Narottam , A Winarta, K Amerta Yasa, P S Priambodo, and N Putra

Solar energy utilized with solar panel is a renewable energy that needs to be studied further. The site nearest to the equator, it is not surprising, receives the highest solar energy. In this paper, a modelling of electrical characteristics of 150-Watt peak solar panels using Boltzmann sigmoid function under various temperature and irradiance is reported. Current, voltage, temperature and irradiance data in Denpasar, a city located at just south of equator, was collected. Solar power meter is used to measure irradiance level, meanwhile digital thermometer is used to measure temperature of front and back panels. Short circuit current and open circuit voltage data was also collected at different temperature and irradiance level. Statistically, the electrical characteristics of 150-Watt peak solar panel can be modelled using Boltzmann sigmoid function with good fit. Therefore, it can be concluded that Boltzmann sigmoid function might be used to determine current and voltage characteristics of 150-Watt peak solar panel under various temperature and irradiance.

6) **Utilization of Solar Energy for Power Generation in Nigeria**

J. O. Oji1,* , N. Idusuyi2 , T. O. Aliu1 , M. O. Petinrin1 , O. A. Odejobi1 , A. R. Adetunji

This study presents the viabilities for power generation in Nigeria through the utilization of the sun's energy. Solar-thermal and photovoltaic options were discussed. It highlights the basic science for the design and selection of components for successfully harnessing solar power. Requirements for solar panel placement and orientation were also highlighted. It emphasizes that the knowledge and experience gained in solar energy as an abundant and convenient energy source, can play a role in steering the nation toward a permanent and sustainable development. The energy demand in Nigeria far outweighs the supply which is epileptic in nature. The acute electricity supply hinders the country's development notwithstanding the availability of vast natural resources in the country. Our ability to continue the trend for affordable energy will be severely tested in the coming decades, as evidenced by the widening trade imbalance, collapse of big manufacturing companies, sharp increase in the cost of doing business just to mention but a few. It is the issue of utilizing the sun's silent, inexhaustible, and non-polluting resource for power generation in Nigeria that this work addresses; hence it is the long-range review of the energy problem.

7) **Generation and transmission prospects for solar electricity: UK and global markets**

T. Muneer *, M. Asif, J. Kubie

World energy demands are assumed to double within the next 20 years. Fossil fuels are being depleted at a faster rate than ever before. Global warming and its associated climatic change are becoming serious concerns for governments worldwide. There is, thus, an urgent need for much more efficient and environmentally friendly energy resources to be exploited worldwide. Renewable energy is the solution to these challenges. Solar photovoltaic (PV) energy, is an elegant and effective renewable energy resource that is increasingly being seen as a promising candidate for provision of clean and sustainable power. Using up to 20 years of measured solar radiation data from seven widespread UK locations, the feasibility of interconnected, solar powered communities has been presently undertaken. This study has also explored the long

term prospects of large scale PV generation in arid/semi-arid locations, around the globe and its transmission using hydrogen as the energy vector. It is estimated that a single solar PV station of 250 250 km2 area, or 12 decentralised stations each of 72 72 km2 area would be sufficient to meet the year 2020 world electricity demand.

8) Solar energy: Markets, economics and policies

Govinda R. Timilsinaa,∗, Lado Kurdgelashvili b, Patrick A. Narbel c

Solar energy has experienced phenomenal growth in recent years due to both technological improvements resulting in cost reductions and government policies supportive of renewable energy development and utilization. This study analyzes the technical, economic and policy aspects of solar energy development and deployment. While the cost of solar energy has declined rapidly in the recent past, it still remains much higher than the cost of conventional energy technologies. Like other renewable energy technologies, solar energy benefits from fiscal and regulatory incentives, including tax credits and exemptions, feed-in-tariff, preferential interest rates, renewable portfolio standards and voluntary green power programs in many countries. The emerging carbon credit markets are expected to provide additional incentives to solar energy deployment; however, the scale of incentives provided by the existing carbon market instruments, such as, the Clean Development Mechanism of the Kyoto Protocol is limited. Despite the huge technical potential, the development and large scale deployment of solar energy technologies world-wide still has to overcome a number of technical, financial, regulatory and institutional barriers. The continuation of policy supports might be necessary for several decades to maintain and enhance the growth of solar energy in both developed and developing countries.

9) Optimizing front metallization patterns: Efficiency with aesthetics in free-form solar cells

Deepak K. Gupta a, * , Matthijs Langelaar a , Marco Barink b , Fred van Keulen a

Free-form solar cells are cells of unconventional shapes (e.g. hexagonal, leaf-shaped etc). Their flexible shape adds to the aesthetics of the surroundings as well as allows to place them over objects where conventional solar cells might not fit. Evidently, these cells need to be efficient as well, and one of the important factors that controls their performance is the front metallization design. In this paper, we present the application of topology optimization (TO) to optimize the front metallization patterns for free-form solar cells. TO distributes the electrode material on the solar cell front surface in an efficient manner, such that the total power output is maximized. To demonstrate the capability of the proposed methodology, we use it to optimize front metal grids for several complex solar cell shapes e.g. circular, hexagonal, leaf-shaped, motorbike fairings, etc. The results presented here demonstrate the capability of TO to generate efficient designs for these free-form shapes.

III. METHODOLOGY

1) Site surveying and area calculation.
2) Calculating amount of solar energy availability.
3) Calculating amount of energy needed.
4) Design of rooftop solar system.
5) Estimation and costing of project.
6) Calculation of payback period.

IV. CONCLUSION

Based on calculations and results the conclusion can be made that, solar energy is beneficial for environment. No any hazardous effects due to solar plants are found yet. So it is safe for use. The initial cost is high but the payback period is less. The solar power plants can be installed in very large scale to fulfill the electricity needs in huge amount.

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Flood and Drought control by Optimising Storage capacity of dam

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ABSTRACT: This project deals with improving storage capacity of Dam. Adapting the canal structure on the upstream side replacing the traditional method of excavating the area near Reservoir. We are providing this canals along the sides of River to increase the storage as well as reducing disaster effects during flood condition. We are providing Concrete Trapezoidal Canal which helps in increasing the capacity as compared to other types. This type of canals reduce hydraulic jumps, seepage, bursting, etc. We are providing two type of gates,one at the inner side of river and another facing towards reservoir due to which water stored in canals can be passed to downstream through reservoir and dam gates. Also it is economical as compared to disaster losses. It also focus on generating electricity by providing solar panels over canal and providing small turbine at the face of inner gate of river.

Keywords: - Dam, Reservoir, River, Storage, Canal, Gates, Panels, Turbines.

1.0 INTRODUCTION

In many countries, rivers prone to floods and drought are often carefully managed. Defences such as trees, bunds, reservoir and weirs are used to prevent rivers from bursting their banks. Floods are caused by many factors: heavy precipitation, severe winds over water, unusual high tides, tsunamis, or failure of dams, levels, retention ponds, or other structures that contained the water. A long-drawn-out period without rainfall can cause an area to dry out. Changes in climate, for instance, global warming can contribute to droughts.

Flooding and drought has many impacts. It damages property and endangers the lives of humans and other species. Rapid water runoff causes soil erosion and concomitant sediment deposition elsewhere (such as further downstream or down a coast). The spawning grounds for fish and other wildlife habitats can be polluted or completely destroyed. Some prolonged high floods can delay traffic in areas which lack elevated roadways. Economic effects of droughts usually involve loss of money by governments, enterprises, families or individuals.

A flooding may occur as an overflow of water from water bodies, such as a river, lake, or ocean, in which the water overtops or breaks levees, resulting in some of that water escaping its usual boundaries, or it may occur due to an accumulation of rainwater on saturated ground in an areal flood. While the size of a lake or other body of water will vary with seasonal changes in precipitation and snow melt, these changes in size are unlikely to be considered significant unless they flood property or drown domestic animals.

A drought is a natural disaster of below-average precipitation in a given region, resulting in prolonged shortages in the water supply, whether atmospheric, surface water or ground water. A drought can last for months or years, or may be declared after as few as 15 days. It can have a substantial impact on the ecosystem and agriculture of the affected region and harm to the local economy. Annual dry seasons in the tropics significantly increase the chances of a drought developing and subsequent bush fires. Periods of heat can significantly worsen drought conditions by hastening evaporation of water vapor.

In rainy season because of high precipitation excessive water of the river not get utilize it get wasted when river meets to the oceans and water get spread out in river basins. So that the excessive water which is get wasted in the rainy season it can be get stored by using this method and stored water can be used in the drought condition and summer season.

There are methods which can be used for controlling drought and flood condition. First method is by excavating and dredging the area near by the reservoir, by increasing the size of reservoir , it also increases storage capacity of reservoir. But because of that force which is exerted by the water on the inside wall of reservoir increases so there may be chances of failure of dam. There is one more drawback which occurs due to this method is migration of people from one place to another.

Another method is to provide better and effective solution i.e. by increasing the Capacity of Reservoir, by providing Canals on both the sides of River banks with opening valves, which stores good amount of water in overflow condition and let water pass to reservoir when required.

As we observe the amount of fluctuation in precipitation is very high, thus we have selected this topic to study and have provided remedies.

2.0 AIM AND OBJECTIVE :

To control floods and drought in case of catastrophe. By providing canal on both the sides of river with opening valves, which can stores large amount of water. In overflow condition we can store it and let that water pass through reservoir when required. Replacing the existing practices used for controlling flood and drought disaster management with our idea, their would be more benefits and to reduce the economy loss occurred after flood and drought.

3.0 CONSTURCTION

Canals are built in one of three methods, or a combination of the three, depending on available water and available path:

3.1 Human made streams :

A canal can be created where no stream presently exists. Either the body of the canal is dug or the sides of the canal are created by making dykes or levees by piling dirt, stone, concrete or other building materials. The finished shape of the canal as seen in cross section is known as the canal prism. The water for the canal must be provided from an external source, like streams or reservoirs. Where the new waterway must change elevation engineering works like locks, lifts or elevators are constructed to raise and lower vessels.

A canal can be constructed by dredging a channel in the bottom of an existing lake. When the channel is complete, the lake is drained and the channel becomes a new canal, serving both drainage of the surrounding polder and providing transport there. Examples include the Lage Vaart . One can also build two parallel dikes in an existing lake, forming the new canal in between, and then drain the remaining parts of the lake. The eastern and central parts of the North Sea Canal were constructed in this way. In both cases pumping stations are required to keep the land surrounding the canal dry, either pumping water from the canal into surrounding waters, or pumping it from the land into the canal.

3.2 Canalization and navigations :

A stream can be canalized to make its navigable path more predictable and easier to maneuver. Canalization modifies the stream to carry traffic more safely by controlling the flow of the stream by dredging, damming and modifying its path. This frequently includes the incorporation of locks and spillways, that make the river a navigation. Examples include the Lehigh Canal in Northeastern Pennsylvania's coal Region, Basse Saône, Canal de Mines de Fer de la Moselle, and Aisne River. Riparian zone restoration may be required.

3.3 Lateral canals :

When a stream is too difficult to modify with *canalization*, a second stream can be created next to or at least near the existing stream. This is called a *lateral canal*, and may meander in a large horseshoe bend or series of curves some distance from the source waters stream bed lengthening the effective length in order to lower the ratio of rise over run (slope or pitch). The existing stream usually acts as the water source and the landscape around its banks provide a path for the new body. Examples include the Chesapeake and Ohio Canal, Canal latéral à la Loire, Garonne Lateral Canal and Juliana Canal.

4.0 CANAL TYPES

- Contour Canal: A contour canal is an artificially-dug navigable canalwhich closely follows the contour line of the l through higher ground, building an embankment over lower ground, or constructing a canal
- Side Slope Canal: A side slope canal is that which is aligned at right angles to the contours; i.e. along the side slopes
- Permanent Canal: Perennial or permanent canals are lined to dams and barrages to provide water throughout the year, and they irrigate a vast area.
- Inundation Canal : Inundation canal are long canals taken off from large rivers.They receive water when the river is high enough and especially when in flood
- Feeder Canal: Canals used only for transportation, Feeder Canal is a canal associated with Farakka Barrage. If the severe drought brings down the Ganges water from its upper reaches, then less water is available in feeder canal.
- Carrier Canal: Canals used for transportation as well as providing water to irrigation fiels.
- Productive Canals: Are those which are introduced with an idea of recovering all the expenditure, incurred during the construction, in a specified time limit.
- Protective Canal : It protects the crops from adverse effects of soil moisture
- Lining Canal : A protective layer. Lined canal means that canal is made of some material (such as brick, or cement concrete) which can block seepage of water into soil.
- Unlined Canal : A unlined canal doesn't have any such arrangement, therefore there is high seepage.

5.0 STUDY REPORT:

Kerala Floods Study :

-Kerala receives average annual rainfall of 3107 mm

-Kerala received heavy rainfall 75% that is usual rainfall.

-Thirty-five out of the fifty-four dams within the state were opened for the first time in history. All five overflow gates of the *IDUKKI* Dam were opened at the same time, for the first time in 26 years

-one of the largest rescue operations, 40 helicopters, 31 aircraft, 182 teams for rescue, 18 medical teams of defense forces, 58 teams of NDRF and 7 companies of Central Armed Police Forces were pressed into service along with over 500 boats and necessary rescue equipments.

-Solaiyar dam, kakkayam dam, idamalayar dam, Mullaiperiyar dam, Idukki dam peringalkuthu dam.

-Idukki dam water level dips below 2400ft.the water level in reservoir came down to 2399.88 feet on Friday compared to wing continues to release water from idukki dam at 200 cu m/sec apart from the 117 cu m/sec water being released for power generation.

This diastolic result may have been compressed or reduced to some extent by providing our methodology. So we have further proceeded to study on our project.

CHAPTER No. 4
WORKING

We are going to provide canals on both side of river at a regular interval. So that can be use for controlling and preventing the flood water which is get generated because of heavy rainfall. That excessive water can create disasters.

Canals provided on both sides of the river near to the reservoir. When river get fully saturated because of flood water at that time gates provided on both inner sides of canal get open manually and after that flood water get distributed inside the canals.

Flood water can be stored at certain capacity when canals get fully saturated then gates provided on inner side of the canals get closed and that stored water will be used in the drought condition or in the summer season.

By using this technique high pressure and velocity of water can be reduced at a certain limit and that excessive water get stored inside the canal. Gates provided inner side of the canals have only one function that they will only allow to pass the flood water inside the canal.

Also high velocity and high pressure water can be used for hydro power generation. We are going to install mini hydro power plant inside the canal.

Also we are going provide solar panels over the canals that can control the evaporation of water and also generate electricity by using solar energy.

Lining is provided for canals that can reduces the erosion of the canals. And also reduces the seepage of water through the canals. We are going to provide design which is having maximum efficiency to control, prevent and stored flood water.

CHAPTER No. 5
PROJECT PLANNING

Initially we have considered two canals on both the sides.

We can mainly use these canals in regions where there is high rainfall.

Particularly in India there are many regions where there is high rainfall

and in such areas controlling the flow of water is much important and accordingly

many of the studies have tried various technique to prevent this flow of water but they

have not met required expectations.

So we came up with the idea of introducing canals.

These canals will help us in preventing the excess flow of water.

And this water can be later on used in draught conditions.

5.0 VISIT TO PAWANA DAM :

A site visit to Pawna dam was organised on 04thJanuary 2019. Under the guidance of Dr. Sameer Sawarkar. Purpose of this visit was to collect the information related to flood and drought conditions occur during rainy season and summer season.

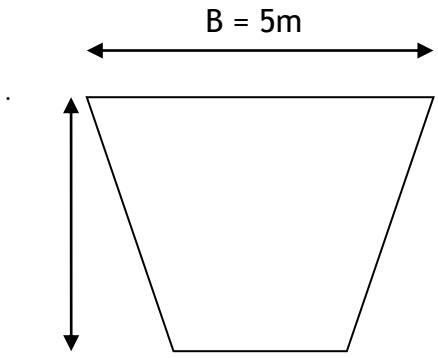
Irrigation - The construction of this dam was started in 1996. The major purpose of this dam is the supply of water to the agriculture, industries, and for drinking. Water supply is majorly done for Wai, Phaltan, Khandala, Bhor, Panchgani - Mahabaleshwar and the surrounding villages on the bank of the dam. This dam supplie's water to agricultural land of the Wai, Koregaon, Satara , Javli and Khandala talukas. The catchment area (42.77 km2) dams the Krishna River and forms the Dhom Lake which is approximately 20 km (11 miles) in length. Completed in 2002, it is one of the largest civil engineering projects commissioned after Indian independence. The Dhom Balkawadi electricity project is run by the Maharashtra State Electricity Board. Storage capacity of Dhom dam is 5.1 T.M.C

There are wide variations in water supply form a river or

canal during the year. This makes its necessary to store water by constructing a dam in order to insure the generation of power through out the year. The storage help in equalizing the flow of water so that any excess quantity of water at a certain period of the year can be made available during times of very low flow in the river. This leads to the conclusion that site selected for hydroelectric plant should provide adequate facility for erecting a dam and storage of water.

We had interaction with **Chief Engineer Gadwal Sir**. Sir told us improvement in our Project.

6.0 SELECTION OF DIMENSIONS :



6.1 CALCULATIONS :

- Area = 0.5(A + B)H
  = 0.5(5+ 3.5)3
  =12.75 m^2
- Length = 20m
- Volume of 1canal = 12.75 x 20
  =255m^3
- Volume of 1 canal = 255x 10^3 litres
- Volume of 2 canal = 510x 10^3 litres
- Volume of 10 canal = 2550 x 10^3 litres

7.0 EXPECTED OUTCOME:

- By studying on field problems and by testing the problems on model prepared, we are getting beneficial outcomes. Large amount of water quantity is stored in canals in flood conditions and that stored water is further utilized in drought conditions. We are also adding solar panels and small turbines so as to increase the benefits obtained by our methodology

8.0 CANAL MAINTANCE

- The correct estimation of conveyance water from losses from an irrigation system is vital for the protect management for the system .Seepage is the most dominant process by Which water is lost in the canal
- Reclamation developed this manual to provide basic guidance to help canal operators promote safe and effective operations and maintenance for canal systems
- Along the canal's course, seepage losses inevitably occur. Seepage which travels downwards into the foundation does not threaten the integrity of the canal embankment, but this can affect the canal's efficiency and ability to make downstream deliveries.
- Conditions can vary greatly along the length of a canal (Figure 2). The canal may traverse various geologic settings, transition from cut to fill construction depending on the surrounding terrain, and cross numerous natural drainages. Seepage and seepage related failures are most often attributed to conditions.
- Along embankment penetrations such as laterals, turnouts and buried utility crossings . Where canal lining has failed or is in disrepair .Where unauthorized embankment modifications have been made

9.0 FUTURE SCOPE :

- Further we will illustrate our project to government and various dam associates.
- Filling patent

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12 PLANNING OF WATER STORAGE RESERVOIRS VERSION 2 CE IIT, KHARAGPUR
13 FLOOD CONTROL RESERVOIR SYSTEM DESIGN USING STOCHASTIC PROGRAMMING

Structural Audit of RCC Structure by using NDT methods

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ABSTRACT Auxiliary review is the specialized overview of the structure so as to check its quality and soundness. Auxiliary review is the initial phase in fixing methodology of the structure. Auxiliary review is for the most part suggested for more established structures. Basic review was first presented by Indian culture of auxiliary specialists. Auxiliary review helps in improving the well being, productivity and gives thought regarding the quality of the structure by point by point specialized investigation. In present examination endeavour have been made to complete basic review of the old RCC working via doing site investigation, performing NDT on the structure. Building is demonstrated and investigated utilizing ETABS and Demand to limit proportion is resolved. Subsequent to checking quality and strength of the auxiliary individuals appropriate proposals are given so as to retrofit hazardous basic part. At last basic review.

INDEX TERMS - Auxiliary, Well being, endeavour etc

1.0 INTRODUCTION

It is typically started as the initial step for fix. This is like the occasional well-being check-up suggested for more established individuals. A strategy for Structural Audit was first displayed by the Indian Society of Structural Engineers. "Basic review is the investigation or examination of the structure, to assess the quality in order to improve its propriety, well-being, productivity". The examination of soundness is in this manner basic for finding the present functionality of the structure and its extension for future improvements or for the adjustment in its use. This data is joined with cutting edge present preparing instruments on derive on the current operational state and remaining life. The decision of specific NDT strategy relies on the property of cement to be assessed, for example, quality, erosion, split observing and so on.

The variables impacting Corrosion of Reinforcement are specifically,

- Quality of Concrete
- Cover Thickness of Concrete Over Reinforcement
- Condition of Reinforcement
- Effect of Environmental and different Chemicals
- Porosity of Concrete
- Effect of High Thermal Stresses
- Freezing and Thawing Condition
- Total Loss of Steel because of Corrosion
- Storage and Stacking Of Reinforcement Steel

a) Reinforcement is as yet latent, I. e. consumption has not started since carbonation or chloride infiltration has not achieved the steel surface.

b) Reinforcement is eroding however the engendering is in the beginning times, e. g. solid spread isn't split and decrease in cross area of rebars is insignificant.

c) Corrosion of steel prompts loss of functionality of the structure, e. g. because of breaking, spalling or delamination of the solid spread and additionally more than unimportant loss of rebar cross segment.

The present paper focuses on condition appraisal of a current multi year old medical clinic building and the conceivable recovery attempts to improve the life expectancy of the structure with security. The primer evaluation of the state of the structure is finished by visual assessment, testing of breaks and spalls to see their degree; fortifications spread estimations and so forth. In the second stage conceivable quality estimations, carbonation estimations, reference anode estimations are finished by taking examples for research facility testing. At last, consolidating the investigation of consequences of different NDT strategies for evaluating the nature of structures has been done and the conceivable fix and rebuilding works are proposed

1.1 Objectives of the Proposed Work

- To recognize the types of structural defects.
- To identify any signs of material deterioration.
- To identify any signs of structural distress and deformation.
- To identify any alteration and addition in the structure, misuse this may result in overloading.

1.2 Non-Destructive Testing (NDT)

Nondestructive testing (NDT) is the way toward reviewing, testing, or assessing materials, segments or gatherings for discontinuities, or contrasts in qualities without decimating the functionality of the part or framework. At the end of the day, when the assessment or test is finished the part can at present be utilized. As opposed to NDT, different tests are ruinous in nature and are in this way done on a predetermined number of tests ("parcel inspecting"), as opposed to on the materials, segments or congregations really being put into administration.

2.0 METHODS OF NDT

- Visual Inspection
- Structural Stability
- Rebound Hammer Test
- Ultrasonic Pulse Velocity Test
- Carbonation Test

2.1 Visual Inspection

Visual testing is presumably the most vital of all non-damaging tests. It can regularly give significant data to the all-around prepared eye. These incorporate for example, breaks, pop-outs, spalling, crumbling, shading change, enduring, recoloring, surface flaws and absence of consistency. Broad data can be accumulated from visual investigation to give a fundamental sign of the state of the structure and permit plan of an ensuing testing program. The benefit of a prepared eye is best depicted by Sherlock Holmes when he expressed: "I see close to you however I have prepared myself to see what I see." The significance and advantages of visual overview ought not be underestimated. "It incorporates an intellectual part where in perceptions are related with learning of structure and with portrayals and graphs from administration writing." "It incorporates an intellectual part wherein perceptions are related with learning of structure and with portrayals and graphs from administration writing."

2.1.2 Typical Defects Found By Visual Inspection

Fig 2.1.2 Defect appear when mortar has been mixed for too long or the time of transport has been too long.

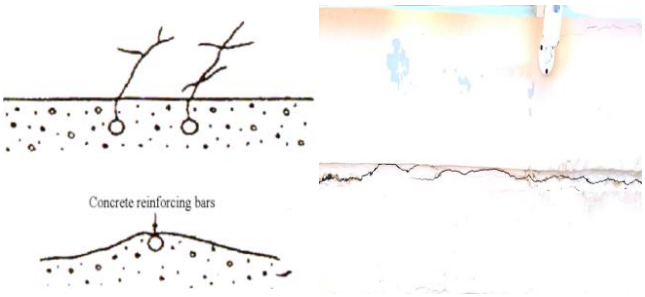


Fig 2.1.3 Defect appear due to sinking of mortar

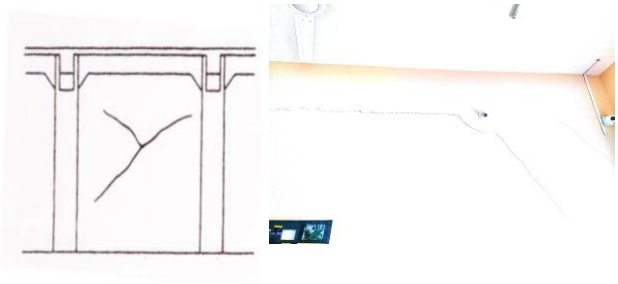


Fig 2.1.4 Defect appear due to unsuitable process at construction of joint.

Fig.2.1.5 Defect occurred due to Dampness

2.1.5 Visual Inspection Report

- Name of the Building: PCCOE&R, Ravet.
- Description: Educational building
- Address: Plot No. B Sector no. 110 Ravet, Pune 412101
- Age of the Building: 05 Yrs.

- Contact Person:- Principal of PCCOE&R.
- Inspection Report Date: 21/10/2018

2.1.6 Interference and Remedial Measures.

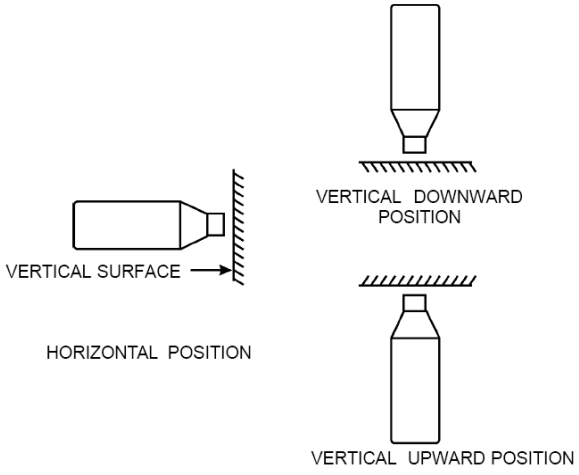
- Polymer Modified Mortar Treatment
- Water Proofing Treatment

2.2 Structural Stability

Structural stability report consist of data related work, name of building, owner of building, auditing member or structure, tests applied on building such data included in stability report.

2.3 Rebound Hammer Test

Prior to initiation of a test, the bounce back mallet ought to be tried against the test iron block, to get dependable outcomes. The testing iron block ought to be of steel having Brinell hardness number of around 5000 N/mm2. The provider/maker of the bounce back sledge ought to demonstrate the scope of readings on the blacksmith's iron reasonable for various sorts of bounce back mallet. For taking an estimation, the mallet ought to be held at right edges to the outside of the structure. The test in this way can be directed on a level plane on vertical surface and vertically upwards or downwards on flat surfaces.



In the event that the circumstance so requests, the mallet can be held at middle of the road points likewise, yet for each situation, the bounce back number will be distinctive for similar cement. There are three positions taking while taking results. Vertical position, horizontal position and vertical upward position.

2.4 Ultrasonic Pulse Velocity Test.

The hardware ought to be adjusted before beginning the perception and toward the finish of test to guarantee exactness of the estimation and execution of the gear. It is finished by estimating travel time on a standard alignment bar provided alongside the gear. A stage/arranging of reasonable tallness ought to be raised to have an entrance to the estimating areas. The area of estimation ought to be checked and numbered with chalk or comparative thing preceding genuine estimation (pre chosen areas).

2.4.1 Mounting of Transducers

The course in which the greatest vitality is engendered is typically at right edges to the essence of the transmitting transducer, it is additionally conceivable to identify beats which have gone through the solid some other way. The accepting transducer distinguishes the landing of segment of the beat which arrives most punctual

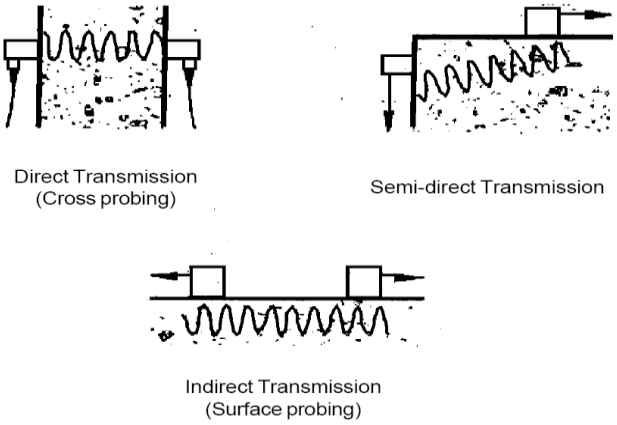


Fig. 2.3.1 Various Methods of UPV Testing

a) Direct Transmission (on inverse appearances) –

This plan is the most favoured course of action in which transducers are kept legitimately inverse to one another on inverse appearances of the solid. The exchange of vitality between transducers is most extreme in this course of action. The precision of speed assurance is administered by the exactness of the way length estimation.

(b) Semi-direct Transmission:

This game plan is utilized when it is beyond the realm of imagination to expect to have direct transmission (might be because of constrained access). It is less delicate when contrasted with direct transmission course of action.

(c) Indirect or Surface Transmission:

Aberrant transmission ought to be utilized when just a single face of the solid is available (when other two courses of action are impractical). It is minimal delicate out of the three game. plans. For a given way length, the accepting transducer get flag of just about 2% or 3% of sufficiency that delivered by direct transmission.

Sr No.	Pulse Velocity by cross probing (km/sec)	Concrete Quality Grading
1	Above 4.5	Excellent
2	3.5 to 4.5	Good
3	3.0 to 3.5	Medium
4	Below 3.0	Doubtful

2.5 Carbonation Test

The powder of cement is gotten by boring inside into cement at chosen area. At that point the gathered powder is made clammy and then phenolphthalein marker is dropped on it to check any shading change. In the event that the shading changes to pink, shows that solid isn't influenced via carbonation and if no shading change is watched, demonstrates concrete is influenced via carbonation.

3.0TEST RESULT AND DISCUSSION

3.1 NDT Test by UPV Method as per IS 13311 (P1-P11):1992 Reaffirmed 2013

Sr no	Location	Dis. mm	Time sec	Velo. Mm/sec	Avg Re No	Com Strenght
1	P01	550	121.6	4.5	44.00	48
2	P02	550	154.6	3.6	45.67	50
3	P03	550	122.1	4.5	44.23	48
4	P04	550	131.4	4.2	43.65	48
5	P05	550	118.8	4.6	45.66	50
6	P06	1450	319.6	4.5	45.33	50
7	P07	1450	308.9	4.7	44.50	49
8	P08	1450	311.2	4.7	43.20	47
9	P09	1450	333.3	4.3	45.67	50
10	P10	1450	318.8	4.5	44.67	49

NOTE:

1. RCC Member is Segment S1(P45-P46)-S10(P45P46)
2. Probe Direction is Direct.
3. Direction of Impact Horizontal.

Table No. 2: Velocity Criterion for concrete quality

3.2 Carbonation Test results

The colour changes to pink, indicates that concrete is not affected by carbonation.

(ISO 1920-12:2015 , Testing of concrete –Part 12: Determination of Carbonation Resistance Of Concrete)

Table No. 3: Average Rebound Number and comparative concrete quality as per IS (Part 2): 1992

Reaffirmed 2013

Sr No.	Average Rebound Number	Quality of Concrete
1	Above 40	Very Good Hard Concrete
2	30 to 40	Good Concrete
3	20 to 30	Fair Concrete
4	Below 20	Poor Concrete

4.0 CONCLUSIONS

According to Visual inspection it is conclude that repairing work is required to the building

- By visual inspection it is found that non Structural element are getting damaged due to lack of building.
- The Structural element are still useful & undamaged hence there is no problems of collapse of building.
- Minor cracks should be repaired by injection of epoxy or using grouting method.

According to the NDT tests it is conclude that

- Ultrasonic Pulse velocity tests gives a better result than the Schmidt Rebound hammer test.
- Ultrasonic Pulse velocity test gives 91% results greater than the Rebound hammer tests.

According to results of Carbonation test the Structural member of the building are not corroded. The affect not reinforcement is nil. Hence further treatment does not required.

- By overall inspection and all above aspect the building should be good in condition and also increases life of building.

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Use of Plastic Waste in Flexible Road Pavement

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ABSTRACT

In this paper the study of some of plastic waste materials which we can reusing and adding in the bitumen of grade VG30 as a homogeneous material to use in road construction as the bitumen is the primary and important binder during construction of road. The effectively using plastic content in bitumen and hence relatively to meet the challenges of society to reduce the problem of disposing the plastic as well as decrease in requirement of bitumen amount in actual road construction and increasing strength and life of the road in an economical way. Waste Plastic use as road material by blending it with bitumen to lay roads in India and compare with the environmental and economic conditions. Some of these materials are relatively cheaper and provide more strength as compared to traditional road materials. This project will come up with useful information and creating awareness amongst people and the learners in the industry regarding waste material. So that one can have a step towards further detailed information about these materials and thus be able to implement on field which will definitely improve the level of construction.

I. INTRODUCTION

The threat of disposal of plastic will not solve until the practical steps are not initiated at the ground level. It is possible to improve the performance of bituminous mixed used in the surfacing course of roads. Studies reported in the used of re-cycled plastic, mainly polyethylene, in the manufacture of blended indicated reduced permanent deformation in the form of rutting and reduced low temperature cracking of the pavement surfacing. The field tests withstood the stress and proved that plastic wastes used after proper processing as an additive would enhance the life of the roads and also solve environmental problems. Plastic is a very versatile material. Due to the industrial revolution, and its large scale production plastic seemed to be a cheaper and effective raw material. Today, every vital sector of the economy starting from agriculture to packaging, automobile, electronics, electrical, building construction, communication sectors has been virtually revolutionized by the applications of plastics. Plastic is a non-biodegradable material and researchers are found that the material can remain on earth for 4500 years without degradation. Several studies have proven the health hazard caused by improper disposal of plastic waste. The health hazard includes reproductive problems in human and animal, genital abnormalities etc., Looking forward the scenario of present life style a complete ban on the use of plastic cannot be put, although the waste plastic taking the face of devil for the present and future generation. We cannot ban use of plastic but we can reuse the plastic waste.

II. LITERATURE REVIEW

1. Johnson Kwabena Appiah et al.: Use of waste plastic materials for road construction in Ghana, Case Studies in Construction Materials, Volume 6, 2017,pp. 1-7.
This paper forms part of research to solve two main problems in Ghana: firstly, the management of municipal solid waste (MSW), particularly with regards to used plastics which have overwhelmed major cities and towns; secondly, the formation of potholes on roads due to excessive traffic and axle weight. This study examines the effect of blending waste thermoplastic polymers, namely High density polyethylene (HDPE) and Polypropylene (PP) in Conventional AC-20 graded bitumen, at various plastic compositions. The plastics were shredded and blended with the bitumen 'in- situ', with a shear mixer at a temperature range of 160 C–170 C. Basic rheological parameters such as penetration, ring & ball softening point and viscosity tests were employed to determine the resulting changes from base bitumen composite. It was observed that polypropylene polymer, showed profound effect on homogeneity and compatibility with slight linear increment in the viscosity, softening and penetration values as against relatively high changes for HDPE modified bitumen. the penetration values decrease as polymer-bitumen ratio increases whiles softening temperature generally increases as polymer ratio increases.The use of waste commodity plastics in binder modification carries the advantage of a cheap and effective means of enhancing conventional bitumen binder performance characteristics and is an alternative way to utilize plastic waste. The choice of

modifier for a particular project can depend on many factors including construction ability, availability, cost, and expected performance. Modification is achieved by two main procedures; Dry process involves direct incorporation of waste plastic, which is blended with aggregate before adding in bitumen, to prepare a plastic modified bituminous concrete mix and the Wet process which involves, simultaneous blending of bitumen and waste plastic. The use of polymer modified bitumen to achieve better asphalt pavement performance has been observed for a long time. The thrust of this study is to generate scientific data which will form basis for using plastic modified bitumen in the construction and repair of roads in Ghana, as well as provide scientific data on the alternative recycling options for managing plastic waste. Materials used for this research are bitumen of AC20 grade and plastic like plastic bags, bottles etc. These used for obtaining modified bitumen and tests for determining various parameters like viscosity, softening point, penetration value. Conclusion obtained from these tests is that as the plastic mixed with bitumen it improves its viscoelastic and rheological properties. They also used various references like journals and research papers.

2. S.S.Verma: Roads from Plastic waste, The Indian Concrete Journal, 2008, pp. 43-47.

This paper concluded that the concept of utilization of waste plastic in construction of flexible road pavement has been done since 2000 in India. In the construction of flexible pavements, bitumen plays the role of binding the aggregate together by coating over the aggregate. It also helps to improve the strength and life of road pavement. But its resistance towards water is poor. A common method to improve the quality of bitumen is by modifying the rheological properties of bitumen by blending with synthetic polymers like rubber and plastics. Use of plastic waste in the bitumen is similar to polymer modified bitumen. Polymer modified bitumen has better resistance to temperature, water etc This modified bitumen is one of the important construction materials for flexible Road pavement. This research paper gave some informative data obtained from survey like the average municipal solid waste production from 0.21 to 0.50 Kg per capita per day in India and total plastics waste consumption in India during last decade 1995 to 2011.This also gives the tables of information about the types of plastic and their origin of formation and available sources. Most of thermoplastics on heating soften at temperature between 130-140^{0}C. The TGA analysis of thermoplastics has proven that there is no gas evolution in the temperature range of 130-180 ^{0}C and beyond 180 ^{0}C gas evolution and thermal degradation may occur. Thus the waste plastic can easily be blended with the bitumen as the process for road construction using bitumen is carried out in the range of 155-165^{0}C. After that it gives the information about the properties of bitumen, its grades and types etc with different forms of bitumen. It also gives the requirement of bitumen properties used for flexible road pavement. They used waste plastic mixed materials in road pavements by both methods like dry and wet process. There are various types of tests conducting on road after mixing of plastic waste like soundness test, Aggregated Impact Value, Los Angel's Abrasion Test, Marshall Stability, Softening point test, Ductility Index Test, Penetration Index Test, Flash and Fire point test and obtaining results comparatively. It concluded the advantages and disadvantages of dry and wet process. Researchers also concluded the study of plastic coated bitumen mix roads in in India with various examples like In Tamil Nadu, length of roads around 1000 m in various stretches were constructed using waste plastic as an additive in bituminous mix under the scheme "1000 km Plastic Tar Road", and found that, the performance of all the road stretches are satisfactory. The performance of the road stretches constructed using waster plastic in Karnataka is also found to be satisfactory. Conclusion of this paper is that the use of modified bitumen with the addition of processed waste plastic of about 5-10% by weight of bitumen helps in substantially improving, strength, fatigue life and other desirable properties of bituminous concrete mix, which improves the longevity and pavement performance with marginal saving in bitumen usage. The process is environment friendly.

3. Amit Gawande et al : An overview on waste plastic utilization in asphalting of roads, Journal of Engineering Research and Studies, E-ISSN0976-7916.

In this paper included that The threat of disposal of plastic will not solve until the practical steps are not initiated at the ground level. It is possible to improve the performance of bituminous mixed used in the surfacing course of roads. Studies reported in the used of re-cycled plastic, mainly polyethylene, in the manufacture of blended indicated reduced permanent deformation in the form of rutting and reduced low – temperature cracking of the pavement surfacing. The field tests withstood the stress and proved that plastic wastes used after proper processing as an additive would enhance the life of the roads and also solve environmental problems. The plastic constitutes two major category of plastics; (i) Thermoplastics and (ii) Thermoset plastics. The thermoplastics, constitutes 80% and thermoset constitutes approximately 20% of total postconsumer plastics waste generated. Plastics can be classified in many ways, but most commonly by their physical properties. Plastics may be classified also according to their chemical sources. The twenty or more known basic types fall into four general groups: Cellulose Plastics, Synthetic Resin Plastics, Protein Plastics, Natural Resins, Elastomers and Fiber. Various Grades of Bitumen used for pavement purpose Grade:30/40; Grade: 60/70; Grade: 80/100.This paper included research on Dry and Wet process. This paper gave the conclusion that This review intended to find the effective ways to reutilize the hard plastic waste particles as bitumen modifier for flexible pavements.

4. Shweta N. Rokdey et al : Use of Plastic Waste in Road Construction, International Journal of Computer Applications (0975 – 8887), International Conference on Quality Up-gradation in Engineering, Science and Technology (ICQUEST2015).

In this paper concluded that the concept of utilization of waste plastic in construction of flexible road pavement has been done. They gave properties of plastic Polymers have a number of vital properties, which exploited alone or together make a significant and expanding contribution to construction needs. They gave description and comparison between Dry and Wet Processes. Also it gives advantages and disadvantages of processes. Plastic will increase the melting point of the bitumen. This innovative technology not only strengthened the road construction but also increased the road life. Plastic roads would be boon for India's hot & extremely humid climate, where temperature frequently cross 50°C.

III. METHODOLOGY

The proposed study will collect required materials and conducted various tests on modified and unmodified bitumen to determine changes in physical parameters of bitumen of grade VG30.

3.1. Material Description

1. Bitumen

The bitumen used, AC-20 grade, was obtained from a local authorized local RMC and Hot mix plant.

Physical properties of this bitumen are presented in Table 2. After the experimental procedures, the modified properties were compared with the Indian Highway Authority (bitumen specifications (Table 1).

2. Plastic

The plastic used was low density waste plastic like bags, wrappers, etc. collected from the residential areas and college campus.

3.2. Modified bitumen preparation

Bitumen (100 g) was heated in oven till fluid condition and polymer was slowly added. The mixture is mixed homogeneously by using stirrer between 160 C and 170 C. The concentration of PP, ranged from 0.5% to 2.5% by weight of blend with an increment of 0.5%. Mixing was continued until it produce homogenous mixtures.

Table 1: Indian Highway Authority Specifications for unmodified bitumen (VG- 30 Grade).

Penetration (mm) at 25 C, 100 g,5 s	45
Softening Point, C	47
Kinematic Viscosity at 135 C	350
Viscosity at 60 C	2400-3600

Table 2.Types of mixture samples with different proportion of bitumen and plastic.

Type of Mix	Bitumen (gm)	Plastic (gm)
M1	100	0
M2	99.5	0.5
M3	99	1.0
M4	98.5	1.5
M5	98	2.0
M6	97.5	2.5

3.3. . Laboratory testing

There are conducting three tests on unmodified and modified bitumen of VG30 according to mixture types as shown in above table.

3.3.1. Penetration value test

The standard 100 g, 25 C, 5 s penetration test was performed by penetrometer on base bitumen and PMB with the concentration of polymer varying between 0.5%-2.5% by weight of the bitumen.

The results of the test are shown in Fig. 1.

3.3.2. Softening point test

Ring and ball softening test, is the standard test to determine the consistency of the bitumen, which represent the temperature at which a change of phase from solid to liquid occurs. It is the temperature at which standard 3/8 inch steel ball weighing 3.55 g falls and touches the base plate which is 2.5 mm away. The results are shown in Fig. 2.

3.3.3. Viscosity test

Viscosity test was conducted viscometer, on unmodified bitumen. The absolute and kinematic viscosity measurements were made at 135 C respectively.

All tests were performed according to the standard specifications and conditions given according to the Indian Highway Authority.

IV. EXPERIMENTAL ANALYSIS

As various tests conducted on unmodified and modified bitumen it gives us the various results related to the tests regarding the plastic content in bitumen. Parameters like penetration, softening point and viscosity gradually changes as the plastic content changes from 0.5% to 2.5% .There are showing and comparison of various observations of physical parameters of bitumen of VG30 grade as shown in table(3).

Table.3. Comparison between specifications of unmodified and modified bitumen of VG30 grade.

	0%	0.5%	1.0%	1.5%	2.0%	2.5%
Penetration (mm)	65.8	60.2	58.1	56.33	54.33	50.6
Softening Point, C	45	48	50	51	53	54
Viscosity value (sec)	10.58	13.7	21.4	23.74	36.23	48.45

4.1 Graphs of Result

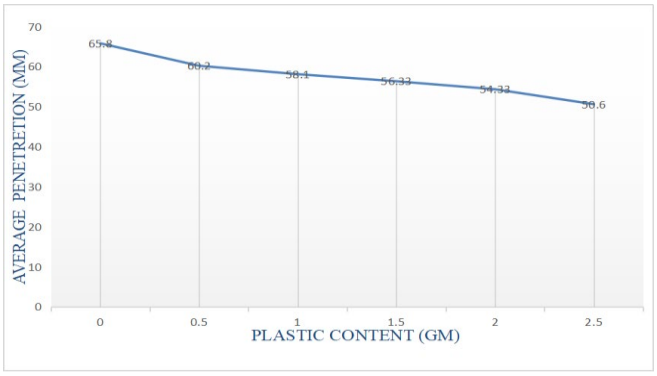

Fig.1.Penetration Value Test

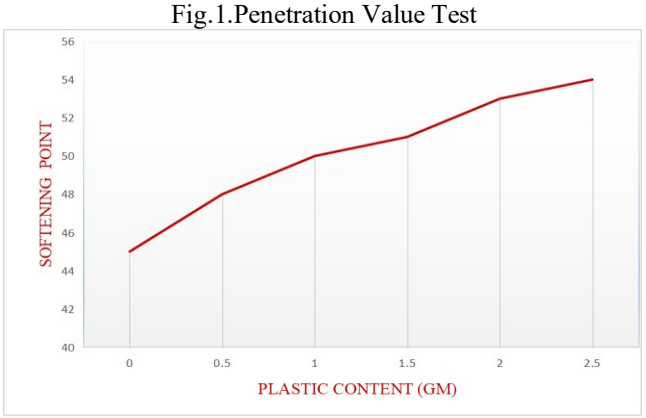

Fig.2. Softening Value Test

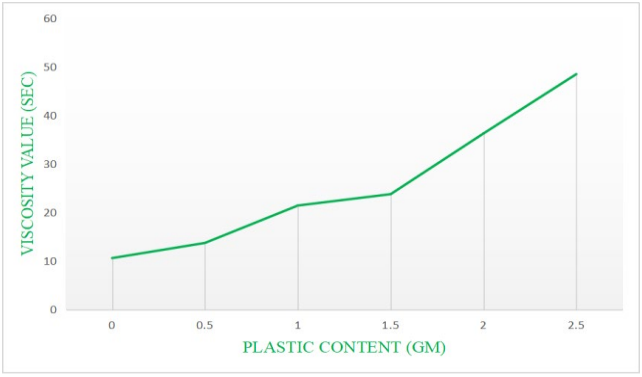

Fig.3. Viscosity Value Test

4.2 Penetration

From the result shown in Fig. 1, The penetration value of the bitumen decreases as the plastic content increases . The melting temperature PP is 165 C. Polyethylene at temperature above 160 C is in melt state; it mixed into the bitumen which increases the viscosity of the PMB. Thus it increases the viscosity by the end of mixing process, and by the time it cools harden mixture was formed. The hardening of the bitumen can be beneficial as it increases the stiffness of the material, thus the load spreading capabilities of the structure.

4.3 Softening point

The results obtained from Fig. 2, shows that there is a linear increase in the softening temperature for PMBs up to 2.5% concentration of polymer in bitumen as compared to base bitumen. Thermoplastic modification does not significantly affect the softening point as compared to the penetration . This is suitable to the internal structure formed by the polymer, which seems to be thermodynamically stable and does not significantly affect the softening point of the PMB. This confirms that the PMBs with an increase softening point have been found to show enhancement in pavement performance characteristics in terms of rutting, fatigue and temperature susceptibility. Again, it can also be observed that, PP offers lesser variation in softening point, which may be due to homogeneity achieved during blending of PP with unmodified bitumen as a result of its low molecular weight.

4.4. Viscosity

The results obtained from Fig 3, The viscosity of the bitumen decreases with the increase in plastic content. It is suddenly increases with the each plastic content increases. It is observed that as the viscosity increases the modified mixture tend to become more and more stiff which resulted in decrease in workability. Above the plastic content 2.5% plastic content, the bitumen shows very exceedingly viscous nature which is not suitable for road construction. the viscous bitumen mixture gives higher strength, low penetration which leads toward the highly working capacity and durability of a road with longer lifespan.

VI. CONCLUSION

The addition of thermoplastic modifiers to conventional bitumen increasing the softening point, decreasing penetration value whilst enhancing the overall viscosity of the binder which are workable in the range of **0.5- 2.5%** plastic content of weight of bitumen in the VG30 grade. Above the **2.5%** plastic content the properties of bitumen exceeds the specified results according to IS codes and material becomes more stiff and less workable. The maximum amount of household plastic that can be added in the bitumen of grade VG-30 for making the roads is **2.5% .** the amount of bitumen required is also decreased, due to this the construction of road is more economical.

ACKNOWLEDGMENT

We feel immense pleasure in presenting this project report on **"Use of Plastic Waste in Flexible Road Pavement".** We wish to express true sense of gratitude towards **Prof. Amar D. Shitole**, our project guide who at very discrete step in study of this project, contributed their valuable guidance and helped to solve every problem that arose.

We take this opportunity to thank our principal **Dr. H. U. Tiwari** and **Prof. Dr. S. S. Sawarkar** (HOD Civil Dept.) for opening the doors of the department towards the realization of our project, for their guidance and encouragement. We offer our sincere thanks to our BE Project Coordinator **Prof. S. S. Bobade**, who gave us extra inspirations to do something new.

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OPTIMIZATION AND ANALYSIS OF VERTICAL AXIS WIND TURBINE WITH ANSYS CFD SIMULATIONS

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ABSTRACT This Project (Design Wind Turbine) is tied in with structuring and assembling a Vertical Axis Wind Turbines VAWT to exchange the wind speed to a rotational movement utilizing these turbines. These turbines will be set in expressway medians that will resemble a cutting, edge plan, which can be introduced in and around any open zone, for example, streets, parks, boats, parallel to railway tracks. Wind Turbines are intended to create control up to 300 watts for every turbine. In this work, the flow conduct was analysed, which influenced the power coefficient, just as the torque coefficient of a Savonius rotor, is researched by methods of CFD. Three-bladed Savonius rotors have a high coefficient of static torque at certain rotor edges and a negative coefficient of static torque at certain rotor edge. To expand the proficiency of all rotor points. 3-Blade turbine the introductions considered were 0 degree, 30 degree, 60 degree and 90 degree in reference to the bearing of the wind. Computational Fluid Dynamics (CFD) investigations were directed for each case to discover the torque and power produced by the turbines for every introduction To guarantee the exactness of the outcomes.

INDEX TERMS Vertical axis Wind turbine, Ansys, CFD simulation, Vertical axis wind turbine, Savonius VAWT

1. INTRODUCTION

A vertical axis wind turbine (VAWT) is a kind of wind turbine where the blades are vertical to the ground and all the parts like generator, gears are situated at bottom. This plan enables the generator and gearbox to be found near the ground, encouraging administration and fix. VAWTs should be pointed iagainst the wind, which expels the requirement for wind-detecting and introduction systems.

If the proficiency of the wind turbine is expanded, at that point more power can be produced accordingly diminishing the requirement for costly power generators that reason contamination. This would likewise lessen the expense of intensity for ordinary citizens. The wind is truly there for using freely and doesn't cost any cash. Power can be produced and put away by a wind turbine with next to zero contamination.

Since its creation man has continually attempted to improve the windmill. Subsequently, throughout the years, the quantity of cutting edges on windmills has diminished.

Wind energy is by a long shot the quickest developing sustainable power source asset. These wind turbines can be utilized to give steady lightning of houses, road lights and so forth.

The vertical axis wind turbine for the most part comprises of 3 involutes in a setup that uses the mass energy of the wind to turn the edges around a focal shaft. Power is connected to the sharp edges by the wind both entering and leaving the turbine, permitting most extreme extraction of energy from the wind.

Figure 1: VAWT Blades

The focus for Renewable Energy Resources has expanded essentially as rising energy request and exhausting petroleum product assets. Diverse sources of sustainable power source incorporate biomass, sun based, geothermal, hydroelectric, and wind energy.

Among these assets, the wind has turned out to be a less expensive elective energy asset and consequently broad research endeavours have been put to improve the innovation of power age through wind energy. The world has a colossal potential for wind energy that ought to be used for power age. The wind energy extraction innovation has an interesting specialized character in perspective on the techniques utilized for structure. The yearly energy yield for the turbine has expanded hugely and the loads of the turbine and the clamour they produce have been diminished, as it were, in the course of the most recent couple of years. Indian Renewable Energy Development Agency (IREDA) and the wind business are cooperating to achieve these enhancements through different innovative work program.

2. OBJECTIVES

- Analyse proposed VAWT using ansys CFD simulation software.
- To find most efficient angle of turbine blades.
- Analyze how different geometry of the wind turbines would affect the output power of the wind turbine.

3. DESIGN CONCEPT

Computational Fluid Dynamics, a part of Fluid Mechanics is characterized as PC innovation that gives a way to model and concentrate the stream mechanics of about a physical issue. CFD has built up the way engineers used to take care of complex liquid stream issues. For instance, CFD programming gives the intend to reproduce the stream of gases and fluids, moving bodies, synthetic response, warmth and mass exchange, liquid structure cooperation, and acoustics through PC modelling.

Table 1 Shows the design parameters used in this paper

Parameter	Valve
Swept area	0.08 m^2
Aspect ratio	2
Diameter-Height	200-400 mm
Number of blades	3
Blade thickness, t	10 mm
Mass density	2700 kg/m^2
Tensile strength	68935600 N/m^2
Yield strength	27574200 N/m^2
Poisson's ratio	0.33

4. SIMULATION AND ANALYSIS

Components of CFD:

a) Pre-handling: The program pre-preparing are CAD or geometry creation, work age and applying limit conditions with the end goal of this proposal.

b) Solving (Simulation): The solving segment is where the real computations are performed, and information results are accumulated. This progression was performed utilizing the Fluent's CFD code and solver.

c) Post-handling: Fluent additionally gives the last advance in an investigation which includes the post-preparing stage. Familiar's post-handling programming gives various instruments that can be utilized to control information and method shading based CFD pictures and movements.

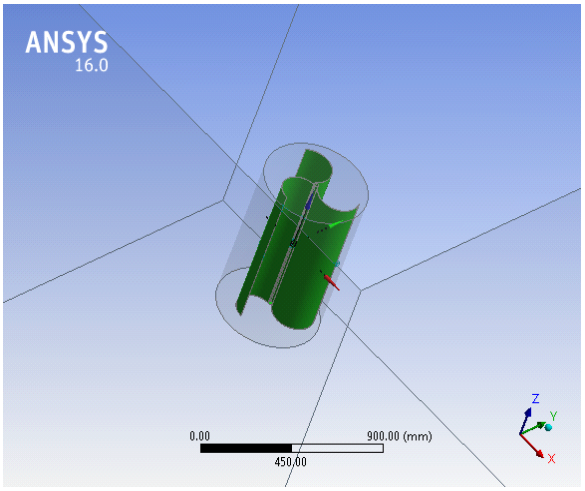

Figure 2: VAWT Model

5. EXTERNAL FLOW ANALYSIS

The flow type of Savonius rotor blade is considered in this paper as outer stream since it includes a strong demonstrate which is surrounded by the stream. The liquid stream isn't limited by any external surface the stream is limited by the computational space limits. The computational space is non uniform is characterized to 1m that implies the Savonius rotor is encased by this district and volume is fixed in this area.

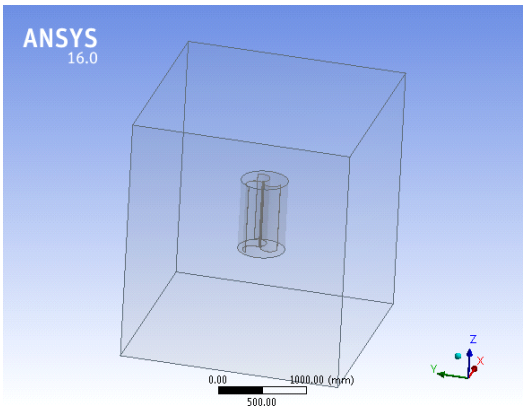

Figure 3: Model

All faces of the rectangular space have distinctive sort of limit conditions which can be expressed as pursues:

- Velocity Inlet-Fluid Inlet
- Pressure Outlet-Fluid outlet
- Symmetry-Side where chamber is cut
- Symmetry-Side inverse of the chamber

Again, the purpose behind these investigations was to discover the impacts of utilization of wind on a Savonius turbine with three edges and break down the speed profile and pressure distribution, power and movement and so on.

To do this investigation a model of wind turbine was separated into four cases, each case showing the cutting edges of a Savonius turbine arranged at various edges to finish a 360 degree turn.

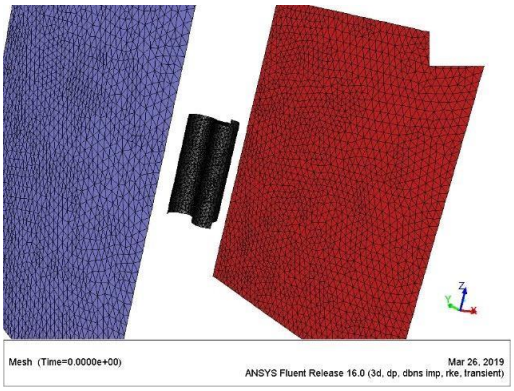

Figure 4: Blade Turbine in a Fluid domain

Case 1 *:* <u>Blade Turbine- 0 Degree Angle</u>

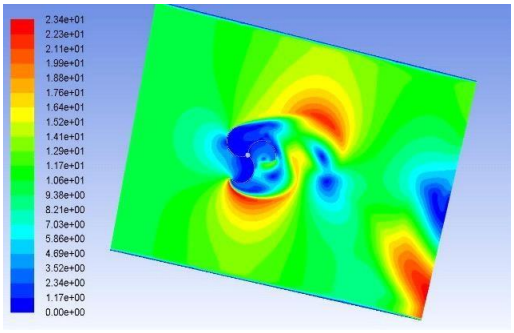

Figure 5: 3 Blade Turb.–Initial Position-Velocity Magnitude

The stream display that was utilized for this case was transition SST model. The input velocity was consistently conveyed over the inlet opening at 10m/s.

The speed size is processed on most of the node point that exist inside the default inside of the area. It very well may be seen that the most extreme velocity on the turbine is 23.45m/s which is created over the turbine. Further, we can see that the greatest speed happens at the tip of sharp edge 3 which keeps on framing a high-speed locale on the base side of cutting edge 3.

The wind gets redirected by cutting edge 1 towards positive Y-axis (upwards) making a high-speed region over the turbine. Awake region is likewise created on the right side of the turbine.

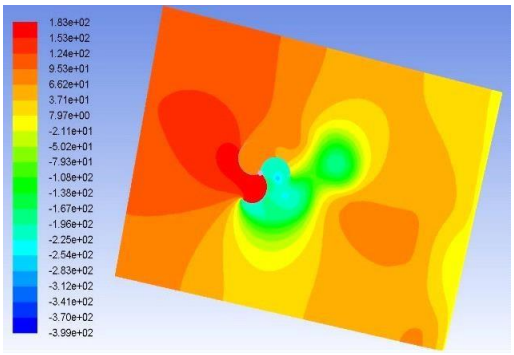

Figure 6: 3 Blade Turb.-0 Degree Orientation- Static Pressure distribution

The fig 6 presents variety of static pressure. The outcomes demonstrate that there is negative pressure created on the downstream side (output) of the turbine and positive pressure on the upstream side (inlet) of the turbine. The most extreme negative pressure is grown just to the correct side of the turbine with an estimation of - 254e+02 Pascal. This is the zone which faces most extreme turbine and has made a wake region on the downstream. The most extreme positive pressure is created in the zone between sharp edge 1 and edge 2 whose esteem is 182.58 Pascal, which is a lot more noteworthy than the pressure created on the downstream side.

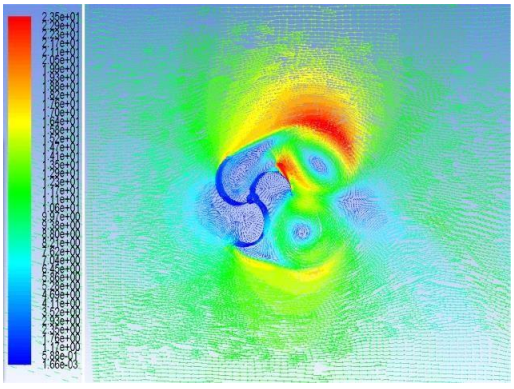

Figure 7: 3 Blade Turb.0 Degree Orientation – Velocity Vector Display

The figure 7 showcases the stream of air over the turbine in speed vector structure. The speed vectors are rendered with broad detail. The figure shows that a turnaround stream is created in the middle of the territory of sharp edge 2 and cutting edge 3. The invert stream is additionally created on the downstream side of turbine.

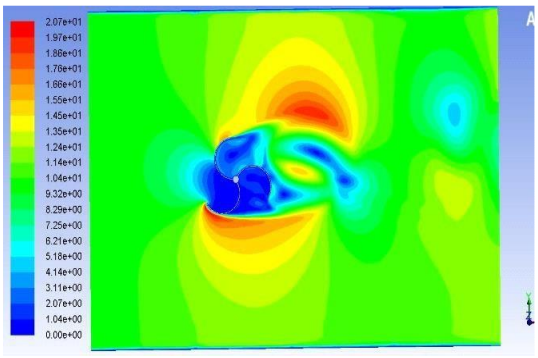

Figure 8: 3 Blade Turb. 30 Degree Orientation

The fig 8 demonstrates that at 30-degree introduction of edges, a high-speed territory was made close to the tips of edge 1 and cutting edge 3. If we investigate the speed at the tip of the sharp edge 1 and 3, we can say that the speed is generally around 15.5 m/s, which is not exactly the most extreme speed. The region close to the cutting edges has speed going from zero to a most extreme estimation of 5.18 m/s. This decrease in speed can likewise be seen on the downstream side (output) of the turbine. The air gets avoided upwards when it interacts with cutting edge 1 and along these lines most of the wind gets occupied upwards, making a high-speed district over the turbine.

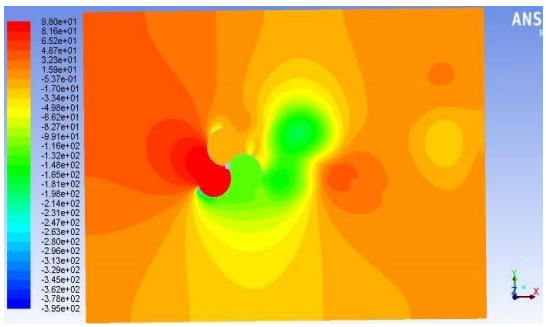

Figure 9: 3 Blade Turb. 30 Degree orientation –Static Pressure

As observed from the figure 9 the greatest static pressure of significant worth 98 Pascal is forced in the region between sharp edge 1 and edge 3. The suction side of sharp edge 3 faces negative pressure generally of esteem - 2.47e-02 Pascal. Subsequently we can say that cutting edge 3 is confronting high stresses because of high positive pressure on the pressure side of sharp edge 3 and high negative pressure on the suction side of edge 3. The static pressure likewise drops to a negative an incentive in the wake area made just to the correct side of the turbine. See that the estimation of negative pressure created in the territory between edge 2 and edge 3 is more in CASE I when

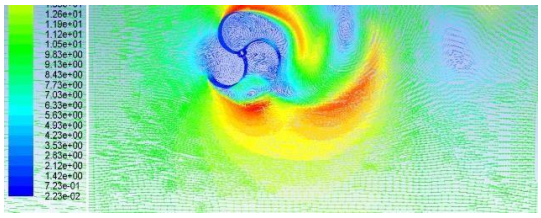

Figure 10: 3Blade Turb. 30 Degree orientation- Velocity Vector Display.

Fig 10 represents to the stream of wind over the turbine cutting edge in the space. It very well may be clearly observed that a turnaround stream happens in the territory close to the turbine cutting edges and furthermore in the wake region. This is appeared filled-arrows which shows the bearing in which the wind streams. It very well may be seen that the air originates from beneath edge 3 and gets occupied upwards cutting the wake locale.

Case 3 : **Blade Turbine- 60 Degree Angle**

An input velocity of 10mps was uniformly distributed over the inlet face. The data was monitored after every 50 time steps.

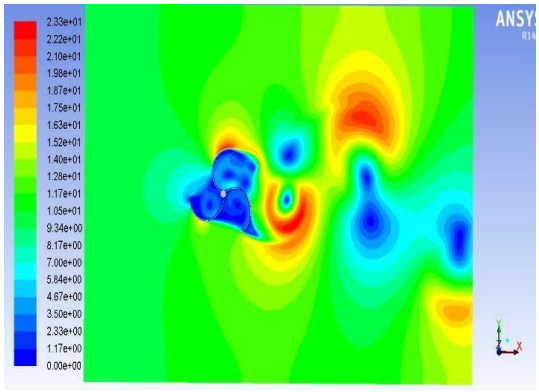

Figure 11: – 3 Blade Turb. 60 Degree orientation- Velocity Contours

Figure 11 presentations the velocity circulation. The estimation of most extreme velocity is 23.35mps which happens in the nearby region of cutting edge 1. As the turbine is pivoted by 60 degrees from its unique position, the structure of the wind stream over the turbine has additionally changed. A high-speed zone is created on the suction side of cutting edge 1. The high-speed territory which was created above edge 1 in CASE II, has moved downstream (output). Additionally, it tends to be seen that speed drops to very nearly zero in certain regions to the correct side of the turbine. This demonstrates nearness of wake locale which is encompassed by high-speed belt

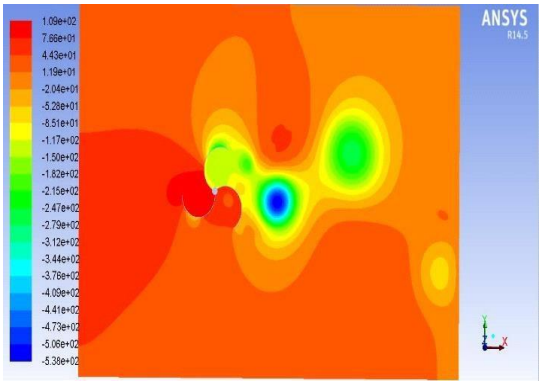

Figure 12: 3 Blade Turb. 60 Degree orientation

As can be seen from the figure 12, the most extreme positive pressure (108.97 Pascal) lies in the territory between sharp edge 1 and cutting edge 3. The estimation of most extreme negative pressure is - 538.00 Pascal which happens in the wake locale, made to the correct side of the turbine. The downstream side (Output side) faces negative pressure while the upstream side (Input side) faces positive pressure. Cutting edge 1 grew more power on its pressure side and suction side since each side is confronting negative pressure and positive pressure individually. See that the estimation of negative pressure is considerably more than those in the past CASE I and CASE II. The wake locale is moved from over the turbine to right half of the turbine where estimation of pressure is - 538 Pascal.

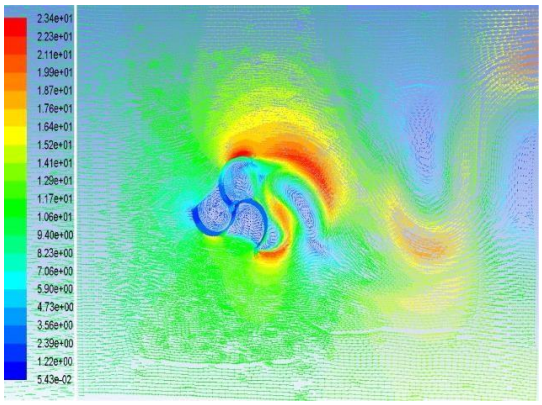

Figure 13: 3 Blade Turb- 60 Degree Orientation- Velocity [Air Flow over turbine]

The figure 13 shows the velocity vectors and the course in which the stream happens. The turnaround stream happens in the pressure side of all the three sharp edges. The wind stream additionally gets redirected in a turnaround bearing in the wake locale making a negative pressure region.

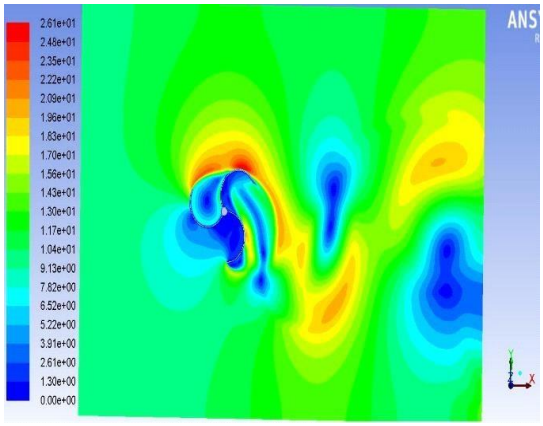

Figure 14: – 3 Blade Turb. 90 Degree Orientation– Velocity Magnitude

Figure 5.15 demonstrates the velocity dispersion of the three-edge turbine. The legend in red shows the most extreme speed which has the estimation of around 26.07m/s. This speed shows up on the ebb and flow of cutting edge 1 and furthermore at the tip of sharp edge 3. The high-velocity zone stretches out from over the turbine to the right side of turbine covering more zone on the base side and top side close to the yield face (downstream of the turbine). This demonstrates a district of high disturbance, therefore meaning wake area. Note that the all-inclusive zone of high speed does exclude the most extreme speed which is 26.07 M/s, however it scopes to generally around 22.2m/s. The speed drops to right around zero in a portion of the parts in the downstream side.

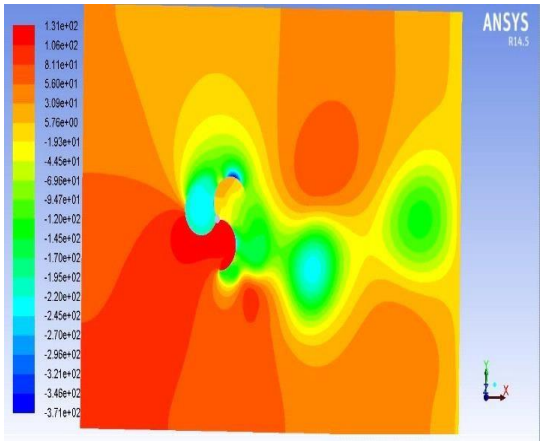

Figure 15: 3 Blade Turb. 90 Degree Orientation– Static Pressure

Figure 15 stipulates the dissemination of static pressure. The legend in blue demonstrates most extreme negative pressure having an valve generally around - 3.71e+02 Pascal. This pressure curvature of edge 1, close to the tip of the cutting edge. The region between the cutting edge 1 and sharp edge 3 additionally faces negative pressure having values

generally around - 2.20e+02 Pascal. The estimation of most extreme positive pressure is 131.30 Pascal and can be seen in the territory between sharp edge 2 and cutting edge 3. Because of the high turbulence the pressure drops in couple of territories on the downstream side, close to the yield face. The wake area has pressure drop appeared by the legend in light blue (water) shading on the suction side of sharp edge 2.

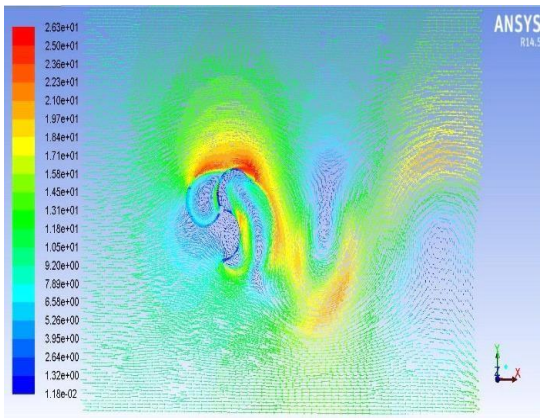

Figure 16: 3 Blade Turb.- 90 Degree Orientation- Velocity Vector [Air Flow over turbine]

Figure 16 showcases the stream of air over the turbine in speed vector structure. The speed vectors are rendered with broad detail, which gives the clear representation of direction of wind. This is critical for complex models of invert stream and vortices are clearly represented. It very well may be seen that the wind currents from over the turbine and advances downwards and again rotates toward the sky. Turn around stream can likewise be seen in the wake region.

6. RESULTS

Sr. no.	Parameter	Static Pressure	Maximum valve
1	0-degree	1.83e+02	3.58e+08
2	30-degree	9.80e+01	3.58e+08
3	60-degree	1.09e+02	3.58e+08
4	90-degree	1.31e+02	3.58e+08

The CFD investigation demonstrates that a wide range of pressure determined are not exactly the material most extreme valve and, in this way, Savonius turbines made of mild steel can be utilized as they give strength just as great electrical yield. The part of strength is tested in this paper and the outcomes are acceptable.

7. CONCLUSION

Number of blades will impact the revolution of the rotor of wind turbine models. The three blades wind turbine produces higher rotational speed and tip speed proportion.

Various designs were adjusted for improving the execution of the Savonius wind turbine. Every design of the Savonius rotor gives great performance characteristics. In past examinations demonstrate that the execution of Savonius wind turbine was influenced by certain parameters like aspect ratio, number of cutting edges, rotor shapes, Reynolds number, disturbance power, blade angle's shaft interface, the course of wind stream. For predicting performance accuracy experimental and CFD simulation technique was utilized. Experimental method is costly and time consuming and other hand Cfd simulation method technique is less expensive and tedious.

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Enhancing the Compressive Streength of Concrete Lost due to Hatching

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ABSTRACT Concrete is given shape by formwork. The quality of cement relies upon kind of formwork. Therefore, formwork plays an essential job in development rehearses. Once formwork is expelled, one gets a smooth surface where upon it is required to get prevalent of concrete. Exactly when concrete is set in molds it helps in and catching air from inside. The caught air diminishes quality and cripples the bond among concrete and steel. In like manner the strong must be genuinely compacted. After evacuation of formwork, concrete individuals are roughened for the simplicity in putting. A smooth surface can't hold the solid paste decidedly. To construct the joining between the smooth surfers and bond strong paste, the surface must have a couple of impressions. In case the impressions are made by beating on the smooth surface, the quality may get impacted. Thus, it is cautioning to use roused formwork. The process is bring forth where solid individuals are hit hard with an uncommon equipment. Hatching helps in simple putting however influences the quality of member. Hence an option for the equivalent is utilizing extraordinary sort of formwork that is embossed plates. These plates build the solidness of the formwork and there was an average increase of strength of 15.96%, 10.44% and 6.73% for M20, M25 and M30 respectively. Thus, it is a best option for bring forth.

INDEX TERMS hatching, embossed plates, plastering, compressinve strength

1. INTRODUCTION

Concrete is a standout amongst the most promptly utilized materials in the development time. The development includes utilization of substantial mass of indistinct cement. So as to give shape and geometrical measurements to the ill-defined crisp solid, self-supporting structures are utilized. These are known as formwork. The formwork takes the heaviness of the wet concrete just as other development loads. Cost is primary angle similarly as formwork is concerned. For enormous tasks formwork should be utilized more than once. In such cases steel formwork is practical. The expense of formwork ranges 20 % of the absolute development cost and thus it must be planned without bargaining quality and productivity.

Formwork is a brief structure which underpins crisp cement till it ends up sufficiently able to continue its very own weight. After setting of cement, the formwork is expelled and a strong structure of required shape and size is created. This is the very imperative component in the development of structure. For some a long time, in the field of development, utilization of ordinary for example wooden formwork was a customary practice. Presently the situation of development field is entirely different, yet the examination is required in request to pick the appropriate formwork with various points of view. Cost and time are the fundamental parameters yet alongside that we ought to likewise concentrate on quality, wellbeing and development squander age amid the procedure.

Presently days, low waste formwork frameworks for development are being utilized. The vast estimated sections in structures are currently being supplanted by little thickness shear/RCC Walls. So, it gives a vast rug region and expulsion of balances in the structure. Also, the nature of development is getting updated. Right now, numerous formwork arrangements are accessible in the market, however the examination must be done so as to pick the best formwork for a specific kind of building. Concrete, the blend of totals with water and bond, is taking off. Its best industrially followed and recorded part, Portland concrete or its variations, has been encountering a phenomenal improvement since the turn of the thousand years, coordinated just amid a couple a long time. Very nearly twenty years after this bounce back, no conspicuous indication of backing off is noticeable, as this paper is composed.

Disliked by the lion's share but then universal, concrete is one of the mainstays of our created social orders, on equivalent foot with silicon, oil and gas, each in its own field: foundations, skyscraper, and expansive private structures for solid; data and correspondence advancements for silicon; and, up until this point, transportation for oil and gas. Increasingly concrete is created than some other engineered material on earth. Twice to such an extent cement and mortar is utilized in development – approximately 35 billion tons as the aggregate of all other mechanical structure materials including wood, steel, plastic and aluminium. Streets, spans, burrows, dams, control plants, ports, airplane terminals, embankments and seawalls, squander and new water plants and systems, every one of these frameworks depend on the broad utilization of concrete, much the same as the establishments of our structures, if not the whole structures themselves. There is a wide agreement that the extraordinary late development of bond and solid utilization on the worldwide scale is expected to a bunch of

performing artists just among the rising nations, China specifically. Be that as it may, there are additionally valid justifications to think about that the reason for this enduring development dwells in the present combining needs in created and creating nations. Alongside a colossal reasonable lodging challenge, the world is by and by likewise confronting a phenomenal foundation challenge.

The quality of concrete relies on the time of formwork expulsion. The solid ought to be disregarded for somewhere around two days to guarantee that it gets totally dry. In the event that the formwork is expelled before 2 days the solid starts to droop, split and breakdown. So as to get simplicity of plastering, solid sections are hatched. The hatching of section expands the simplicity of plastering, anyway it influences the quality. The quality is decreased by 20% .This affects the life of the structure. So as to keep this, one can supplant bring forth physically by utilizing formwork having impacts on its own(Embossed plates) .Using such sort of formwork expands quality, increases strength as well as is practical. On the off chance that formwork with impressions is utilized, there will be significant increment in the attributes of the concrete member. Also, the quality won't be influenced any longer. Additionally if steel plates are put over timber formwork the sturdiness of this formworks will likewise be expanded.

2. OBJECTIVES:

- To study the loss of strength of concrete due to hatching.
- To find optimum measures to increase the strength and an alternative for hatching (embossed plate.
- To compare the variation in strength of hatched and embossed mould.

3. RESULTS

BATCH	HATCHED BLOCKS STRENGTH (N/mm^2)	PLAIN BLOCKS STRENGTH (N/mm^2)
BATCH-1	13.64	16.22
BATCH-2	9.24	10.97
AVERAGE-	11.44	13.59

TableNo. 1 (Results of Preliminary Tests)

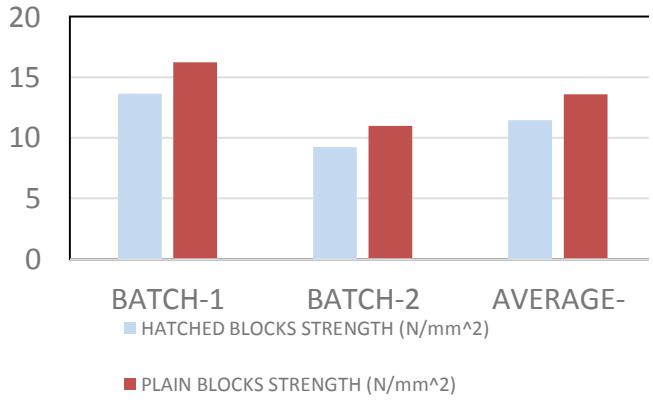


Fig No.1 (Graph of Preliminary Tests)

BATCH	DESIRED DAY STRENGTH	STRENGTH OF HATCHED BLOCKS (N/mm^2)	STRENGTH OF EMBOSSED PLATE BLOCKS (N/mm^2)	% STRENGTH GAIN
BATCH-1	3-DAYS	6.71	8.18	17.97
	7-DAYS	12.3	13.9	11.51
	28-DAYS	18.4	20.97	12.25
BATCH-2	3-DAYS	7.15	8.75	18.28
	7-DAYS	11.3	13.6	16.91
	28-DAYS	17.2	19.8	13.13
BATCH-3	3-DAYS	6.93	8.18	15.28
	7-DAYS	9.44	11.36	16.90
	28-DAYS	17.68	22.82	22.52

TABLE NO. 2 (Compressive Test Results of M20 grade)

Fig No. (Graph of M20 Results)

BATCH	DESIRED DAY STRENGTH	STRENGTH OF HATCHED BLOCKS (N/mm^2)	STRENGTH OF EMBOSSED PLATE BLOCKS (N/mm^2)	% STRENGTH GAIN
BATCH-1	3-DAYS	13.78	13.94	1.16
	7-DAYS	15.6	16.6	6.02
	28-DAYS	23.42	25.16	6.91
BATCH-2	3-DAYS	13.6	13.79	1.37
	7-DAYS	15.2	16.9	10.05
	28-DAYS	21.6	25.63	15.72
BATCH-3	3-DAYS	12.84	13.98	8.15
	7-DAYS	14.16	15.32	7.57
	28-DAYS	23.06	25.26	8.70

TABLE NO. 3 (Compressive Strength Test Results of M25)

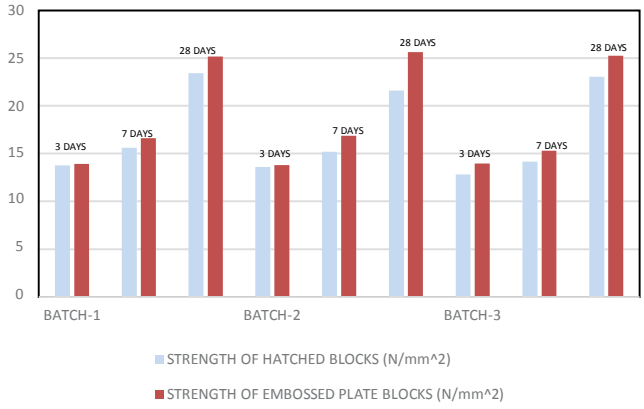
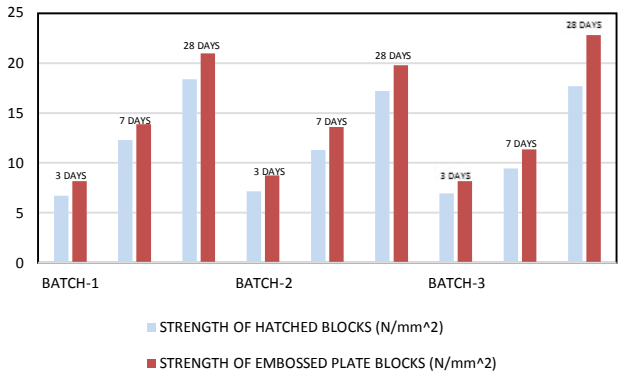


Fig No. 3 (Graph of M25 Results)

BATCH	DESIRED DAY STRENGTH	STRENGTH OF HATCHED BLOCKS (N/mm^2)	STRENGTH OF EMBOSSED PLATE BLOCKS (N/mm^2)	% STRENGTH GAIN
BATCH-1	3-DAYS	7.55	9.08	16.85
	7-DAYS	17.82	19.50	6.61
	28-DAYS	29.02	30.78	5.71
BATCH-2	3-DAYS	8.13	10.08	19.44
	7-DAYS	18.31	20.11	8.95
	28-DAYS	31.02	33.57	7



BATCH-3	3-DAYS	8.53	9.56	10.77
	7-DAYS	17.68	19.31	8.44
	28-DAYS	30.35	32.82	7.49

TABLE No. 4 (Compressive Strength Test Results of M30)

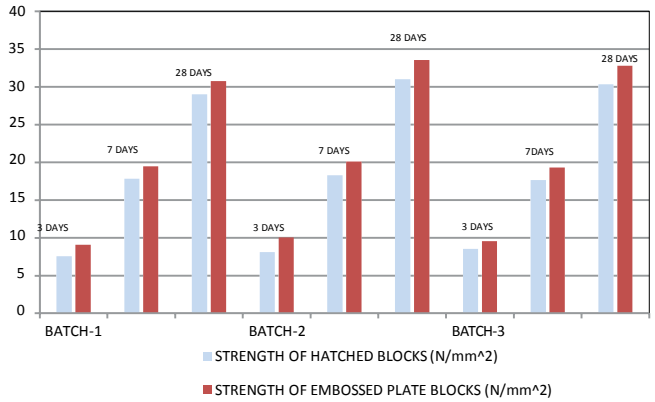


Fig No. 4 (Graph of M30 Results)

Fig No. 7 (Embossed Plates Mould & Casted Blocks)

Fig No. 8 (Embossed plates columns casted for plastering purpose)

Fig No. 9 (Even surface obtained after plastering the columns casted using embossed plate formwork)

4. CONCLUSION

1. With the help of embossed plate, we obtained an adequate rough surface for plastering and hence hatching was eliminated.
2. As hatching is eliminated the loss of strength due to hatching is also eliminated and we obtain the desired strength in the concrete.
3. The metallic embossed plates serve as a impermeable membrane which doesn't allow the water to get in contact with the wooden formwork, which results in increased life of the formwork.
4. There is an increase in cost of the formwork after using the embossed plates but using them also results in a considerable increase in the life of formwork. This finally results in cost reduction.

ACKNOWLEDGMENT

We express our deep gratitude to **Prof. Dr.H.U.Tiwari** principal of **PCET's, Pimpri-Chinchwad College of Engineering & Research** for their encouragement and co-operation throughout this project. We express our deep gratitude to **Dr. Sameer Sawarkar** & Project coordinator **Prof. Nidhi Khare** for her support and encouragement.

In particular we are indebted to **Prof. Nidhi Khare & Prof. A.B.Kudoli,** our guides who had a faith in this project, believed in our ability, whispered the words of encouragement and made helpful suggestion from time to time.

We are most grateful to **Siddhivinayak RMC,** Kiwale, for offering us their space, equipments and materials. This helped us in easy completion of our project work.

We will be failing in our duty if we do not acknowledge to our parents, without their help and moral support this would not have been possible to complete this report.

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TIME OPTIMISATION IN TRADITIONAL SURVEYING METHODS

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ABSTRACT Number of operations in Surveying requires different instruments. While plotting a traverse, ranging rods requires for ranging, tape is used for linear measurements and theodolite is used for angular measurements. To avoid carriage of different instruments on site, we have manufactured a new instrument which has united all these operations by single set up. This instrument set up is able to perform different functions i.e. ranging, leveling, traverse plotting simultaneously.

This invention consist of a two ranging rod connected to each other at the bottom portion with the help of metallic tape. Above that 360 degree protractor and vernier scale is provided to measure the horizontal angle between any two points to an accuracy of 20 seconds. It can also used to measure the linear distance between two stations. It is also helpful in measuring bearings of the survey line with the help of compass atteached to it. With the help of telescope and vertical protractor, vertical angles and level difference can be easily worked out.

INDEX TERMS Traverse Plotting, Ranging, Theodolite, Reconnaissance, Preliminary.

1. INTRODUCTION

Surveying has been an element in the development of human environment since the beginning of recorded history. Planning and execution of most forms of construction requires it. It is also used in transport, communication, mapping, and other definitions of legal boundaries for land ownership. It is an important tool for research in many other scientific discipline. Various surveying devices are used to carry out the survey of large stretch of land. Commonly used instruments are total station, theodolite, auto level, dumpy level, prismatic compass, measuring tape etc. Most precise and mosly used instrument is total station but it is very costly as compared to other instruments hence it limits its use in extensive projects only. For small projects theodolite is mostly preferred. Theodolite is used to measure horizontal as well as vertical angles. Auto levels and dumpy levels are used to measure the elevation of the different levels of the ground. Prismatic compass is used to measure bearings of the angles. Measuring tape is used to measure distance between two points.

These are some commonly used conventional instruments in surveying. As this instruments are very costly they involve very high investment and each instrument is used for certain special measurements. Theodolite is used for measurement of horizontal as well as vertical angles. Measurement tape is used for measurement of distance between two points. So we have combine characteristics of these instruments to construct a new instrument which will measure horizontal, vertical angles, level difference, bearings of line, plotting of offsets as well as horizontal distances on ground simultaneously which improves the speed of the surveying and the instrument is economical as compared to other conventional instruments.

2. OBJECTIVES OF THEPROJECT

1. Time and cost optimization in traditional surveying methods.
2. To introduce ease in handling of surveying instruments.
3. To perform various surveying operations at the same time to promote faster surveying.
4. To reduce the accessories carried on to the site for surveying.
5. To unite all surveying operations to form single instrument set up.

3. SCOPE OF THEPROJECT

1. This instrument can be used for reconnaissance survey work with better accuracy for measuring the area of the plot, measurement of angles, level differences, bearing of traverse.
2. This instrument will increase the speed of the surveying work.
3. As it is too much user friendly, non-technical person can work out areas of plots, level

differences with the help of this instrument.

4. METHODOLOGY

For surveying small areas surveying instruments like theodolite, measuring tape, prismatic compass etc. are used. But these instruments are very costly and need skilled personnel to operate it. So there is a need of such instrument which will perform all the necessary functions with a single instrument setup with a reduced cost.

We have combined all these functions which can be performed from single set up. We required to carry number of accessories to the site for the preliminary survey work. There is a need of such instrument which will carry out number of operations with the help of single instrument which will reduce the time required for preliminary surveying work and also the accessories required for it.

We have incorporated the main scale and the vernier scale to measure the horizontal angle up to accuracy of 20 seconds and we have connect the two ranging rods with the help of tape to measure the horizontal distances when two rods are kept apart from one another.

5. LIMITATIONS OF INSTRUMENTS

1. As the linear distance measurement is dependent on the tape, tape length influences the length of distance measurement. We can fluctuate the range of the instrument by changing the length of the tape.
2. Linear distance measurement cannot be accurate due to sagging of the measurement tape. We can avoid this difficulty by replacing tape with electronic distance meter and making it digital.

6. COMPONENTS OF INSTRUMENT

Our instrument comprises of following components:

1. Ranging rod
2. Vernier scale
3. Telescope
4. Measuring tape
5. Base stand
6. Vertical scale
7. Level Tube
8. Compass

7. PROCEDURE OF MEASURING HORIZONTAL ANGLE

There are two ranging rods connected to each other by means of measuring tape. By placing one ranging rod at station A second rod is moved to the station B. While moving second rad vernier scale moves over main scale and pointer points the angle on the main scale. In this way angle between two points can be measured.

8. PROCEDURE OF MEASURING VERTICAL ANGLE

Vertical circle is provided at the side of the telescope for measurement of vertical angle. Pointer is attached to denote the angle. As we rotate the telescope the needle rotates around the semicircular protractor to measure the vertical angle between two points. By knowing vertical angle between two points by using trigonometric calculations we can find out the level difference between two points.

9. ADVANTAGES OF INSTRUMENT

1. Cost of Instrument: This instrument is very much less costlier than theodolite. Theodolite costs about 30,000-40,000. This instrument costs near about 10,000.
2. Functions: Theodolite can measure only horizontal and vertical angles. This instrument can measure horizontal angle, vertical angle, linear distances, as well as bearings of the angles too.
3. Carriage of Instrument: Theodolite is tedious to carry to the required location. This instrument facilitates easier transportation.
4. Measurement of irregular area: To calculate the area of the irregular area lengths of sides as well as angles should be known. By using theodolite we can measure angles only but this instrument measures lengths as well.
5. Operation: Operation of theodolite is quite difficult whereas operation of this instrument is little bit easier.

10. FIELDS OPERATIONS

1. Area: It can be used to calculate the area of the irregular shape land by measuring the lengths of the sides and angles between the sides.
2. Difference in elevation: By calculating vertical angle between two points by using trigonometric calculations we can find out the level difference.
3. Traverse plotting: It can be used to plot the traverse on the open land by taking required angles.
4. Ranging: With the help of two ranging rods we can perform the function of ranging.
5. Measurement of Linear Distances: Two rods are connected by using tape therefore distance between two points can be directly measure using measuring tape.
6. Bearing: We can measure the bearings of the survey lines using this instrument.

11. CASE STUDY

We have carried out the measurement of area of irregular area with the help of theodolite and our instrument for the purpose of validation. We consider a particular area under consideration for the measurement of area. We measure the sides of the quadrilateral with the help of measuring tape and measured the angles with the help of theodolite. Then we measure the sides and angles of the quadrilateral with our instrument and validate the result as follows:

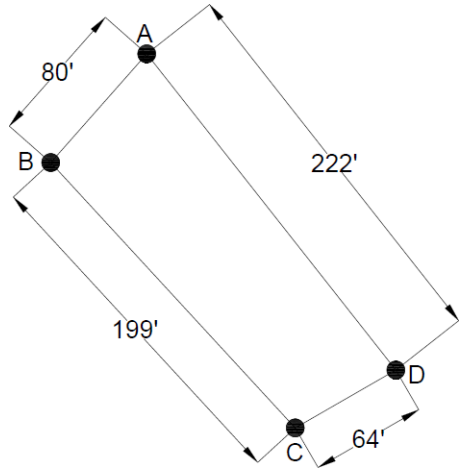

Fig No. 1

We have consider above irregular area for the measurement of area. We measure above area with the help of theodolite and with our instrument. We got the following results:

Area measured using Theodolite	14876 sq.feet
Area measured by our instrument	14875.09 sq feet

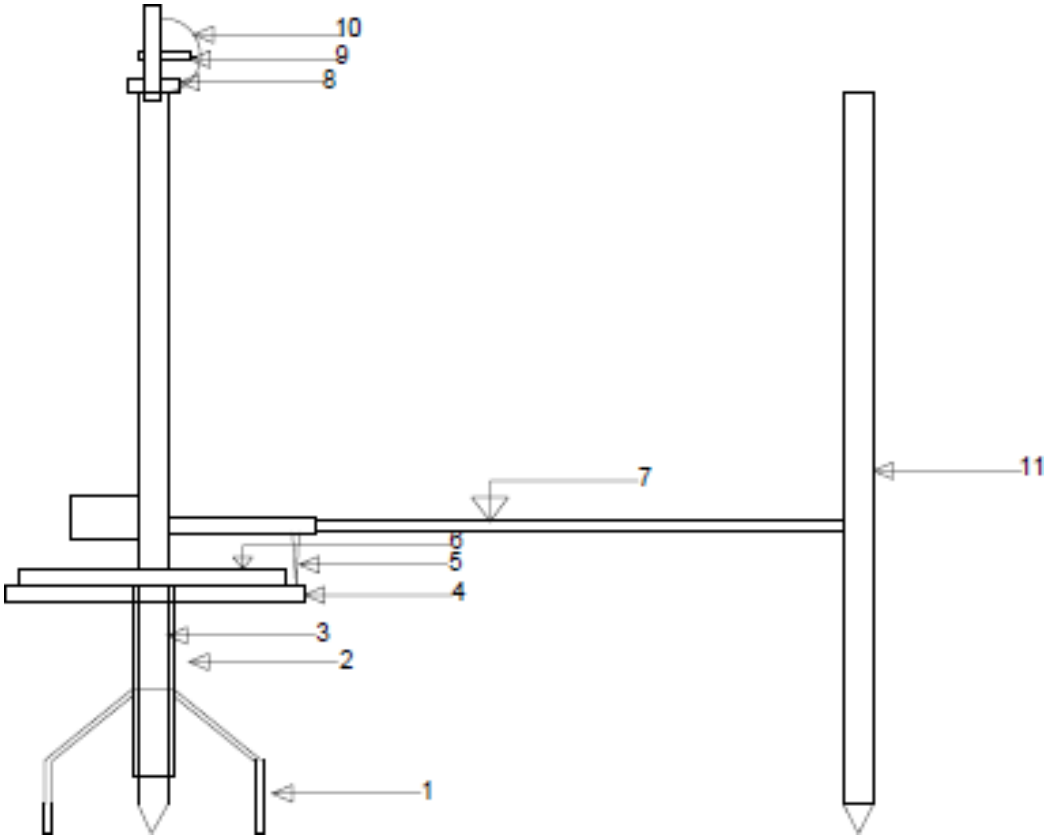

Fig No. 3 Schematic representation of Instrument

Application ID: 201821027109
Patent Docket No. 31872

1. Base Stand
2. Base Stand Rod
3. Rotating Rod A
4. Main Scale
5. Needle
6. Vernier Scale
7. Measuring Tape
8. Compass
9. Vertical Circle Needle
10. Vertical Circle
11. Rotating Rod 11

Fig No:4
Protractor with Telescope

Fig No: 5
Base Stand

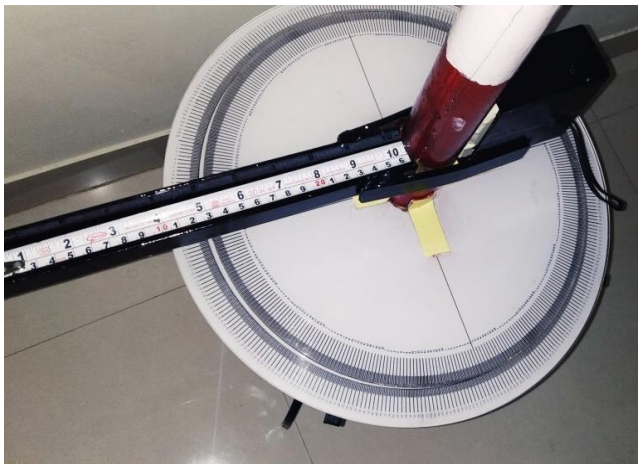

Fig no: 6
Measuring Scales

Fig No: 7
Measuring Scales

CONCLUSIONS:

Traditional equipments like chain, tape, cross staff, prismatic compass, ranging rod are used for reconnaissance survey. These instruments are able to perform single surveying operations which obviously consumes ample of time and manpower. By uniting all these functions and replacing them by single setup leads to finish all surveying operations within a very short time and limited manpower.

We can easily perform functions such as plotting of traverse, measurement of horizontal angle, measurement of vertical angle, determination of level difference between two points, bearings of survey lines, measurement of area using horizontal angle and linear distances, plotting of curves simultaneously. As all parts of this instrument is detachable, this instrument is much handy and convenient to carry out preliminary surveying work.

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Study and Analysis of Bicycle Track (From Nigdi to Mukai chowk) (May 2019).

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Abstract-This report aims to determine the potential of bicycle as a sustainable mode of transport from Nigdi to Mukai Chowk via Aundh-Ravet BRT road. The study examines the perception and preferences of commuters towards the use of bicycle as a mode of transport for commuting various distances. It includes various socio-economic and spatial differences. This study is carried out to identify how commuters perceive and value the proposed change in the bicycle infrastructure and its attributes in view of providing affordable,quality and accessible service. A questionnaire-based survey was administered to a selected sample size using a stated preference and a revealed preference approach to understand how the bicycle (potential/regular) users perceive and prefer the bicycle attributes.

The commuters preferences are analyzed and discussed with respect to the different land use attributes and with their socio-economic characterictics. A choice model can be employed to estimate the bicycle attribute parameters .

A general method has been adopted to design a sustainable cycle track. First, potential bicycle users in city are characterized and identified through a household survey and street survey. This data is to be used to design a cycle track by considering the factors which people usually face while cycling. The results indicates that most important criteria taken into consideration are : (a) safety (b)comfort (c)convenience. The main finding of this report was that at present only 9% of people in city use bicycle and there are many places where the need for cycle track design is must and this may also help in reducing pollution and traffic congestion.

I. INTRODUCTION

A study in 2008 by Wilbur Smith and Associates commissioned by the Ministry of Urban Development indicated clearly that the modal share of non-motorized transport (bicycles) is rapidly declining, especially in small and medium towns. The National Urban Transport Policy published by the Ministry has given special importance to non-motorized transport modes as these are not only non-polluting but also serve the needs of the urban poor people. Recognizing that these modes are neglected and have become less safe the Urban Transport Policy calls for equitable allocation of road space by reserving lanes and corridors exclusively for public transport and non-motorized modes of travel. With the launch of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), the Ministry while sanctioning funds to cities to build Bus Rapid Transit (BRT) systems, also made the construction of dedicated cycle tracks along the bus corridors mandatory. As a result, Pune, which under the JNNURM has been sanctioned 1051 crores to build 115.67 km of BRT, has also built cycle tracks along most of these corridors. However it quickly turned out that poorly designed, poorly constructed and poorly maintained cycle tracks were all but unusable by cyclists, which either fell into disuse or were encroached. This in turn made it even less likely to be used by cyclists. City councilors (corporators) were quick to realize that cycle tracks are not being used, but instead of trying to ascertain the reasons for this, assumed that this was due to the fact that cyclists either do not exist or do not care for having segregated cycle tracks and asked for their removal, in order to provide more space for vehicular traffic. As public officials become more aware of the connection between physical activity levels, environmental degradation, and the design of the transportation system infrastructure, many municipalities are increasing their efforts to develop a network of bicycle facilities. In the United States, this often means retrofitting existing roadways. Bicycle plans are developed that prioritize projects aimed at improving bicycling conditions (e.g., installing bicycle lanes), but little guidance is available about how to conduct such a prioritization.

The work presented here proposes a systems level approach to infrastructure project selection that has the potential to save costs over other, simpler approaches.

In urban areas, there is a positive correlation between accessibility and income security. Accessibility not only determines the place of work and time taken to reach the place but also, in many cases, the type and availability of work. With fast urbanization in low income countries in general and India in particular, the demand for a whole new set of services is increasing. These service providers either belong to organized or unorganized sectors. These people either walk or use bicycles for the short distance travelling. Bicycle travelling generally involves short or medium distances travelling (5-10kms). These distances involve going to school or colleges, running errands and delivering goods or services. However bicyclists presence is however ignored by society and policy makers and planners it became very necessary to take action against this issue.

So special cycle tracks are to be provided in large cities for reducing the accidents and controlling the haphazard traffic flow.

II. LITERATURE REVIEW

2.1 Bicycle tracks and lanes (November 7, 2007) – (Soren Underlien a Member of TRB committee on Bicycle Transportation)

This paper presents a before and after crash, injury and traffic study of constructing bicycle tracks and marking bicycle lanes in Copenhagen, Denmark. Correction factor for changes in traffic volume and crash/injury trends are included using a general comparison group in this non-experimental observational study. Analysis of long term crash trend points towards no significant abnormal crash counts in the before period.

The safety effects of bicycle tracks in urban areas are an increase of about 10% in both crashes and injuries. The safety effects of bicycle lanes in urban areas are an increase of 5% in crashes and 15% in injuries. Bicyclists safety worsened on road, where bicycle facilities have been implemented. Design of bicycle facilities and parking condition for motor vehicle clearly seems to have safety implications, especially at intersections. Study has revealed a few points in relation to this. Construction of bicycle tracks resulted in a 20% increase in bicycle/moped vehicle traffic mileage and a decrease of 10% in motor vehicle traffic mileage, whereas marking of bicycle lanes resulted in 5% increase in bicycle/moped traffic mileage and decrease of 1% in motor vehicle mileage. The changes in traffic do result in health benefits due to more physical activity, less air pollution and less traffic noise.

2.2 Risk of injury for bicycling on cycle tracks versus in the street (February 9, 2011) - (Anne C Lusk, Peter G Furth, Patrick Morency, Luis F Miranda-Moreno, Walter C Willett, Jack T Dennerlein)

Most individuals prefer bicycling separated from motor traffic. However, cycle tracks (physically separated bicycle-exclusive paths along roads, as found in The Netherlands) are discouraged in the USA by engineering guidance that suggests that facilities such as cycle tracks are more dangerous than the street. The objective of this study conducted in Montreal (with a longstanding network of cycle tracks) was to compare bicyclist injury rates on cycle tracks versus in the street. For six cycle tracks and comparable reference streets, vehicle/bicycle crashes and health record injury counts were obtained and use counts conducted. The relative risk (RR) of injury on cycle tracks, compared with reference streets, was determined. Overall, 2.5 times as many cyclists rode on cycle tracks compared with reference streets and there were 8.5 injuries and 10.5 crashes per million bicycle kilometers. The RR of injury on cycle tracks was 0.72 (95% CI 0.60 to 0.85) compared with bicycling in reference streets. These data suggest that the injury risk of bicycling on cycle tracks is less than bicycling in streets. The construction of cycle tracks should not be discouraged. Bicycling could address obesity, cancer, stroke, diabetes, asthma, mortality and pollution; however, the bicycling environment is a limiting factor. The predominant bicycle facilities in The Netherlands and Denmark are cycle tracks, or bicycle paths along streets that are physically separated from motor traffic, bicycle-exclusive and with a parallel sidewalk. Due to the separation from vehicles afforded by 29000 km of cycle tracks in The Netherlands plus other initiatives, 27% of Dutch trips are by bicycle, 55% are women, and the bicyclist injury rate is 0.14 injured/million km. In the USA, 0.5% of commuters bicycle to work, only 24% of adult cyclists are women, and the injury rate of bicyclists is at least 26 times greater than in The Netherlands. The chief obstacle to bicycling, especially for women, children and seniors is perceived danger of vehicular traffic. The construction of cycle tracks should not be discouraged.

2.3 Modeling the Effects of Pro Bicycle Infrastructure and Policies Towards Sustainable Urban Mobility (ASCE October 1, 2013) – (Luigi dell Olio; Angel Ibeas (et.al)**)**

This paper aims to determine the potential of bicycle as sustainable mode of transport in medium size Spanish city with strong inclines and relatively inclement weather. For this purpose, a general methodology has been designed that could serve as an example for other areas. First, potential bicycle users in city are characterized and identified through a household survey, which included a complete travel diary. Then they were asked to participate in a stated preference survey design to find out the relative importance of certain key variables, previously identify, associated with making bicycle journey.

2.4 Optimization Framework for Bicycle Network Design (ASCE April 25, 2014) - (Jennifer Duthie; Avinash Unnikrishnan**)**

This paper presents a new formulation for the network design problem as it relates to retrofitting existing roadway infrastructure for bicycles. The goal of the problem is, for a minimum cost, to connect all origin destination pairs with paths where each roadway segment and intersection meets or exceeds a lower bound on its bicycling level of service. The length of each optimal path is constrained to be no greater than a given upper bound, which is expressed as a function of shortest path length.

2.5 Measuring the impact of bike-to-work day events and identifying barriers to increased commuter cycling (ASCE paper January 13, 2015) - (Daniel Piatkowski; Rachael Bronson; et.al**)**

This paper aims to understand the following:

(1) Who attends BTWD (Bicycle to work Day); (2) The impacts of these event-based promotional strategies across different groups; (3) Lessons for increasing commuter cycling in general? Over 1,000surveys were collected in the Denver region. Using an ordered logit model, the authors then identify significant factors for grouping cyclists by behavior category. The results suggest that event attends vary widely, from those who only bicycle on BTWD to those who report year-round bicycling, while reasons for participation and impacts of participation vary across bicycling behavior groups. This research also identifies specific barriers to increased commuter cycling.

2.6 Cycle-Length Strategies for Diverging Diamond Interchange in a Coordinated Arterial (ASCE August 8, 2016) – (Christopher. M. Day (et.al))

Six different origin-destination (O-D) scenarios are tested in a micro simulation study. Results are presented in terms of the number of stops, movement delays at the DDI, queue lengths, and delay by O-D path. The outcomes show that the half-cycle strategy yielded lower total and average delays yet resulted in more stops along the arterial and higher arterial O-D path delays. The full-cycle option, meanwhile, tended to achieve fewer stops and lower delays for arterial routes but increased total and average delays for other movements. The three-phase strategy often reduced delays and queue lengths for the arterial movements exiting the DDI, but increased these for other movements.

2.7 Cycle Track Concepts for Burlington ON: Design Lessons- (Apeldoorn NL
Norma Moores, P. Eng. IBI Group)
A concept for a quality framework for the cycling network was developed. This concept focuses on improving cycling quality of two existing linear trails that traverse the City, creating a new crossing of the QEW freeway, introducing cycle tracks on a future rapid transit corridor along the northern boundary of the City, and filling in the framework with bike lanes and bicycle priority streets. One element that was discussed was the high level of government support to encourage and support cycling in Apeldoorn cycling is not just a cultural preference among the Dutch but government policy:
 Design comfortable infrastructure and visible space for cyclists on roadways
 Enact legislation that protects cyclists
 Support cycling education for all school children
 Host cycling events to promote the cycling culture
 Encourage large employers to provide end-of-trip facilities for cyclists
 Provide secure bicycle parking at destinations.

2.8 Promote cycling in urban areas by developing cycling infrastructure in cities, introducing cycle-sharing schemes, and promoting awareness campaigns-
(Akshima T Ghate, TERI, All India Cycle Manufacturers Association (AICMA))
Given the severe lack of cycling infrastructure in cities, the following suggested approach needs to be urgently adopted at the city level in order to ensure development of quality cycling infrastructure in cities:
Ensuring provision and maintenance of cycling infrastructure in cities

Make non-motorized transport (NMT) projects a mandatory requirement for central funding.

Cities should implement city-wide cycle-sharing schemes.

Government of India should initiate awareness campaigns for promoting cycling.

2.9 Cycle Tracks: A Technical Review of Safety, Design, and Research (Toole Design Group for the City of Cambridge & New York City Department of Transportation, and Alice Brown)
Accessible for All: Cycle Tracks Increase Ridership and are Preferred by More People. A review of research, preference surveys, and bicycle data around the world has shown a clear trend: cycle tracks increase overall ridership, and are preferred by more types of potential bicyclists. Below are some of the key findings:-
In Washington, DC, more bicyclists began riding on 15th Street after the one-way cycle track was installed. After the two-way cycle track was installed, there was a 205% increase in bicycle volumes.

A study of nine large North American cities show a clear trend in safety in numbers, and " as the levels of cycling increase, injury and fatality rates per trip and per km traveled fall dramatically. Thus, if we can increase cycling, it will almost inevitably be safer,

More and better bicycling facilities have dramatically increased bicycle share trips in cities without any tradition of cycling for daily travel.

The City of Vancouver, BC, conducted counts before and after the installation of a cycle track on Hornsby Street. Ridership increased from 10,000 bicyclists per month prior to construction to 55,000 bicyclists per month two years after construction.

III. METHODOLOGY

Survey of existing bicyclists and potential bicyclists had been conducted which have not influence on commuting bicycles
1. Deciding the sample size for the survey work-sample should be representative of the people who potentially affected by action.
2. Target groups-Decide the target groups using the secondary data.
3. Zoning is done based on socio-economic activities such as income.
4. It includes three types of different land use characters.

QUESTIONNARIE
FOR SURVEY
(A)SURVEYOR INFORMATION: 1. Name : 2. Sector/survey ward: (B) ORIGIN & DESTINATION SURVEY: 1. Distance between 2-5 km = YES NO 2. People travelling whole distance from origin to destination= YES NO (C) SOCIO-ECONOMIC DETAILS: . Name: . Sex: . Age: . Occupancy: 1. Which mode of Transport they use? (a) Auto Rickshaws (b) Bicycle (c) Bike/Scooter (d) Car (e) Public Bus (f) Metro/ train 2. Do you take shortest route to work place by bicycle? YES NO 3. If NO, reason why they do not use bicycle?(a) Discomfort due to weather(b) Pollution(c) Lack of infrastructure facilities(d) Long commuting distances(e) Risk of road accidents 4. If proper facilities are provided will they use bicycle in future? YES NO 5.On average, how frequently do you bicycle for the following reasons? (a).Go to work (b).Go to School (c).Go to transit stop (d).Exercise or go to the park 6.How important do you think the following improvements would be insupporting Bicycling in pradhikaran,nigdi region?(a)Provision of bicycle track(b)Provision of bicycle parking near transit area(c)Awareness about benefits of bicycling 7.If it were safe and convenient,how likely would you be willing to bicycling for the Following reason?(a).Go to work (b).Go to School(c).Go to transit stop (d).Exercise or go to the park 8.Reasons for not cycling?(a).Disability,other health reasons (b).Too busy(c).Don't want to enjoy it (d).Othertransportation is faster.

IV SCOPE OF PROJECT

Cycling to work may soon become a reality in Pune, and not just for poor but also for urban population. With pollution and shrinking road spaces, the city is under pressure to adopt the model that promoted cycling as an alternative to driving. Cycle is the future in Pune, India but the voice has to reach out. A new study revealed on March 22 by the Centre for Science and Environment (CSE) states that Pune has to wake up to the mobility crisis with non-conventional, eco-friendly and easier

systems of transport. According to various studies the increased use of cars in the city has reduced the carrying capacity of roads and by 2020, if the city has to meet its target of 80% of public transport share it will have to spend more on cycling, this will help in reducing pollution and control the traffic.

Through this project we propose to develop a travel choice model for the use of bicycle in PCMC urban area. For implementing this project it is therefore necessary to understand whether safe and comfortable infrastructure is created for bicycle users. What impact will it have as choice of bicycle as a commuting mode.

If we implement some changes in context of bicycle as mode of choice such as infrastructure development, safety, comfort, etc.; to check whether there will be change in bicycle modal shift? After changing the infrastructure and after meeting the needs of people, will people use bicycle as mode of transport on large scale or not?

V. DESIGN

Design Speed:The average speed range of NMT is about 5 km/hr — 15 km/hr. In rare cases, it can be seen to be 20 km/hr. It is important for cyclists gain a cruising speed for constant usage. Interruptions due to parking, side roads, access to properties affect the desirable speed and make it difficult for the cyclist.Clearances and Widths: The width requirement for a NMV in movement is higher than its physical dimensions. This is on account of two main factors: zigzagging movement (side to side movement to maintain balance during riding) and fear of obstacles (or maintenance of manoeuvring gap). Bicyclists carrying goods and pillion riders may experience higher zigzagging on account of the extra weight carried, while cycle rickshaws experience minimal or no zigzagging.

VI. CONCLUSION

Potential cyclist are higher than cyclist

Male cyclist are more than female cyclist

There are few respondents (17%) does not like to use bicycles because of various reasons like (long commuting distance , accident fear)

From the analysis it is observed that the highest no of potential cyclist are from the age group of 10 to 45.

The observation obtain from the final survey by using the questionnaire did not give detailed information like the purpose of cycling (leisure, Fitness etc.) and hence its need to revised for some sections.

Most of the respondents gave the reason for not using bicycle as lack of infrastructure facility, so we need to provide cycle track to increase the number of cycle users.

It is not possible for everyone to own the cycle so provision of PBS (Public Bicycle Share System) in the locality is essential.

It will be a boost for intermodal passenger transport system as it is the most effective mode for last mile connectivity.

In this locality, mostly bungalows are constructed (on main proposed cycle route) creating problem for providing segregated and raised type of cycle track

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Accident Cause Model For Talawade, Pune, Maharashtra.

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ABSTRACT It is projected that road traffic injuries will move up to the third position by the year 2020 among leading causes of the global disease burden. Talawade being a major industrial area in P.C.M.C. due to which lot of heavy vehicles operate along with the local travellers. Hence, the area is prone to accidents. We studied the various accident causes in Ganeshnagar by preparing questionnaire & creating Google form. From which 40% being due to road condition,32% overtaking problems, 14% improper pedestrian crossing 10% maintenance problem & 4% personal problem. We analyzed the geometric errors on the location & also the peak hour of occurance was observed to be 8.00am -11.00am & 3.00pm-10.00pm. The outcomes of the study will help in minimizing the accidents & allow the safe travel with growth in the industrialization.

INDEX TERMS black-spot, Questionnaire, collision diagram, accident cause model.

I. INTRODUCTION

A road traffic accident (RTA) is any injury due to crashes originating from, terminating with or involving a vehicle partially or fully on a public road. The Global status report on road safety 2013 indicates that worldwide the total number of road traffic deaths remain unacceptably high at 1.24 million per year. Road traffic injuries are the leading cause of death among young people, aged 15–29 years. Children, pedestrians, cyclists and older people are among the most vulnerable of road users constituting half of those dying on the world's roads. India is no exception and data showed that more than 1.3 lakh people died on Indian roads, giving India the dubious honor of topping the global list of fatalities from road crashes. Rapid urbanization, motorization, lack of appropriate road engineering, poor awareness levels, nonexistent injury prevention programmers', and poor enforcement of traffic laws has exacerbated the situation. India has the highest road traffic accident rate worldwide with over 140,000 deaths annually, beating even China. Every hour, nearly 14 lives are lost due to road accidents in India. Total deaths in Maharashtra are 9205 in year 2015 as per survey.

II. LITERATURE REVIEW

Road condition :-

Identification of factors in road accidents through in-depth accident analysis by Mouyid bin Islam , Kunnaw Kanitpong thailand.

This paper addresses an in-depth study through crash investigation and reconstruction. This research paper establish the linkage between the causes and consequences with event. They studied accidents by drawing the driving path on software .They have listed the various factors like - Lack of street lighting, No "Speed Limit" sign along the roadside. Lack of conspicuity of the static roadside objects during nighttime.

A Descriptive Study on the Consciousness of Traffic Rules among the people of 'Amdavad' By Poonam Arora.

One of the biggest problems regarding transportation that the city is facing is the congestion that millions of commuters face each day on roads.

The paper reveals and concludes that the majority of the drivers does not follow rules and traffic signs while driving. A very small chunk doesn't believe in following traffic signal which causes accidents and other traffic problems.

Failing to keep lane . Failing to yield right of the way . Driving in excess of speed .

B. Vehicle condition:-

Traffic Analysis and Road Accidents: A Case Study of Hyderabad using GIS by **M. Bhagyaiah1, B. Shrinagesh.**
This Paper addresses to increase of vehicle the major accidents are happened. The increase of vehicle has lot of pressure on the existing roads and ultimately resulting in road accidents. From 2001 there is an increase of 202 percent of two wheeler and 286 percent of four wheeler vehicles with no road expansion. Motor vehicle crashes are a common cause of death. GIS helps to locate the accident hotspot.

C. Age of Driver : -

Road Traffic Accidents in India: - Issues and challenges by Sanjay Kumar Singh.
This research paper is based on the age group of drivers. The age group of 30-59 years is the most vulnerable population group In this group the most road accidents are happened. The age group of 30-59 males face higher level of fatalities and injuries than the female. Road accidents are relatively higher in extreme weather and during working hours.
Fatal Road Traffic Accidents among Young Children by Harnan.Singh,AD.Aggarwal.
This Paper addresses to studied the major accidents are caused by young children's. Children themselves were at fault in majority of cases Young children's are extremely vulnerable to such injuries which are vastly preventable 59 cases of fatal road traffic accidents in children aged below 16 years were studied. The most common age group involved was 13-16 years. The study highlights the pattern of fatalities due to road accidents in children and suggests suitable preventive measures to reduce burden of childhood mortality due to road accidents

D. Human Behaviour : -

Preventing Traffic Accidents With in Vehicle decisions Support System – The Impact Of Accident Hotspot Warning On Driver Behaviour by Benjamin Ryder
This paper is based on the road accidents are happened due to the human behavior while driving. In this paper they provide the evidence in- vehicle decision support systems (DSSs) can have significant positive effects on driving behavior and collision avoidance.

E. Provide Safety & Prevention Measures:-

Safety Measures for Controlling road Acccidents Injuries And Fatalities by Manisha Minesh Desai.
It is difficult to imagine life without it tremendous growth of both road network and road traffic in India bought the problem of road accident resulting in injuries and fatalities In this paper we studied graph ,road accident statistics Vs no of accident ,as per WHO 12 Lakh people die every year out of which more than 83000 people die in India while 5 times is seriously injured. In this paper we have studied some safety provisions regarding the driver which include driver training and testing, driver behavior, over speeding, Drug or alcohol consumption etc

Road Traffic Accidents In India by S.M. Sharma.
There is tremendous rise in road traffic accident due to vehicular volume, increase in vehicle speed, poor driving skills, drunk driving, bad roads, poor traffic controls, lack of public awareness etc. So the solution for this is to reduce vehicular traffic give training to the drivers regarding road safety measures it can also be improved by introducing some strict rules and regulations. Theroads must be displayed with various regulatory signs and signal, boards crossings and highway, stop and give way sings and traffic lights. Road accidents are increased due to rapid urbanization and industrialization and due purchasing power of people they are able to buy all kinds of vehicle .and construction of alternative routes has not kept the pace with volume of traffic we see.

METHODOLOGY

This study is focused on the collection of data of accidents through respected authorities, studying the causes which may trigger accidents. It also deals with studying various suggestions and applying according to the feasibility & recommends it to the authorities.

CASE STUDY [Talawade] :

The area of talawade is the accident prone area. We observed this from the news obtained from 'TIMES OF INDIA' newspaper and also from the people's opinion.

CHARACTERSTICS OF ROAD

Location of site : Ganeshnagar, near MSCB office Talawade road, Pune 411062

Width of road : 15m

Length of road(A) : 86.4 m

Length of road (B) : 100 m

Average speed: 40 km/hr

Side Margin : 3.6 m

B opposite side : 4.3 m (Right)

MSCB side : 5.6 m

TECHNICAL TERMS

Stopping sight distance:

The clear distance ahead needed by a driver to bring his vehicle to a stop before meeting a stationary object on the road is called as stopping sight distance

$SSD = Vt + V^2/gf$

Super elevation:

The inward transverse inclination provided to the cross section of the carriageway at horizontal curved portion of the road is called super elevation

$e = V^2/127R$

Here, V= 40kmph

t= 2.5 sec

g= 9.81

f = 0.15

R = 300m

$SSD = (40*2.5+40^2/9.81*0.15)$

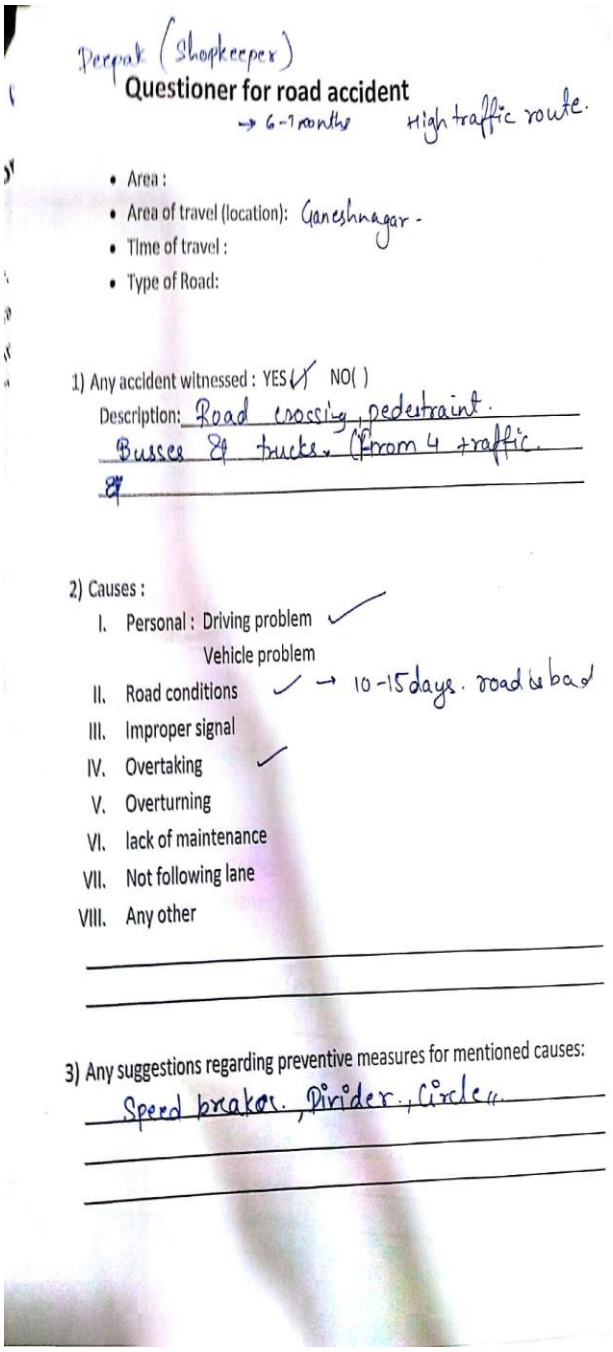
= 1187.32m

$e = 40^2/127*300$

=4.19%

Condition of Road

As per our observation people face many problems due to improper sight distance, super elevation & no provision of traffic control devices. We visited RTO office at Moshi and Dehuroad Police Station for collection of accident data.



Deepak (Shopkeeper)

Questioner for road accident

→ 6-7 months High traffic route.

- Area :
- Area of travel (location): Ganeshnagar -
- Time of travel :
- Type of Road:

1) Any accident witnessed : YES ✓ NO( )

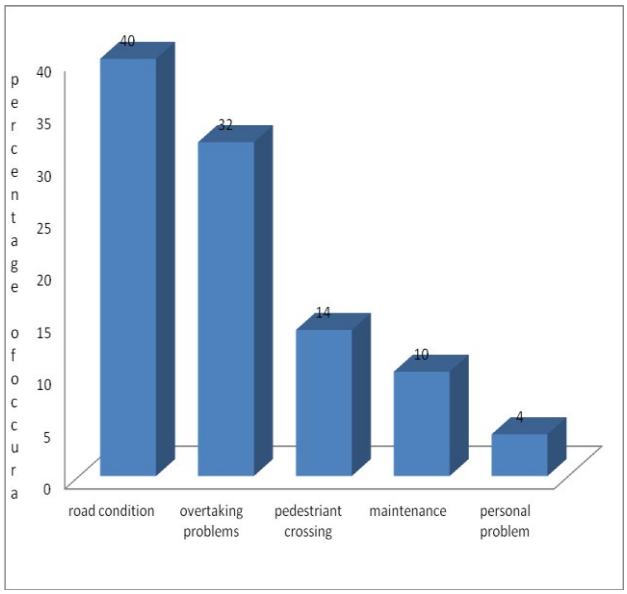
Description: Road crossing, pedestraint. Busses & trucks. From 4 traffic.

2) Causes :

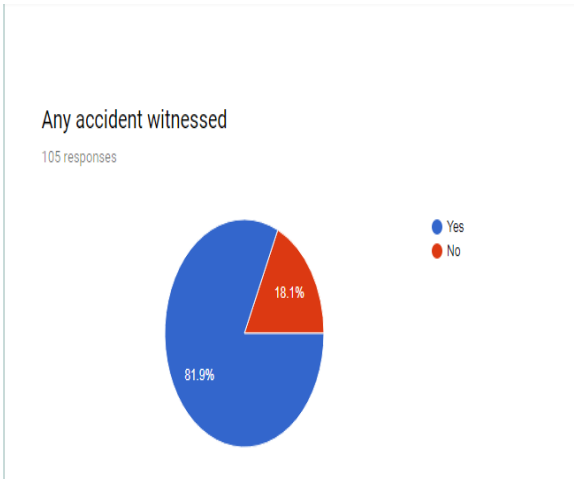
I. Personal : Driving problem ✓
Vehicle problem
II. Road conditions ✓ → 10-15 days. road is bad
III. Improper signal
IV. Overtaking ✓
V. Overturning
VI. lack of maintenance
VII. Not following lane
VIII. Any other

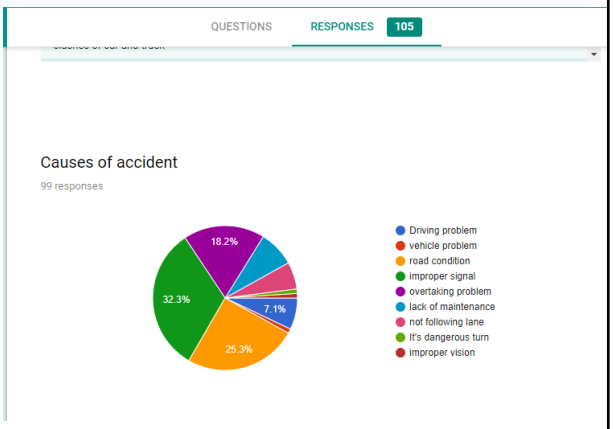
3) Any suggestions regarding preventive measures for mentioned causes:

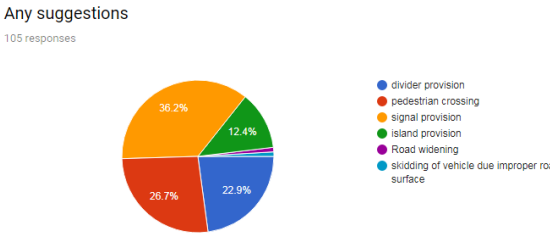
Speed brakes, Divider, Circle.

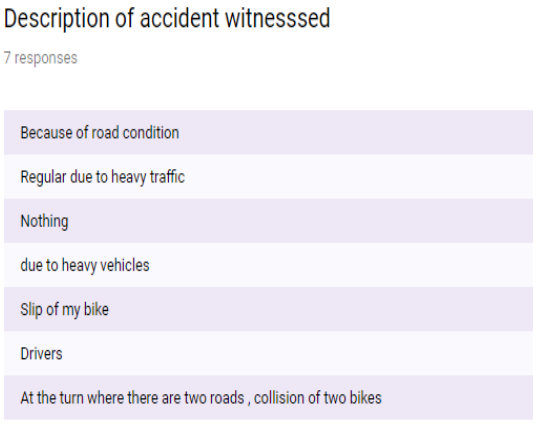


DATA GENERATED BY CREATING GOOGLE FORM









ACCIDENT CAUSE MODEL

We have developed an accident cause model by regression method as follows:

The equation is,

$$ACM=0.4IS+0.387RC+0.408DP+0.365OP+0.258VP$$

Where,

IS = Improper Signal

RC = Road Condition

DP = Driving Problem

OP = Overtaking Problem

VP = Vehicle Problem

For example:

eg 1. n= 3, x= 40

then $\bar{x} = 40/3 = 13.33$

Now, $r = \text{cov}(x)/\sigma x$

$= [\ 1/3(40-13.33)] /[\ \sqrt{1/3(40^2} - 13.33^2]$

$= 8.89/21.77$

$= 0.40$

SR NO.	CAUSES	NO OF USER REVIEW
A.	Driving Problem	10
1	Psychological Problem	2
2	Speed	5
3	Distraction to Driver	3
B.	Vehicle Problem	
1	Improper Maintenance of vehicle	2
C.	Road Conditions	43
1	Improper Camber	14
2	Road Width, Road Margin	10
3	Improper Vision	9
4	Potholes	10
D	Improper Signal	40
1	Height of Signal	17
2	Signals are not in working condition	13
3	Time Cycle	10
E	Other problems	55
1	Overtaking Problem	35
2	Lack of Maintenance	13
3	Not Following Lane	5
4	It's Dangerous Turn	1
5	Improper Vision	1

Cause no	No of accidents (X)	No of causes (n)
A	10	3
B	2	1
C	43	4
D	40	3
E	55	5

Obtaining the data from the police station we found the values of certain causes of accidents.

Causes	No of accidents
I.S	42
R.C	45
D.P	13
O.P	60
V.P	5

Substituting values in the formula

ACM = 0.4*42+0.387*45+0.408*13+0.365*60+0.258*5

= 63 no. of accidents in a week

CONCLUSION :-

The following model concludes that huge number of accidents occur weekly.

The model consist of various causes by which accidents may occurs in that area.

RESULTS:-

Obtaining the data from the police station we found the values of certain causes of accidents .

Causes	No of accidents
I.S	42
R.C	45
D.P	13
O.P	60
V.P	5

Substituting values in the formula

ACM = 0.4*42+0.387*45+0.408*13+0.365*60+0.258*5

= 63 no. of accidents in a week

DISCUSSION

So from above results we have observe that due to overtaking problem, lack of maintenance, not following lane, and dangerous turns accident may take place and from the model we have concluded that 63 no of accidents takes place in week.

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Automated Drip Irrigation System Using Soil Moisture Sensors

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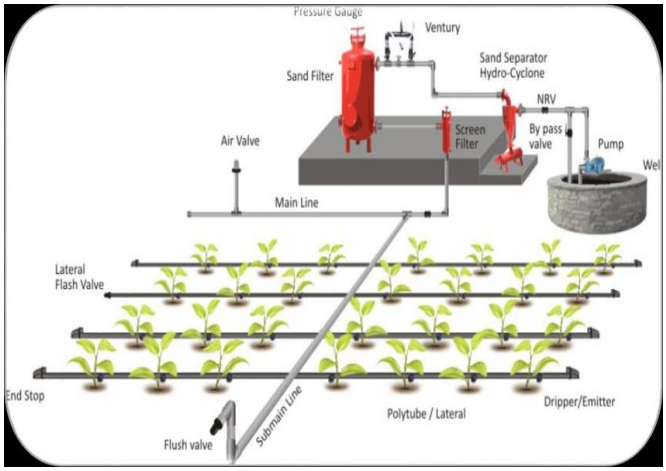
ABSTRACT -Use of soil moisture sensors to optimize the drip irrigation system and increase the efficiency of conventional drip irrigation system. The wastage of even little amount of water is also not there and it can be useful in reducing the wastage of water.

INDEX TERMS - drip irrigation, soil moisture sensors

1. INTRODUCTION

1. As the current drip irrigation system is the advanced and most modern technique of irrigation in INDIA, so it is used mostly in irrigation of almost all the crops. Sometimes, in this system also there are some difficulties and the most seen difficulty is not giving the exact amount of water to the crops and it gets extra and there is loss of some amount of water.
2. To solve this problem soil moisture sensors are introduced in the drip irrigation system.
3. They detect moisture easily and a programmed system beside the drip irrigation makes it possible to reduce the wastage of water.



2. RESEARCH METHODOLOGY

1. Various fields were visited to enquire about the drip irrigation system and all setup with the problems associated with it.
2. The problems associated with the conventional drip irrigation system were studied in detail and solutions were made out from them.
3. Soil moisture sensors were introduced to reduce the water wastage problem so that the efficiency of the system can be increased.

3. ANALYSIS

1. Various parameters of soil were studied and the moisture parameter is being studied for resolving the problem.

2. Different plants' duty, delta and base period and moisture were also studied and it was found that most of the plants average range of moisture goes between 20%-60%.

3. Exception comes for some crops which sometimes need excessive water and some plants need less than the average initial value i.e., <20%

FIGURE 1.- conventional drip irrigation system

FIGURE 2. automated drip irrigation system

4. MODEL DETAILS

Description	value
Type of soil used	Black cotton soil
Dimension of box	1.1m x 1m
Type of sensor	Capacitance sensor
Length of sensor	6 cm
Range of sensor	8 cm

5. BASIC MATHEMATICAL EQUATIONS USED

$$\Delta = 8.64 \times B / D$$

B= base period in days
Δ = delta in meters
D= duty in hectares/cumec

6. CONCLUSION

From analysis and results we can conclude that the moisture parameter can be taken to resolve the water wastage problem in the fields in which the drip irrigation system is installed within a range of 20%-

50%. The higher limit is 50% and the lower limit is 20%

ACKNOWLEDGMENT

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Soil Characteristics Study For Rainfall Induced Landslides, A Case Study In Mahad Tehsil (May 2019)

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ABSTRACT

In this paper the comparative study of change in soil characteristics due to rainfall intensity is studied. Effort has been taken to correlate the rainfall intensity and landslide to nearly predict the landslide in study area. A parametric study is conducted at Dasgaon from Mahad Tehsil, Maharashtra. To find out current actual input design parameters, various geotechnical laboratory tests were conducted on the soil sample collected from backfill such as particle size distribution, natural moisture content, Atterbergs limit, coefficient of permeability, maximum dry density and optimum moisture content, cohesion and internal angle of friction by direct shear test, and results were calculated. The results of these tests are used to find out the factor that should be considered for predicting the landslide in study area depending upon the research conducted in the area.

I. INTRODUCTION

Landslides very commonly occur during a long period of heavy rainfall and occur every year in many parts of the world, especially in environments that provide a prolonged and intense rainfall, steep slopes, sparse vegetation and an abundant source of incoherent fine-grained soils, including colluvium and residual soils. These landslides are common sights in tropical countries, and in some cases, in temperate regions where residual soil prevails. In tropical countries, most landslides occur annually between July and September, in which period the frequency and intensity of rainfall is higher than any other months.

Worldwide, rainfall-induced landslides have claimed untold numbers of human lives and have caused economic losses every year. During the last ten years, the landslide events have resulted, either directly or indirectly, in more than 537 deaths and economic losses at about US$ 10 million annually. For this reason, these landslides have

This paper aims to present the current state of the art hydrological approach for landslide investigation mainly considering the technological and software based analysis using ARC-GIS and SWAT (Soil Water Assessment Tool).

II. LITERATURE REVIEW

1. **Aditya, Muchamad Reza, Reymon Agra Medika, Yosua Alfontius, Zukhruf Delva Jannet, and Eddy Hartantyo. "Zonation of Landslide-Prone Using Microseismic Method and Slope Analysis in Margoyoso, Magelang." In Journal of Physics: Conference Series, vol 1011, no. 1, p. 012039. IOP Publishing, 2018.**

This paper describes Margoyoso Village, Salaman Sub-district, Magelang Regency, Central Java is one of the villages that were included in landslide prone areas. The steep slopes and land use in this village were quite apprehensive. There were fractures with 5 cm in width

method used in this research was microseismic method and geotechnical analysis. The microseismic measurement and slope stability analysis at Margoyoso village was a step in analysing the landslide-prone zone boundary. The results of this research indicated that landslide potential areas had a low peak ground acceleration values with a range from 36 gal to 46 gal. Measurement of slope stability indicated that a slope angle values between 55o-78o are a potential landslide slope because the soil in this village has very loose properties so it is very easy to move.

2. **Richards, R. "Tilting failure of retaining walls including p-delta effect and application to Kobe walls." In Proc. 12th World Conf. on Earthquake Engrg. 2000.**

The purpose of the research described in this paper is to generalize the Richards and Elms (1979) procedure for prediction of seismically induced permanent displacement of retaining walls for the case of mixed sliding and rotation modes. A simplified mathematical model and modified computational method based on the work of Siddharthan et al (1992) is presented. In the model presented in this paper seismic reduction of bearing capacity is included in the Siddharthan approach; and the P-Δ effect, and corresponding magnification of displacements is also considered in the analysis. Initially, the model is applied to a simple problem to demonstrate the concepts and application. Finally, as a check on the validity of the analysis, retaining walls located in Kobe, Japan are investigated using an available time history of acceleration record from the Hyogoken- Nambu Earthquake as input. The results from the calculation are in good agreement with the observed behavior of the Kobe walls.

3. **Arvind, G., P. Ashok Kumar, S. Girish Karthi, and C. R. Suribabu. "Statistical Analysis of 30 Years Rainfall Data: A Case Study." In IOP Conference Series: Earth and Environmental Science, vol. 80, no. 1, p. 012067. IOP Publishing, 2017.**

This paper tells about rainfall is a prime input for various engineering design such as hydraulic structures, bridges and culverts, canals, storm water sewer and road drainage system. The detailed statistical analysis of each region is essential to estimate the relevant input value for design and analysis of engineering structures and also for crop planning. A rain gauge station located closely in Trichy district is selected for statistical analysis where agriculture is the engineers to assess the availability of water and create the storage accordingly. The mean, standard deviation and coefficient of variation of monthly and annual rainfall was calculated to check the rainfall variability. From the calculated results, the rainfall pattern is found to be erratic. The best fit probability distribution was identified based on the minimum deviation between actual and estimated values. The scientific results and the analysis paved the way to determine the proper onset and withdrawal of monsoon results which were used for land preparation and sowing.

4. **Du, Dong-Ning, Lai-Gui Wang, Xiang-Dong Zhang, and Shu-Kun Zhang. "Study on sand particles creep model and open pit mine landslide mechanism caused by sand fatigue liquefaction." In IOP Conference Series: Earth and Environmental Science, vol. 69, no. 1, p. 012021. IOP Publishing, 2017.**

This paper informs about the sand particles in the sand - rock composite slope of the open pit mine occurs creep deformation and fatigue liquefaction under the action of vehicle load vibration and hydraulic gradient, which causes landslide geological disasters and it destroys the surface environment. To reveal the mechanism, a mechanics model based on the model considering the soil structural change with a new “plastic hinge” element is developed, to improve its constitutive and creep curve equations. Data from sand creep experiments are used to identify the parameters in the model and to validate the model. The results show that the mechanical model can describe the rotation progress between the sand particles, disclose the negative acceleration creep deformation stage during the third phase, and require fewer parameters while maintaining accuracy. It provides a new creep model considering rotation to analyze sand creep mechanism, which provides a theoretical basis for revealing the open pit mine landslide mechanism induced by creep deformation and fatigue liquefaction of sandy soil.

5. **Feranie, S., Adrin Tohari, and F. D. E. Latief. "Prediction of landslide run-out distance based on slope stability analysis and center of mass approach." In IOP Conference Series: Earth and Environmental Science, vol. 29, no. 1, p. 012003. IOP Publishing, 2016.**

Mitigation of landslide hazard requires the knowledge

Results of the slope stability analysis showed that the soil unit weight can influence the depth of sliding zone, and the volume of unstable material. The slope model of silty sand and gravel would have the largest volume of unstable mass. From the Coulomb friction analysis, this slope model has higher run-out distance and velocity than other slope models. Thus, the run-out distance will be influenced by soil type and the dimension of unstable soil mass.

6. **Habil, H., E. Yuliza, M. M. Munir, and M. Irsyam. "Instrumentation system design and laboratory scale simulation of landslide disaster mitigation." In Journal of Physics: Conference Series, vol. 739, no. 1, p. 012056. IOP Publishing, 2016.**

Research on landslide has been developed recently because it may endanger human life. Landslide is the movement of rock, detritus, or soils caused by the action of gravity. Landslides are influenced by several factors such as ground slope, degree of rainfall, land cover (ground layers), and the vibration around the slopes. From these factors, tilt detection sensors and soil moisture sensor have been developed to detect landslide failure. These sensors mounted so that it can detect the occurrence of landslides. The study was conducted on a container which contains the sloping ground. Landslide, slope processes, and soil humidity were investigated in this container. MMA8451Q accelerometer was used as a tilt sensor to detect the acceleration assembled in MEMS (Micro Mechanical System) technology since it is easily available, massproduced, inexpensive, and high-precision output data. Landslide simulator has been developed hence the process leading to landslide event can be directly analyzed without the need of real life occurrence of landslides. The simulator was made from glass with size 80 cm × 20 cm × 40 cm that was filled by soil. Based on the simulation results, there were changes on accelerometer and soil moisture data during the landslide occurrence.

7. **Lin, Jiayuan, Meimei Wang, Jia Yang, and Qingxia Yang. "Landslide Identification and Information Extraction Based on Optical and Multispectral UAV Remote Sensing Imagery." In IOP Conference Series: Earth and Environmental Science, vol. 57, no. 1, p. 012017. IOP Publishing, 2017.**

This paper has to offer information about landslide, one of the most serious natural disasters which caused enormous economic losses and casualties in the world. Fast and accurate identification of newly occurred landslide and extraction of relevant information are the premise and foundation for landslide disaster assessment and relief. As the places where landslides occur are often inaccessible for field observation because of the temporary failure in transportation and communication. Therefore, UAV remote sensing can be adopted to collect landslide information efficiently and quickly with the advantages of low cost, flexible launch and landing, safety, under-cloud-flying, and hyperspatial image resolution. Newly occurred landslides are usually accompanied with those phenomena such as vegetation burying and bedrock or bare soil exposure, which can be easily detected in optical or multispectral UAV images. By taking one typical landslide occurred in Wenchuan Earthquake stricken area in 2010 as an example, this paper demonstrates the process of integration of multispectral camera with UAV platform, NDVI generation with multispectral UAV images, three-dimensional terrain and orthophoto generation with optical UAV images, and identification and extraction of landslide information such as its location, impacted area, and earthwork volume.

8. **Matziaris, V., A. M. Marshall, C. M. Heron, and H. S. Yu. "Centrifuge model study of thresholds for rainfall-induced landslides in sandy slopes." In IOP Conference Series: Earth and Environmental Science, vol. 26, no. 1, p. 012032. IOP Publishing, 2015.**

This paper tells about rainfall-induced landslides, very common natural disasters which cause damage to properties and infrastructure and may result in the loss of human life. These phenomena often take place in unsaturated soil slopes and are triggered by the saturation of the soil pro le due to rain in ltration which leads to the decrease of e ective stresses and loss of shear strength. The aim of this study is to determine rainfall thresholds for the initiation of landslides under di erent initial conditions. Model tests of rainfall-induced landslides were conducted on the Nottingham Centre for Geomechanics geotechnical centrifuge. Initially unsaturated plane-strain slope models made with ne silica sand were prepared at varying densities at 1g and accommodated within a centrifuge container with rainfall simulator. During the centrifuge ight at 60g, rainfall events of varying intensity and duration, as well as variation of groundwater conditions, were applied to the slope models with the aim of initiating slope failure. This paper presents a discussion on the impact of soil state properties, rainfall characteristics, and groundwater conditions on slope behaviour and the initiation of slope instability.

9. **Qalbi, Harisa Bilhaqqi, Akhmad Faqih, and Rahmat Hidayat. "Future rainfall variability in Indonesia under different ENSO and IOD composites based on decadal predictions of CMIP5 datasets." In IOP Conference Series: Earth and Environmental Science, vol. 54, no. 1, p. 012043. IOP Publishing, 2017.**

This paper tells about climatic information companies like El Niño-Southern Oscillation (ENSO) and Indian

Ocean Dipole (IOD) are amongst important climate drivers that play a significant role in driving rainfall variability in Indonesia, especially on inter-annual timescales. The phenomena are suggested to have an association with interdecadal climate variability through the modulation of their oscillations. This study aims to analyse the characteristics of future rainfall variability in Indonesia during different condition of ENSO and IOD events based on decadal predictions of near-term climate change CMIP5 GCM data outputs up to year 2035. Monthly data of global rainfall data with 5x5 km grid resolutions of CHIRPS dataset is used in this study to represent historical rainfall variability as well to serve as a reference for future rainfall predictions. The current and future rainfall and sea surface temperature data have been bias corrected before performing the analysis. Given the comparison between rainfall composites during El-Nino and positive IOD events, the study showed that the future rainfall conditions in Indonesia will become drier than the historical condition resulted from the same composite approach. In general, this study showed the Indonesian rainfall variability in the future is expected to respond differently to a different combination of ENSO and IOD conditions.

10. **Su, Lijun, Xingqian Xu, Hongjian Liao, and X. Y. Geng. "Shear wave velocity analysis of a deep seated gravel landslide structure using the microtremor survey method." In IOP Conference Series: Earth and Environmental Science, vol. 26, no. 1, p. 012026. IOP Publishing, 2015.**

This paper tells about study of landslide failures. The depth and geometry of potential failure surface is the fundamental for evaluating the mechanisms of a landslide. Traditional techniques to acquire information on potential sliding surface are mainly drilling, pitting, and trenching, but these techniques are time consuming and expensive. In this study, microtremor signals and the dispersion curves of surface wave are extracted from the vertical component of microtremor records using the spatial autocorrelation (SPAC) method to estimate shear wave velocity structure. The results suggest that the buried depth of phyllite bedrock is approximately 47.4m, and the thickness of weathered bedrock layer is about 9.9m at about 57.3m deep, which could be interpreted as the potential sliding surface of this landslide, in accordance with borehole data. The microtremor survey method (MSM) is flexible, non-invasive, relatively quick and deployable on the landslide. It clearly demonstrat that it is an effective tool to improve the drilling success rate, and hence allow a large scale and high density investigation of structure characteristics of a deep seated landslide.

11. **Sugiarti, K., and S. Sukristiyanti. "TRIGRS Application for landslide susceptibility mapping." In IOP Conference Series: Earth and Environmental Science, vol. 118, no. 1, p. 012040. IOP Publishing, 2018.**

This paper tells about essential data required for landslide evaluation. The Transient Rainfall Infiltration and Grid-Based Regional Slope-Stability Analysis (TRIGRS) is essential for landslide susceptibility mapping study. TRIGRS generates more satisfactory results than other landslide susceptibility analysis models, for example, SINMAP (Stability INdex MAPping) [1]. TRIGRS model is ideal for landslide hazard zoning for land-use planning on a regional scale [1,2]. It is suitable for landslide susceptibility mapping study in Indonesia. TRIGRS is capable of reproducing the frequency of the size of the patches of terrain predicted as unstable by the model [3]. TRIGRS used for the landslide ratio of each predicted FS class (hereafter LR class) is employed for evaluating the unstable slope basins under various rainfall conditions [3]. TRIGRS model is a powerful tool for decision makers on susceptibility mapping, especially if integrated with numerous advanced applications using Geographic Information System (GIS) spatial functions [4]. TRIGRS model is a Fortran program designed for modeling landslide susceptibility by combining an infinite slope stability calculation and an analytic, one-dimensional solution for pore-pressure diffusion in a soil layer of finite depth in response to time-varying rainfall [5]. The TRIGRS analysis has been successfully used by [2,4,6-14]. TRIGRS model was used to evaluate regional shallow landslide susceptibility in a GIS framework [7-10]. This paper aims to present a current state-of-the-art science on the development and application of TRIGRS. Some limitations of TRIGRS, some developments of it to improve its modeling capability, and some examples of the applications of some versions of it to model the effect of rainfall variation on landslide are reviewed and discussed.

12. **Take, W. A., and R. A. Beddoe. "Physical modelling of rainfall-induced flow failures in loose granular soils." In IOP Conference Series: Earth and Environmental Science, vol. 26, no. 1, p. 012001. IOP Publishing, 2015.**

This paper refers to a case study. The tragic consequences of the March 2014 Oso landslide in Washington, USA were particularly high due to the mobility of the landslide debris. Confusingly, a landslide occurred at that exact same location a number of years earlier, but simply slumped into the river at the toe of the slope. Why did these two events differ so drastically in their mobility? Considerable questions remain regarding the conditions required to generate flow failures in loose soils. Geotechnical centrifuge testing, in combination with high-speed cameras and advanced image analysis has now provided the landslides research community with a powerful new

tool to experimentally investigate the complex mechanics leading to high mobility landslides. This paper highlights recent advances in our understanding of the process of static liquefaction in loose granular soil slopes achieved through observations of highly-instrumented physical models. In particular, the paper summarises experimental results aimed to identify the point of initiation of the chain-reaction required to trigger liquefaction flow failures, to assess the effect of slope inclination on the likelihood of a flowslide being triggered, and to quantify the effect of antecedent groundwater levels on the distal reach of landslide debris with the objective of beginning to explain why neighbouring slopes can exhibit such a wide variation in landslide travel distance upon rainfall-triggering.

13. **Tohari, Adrin. "Study of rainfall-induced landslide: a review." In IOP Conference Series: Earth and Environmental Science, vol. 118, no. 1, p. 012036. IOP Publishing, 2018.**

This paper completely focuses upon rainfall-induced landslides, which pose a substantial risk to people and infrastructure. For this reason, there have been numerous studies to understand the landslide mechanism. Most of them were performed on the numerical analysis and laboratory experiment. This paper presents a review of existing research on field hydrological condition of soil slopes leading to the initiation of rainfall-induced landslide. Existing methods to study field hydrological response of slopes are first reviewed, emphasizing their limitations and suitability of application. The typical hydrological response profiles in the slope are then discussed. Subsequently, some significant findings on hydrological condition leading to rainfall-induced landslides are summarized and discussed. Finally, several research topics are recommended for future study.

14. **Vasudevan, Nirmala, and Kaushik Ramanathan. "Geological factors contributing to landslides: case studies of a few landslides in different regions of India." In IOP Conference Series: Earth and Environmental Science, vol. 30, no. 1, p. 012011. IOP Publishing, 2016.**

This paper tells about landslide and human life relationship. Research on landslide has been developed recently because it may endanger human life. Landslide is the movement of rock, detritus, or soils caused by the action of gravity. Landslides are influenced by several factors such as ground slope, degree of rainfall, land cover (ground layers), and the vibration around the slopes. From these factors, tilt detection sensors and soil moisture sensor have been developed to detect landslide failure. These sensors mounted so that it can detect the occurrence of landslides. The study was conducted on a container which contains the sloping ground. Landslide, slope processes, and soil humidity were investigated in this container. MMA8451Q accelerometer was used as a tilt sensor to detect the acceleration assembled in MEMS (Micro Mechanical System) technology since it is easily available, massproduced, inexpensive, and high-precision output data. Landslide simulator has been developed hence the process leading to landslide event can be directly analyzed without the need of real life occurrence of landslides. The simulator was made from glass with size 80 cm × 20 cm × 40 cm that was filled by soil. Based on the simulation results, there were changes on accelerometer and soil moisture data during the landslide occurrence.

15. **Yuliza, E., H. Habil, M. M. Munir, M. Irsyam, and M. Abdullah. "Study of soil moisture sensor for landslide early warning system: Experiment in laboratory scale." In Journal of Physics: Conference Series, vol. 739, no. 1, p. 012034. IOP Publishing, 2016.**

This paper tells about the rainfall intensity and occurrence of landslide. The high rate of rainfall is the main trigger factor in many cases of landslides. However, each type of soils has unique characteristics and behavior concerning the rainfall infiltration. Therefore, early warning system of landslide will be more accurate by monitoring the changes of ground water condition. In this study, the monitoring of ground water changes was designed by using soil moisture sensor and simple microcontroller for data processing. The performance of soil moisture sensor was calibrated using the gravimetric method. To determine the soil characteristic and behavior with respect to water content that induce landslides, an experiment involving small-scale landslide model was conducted. From these experiments, the electric resistance of the soil increased as soil water content increases. The increase of soil water content led to the rise of the pore pressure and soil weight which could cause soil vulnerability to the movement. In addition, the various soil types were used to determine the responses of soils that induce the slope failure. Experimental results showed that each type of soils has different volumetric water content, soil matrix suction and shear strength of the slope. This condition influenced the slope stability that trigger of landslide.

16. **Rientjes, T.H.M., 2004. Inverse modelling of the rainfall-runoff relation: a multi objective model calibration approach. PhD Thesis, Delft, 371 pp.**

This paper tells about runoff, one of the major factor for occurrence of rainfall induced landslides. The term runoff can be applied to stream or river discharge. It can also be employed in reference to the gravitational movement of a fraction of rainfall over the surface of land or as subsurface flow from an area peripherally bound by a water divide, towards a water body. Runoff is expressed in terms of

volume per unit of time and its generation largely depends on the amount of rain water that reaches the earth's surface.

17. **Ward, R.C. and Robinson, M., 1990. Principles of hydrology. McGraw-Hill, London, 365 pp.**

This paper tells about the distribution of rainfall water at the initial stage. Rainfall that is not lost to interception and reaches the soil surface either infiltrates into the soil, is stored in surface depressions or evapo-transpires. The remaining excess rainwater travels over land as surface runoff. Surface runoff occurs either when the soil is saturated from above or from below. If the rate at which rain falls to the ground is higher than the rate at which it infiltrates into the soil and surface storage is full then, the excess water at the surface flows along its gravitational gradient as surface runoff. This is referred to as saturation from above or overland flow. On the other hand, if the soil is already saturated due to previous rainstorm events and the infiltration capacity of the soil is zero, saturation from below occurs. In this case, most of the rain that reaches the ground is converted to overland flow after satisfying surface storage and no or very little water infiltrates into the soil.

18. **White, R.E., 1997. Principles and practice of soil science: the soil as a natural resources. Blackwell Science, Oxford, 348 pp.**

This paper tells about importance of soil properties in occurrence of landslides. The most important soil properties that influence the rate of infiltration, as mentioned above, are the physical properties of the soil. The size of the particles that make up the soil, the extent of soil particle aggregation and the way in which the aggregates are arranged are properties of the soil that make it a porous permeable medium through which water can flow (Schwab et al., 1981). These properties vary extensively both spatially and temporally, and are a consequence of the geology and geomorphology of an area. They can also be influenced through catchment management practices.

Hydraulic conductivity of the soil refers to the soils ability to conduct water down its profile. It largely determines the amount of water that can pass into the soil and therefore it is directly proportional to the infiltration rate (White, 1997). During a rain fall event, rainwater reaching the surface of the earth is drawn into the soil through pores by a suction gradient and a gravitational head gradient. If the soil at the start of a rainfall event is dry then, the suction head gradient becomes the strongest force pulling the water into the soil. As the soil fills up with water however, the suction head force decreases and the gravitational head gradient becomes the driving force conducting water down the soil profile. With continued saturation of the soil, the rate at which water moves into the soil approaches the saturated hydraulic conductivity. Under such conditions, if the rainfall intensity is greater than the rate at which the soil accepts water, ponding occurs at the surface. Further input of rainwater causes the capacity of surface storage to be exceeded resulting in surface runoff.

19. **Hillel, D., 1980. Fundamentals of Soil Physics. Academic Press, New York etc., 413 pp.**

This paper focuses of specific soil properties responsible for landslide. Soil structure and texture influence the hydraulic conductivity of soils (Hillel, 1980). In general, soils with high clay content have lower saturated hydraulic conductivity values whereas coarse textured soils such as sandy soils have higher values because of the larger pore space between the soil particles. As such, the infiltration rate of clayey soils is much lower than that of sandy soils. The infiltration rate can range from approximately 5mm/h for clay soils to 200mm/h for sandy soils (Morgan, 1995). In terms of soil structure, the extent of the soils porosity and the arrangement of soil aggregates determine the hydraulic conductivity of soils. Porous soils with stable aggregates have higher saturated hydraulic conductivity values than soils that are compact and dense.

20. **Green, C.H., Parker, D.J. and Tunstall, S.M., 2000. Assessment of Flood Control and Management Options, Thematic Review IV.4 prepared as an input to the World Commission on Dams, CapeTown.**

This paper tells about the conversion of rainfall to runoff, there are a number of stages in the hydrologic cycle that rainwater goes through before runoff is generated in a catchment. These different stages result in different losses from the total rain, reducing the amount of water that will be available for overland flow. Through catchment management practices, man has had considerable influence over certain aspects of these stages. This has brought notable differences in the rate at which surface runoff is generated.

Soil compaction brought about as a result of changes in land use/cover practises in a catchment disrupts the natural arrangement of soil particles and their aggregates. This disruption causes soil particles to be more closely packed which reduces soil porosity, increases soil bulk density and destabilizes soil aggregates (Hillel, 1980; Schwab et al., 1981). This in turn causes a decline in the hydraulic conductivity of soils which directly influences the rate at which rain water infiltrates into the soil. In addition to hydraulic conductivity, other hydraulic properties of the soil including suction head and soil moisture deficit which are functions of soil porosity and closely related to infiltration characteristics of the soil can also be affected as a result of a disruption in soil structure.

21. Dunne, T. and Black, R.D., 1970. Partial Area Contributions to Storm Runoff in a Small New England Watershed. Water Resources Research, 6(5): 1296-1311.

This paper focuses upon Runoff, not in itself a form of land degradation but it is one of the major causes of land degradation problems, of which the main ones are erosion and flooding. Furthermore, the rate at which runoff is generated can be increased because of land degradation problems. Runoff on the one hand is an essential process in that it maintains water level in lakes and rivers preventing them from drying out and providing fresh water on which many living beings including humans largely depend. If however the rate of runoff is increased as a result of catchment management practices it can result in severe land degradation problems.

Areas having shallow and compact soils ensuing from a combination of poor farming techniques, exploitation of marginal lands, deforestation and excessive erosion are susceptible to higher rates of runoff. High runoff rate leads to an increase in soil erosion by running water. On the other hand, areas with deeper, more porous soil structures that are densely vegetated contribute to a reduction in the amount of water available for runoff which results in reduced rates of erosion (Schwab et al., 1981; White, 1997). Land use/ cover changes that increase runoff rates therefore ultimately influence the rate at which soil loss occurs. Soil loss brings about problems of soil degradation which in turn further aggravates problems of runoff.

III. METHODOLOGY

The proposed study will correlate the impact of changes in soil characteristics with respect to change in rainfall intensity in study area.

- To carry out the rigorous literature survey to define the methodology to carry out the project work. To select the satellite imagery, digital elevation models database and recent geoinformatics tools for achieving greater efficiency.
- List of the various software used in this study:

  Geospatial analysis

  ArcMap 10.5

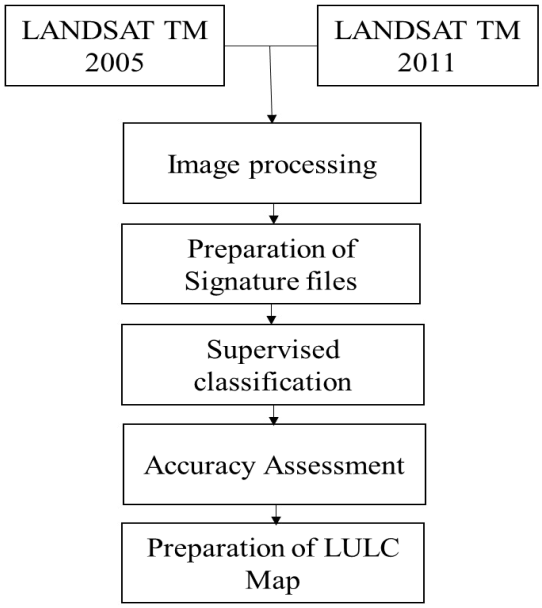
  ARC SWAT

  Microsoft word and excel

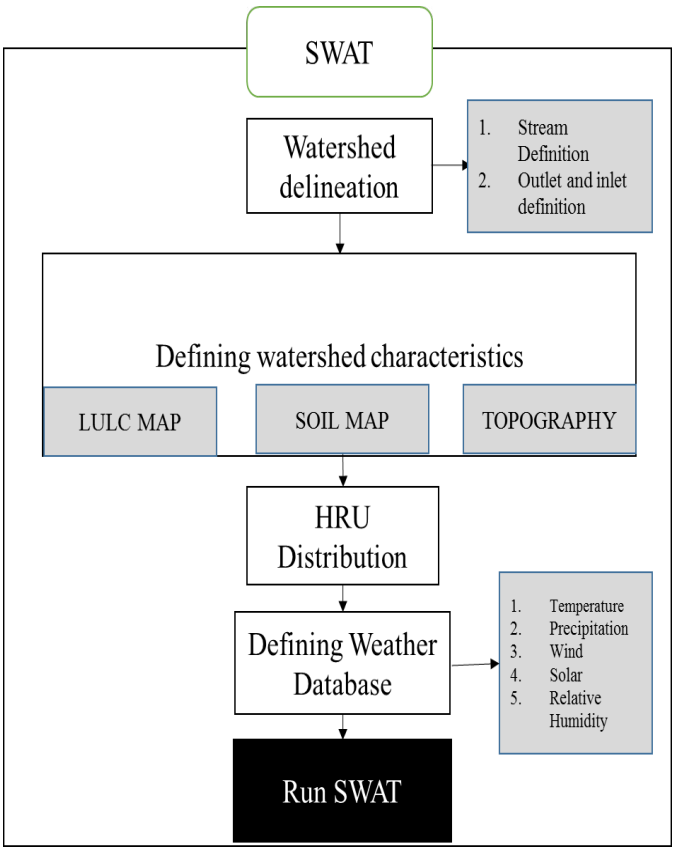
- This study primarily focus on three objectives:
  1. Preparation of Land use and land cover map for Mahad watershed for years 2005 and 2017 respectively.

  2. To quantify the rate of runoff and soil erosion in the study area between the period of 2005-2017.

  3. To investigate the impacts of changes in land use/ cover runoff discharge by using SWAT.



- Run off and sediment yield estimation



IV. CASE STUDY

1.1 Impacts of changes in land use/ cover on runoff discharge and sediment yield.

In this study, we explore the impacts of LULC change, particularly urbanisation, in the Mahad watershed behaviour and contribute to discussions regarding the nature of this impact in relation to floods in the basin. The specific objectives of this study are to (1) determine how land use has changed in the Mahad watershed over a period of 2005 to 2017; (2) investigate the relationship between land cover change and discharge response.

1.2 Data collection and Processing

SWAT model is data driven, which requires several data ranging from topography, land use, soil, climate, etc. Data was collected from internet and other sources, following section describes about the data collection and processing.

1.3 Soil Database

The necessary input information required by the SWAT model was extracted from the soil database for each soil type, namely soil texture, bulk density, Hydrological Soil Group (HSG), soil depth, rock fragments, organic carbon content, soil erodibility factor (K) were obtained for each soil type. Look up table was prepared for linking the soil map to the database. Fig 6 shows the interface used for storing the soil properties.

1.4 Input design parameters

From structural point of view cohesion, internal angle of friction and soil bearing capacity are important parameters. The various soil parameters and their relationship is described below.

a) ***Specific Gravity:***

Increase in specific gravity can increase the shear strength parameters (cohesion and angle of shearing resistance). Also increase in specific gravity also increases the California bearing ratio.

b) ***Consistency Limits*** Plastic limit and liquid limit are known as consistency limit. The consistency limit is used in soil classification and finding various correlations with other soil properties

c) ***Particle Size Analysis***

The particle size distribution curve (gradation curve) represents the distribution of particles of different sizes in the soil mass. Information obtained from particle-size analysis can be used to predict soil-water movement, although permeability tests are more generally used.

d) ***Permeability of Soil***

The amount, distribution, and movement of water in soil have an important role on the properties and behavior of soil. Shear strength of soils also depends indirectly on its permeability, because dissipation of pore pressure is controlled by its permeability.

e) ***Shear Strength of Soil (cohesion and internal angle of friction)***

Shear strength is the most important geotechnical property of soils; help in stability of civil engineering structures on or below the earth. The shear strength of soil depends on the effective stress, drainage conditions, density of the particles, rate of strain, and direction of the strain. Thus, the shearing strength is affected by the consistency of the materials, mineralogy, and grain size distribution, shape of the particles, initial void ratio and features such as layers, joints, fissures and cementation. Shear strength parameters are a result of the frictional forces of the particles, as they slide and interlock during shearing. Friction angle is high for a sandy soil than its cohesion and vice versa for clayey soil.

SL No	Name of Test	Unit	Test Results	Test Method
1	**Light Compaction Procter Test**			
	a) Maximum dry density (MDD)	g/cc	1.98	IS:2720:1983 (P-8) (RA 2015)
	b) Optimum Moisture Content (OMC)	%	15.05	
2	Lab CBR (Soaked) 96 Hrs	%	9.96	IS:2720:1987 (P-16) (RA 2011)
3	Natural Water Content	%	16.95	IS:2720:1973 (P-2) (RA 2015)
4	Natural Compaction By Core Cutter	%	96.50	IS:2720:1973 (P-29) (RA 2015)
5	Atterberg's limit's Liquid limit (LL)	%	Non Plasric - Sandy Soil	IS:2720:1985 (P-5) (RA 2015)
6	Atterberg's limit's Plastic limit (PL)	%	Non Plasric - Sandy Soil	IS:2720:1985 (P-5) (RA 2015)
7	Atterberg's limit's Plasticity Index (PI)	%	Non Plasric - Sandy Soil	IS:2720:1985 (P-5) (RA 2015)
8	Specific Gravity	-	2.48	IS:2720:1985 (P-3) Sec-1 (RA 2016)
9	Free swell index	%	10	IS 2720:1977 (Part 40) (RA 2011)

GRAIN SIZE ANALYSIS OF SOIL (DRY METHOD)

Sl No	IS Sieve Size (mm)	Wt.Retain (gm)	% Wt. Retain	Cumulative % Wt. Retain	Cumulative % Passing	Classification
1	100	0.00	0.00	0.00	100.00	Cobbles
2	75	0.00	0.00	0.00	100.00	0%
3	53	0.00	0.00	0.00	100.00	Gravel Coarse
4	37.5	80.00	7.25	7.23	92.77	23%
5	25	108.00	9.76	17.00	83.00	Gravel Medium
6	19	70.00	6.33	23.33	76.67	22.97%
7	16	52.00	4.70	28.03	71.97	Gravel Fine
8	12.5	64.00	5.79	33.82	66.18	26.54%
9	6.3	138.00	12.48	46.29	53.71	Sand Coarse
10	4.75	56.00	5.06	51.36	48.64	15.10%
11	2.36	85.00	7.69	59.04	40.96	Sand Medium
12	2.0	152.50	13.79	72.83	27.17	4.25%
13	1.18	100.50	9.09	81.92	18.08	Sand Fine
14	0.600	66.50	6.01	87.93	12.07	4.97%
15	0.425	33.50	3.03	90.96	9.04	Silt & Clay Size
16	0.300	21.50	1.94	92.90	7.10	3.16%
17	0.150	31.50	2.85	95.75	4.25	Total Sample
18	0.075	12.00	1.08	96.84	3.16	1106.00
19	Pan	35.00	3.16	100.00	0.00	

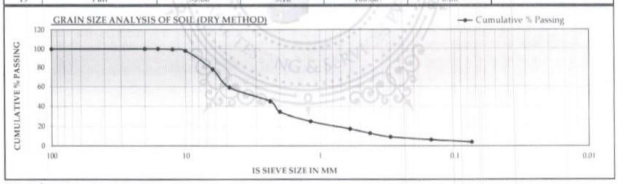


Table 1. Order, number and lengths of streams in different watersheds

Watershed No.	Stream characteristics	Stream Order 1st	2nd	3rd	4th	5th
WS 1	Total Stream Length (Km)	54.37	38.35	25.61	-	-
	Cum. Stream Length (Km)	54.37	92.72	118.33	-	-
	Total Number of Streams	21	7	1	-	-
	Mean Stream Length (Km)	2.59	5.47	25.61	-	-
WS 2	Total Stream Length (Km)	122.07	60.07	33.85	28.50	22.36
	Cum. Stream Length (Km)	122.07	182.14	215.99	244.49	266.85
	Total Number of Streams	49	9	3	2	1
	Mean Stream Length (Km)	2.49	6.67	11.28	14.25	22.36
WS 3	Total Stream Length (Km)	131.64	41.77	37.88	47.93	23.90
	Cum. Stream Length (Km)	131.64	173.41	211.29	259.22	283.12
	Total Number of Streams	59	10	4	2	1
	Mean Stream Length (Km)	2.23	4.177	9.47	23.96	23.90
WS 4	Total Stream Length (Km)	34.99	23.94	11.70	22.73	-
	Cum. Stream Length (Km)	34.99	58.93	70.63	93.36	-
	Total Number of Streams	19	6	2	1	-
	Mean Stream Length (Km)	1.84	3.99	5.85	22.73	-
WS 5	Total Stream Length (Km)	173.15	97.01	45.00	32.92	38.06
	Cum. Stream Length (Km)	173.15	270.16	315.16	348.08	386.14
	Total Number of Streams	65	17	4	2	1
	Mean Stream Length (Km)	2.66	5.70	11.25	16.46	38.06
WS 6	Total Stream Length (Km)	72.83	17.89	27.81	16.26	-
	Cum. Stream Length (Km)	72.83	90.72	118.53	134.79	-
	Total Number of Streams	26	4	2	1	-
	Mean Stream Length (Km)	2.8	4.47	13.90	16.26	-
WS 7	Total Stream Length (Km)	243.87	140.40	72.70	41.87	100.61
	Cum. Stream Length (Km)	243.87	384.27	456.97	498.84	599.45
	Total Number of Streams	101	28	10	3	1
	Mean Stream Length (Km)	2.41	5.01	7.27	13.95	100.61
WS 8	Total Stream Length (Km)	53.32	31.71	32.33	9.40	-
	Cum. Stream Length (Km)	53.32	85.03	117.36	126.76	-
	Total Number of Streams	25	7	4	2	-
	Mean Stream Length (Km)	2.13	4.53	8.08	4.70	-

VI. CONCLUSION

Landslide and especially large catastrophic landslide causes significant change in natural state and economy of the affected region. The use of multi-sourced soil data obtained from laboratory tests used in the GIS Tool for hydrological modeling under the SWAT (Soil Water Assessment Tool) model which had made it possible to study the evolution of soil related activity like landslide due to rainfall, land-use and land-cover phenomenon along with erosion of soil.

Due to help of various software combinations like ARC-GIS, ARC-Map, SWAT (Soil Water Assessment Tool) hydrological modeling is possible which gives satisfactory results which are beneficial for mankind.

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Interlocking Brick (May 2019)

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ABSTRACT There is a need to identify innovative technologies to supplement age-old concrete and burnt clay brick mortar based construction for masonry work. Today we need technologies which are sustainable in terms of one or more of the following parameters i.e. use of locally available resources – material & manpower, cost effectiveness, eco-friendly, easy to adopt in construction practice, can be cast – in situ to reduce transportation, faster to build and energy efficient. The paper addresses the technical specifications, raw material options, construction procedure, structural performance energy and conformity with the building standards. The use of interlocking bricks masonry has gained rapid popularity in many foreign countries as an alternative to conventional bricks for sustainable housing. It is being always challenge for researchers to make interlocking brick light weight, low cost and improve the performance against aggressive environment. An experimental effort made in this concern. This paper gives the results of an experimental investigation in which the compressive strength, water absorption and density were investigated by using varying percentage of fly ash, stone dust, and sand with different mix proportion. The interlocking bricks will prove to be economical from manufacturing point of view, may eliminate plaster and prove to be user friendly and eco-friendly as waste materials like fly ash will be used.

INDEX TERMS interlocking, flyash, eliminate plastering, ecofriendly.

1. INTRODUCTION

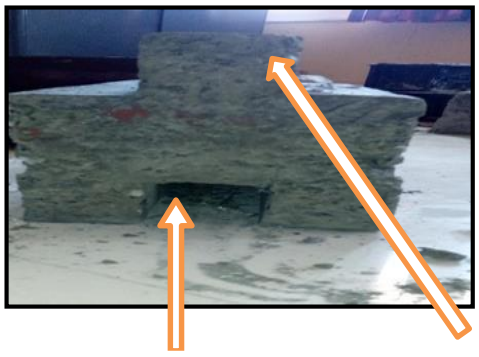
A very high amount of waste is being produced all around the world. The most common method of managing waste is through its disposal in landfills creating in that way huge deposits of waste. In this situation, waste recycling is gaining increasing importance [1]. At present in India, about 206 coals based thermal power plants are producing about 160 million tons of fly ash every year, the current annual production of fly ash worldwide is estimated around 600 million tonnes. The dry stacked interlocking block masonry replaces the conventional brick and mortar construction masonry by interlocking blocks masonry construction. The other components of the conventional building system remain largely unchanged. The system is a dry stacked Interlocking masonry but can be done with mortar/slurry/grout also that enables aesthetic and affordable building, speedier construction of high quality in stretcher bond, and as well as in the normal English/Flemish bond with mortar. The blocks have an extremely appealing face brick/wash finish and provide a pre-pointed straight masonry. The walls may be left exposed, plastered/rendered or finished with cement wash.

Mortarless technology is directly associated with interlocking bricks: so the two terms will be used interchangeably.

2. METHODOLOGY:

1. Design of the Brick:

Initially the size of the brick was decided and then accordingly the shape was finalized. The main focus was on the design of the interlocking male and the female parts so that the bricks can be locked with each other with less use of mortar.



Female part Male part

2. Making of the mould:

A mould was made in plywood and a no. of bricks were casted from the mould.

Size of the brick= 18" x 8" x 8"

3. Material:

1. **Flyash:**

The main material to be used in production of the brick will be flyash. Flyash being a waste product it is easily and cheaply available, hence results in lightweight, economical brick.

Material	Chemical Constituents	Percentage
Fly ash	Silica (as SiO_2)	64.23 %
	Alumina (as Al_2O_3)	25.82 %
	Iron (as Fe_2O_3)	4.06 %
	Sodium (as Na_2O)	0.40 %
	Sulphur Trioxide (as SO_3)	0.27 %
	Magnesium Oxide (as MgO)	0.78 %
	Loss of ignition (as I.OI)	0.39 %

2. **Cement:**

Cement to be used along with flyash to increase the bonding and to provide enough strength to the block.

3. **Sand/Crush Sand/River Sand:**

Sand i.e., fine aggregate obtained locally from nearest river is used or we can also use crush sand instead.

4. **Water:**

Water used for mixing the soil should be free from dissolved contaminants, suspended particles. Ordinary tap water was used for both mixing the constituents of the bricks as well as for the curing of bricks.

3. DESIGN TRIALS FOR BRICK

Fig 2.Model of brick made using soap

Fig 3. Locking of bricks with one another

Fig 4. Locking of bricks with one another

4. VARIOUS DESIGN MIXES :

A number of design mixes were made and cubes of 150 mm x 150 mm x 150 mm were casted and its compressive strength was checked, of which some are shown in the table:

Sr No	Cement	Sand	Flyash	Compressive Strength	Weight (kg)
1.	1 (20%)	1(20%)	3(60%)	3.7 MPA (3 Days)	7.300
2.	1 (30%)	0.67 (20%)	1.67 (50%)	3.81MPA (3 Days)	8.210
3.	1 (10%)	1(10%)	8(80%)	Failed	6.720
4.	1 (15%)	0.67 (10%)	5(75%)	Failed	6.830
5.	1 (25%)	1(25%)	2(50%)	7.3 MPA (7 Days)	8.120

Table 1.

5. FUTURE SCOPE

1. Reduction in wastage of mortar.
2. Economy in construction.
3. Lightweight construction.
4. Eco-friendly bricks.
5. User friendly bricks.

construction.

7. High finish blocks are made; result in exposed finish aesthetic walls, saving on plaster/rendering & finishes.

6. CONCLUSION

1. Interlocking bricks are economical as flyash(waste) is used.
2. They will help eliminate plaster due to their high quality finish.
3. They will help reduce the wastage of mortar.
4. They will be user friendly.
5. They are lightweight and cover area as much as covered by 5 conventional clay bricks(19cm x 9cm x 9cm)

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Slope Stability Analysis Against Earth Retaining Structures: Case Study (May 2019)

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ABSTRACT In this paper the comparative study of input design parameter in pre and post construction condition of earth retaining structure is studied. RCC retaining structures are constructed for total lifespan of 30-60 years but generally it cannot withstand for its total life. A parametric study is conducted to assess the durability of cantilever earth retaining wall at Dasgaon from Mahad Tehsil, Maharashtra. To find out current actual input design parameters, various geotechnical laboratory tests were conducted on the soil sample collected from backfill such as particle size distribution, natural moisture content, atterbergs limit, coefficient of permeability, maximum dry density and optimum moisture content, cohesion and internal angle of friction by direct shear test, and results were calculated. The results of these tests are used to find out the factor of safety considered for structural safety while designing cantilever retaining structure and the effect of changed input design parameters on factor of safety is compared and conclusion about durability is noted.

I. INTRODUCTION

Retaining walls are relatively rigid walls used for supporting the soil mass laterally so that the soil can be retained at different levels on the two sides. Retaining walls are structures designed to restrain soil to a slope that it would not naturally keep to typically a steep, near-vertical or vertical slope. They are used to bound soils between two different elevations often in areas of terrain possessing undesirable slopes or in areas where the landscape needs to be shaped severely and engineered for more specific purposes like hillside farming or roadway overpasses.

Earth retaining structures (ERS) are used to hold back earth and maintain a difference in the elevation of the ground surface. The ERS is designed to withstand the forces exerted by the retained ground or “backfill” and other externally applied loads, and to transmit these forces safely to a foundation and/or to a portion of the restraining elements, if any, located beyond the failure surface.

Drainage is one of most important parameter used in construction of earth retaining structures. Earth retaining structures such as retaining walls also need to consider groundwater drainage. Typical retaining walls are constructed of impermeable material which can block the path of groundwater. When groundwater flow is obstructed, hydrostatic water pressure buildups against the wall and may cause significant damage. If the water pressure is not drained appropriately, retaining walls can bow, move, fracture and seams separate. The water pressure can also erode soil particles leading to voids behind the wall and sinkholes in the above soil. Traditional retaining wal drainage systems can include, French Drains, drain pipes o weep holes. To prevent soil erosion, Geotextile filter fabric are installed with the drainage system. Disturbance i surface and subsurface drainage affects serviceability o earth retaining structures (ERS).

II. LITERATURE REVIEW

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In this paper author presents the experimental results of a comparative study carried out on the Bristol shaking table The behaviour under seismic loads of two similar models o retaining walls has been investigated. One of them modelled a reinforced soil wall, while the other was a confined wall. The test programme used three types o inputs: sinedwell, Calitri and EC8. Since testing objective were the settlements, horizontal displacements and induce accelerations at five different levels appropriate recordin devices were provided. A total of 50 quakes with gradually increasing intensities were performed: 26 for the gravity model and 24 for the confined one. The tilting phenomeno experienced by prototype retaining walls in the Kob earthquake also occurred in the shaking table tests However, the two models behaved essentially differently While the induced accelerations were much amplified by

the gravity model, the confined model showed a strong attenuation. Both conceptual design and further research of practical interest for developing advanced numerical models are supported by the results.

2) **Richards, R. "Tilting failure of retaining walls including p-delta effect and application to Kobe walls." In Proc. 12th World Conf. on Earthquake Engrg. 2000.**

The purpose of the research described in this paper is to generalize the Richards and Elms (1979) procedure for prediction of seismically induced permanent displacement of retaining walls for the case of mixed sliding and rotation modes. A simplified mathematical model and modified computational method based on the work of Siddharthan et al (1992) is presented. In the model presented in this paper seismic reduction of bearing capacity is included in the Siddharthan approach; and the P-Δ effect, and corresponding magnification of displacements is also considered in the analysis. Initially, the model is applied to a simple problem to demonstrate the concepts and application. Finally, as a check on the validity of the analysis, retaining walls located in Kobe, Japan are investigated using an available time history of acceleration record from the Hyogoken- Nambu Earthquake as input. The results from the calculation are in good agreement with the observed behavior of the Kobe walls.

3) **Yang, Su, Amin Chegnizadeh, and Hamid Nikraz. "Review of Studies on Retaining Wall's Behavior on Dynamic/Seismic Condition." Journal of Engineering Research and Applications, ISSN (2013): 2248-9622.**

Current theories, experimental investigations and numerical findings for retaining walls subject to dynamic excitations are reviewed. Brief features of each method, and experimental and numerical methods are introduced and compared. Tables are listed after each section for a clear and brief view of methods in a categorized manner. Conclusive comments plus current concerns and future expectations of this area are made at last. This review aims at shedding light on the development and concepts of different researches in dynamic retaining wall design and analysis.

4) **Manchanda, M. L., M. Kudrat, and A. K. Tiwari. "Soil survey and mapping using remote sensing." Tropical ecology 43, no. 1 (2002): 61-74.**

Soil survey constitutes a valuable resource inventory linked with the survival of life on the earth. The technological advancements in the field of remote sensing and Geographical Information System have been a boon for such surveys. Present paper describes the role of remote sensing and Geographical Information System (GIS) technologies for mapping and characterizing soils at various scales. The spectral behaviour of soil and its components, which is fundamental to deriving information from remote sensing data, is also discussed with illustrations. Furthermore, the scope of present day remote sensing data for varying levels information generation is also reviewed.

5) **Thine, Christian, K. Shepherd, M. Walsh, M. Coe, and G. Okwach. "Application of GIS and remote sensing in characterization of soil hydraulic properties for soil physical quality assessment." Project report (2004).**

Populations in sub-Saharan Africa depend heavily on natural resources but land degradation is posing a serious threat to future public welfare. In tropical watersheds, particularly the semi-arid and arid areas within Eastern Kenya, it is believed that soils are undergoing rapid degradation (Okwach, 2002) both chemically (e.g. nutrient depletion) and physically (e.g. soil infiltration and erosion). Progress in addressing these problems is impaired by a lack of methodology for reliable and repeatable measurement of soil degradation over large areas. However, recent advances in technology for GIS and remote sensing at different scales provide new opportunities for large area rapid assessment.

III. METHODOLOGY

The proposed study will correlate the impact of changes in drainage pattern on ERS by using geo-informatics tools and hydro processing models.

- To carry out the rigorous literature survey to define the methodology to carry out the project work. To select the satellite imagery, digital elevation models database and recent geoinformatics tools for achieving greater efficiency.
- Comparing the results obtained from the RS and GIS techniques against laboratory test for ground truth study.
- To carryout various geo-technical tests to suggest the input database for structural design of ERS.
- To run the hydrological models to achieve the variables that affect the design of earth retaining structures.
- To formulate mathematical equation amongst proposed changes in drainages and its impact on reduction of serviceability of ERS.
- To derive the effects of various conditions on the structure and the decrease in the life of the structure and predicting its failure.

IV. CASE STUDY

1.1 Background & History

The present Raigarh district owes its name from the historical fort of Raigarh built by Shri Chhatrapati Shivaji Maharaj and is the erstwhile Kolaba district of Maharashtra state. The reorganization of state in 1956, the Kolaba

district was incorporated in Bombay state. Since 1960, it forms a part of Maharashtra state. Kolaba district has been renamed as Raigarh district from 1st January 1981. Raigarh district forms a part of Konkan coastal plain and has a north-south coastline of Arabian Sea about 240 km. The district has natural scenic beauty and historical background with forts and ports constructed by Shri Chhatrapati Shivaji Maharaj.

1.2 Location

Raigarh district is situated in Konkan region of Maharashtra state covering an area of 7148 sq km which is about 2.27 per cent of the total area of the state. (Fig. 2.1) It lies between 17o51' and 19o 80' N latitude and 72o 51' and 73o 40' E longitude with an altitude of 10 to 50 metres above mean sea level (MSL). Raigarh district covers 240 km out of 720 km coastal length of Arabian Sea.

1.3 Materials and Procedures

The soil sample for the purpose of this research was collected from Dasgaon Village in Mahad Tehsil. The soil sample A shows the result of soil at foundation and soil sample B shows the result of soil at backfill material. In design, the important input design parameters are specific gravity, plastic limit, liquid limit, plasticity index, particle size distribution, coefficient of permeability, cohesion, internal angle of friction and soil bearing capacity. This all parameters are depending on natural condition. The local parameters for Dasgaon cantilever retaining wall are calculated by laboratory test. For sample A 1.5 Kg sample and for sample B 1 kg sample is used for particle distribution of soil by sieve analysis test. The particle size distribution of soil and backfill are shown in table 1.

1.4 Input design parameters

From structural point of view cohesion, internal angle of friction and soil bearing capacity are important parameters. The various soil parameters and their relationship is described below.

a) ***Specific Gravity:***

Increase in specific gravity can increase the shear strength parameters (cohesion and angle of shearing resistance). Also increase in specific gravity also increases the California bearing ratio.

b) ***Consistency Limits*** Plastic limit and liquid limit are known as consistency limit. The consistency limit is used in soil classification and finding various correlations with other soil properties

c) ***Particle Size Analysis***

The particle size distribution curve (gradation curve) represents the distribution of particles of different sizes in the soil mass. Information obtained from particle-size analysis can be used to predict soil-water movement, although permeability tests are more generally used.

d) ***Permeability of Soil***

The amount, distribution, and movement of water in soil have an important role on the properties and behavior of soil. Shear strength of soils also depends indirectly on its permeability, because dissipation of pore pressure is controlled by its permeability.

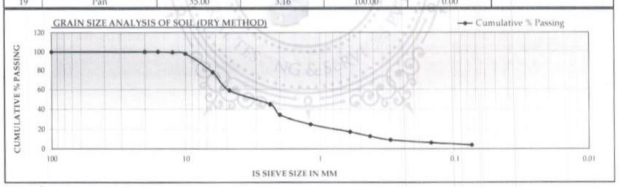
e) ***Shear Strength of Soil (cohesion and internal angle of friction)***

Shear strength is the most important geotechnical property of soils; help in stability of civil engineering structures on or below the earth. The shear strength of soil depends on the effective stress, drainage conditions, density of the particles, rate of strain, and direction of the strain. Thus, the shearing strength is affected by the consistency of the materials, mineralogy, and grain size distribution, shape of the particles, initial void ratio and features such as layers, joints, fissures and cementation. Shear strength parameters are a result of the frictional forces of the particles, as they slide and interlock during shearing. Friction angle is high for a sandy soil than its cohesion and vice versa for clayey soil.

SL No	Name of Test	Unit	Test Results	Test Method
1	**Light Compaction Procter Test**			IS:2720:1983 (P-8) (RA 2015)
	a) Maximum dry density (MDD)	g/cc	1.98	
	b) Optimum Moisture Content (OMC)	%	15.05	
2	Lab CBR (Soaked) 96 Hrs	%	9.96	IS:2720:1987 (P-16) (RA 2011)
3	Natural Water Content	%	16.95	IS:2720:1973 (P-2) (RA 2015)
4	Natural Compaction By Core Cutter	%	96.50	IS:2720:1973 (P-29) (RA 2015)
5	Atterberg's limit's Liquid limit (LL)	%	Non Plasric - Sandy Soil	IS:2720:1985 (P-5) (RA 2015)
6	Atterberg's limit's Plastic limit (PL)	%	Non Plasric - Sandy Soil	IS:2720:1985 (P-5) (RA 2015)
7	Atterberg's limit's Plasticity Index (PI)	%	Non Plasric - Sandy Soil	IS:2720:1985 (P-5) (RA 2015)
8	Specific Gravity	-	2.48	IS:2720:1985 (P-3) Sec-1 (RA 2016)
9	Free swell index	%	10	IS 2720:1977 (Part 40) (RA 2011)

GRAIN SIZE ANALYSIS OF SOIL (DRY METHOD)

Sl No	IS Sieve Size (mm)	Wt.Retain (gm)	% Wt. Retain	Cumulative % Wt. Retain	Cumulative % Passing	Classification
1	100	0.00	0.00	0.00	100.00	Cobbles
2	75	0.00	0.00	0.00	100.00	0%
3	53	0.00	0.00	0.00	100.00	Gravel Coarse
4	37.5	80.00	7.25	7.23	92.77	23%
5	25	108.00	9.76	17.00	83.00	Gravel Medium
6	19	70.00	6.33	23.33	76.67	22.97%
7	16	52.00	4.70	28.03	71.97	Gravel Fine
8	12.5	64.00	5.79	33.82	66.18	26.54%
9	6.3	138.00	12.48	46.29	53.71	Sand Coarse
10	4.75	56.00	5.06	51.36	48.64	15.10%
11	2.36	85.00	7.69	59.04	40.96	Sand Medium
12	2.0	152.30	13.79	72.83	27.17	4.25%
13	1.18	100.50	9.09	81.92	18.08	Sand Fine
14	0.600	66.50	6.01	87.93	12.07	4.97%
15	0.425	33.50	3.03	90.96	9.04	Silt & Clay Size
16	0.300	21.50	1.94	92.90	7.10	3.16%
17	0.150	31.50	2.85	95.75	4.25	Total Sample
18	0.075	12.00	1.08	96.84	3.16	1106.00
19	Pan	35.00	3.16	100.00	0.00	



1.5 Drainage Morphology

The streams of the area display a sub-dendritic pattern characterised by sharp, nearly right-angled bends. They are short and flow westwards over a humid tropical landscape of280 to 100 meters ASL, along narrow to broad V -shaped valleys. Rivers in the region originate from Sahyadri range. and attain their base level of erosion within a distance m 20

km. They have their knick points along the base of the scarps and have east to west course in general. Ulha~ Patalganga, Amba, Kundalika, Kal and Savitri are some 0: the major rivers. The river systems are young and owing t heavy rainfall, they exhibit headward erosion capabilit~. resulting in river piracy at places. In the lower reache. many of them are tidal in nature (Das, 1999). The district is spread over 15 watersheds viz. WS I, WS2. WS3, WS4, WSS. WS6. WS7, WS8, WS9, WSW, WS1J. WS12, WSI3. WS14 and WSIS. Out of this, WSI, WS12 and WS13 fall only partially in the district.

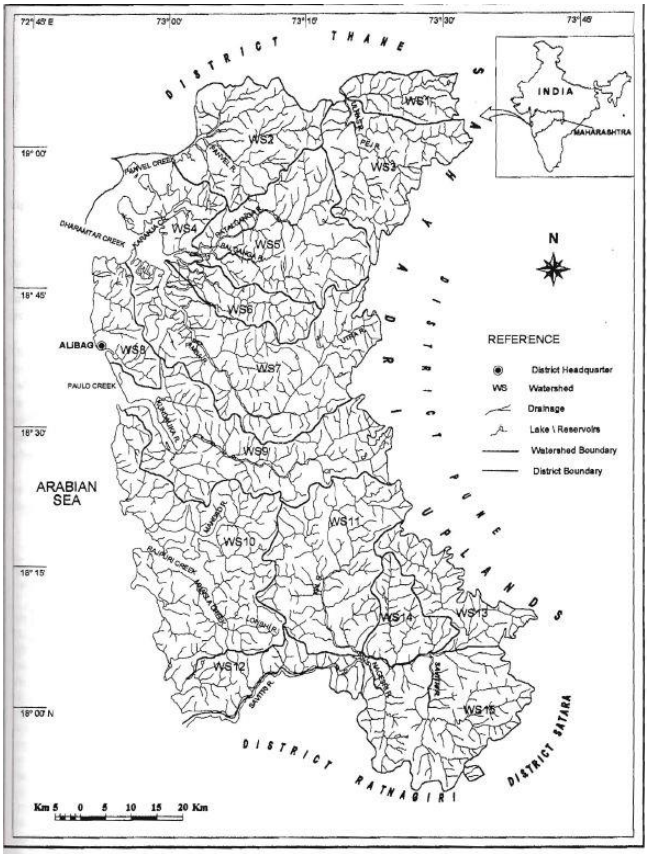


Fig.1. Drainage map of the study area showing watershed boundaries.

Table 1. Order, number and lengths of streams in different watersheds

Watershed No.	Stream characteristics	Stream Order				
		1st	2nd	3rd	4th	5th
WS 1	Total Stream Length (Km)	54.37	38.35	25.61	-	-
	Cum. Stream Length (Km)	54.37	92.72	118.33	-	-
	Total Number of Streams	21	7	1	-	-
	Mean Stream Length (Km)	2.59	5.47	25.61	-	-
WS 2	Total Stream Length (Km)	122.07	60.07	33.85	28.50	22.36
	Cum. Stream Length (Km)	122.07	182.14	215.99	244.49	266.85
	Total Number of Streams	49	9	3	2	1
	Mean Stream Length (Km)	2.49	6.67	11.28	14.25	22.36
WS 3	Total Stream Length (Km)	131.64	41.77	37.88	47.93	23.90
	Cum. Stream Length (Km)	131.64	173.41	211.29	259.22	283.12
	Total Number of Streams	59	10	4	2	1
	Mean Stream Length (Km)	2.23	4.177	9.47	23.96	23.90
WS 4	Total Stream Length (Km)	34.99	23.94	11.70	22.73	-
	Cum. Stream Length (Km)	34.99	58.93	70.63	93.36	-
	Total Number of Streams	19	6	2	1	-
	Mean Stream Length (Km)	1.84	3.99	5.85	22.73	-
WS 5	Total Stream Length (Km)	173.15	97.01	45.00	32.92	38.06
	Cum. Stream Length (Km)	173.15	270.16	315.16	348.08	386.14
	Total Number of Streams	65	17	4	2	1
	Mean Stream Length (Km)	2.66	5.70	11.25	16.46	38.06
WS 6	Total Stream Length (Km)	72.83	17.89	27.81	16.26	-
	Cum. Stream Length (Km)	72.83	90.72	118.53	134.79	-
	Total Number of Streams	26	4	2	1	-
	Mean Stream Length (Km)	2.8	4.47	13.90	16.26	-
WS 7	Total Stream Length (Km)	243.87	140.40	72.70	41.87	100.61
	Cum. Stream Length (Km)	243.87	384.27	456.97	498.84	599.45
	Total Number of Streams	101	28	10	3	1
	Mean Stream Length (Km)	2.41	5.01	7.27	13.95	100.61
WS 8	Total Stream Length (Km)	53.32	31.71	32.33	9.40	-
	Cum. Stream Length (Km)	53.32	85.03	117.36	126.76	-
	Total Number of Streams	25	7	4	2	-
	Mean Stream Length (Km)	2.13	4.53	8.08	4.70	-

1.6 Ground Water Resources

Central Ground Water Board and Ground Water Survey and Development Agency (GSDA) have jointly estimated the ground water resources of Raigarh district based on GEC–97 methodology. The same is presented in Table-4. Ground water assessment is done for an area of 3747 sq. km of which 152.94 sq. km area is under command and 3594.65 sq. km area is under non– command. As per the estimation the total annual ground water recharge is591.65 MCM with the natural discharge of 29.87 MCM, thus the net annual ground water availability comes to be 561.77 MCM. The gross draft for all uses is estimated of 67.48 MCM with irrigation sector being the major consumer having a draft of 46.53 MCM, whereas the domestic and industrial draft is to the tune of 20.94 MCM. The net ground water availability for future irrigation is estimated to be 473.35 MCM, whereas the allocation for domestic and industrial supply up to next 25 years is 41.88 MCM. Stage of ground water development varies from 6.22% (Karajat) to 32.97% (Alibaga). The overall stage of ground water development for the district is 12%. All the talukas and watersheds of the district fall in "Safe" category.

(in ham)

Taluka	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for irrigation	Existing Gross Ground Water Draft for domestic and industrial water supply	Existing Gross Ground Water Draft for All uses	Provision for domestic and industrial requirement supply to 2025	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development (%)	Categorisation
Alibag	3189.75	617.67	433.83	1051.50	867.66	1704.43	32.97	Safe
Karjat	6614.70	265.77	145.73	411.50	291.46	6057.47	6.22	Safe
Khalapur	4779.45	248.15	159.78	407.93	319.58	4211.83	8.54	Safe
Mahad	4410.13	300.69	155.80	455.89	311.58	3798.41	10.34	Safe
Mangaon	8106.59	236.62	178.24	414.86	352.58	7519.03	5.12	Safe
Mhasala	1934.73	417.31	66.58	483.89	133.71	1385.06	25.01	Safe
Murud	2016.57	226.85	45.61	272.45	91.80	1699.35	13.51	Safe
Panvel	5098.74	824.84	359.42	1184.26	718.83	3555.03	23.23	Safe
Pen	3266.22	169.77	98.56	268.33	197.13	2899.36	8.22	Safe
Poladpur	1922.00	66.56	81.68	148.24	163.37	1692.07	7.71	Safe
Roha	6376.60	358.95	128.84	487.78	257.88	5760.29	7.65	Safe
Shriwardhan	1415.04	375.34	56.54	431.87	113.09	926.64	30.52	Safe
Sudhagad	3745.26	185.87	99.20	285.07	198.39	3360.95	7.61	Safe
Tala	1329.49	183.14	34.67	217.81	71.90	1069.51	16.38	Safe
Uran	1972.02	177.04	49.61	226.65	99.21	1695.75	11.49	Safe
Total	56177.28	4653.96	2094.08	6748.05	4188.16	47335.15	12.0	Safe

VI. CONCLUSION

Comparing the results of retaining wall design obtained by two sets of input design parameter shows the changes observed in current design parameters due to impact of rainfall intensity, overall climatic conditions and manmade activities like nearby construction. This proves that due to change in the considered input design parameters at current condition the serviceability of cantilever earth retaining structure is about to decrease against pre decided lifespan of 60 years. This triggers the need to study the input design parameters periodically so as to one can able to manage these parameters in safe range to achieve and enjoy the service for design lifespan of 30-60 years.

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Computer Engineering

A Web-Based Emergency Alert System (May 2019)

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ABSTRACT In today's developing world where vehicles are on the rise, Accidents remain one of the major cause of deaths. Reasons for occurrence of accidents can be of varying parameters, some of the reasons include not following the traffic rules, drink and driving, rash driving, etc. Whenever an accident occurs post-occurrence scenario remains a crucial time period as it can determine the life and death of persons involved in accidents. If medical aid is not provided at time, it can result in death of the persons met in accidents. Existing system includes reporting of accidents with the help of helpline numbers, toll-free numbers, though they can provide relief to the victims at some point they may tend to fail in protecting the victims. Police personnel who arrive at the scene sometimes may get confused on how did the accident occur as they do not have the evidence, whether it was a collision, vehicle coming from wrong direction or any other causes. To address all these issues we are presenting with an emergency alert system in this paper. Billions of people all over the world now own a smartphone with a good camera. This system is implemented in two phases-an android application which will capture the image of the accident and the web based system which will be at the back-end providing alerts to hospitals, police stations and fire-stations. The image will be captured by the user who will have the android application installed on his smartphone. Once the image is captured the user will upload it to the server /backend which will send an alert to nearby police stations and hospitals so that quick action can be taken. The captured image will contain the date, time and location where the incident took place. By implementing the system we tend to reduce the time of reporting and quick dispatch of the emergency services to the accident location.

INDEX TERMS Camera, GPS (Global Position System), Android App Development, MySQL

1. INTRODUCTION

Accidents are one of the leading causes of death in developing as well as developed countries. Many people who meet with accidents die on spot is due to delay in providing medical aid after the accident has occurred. This delay can be attributed to many factors such as delay in calling emergency services, lack of responsibility among the onlookers who tend to just look on, problems in network connectivity, etc. Inorder to address all these issues this emergency alert system is proposed and implemented. This system will use the GPS for getting accurate location and will contain the time-stamp and date stamp when the image is captured by the user using the android application. After uploading the captured image there will be an alert sent to nearby hospitals, police stations and fire-stations considering the area were the accident is occurred. By introducing this system we tend to improve the efficiency of accident reporting and save more human lives.

2. EXISTING SYSTEM

The existing system provides solutions in the form of Help-lines, Toll-free numbers, Control-Room help-line, etc. Existing system provides certain solutions which provide efficiency till a certain amount. At certain scenarios these systems may fail to address the solution properly. So Inorder to address the post-accident scenario we are proposing a web-based emergency alert system.

3. Proposed system

The system that we are proposing is known as a Web-based emergency Alert System which basically works when a user captures the image and uploads it to the server, when the system receives any kind of image it sends an alert to the police-stations, hospitals using k-NN algorithm and haversine formula. The hospitals then respond by acknowledging the alert or the alert will be forwarded to next nearest hospitals

4. System Architecture

This systems involves four important participants, they are the user who has the android application installed on smartphone. Hospitals, police stations and fire stations will first have to register and login on our system to prevent misuse. They will be having the backend of the system through which they will receive the alerts whenever an incident/accident has taken place. The personnel deployed at police stations will have to acknowledge the alert and deploy the team immediately. The images captured will be stored in a database.

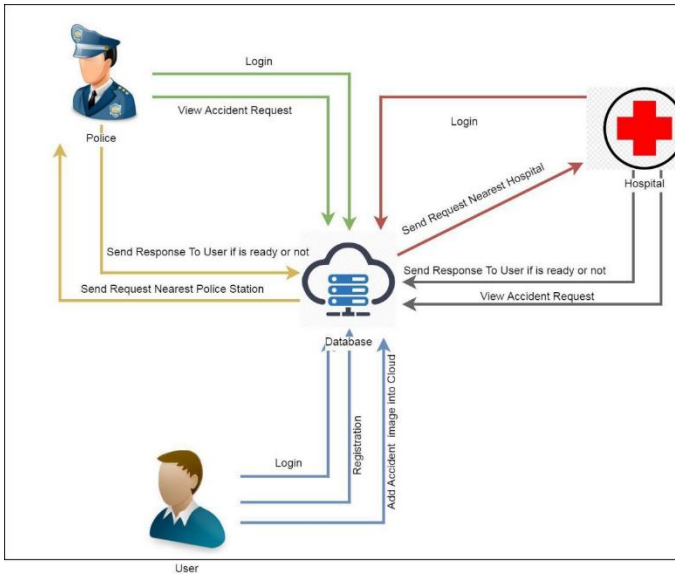

Figure 1. Proposed System Architecture

5. MATHEMATICS

In our system we are taking help of concept in mathematics known as haversine formula. The Haversine formula determines the great-circle distance between two points on a sphere given their longitudes and latitudes. Important in navigation, it is a special case of a more general formula in spherical trigonometry. The equation of this formula is as follows

$$d=2r\arcsin*\sqrt{hav(\varphi 2-\varphi 1)+\cos(\varphi 1)\cos(\varphi 2)hav(\lambda 2-\lambda 1)} \text{ --1}$$

6. k-NN Algorithm

k-NN algorithm is a classification based algorithm and used in machine-learning and applied fields. It is also named as lazy algorithm as it does not contain an explicit training phase. k-NN algorithm is very beneficial as it does not require little or no prior knowledge of distribution data. We can say that k-NN algorithm is very much based on how close the features resemble our training data-set and perform the classification accordingly. It is also useful in detecting the outliers in a given data-set. Basically, it classifies the neighbors based on distance functions

7. Mathematical Model of our system

System Description:

Input:
u=No of user
u=u1, u2, u3….u nth
GPS =Global Position System
Camera

Process:
Process1: User- User Registration and Log in
Process2: User Take accident Picture with current location
Process3: Police- Log in and View Accident Location and Take Action.
Process4: Hospital- Log in and View Accident Location and Send immediate Ambulance Services.

Output:
O=Generate the report of every accident.

8. Working of our system

Whenever an accident occurs, the user who is present will capture the image of the accident and upload it to the server. The image will contain the location in the form of longitude and latitude, time and date. At the backend the system will store the image in the database and send an alert to nearby hospitals using the haversine formula. After getting the alert the personnel present in hospitals will acknowledge the alert and deploy the team immediately. If the hospital is not able to provide immediate assistance it will forward the alert the next nearby hospital. This will be effective in cities and certain location where the probability of occurrence of accident is more.

8. Results and screenshots of our system

We have tested our application for the same whenever an accident occurs, the user who is present will capture the image of the accident and upload it to the server. The system takes couple of seconds for uploading which may incase depend on data connectivity. As this is for an emergency alert systems we performed the testing by using dummy values. The necessary alert were sent to emergency services. Our application performed well during testing and provided the appropriate results

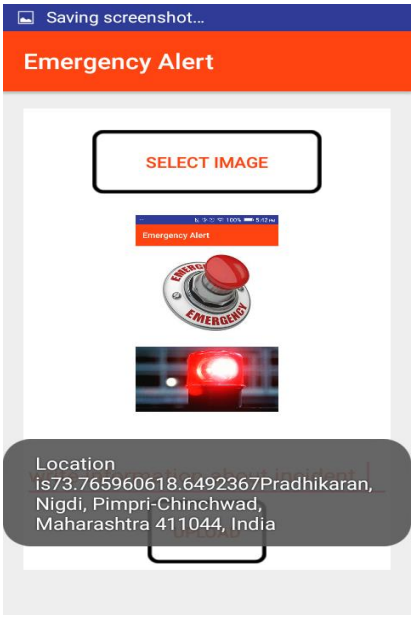

Figure 2.Test image displaying the location of the incident occurred while uploading the image

9. Conclusion

The proposed system is developed to provide the information about the occurred accident and the location of the accident .It helps to easily provide assistance to the victim. This system uses GPS module to locate the vehicle. The results of the proposed systems are satisfactory.

10. Acknowledgement

I would like to take this opportunity to thank my internal guide Prof. Jameer Kotwal for giving me all the help and guidance I needed. I am really grateful to them for their kind support. Their valuable suggestions were very helpful. I am also grateful to Prof. Dr. Archana A. Chaugule, Head of Computer Engineering Department, PCCOER for their indispensable support, suggestions. In the end our special thanks to Principal Dr. H.U. Tiwari for providing various resources such as laboratory with all needed software platforms, continuous Internet Connection, for our project.

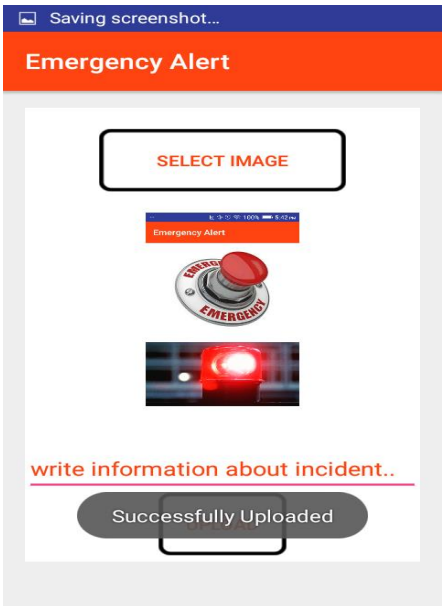

Figure 3. Uploading the image and description of accident module

11. Future Scope

The Proposed system can be extended by using sound sensor, so that it becomes more accurate and efficient to detect and avoid the accident. By introducing deep-learning methods. We will be trying to automate the process of capturing the accident image by installing devices at specific locations where there are high chances of occurrence of accidents.

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He is member of professional societies like ACM, ISTE and LIMSTE. He is on editorial board and review panel of various journals and conferences. He has given expert talks on concepts in Compiler Design in various Colleges. He is also an Journal reviewer member of Advances in Science, Technology and Engineering Systems Journal.

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provide first insight into hardware differences between various smartphone models and suggestions for further investigation and optimization of the algorithm, sensor choices and signal processing.

3.TITLE: Providing Accident Detection in Vehicular Networks Through OBD-II Devices and Android-based Smartphones.

Published by: Jorge Zaldivar, Carlos T. Calafate, Juan Carlos Cano, Pietro Manzoni By combining smartphones with existing vehicles through an appropriate interface we are able to move closer to the smart vehicle paradigm, offering the user new functionalities and services when driving. In this paper we propose an Android based application that monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents. Our proposed application estimates the G force experienced by the passengers in case of a frontal collision, which is used together with airbag triggers to detect accidents. The application reacts to positive detection by sending details about the accident through either e-mail or SMS to predefined destinations, immediately followed by an automatic phone call to the emergency services. Experimental results using a real vehicle show that the application is able to react to accident events in less than 3 seconds, a very low time, validating the feasibility of smartphone based solutions for improving safety on the road.

3. System Architecture

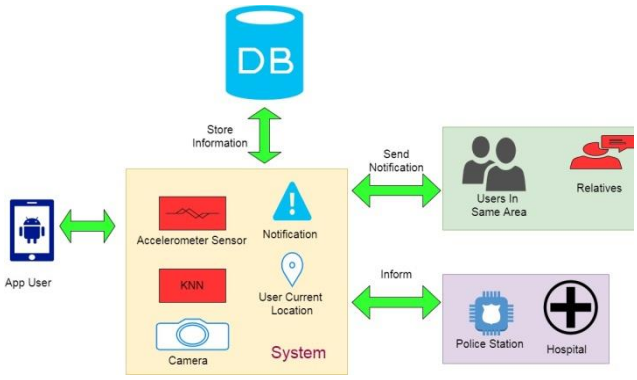

Figure 1: System Architecture

4. Proposed System

In proposed system, our system place user's mobile on desk at the time of driving. Accident is detected with the help of accelerometer sensor. When accident is occurred, it checks accident is occurred or not by sending alert notification to application user. If user responds to system with confirmation that user is ok then system will be in normal mode. If user gives no response or tells that user is not ok then system will take photo from front camera and with current address sends all information to nearest hospital, police station and user relatives. A. User: In this module user register into the system. All information (Name, Mobile No., UID No., License No., and Password) of user stored into data based. User places the mobile in car. This application also shows accident spots. So, user can take precaution about accident.

B. Admin: After detecting accident, system will alert to user and take the response if user doesn't response to system then system consider that accident actually occurred. System will collect accident spot information (Location, Username) and then stored into database. After collecting data, the system searches the nearest hospital and police station. C. Inform nearest hospital and police station: System at the background searching the nearest location of police and hospital. After searching done system request successfully send to that police station. In this model user current location used to find nearest hospital and police station.

D. Inform to relatives and other user: After detecting accident system inform to nearest user to avoid the traffic. System also inform to relatives by sending SMS. Relative's mobile number is store at user registration.

Figure 2: Working of ultrasonic sensor

Ultrasonic Sensor is used for detecting presence of an object, that object can be user. Ultrasonic Sensors or Ultrasonic transducers are type of acoustic sensor. Transmitters are used to convert electrical signals into ultrasound, receivers can convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

Figure 3: ESP8266 Microcontroller

The ESP8266 is a microcontroller having low cost microchip with full TCP/IP and microcontroler stack capability that allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands.

5. Conclusion

Result shows that the application developed is able to correctly fulfill its purpose within a short time period. Overall time required to perform all the tasks, including the delivery of an SMS with the accident details, followed by providing the nearby police station and hospital details and providing them an alert message of the user accident with exact location of user, is taking short time period.

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Virtual Trial Room (May 2019)

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ABSTRACT Augmented reality is the technology that expands our physical world, adding layers of digital information onto it. Augmented reality adds digital element to live view by using cameras or sensors. The main aim of this work is to develop virtual trial room using augmented reality which allows user to try on virtual clothes. Kinect sensor is used to calculate the effective distance between the sensor and the user who is standing in front of it. Based on this distance we can analyze how the clothes will look on user. This application improves present augmented based posing and gives full view of 3D image rather than 2D image.

INDEX TERMS Augmented reality, Kinect v2, processing, Skeleton tracking

1. INTRODUCTION

A lot of shoppers have encountered a problem that trying clothes in clothing stores is usually a time consuming activity especially during peak hours such as weekends, it might not even be possible to try-on clothes in such cases as online shopping. Also Due to security reasons there is limitation on number of garments that can be taken for trial at a time (3). Also some times the shoppers are unable to show the customers the new stock that is supposed to arrive in coming few days. To overcome these problems we aim to develop a virtual trial room using augmented reality.
In this proposed application a sensor named Kinect is used for the overall analysis of the user's body measurements with the help of sensor information and his positioning coordinates. (5)
Following components will be required to design the system.

1.1 Kinect

Kinect is a line of motion sensing input devices that was produced by Microsoft. Kinect has resolution of up to 1280x1024, monochrome depth sensing video stream is in VGA resolution with 11-bit depth. This sensor will give video frames as input to system for finding the available dresses in database [6].

1.2 Processing

Processing is an incredibly powerful and versatile programming environment and language. All Processing code is translated to java code first. This means you can write java code and import java libraries in your Processing code, within (or outside) the Processing IDE.

1.3 LCD Screen

LCD screen will be used as interface between user and system for displaying the output.

2. Literature Survey

A. ***Md. Farhan hamid, md. Ashraful alam, "virtual wardrobe for physically impaired using microsoft kinect sensor"***

This paper throws light particularly on physically impaired people who are partially or completely challenged. For completely impaired people, sensor senses the head movements for iterating through the clothes and the eyes movement for selection of apparel[5]But the paper tends to incline more towards the challenged people rather than normal people leading to noticeable change in functions adding to which the population too reduces as compared to normal people.

B. ***Ari Kusumaningsih; Arik Kurniawati; Cucun Very Angkoso, Eko Mulyanto Yuniarno; Mochammad Hariadi, "User experience measurement on virtual dressing room of Madura Batik clothes"***

The system proposed in paper is used for online trial of Madura Batik clothes which is the regional wear of Indonesia. It provides virtual reality trial room for foreign customers to change consumer shopping experience and increase buying desire [8]. The major drawback here could be that the apparels are limited only to their regional wear and nothing apart from that.

C. ***Srinivasan K.,Vivek S., "Implementation of virtual fitting room using image processing"***

This system uses a fixed webcam for capturing the images of the user. This image is processed by MATLAB to compute every pixel of the image and check which apparel suits the best as per user's choice [9]. The drawback for this is that the system was only used for online shopping platform and not for any other offline use. Also as there is absence of kinect sensor due to which the actual measurements with respect to the depth is missing.

3. System Architecture

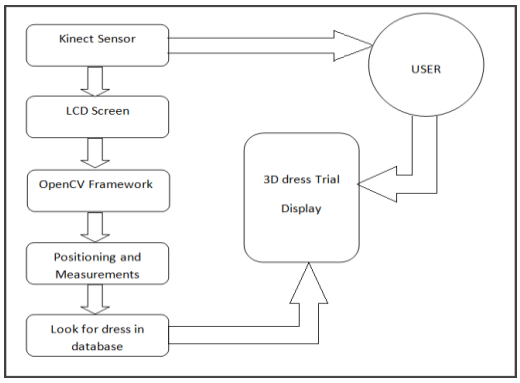

Fig1: System Architecture

4. Proposed System

The implementation of the project starts by initializing the kinect sensor, which acts as the main hardware of the project. Also for running the application, the IDE(Integrated Development Environment) is Processing 3.5.3. The programming language used is Java. As soon as the application starts, the GUI that flashes a debut is the choice given the user to choose between male and female. Once the first step is done, the next step consists of Apparel selection which consists of different categories like shirt, pant, dress, t-shirt. Once that is selected then the selected apparel gets mapped onto user body with the help of body coordinates. This could virtual representation of look of the apparel.

To augment the cloth onto the virtual body in the virtual environment of user interface, we need certain calculated parameters as an input for modeling the cloth and augmenting the cloth onto the virtual body. To achieve this, Kinect V2 provides 25 joints tracked at 30 frames per second frequency and we can access the joints using the Kinect SDK. Out of the 25 joints, we use certain joints to calculate the measurements of shirt required to be augmented on the virtual body. The figure depicts the joints obtained by skeletal tracking with which we will be performing some calculations for modeling the shirt later in this paper. Since, we are calculating the RGB pixel value at a position, say A, on user body by color stream and calculating the position coordinates by depth stream, we need to map each other to find the RGB pixel at a position A(x,y,z) .But since color stream and depth stream have different resolutions, we need the use of Coordinate Mapper which maps corresponding coordinates correctly. As a result, we have access to all coordinates on virtual user body with corresponding RGB values. The image has been taken from official Microsoft site to show the various joints detected while skeletal tracking. To augment the shirt onto the virtual human body, we need to fill the color stream of the tracked user by pixels of shirt stream at positions where the shirt is supposed to be augmented onto the virtual body. For instance, to calculate the length of shirt, we make use of the hip center joint coordinates and shoulder center coordinates. To calculate the width of the shirt around shoulders, we make use of the shoulder left joint coordinates and shoulder right joint coordinates and their difference gives the width of shirt around the shoulder. To calculate the waist size, we use the hip left joint coordinates and hip right joint coordinates and their difference gives the waist size. These sizes can also help in scaling and cropping the shirt to anticipated measurement. For rotation, we make use of slope of line formed between shoulder center joint coordinates after rotation and hip center joint coordinates after rotation with the slope of the line formed by shoulder center joint coordinates before rotation and hip center joint coordinates before rotation to calculate the rotation angle.

Our object model is the geometrical object that created by using Blender3D software. We created models for both male and female consumer. 3-D meshes of clothing are designed in Blender3D software and imported to Obj and mtl file. In this research, Blender3D created Obj-files for the 3d vertex modeling object, mtl-files for describing the surface shades.

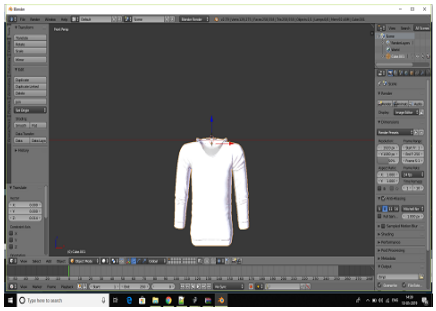

Fig2: Blender 3D

Homogeneous transformation matrix for 3D bodies and 3D has been made. We use a rigid transformation which consists of rotation (R), translation (T) and scaling (S) [8]. These three values transform the rigid object from a three dimensional coordinate to the reference coordinate. The transformation of each joint point from one of the three dimensional coordinates to the other is transformed by the value of certain rotational, translational and scaling values.

The most commonly used definition in graphics describes a rotation by Euler angles (Φ, θ, Ψ) as a product of three rotations. The matrix M for the rotation is, therefore, product of three others [9].

4.1 Scaling

Position of left-shoulder is calculated. This real world position is converted to projective. The same is repeated for right-shoulder To calculate x-coordinate, distance between left and right shoulder position is calculated.

- x-coordinate=RightShoulderPos.x-LeftShoulderPos.x.
- Neck position of skeleton = skel-neck.
- mid.y = ((LeftHip.y+RightHip.y)/2)
- y-coordinate = sqrt(sq(skel-neck-mid.y))
- z-coordinate is manually entered.

4.2 Translation

- The centre point of 3d model= jointPos
- This real world position is converted to projective.
- translate(jointPos.x,jointPos.y,60)
- The model gets translated

4.3 Rotation

- The centre point of 3d model= jointPos
- This real world position is converted to projective.
- translate(jointPos.x,jointPos.y,60)
- The model gets translated

To calculate rotation around x axis

- phi= atan(orientation.m12/orientation.m22)

To calculate rotation around y axis

- theta = -asin(orientation.m02)

To calculate rotation around z axis

- psi= atan(orientation.m01/orientation.m00)

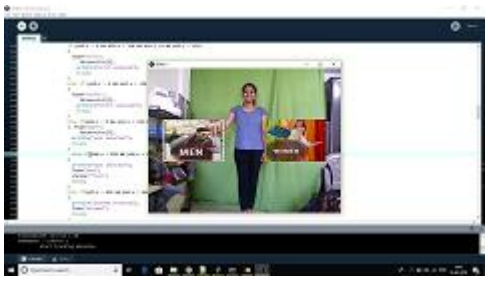

Fig3: Output

5. Conclusion

As the final output, system will display the available dresses from database according to positioning and measurements of user. The user can access the GUI by hand gesture and can select the apparel or also select various category. Thus it will be very convenient and hassle free for the customer to choose the perfect apparel through virtual means without much of inconvenience. Also an additional feature that gets displayed on the screen is the size of the apparel. The sizes of the apparel would me 'S', 'M', 'L', 'XL'. Along with this the price of the product, description about the selected category can also be displayed.

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Digitalization of Ticket with a Quick Response Code

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ABSTRACT Indian Railway's one of the eldest, biggest and convenient means of transport in India. And being the eldest and biggest it has hectic jobs with it. Using this application Ticket Checker can register on the app and using the credentials they can login. This application will help to display available and vacant seat in the train. It will show the seat map inside train. On clicking a particular seat all details of passenger that has booked seat will be shown to TC. This will reduce the paper work required and help TC to verify details quickly. Users have to scan QR code generated with ticket as this will update the details of onboard passenger to master data. Application provides Passenger Details with Source, destination, Name, etc.

INDEX TERMS Indian Railway, Ticket checker, Seat allocation, QR Code, scan QR code.

1. INTRODUCTION

Indian Railway is one of the most eldest, biggest and convenient means of transport in India. And it has very tedious jobs with it. Application proposed will give some important features to TC which will help in to reduce paper work. TC can view the seat map of train and it will display available and vacant seat. View of seat map will be same as online booking sites like paytm and book my show. On clicking on seat all details of passenger that has booked seat will be shown to TC. The application will be used to verify passengers and their details. QR(Quick Response) code is provided with every ticket purchased. User Scans the QR code which will update the data to sever and this is updated on the seat map available (by means of change in color of seat on seat map). Application provides Passenger Details with Source, destination, Name, etc. There should be verify button present, if seat verified Color of seat should be changed and would be updated in List. We need to create Web Portal for booking ticket, user will walk in and provide hid details and ticket will be booked on FIFO basis. Also, create PDF file or image File of ticket and QR code will be present on Ticket. User will scan QR code while entering into boogie. For demo, we can use Third Party App for scanning QR code. (Or add functionality to our own App for scanning). If passenger is not traveling who has

Reserved a seat then, TC can assign same seat for waiting list passenger and update details in Database accordingly.

2. RELATED WORK

We looked at several QR code ticket systems and GPS based ticket system that has been researched and implemented by other researchers. A brief survey of the following was made and these aggregated together which lead to our proposed system. It will give various alternatives to develop the system.

A. Urban railway ticketing application.

They proposed application such as Android, cloud database, MySQL, QR code which will be used for the process of booking a ticket for travel through local trains or metros [1].

B. Android application for local railway ticketing using GPS validation.

They proposed the various techniques for buying metro tickets or local railway tickets through their Smartphone application and introduced ticket checker [2].

C. Android application for ticket reservation with GPS as ticket validation.

They provided various techniques for buying tickets through their Smartphone application through GPS facility of android mobile so that passenger can easily get the list of station and he can easily buy tickets [3].

D. A QR code based processing for dynamic and transparent seat allocation in Indian railway.

They proposed a system through which railway ticket booking is done through website and also from multimedia phones [4].

3. METHODOLOGY

3.1 Objective

Objectives of this application is to,

-To efficiently digitize the ticket validation and verification system

- To reduce paperwork

- To reduce corruption

- To save time.

3.2 Algorithm

Step 1: Accept Passenger's details
Step 2: Get UID/Photo from passenger.
Step 3: call QR generation function
Step 3.1: Passenger's Source to Destination.
Step 3.2: Passenger's Type Waiting/General/RAC
Step 3.3: Passenger's Allocated Seat No.
Step 3.4: Passenger's Phone No
Step 3.5: Output as QR code.
Step 4: call of scanning Function
Step 4.1: Get Seat no as Input (If General /RAC Type else go to Step 6).
Step 4.2: Call Insert Function
Step 4.3: Process (UID, Phone No, Source, Destination).
Step5: Display Result on TC's App.
Step 6: Start the process for assigning vacant seat to the passengers
Step 6.1: Check for Source and Destination.
Step 6.1: Check for available Seat.
Step 6.2: Allocate Seat to the Passenger.
Step 6.3: Notify Passenger with the help of text message.
Step 6.4: Update on TC's App.
Step 7: Stop.

3.3 Architectural Diagram

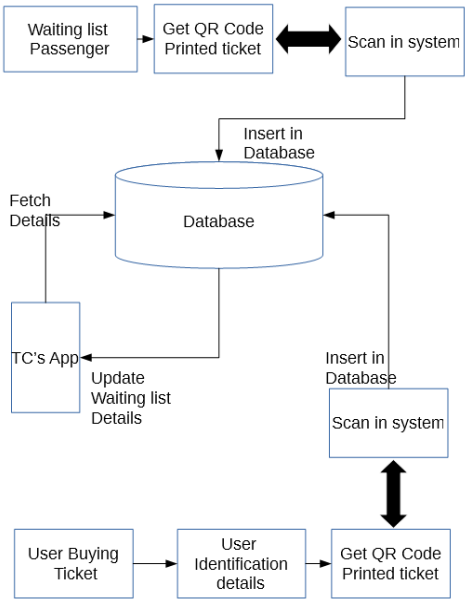

Figure 1. System Architecture

3.4 Technologies to be used

Android:

Android is a mobile operating system developed by Google. It is based on a modified version of the Linux kernel and other open source software, and is designed primarily for touchscreen mobile devices such as smartphones and tablets. In addition, Google has further developed Android TV for televisions, Android Auto for cars, and Wear OS for wrist watches, each with a specialized user interface. Variants of Android are also used on game consoles, digital cameras, PCs and other electronics.

JSP :

JSP is a file extension for Java Server Pages file format. A JSP is an HTML page containing a reference to Java servlets, or, java server side applets. JSP files help to deliver server side customized content on a webpage through servlets. JavaServer Pages (JSP) is a technology that helps software developers create dynamically generated web pages based on HTML, XML, or other document types. Released in 1999 by Sun Microsystems, JSP is similar to PHP and ASP, but it uses the Java programming language.

Servlet:

A Java servlet is a Java program that extends the capabilities of a server. Although servlets can respond to any types of requests, they most commonly implement applications hosted on Web servers. Such Web servlets

are the Java counterpart to other dynamic Web content technologies such as PHP and ASP.NET. A number of OTP systems also aim to ensure that a session cannot easily be intercepted or impersonated without knowledge of unpredictable data created during the previous session, thus reducing the attack surface further. JSP is a webpage scripting language that can generate dynamic content. Servlets are Java programs that are already compiled which also creates dynamic web content. JSP run slower compared to Servlet as it takes compilation time to convert into Java Servlets. Servlets run faster compared to JSP.

SQLite:

SQLite is a relational database management system contained in a small (~350 KiB) C programming library. In contrast to other database management systems, SQLite is not a separate process that is accessed from the client application, but an integral part of it. SQLite is ACID-compliant and implements most of the SQL standard, using a dynamically and weakly typed SQL syntax that does not guarantee the domain integrity. SQLite is a popular choice as embedded database for local/client storage in application software such as web browsers. It is arguably the most widely deployed database engine, as it is used today by several widespread browsers, operating systems, and embedded systems, among others. OS like Android, Web browsers like Mozilla etc. SQLite has many bindings to programming languages.

3.5 Mathematical Model

- **S(System)** = Is our proposed system which includes following tuple.
- **s (initial state at time T)** = GUI of search engine. The GUI provides space to enter a query/input for user.
- **X (input to system)**:- Input Query. The user has to first enter the query. The query may be ambiguous or not. The query also represents what user wants to search.
- **Y (output of system)**:- List of URLs with Snippets. User has to enter a query into search engine then search engine generates a result which contains relevant and irrelevant URL's and their snippets.
- **T (No. of steps to be performed)**:- **4.** These are the total number of steps required to process a query and generates results.
- **f_{main}(main algorithm)** :- It contains Process P. Process P contains Input ,Output and subordinates functions. It shows how the query will be processed into different modules and how the results are generated.
- **DD (deterministic data)**:- It contains Database data. Here we have considered MySQL and SQLite which contains number of queries. Such queries are user for showing results. Hence, MySQL and SQLite is our DD.
- **NDD (non-deterministic data)**:- No. of input queries. In our system, user can enter numbers of queries so that we cannot judge how many queries user enters into single session. Hence, Number of Input queries are our NDD.
- **Memory shared**: - MySQL and SQLite. MySQL and SQLite will store information like list of information about Bus, registration details and numbers of Bus. Since it is the only memory shared in our system, we have included it in the MySQL and SQLite.
- **CPU_{count}**: - 1. In our system, we require 1 CPU for server.
- **Success** = successfully recommended best system as per user's interest
- **Failure** = Failed to be recommended

Subordinate functions:

Where

s=Start State
e=End State
X= {Set Of Inputs}
= {x1, x2}
Where x1= Scan QR code.
x2= Seat No.

Y= {Set of Outputs}
= {y1, y2}
Where y1=Passenger Details with Source destination.

y2= Name, etc.

F_{main} = {Set of procedure}
= {f1, f2}
Where
f1= Take x1 input
f2= Give y1 output
f3= Take x2 input
f4= Give y2 output

3.6 State Transition Diagram

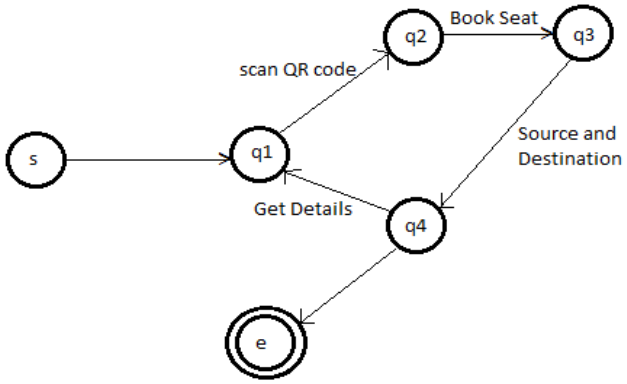

Figure 2. State Transition Diagram

s=input state
x=query

Passenger scan QR code

q2= Display Passenger details with
rce, destination

q3= seat No.

q4= Name, etc.

Explanation

- The ‘q1’ state user Registration Details and login the application from the state ‘s’ which is our initial state .
- The ‘q2’ state is meant for passenger scan the QR code which is accepted in state q1. And in state q2 Display passenger details with source, destination.
- The ‘q3’ state generate seat No
- The ‘q4’ state get passenger name.

In this step i.e. ‘q2’, we use QR code performance of restructured result.

4. CONCLUSION

Using this system, Android Application given to the user (Ticket Checker) and a QR code would be printed on Ticket of the boarding passenger. Thus as passenger boards the train the QR code would get scanned and the details would be passed to Database. Once the details are updated it would be reflected on Android App. In this paper we also have took concern about the waiting list Passengers. Even the passengers is in waiting list would be having QR code printed on their ticket. In this system a passenger’s unique identity would be recognized with help of UID and Photo ID at the time of purchasing of ticket.

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Smart Control System in Automobile (May 2019)

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ABSTRACT-The traffic system and the road rules sometimes go haywire leading to numerous accidents. The adoration to save lives leads to a control system for automobiles, which operates in real time. This will comprise numerous features such as the sensors which will be cheaper and functional for a low budget car helping detect a living or non-living objects well ahead of time and taking action. It will have a voice-controlled braking system and mechanism for the rear view mirrors for automatic folding in a critical situation. In critical situations, the system could avoid accidents caused by the delays in driver reaction times. This paper is structured as follows: Obstacle detection leading to slowing down of vehicles, Sensing leading to the closure of mirrors, Voice controlled braking system.

INDEX TERMS- Anti-lock braking system, LPCC, MFCC, Pattern Recognition of speech, Ultrasonic sensors, Voice control

1. INTRODUCTION

Globally, the number of automobile users has been increasing day by day leading to traffic congestion. This leads to an increase in the number of accidents which occur on a daily basis. The main causes of these accidents include human driving errors and driver reaction delay times. Overcoming these deficiencies in the current scenario, there is a need for a smart control system which will control the working of the automobile to take action depending on the environment. To provide such a smart control system, in this paper, we are providing three modules which will prevent the loss incurred in accidents which consist of both human losses as well as loss of the vehicle. The system consists of various sensors and the data collected from these sensors can be transmitted with real-time constraint over wired media depending on which after processing necessary actions would be performed For distance measurements, ultrasonic sensors are employed.

Among the advantages of ultrasonic sensors over traditional sensors is the ability to observe and measure moving objects. Ultrasonic sensors are not affected by the color of the object and they can detect small objects over long distances. Ultrasonic sensors can measure the distance to a wide range of objects regardless of shape, color or surface texture. They are also able to measure an approaching or receding object. By using “non-contact” ultrasonic sensors, distances can be measured without damage to the object. They are easy to use and, in many cases, can be used in place of other traditional sensors when the environmental conditions make traditional sensors unusable.

2. EXISTING SYSTEM

In the existing system, the task of slowing the speed of the vehicle is done manually. In such a system driver has to pay his continuous care. But in such a system, it is very hard to detect some obstacles. If the user fails to pay attention or may get engaged it may lead to harmful accidents. To avoid this and to help the driver in such scenario, some automatic or intelligence based system help should be provided to the driver. Current techniques used for obstacle detection are vision based or sensor based. But the techniques for vision-based systems do not help to detect obstacles in the dark. On the other hand, such smart systems need to be more alert and appropriately at night. As sensors are not affected by the time of the day or other environmental conditions much, they have been considered as a more appropriate option. Even though sensor-based systems are available, 3d object recognition has been a challenge .In the existing system, we can see so many cases of side view mirror destruction in congested areas or due to unnoticed objects. Also in such a kind of system, there is no automatic action provided to the vehicle to prevent any unwanted event.

Also, the available systems are not cost efficient, which lead to less amount of implementation of such systems. Antilock braking [1] is another issue in designing an efficient braking system in automobiles. Conventionally, in automobiles equipped with ABS, it is a part of the engine control unit and prevents the locking up of wheels. Hence, applying fuzzy logic to intelligent control seems to be an appropriate way to achieve this human behavior, because driver’s experience can be transformed easily into rules and any kind of nonlinearities can be easily tackled.

3. PROPOSED SYSTEM

3.1. Obstacle detection leading to slowing down of vehicles

This system uses an array of ultrasonic sensors for detecting obstacles and measuring the distance between the automobile and the obstacle. This is used further to control

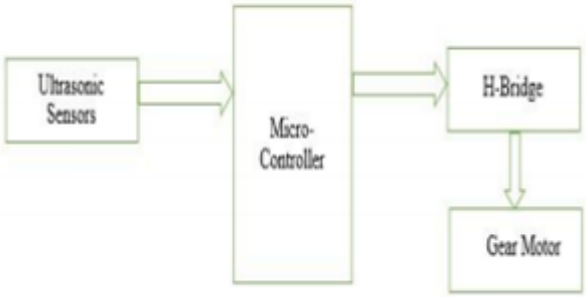

FIGURE 1. MOTOR CONTROL VIA MICRO-CONTROLLER

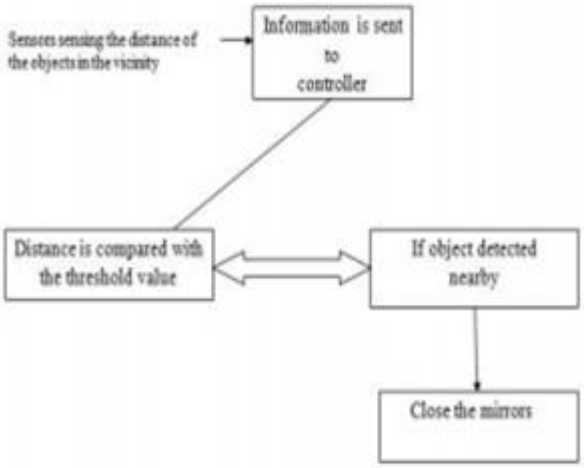

FIGURE 2.WORKING OF SIDE MIRROR CLOSING

automatic braking to slow down the speed of the vehicle. The main purpose for using an array of ultrasonic sensors is greater accuracy and greater coverage of obstacles helping 3d recognition. The array of sensors provides a greater coverage of the obstacles as the distance between the obstacle and the vehicle increases.

As we know the surface of an obstacle may not be always plain which may reflect incident pulses to undesired direction. So it is necessary to measure the roughness of obstacle and to choose a kind of ultrasonic sensor. The roughness of obstacle should be greater than the wavelength of ultrasonic waves which is calculated by solving the following formula[6]:

$$v = n*\lambda$$

In an array of ultrasonic sensors, each sensor measure it's the separate distance from an object which works simultaneously with a delay of 1 sec. Based on all measurements difference matrix is calculated to obtain an optimal or exact distance from obstructing material or any object [6].

$$Diff\ Mat\ (i, j) = i = 0\ to\ n\ [j = 0\ to\ n\ [a\ (i) - a\ (j)]]$$

Where i and j are integers from 0 to n, a() is array of distances obtained from sensors in horizontal array

Consider a car moving at a high speed. The safety distance maintained from any obstacle is to be considered as 2 meters. If any changes are observed within this range, brakes are applied automatically and thus, the speed gets reduced. Ultrasonic sensors calculate distance based on the measurement of time of flight of the ultrasonic pulse which gets reflected back from the ground of the obstacle. Further, an optimized technique is employed to detect these reflected pulses that are detectable by a threshold comparator. The ultrasonic sensors are attached to the microcontroller which continuously keeps on tracking the distance of the obstacles in its vicinity. This information is further sent to the controller which processes the information. The control unit consists of the gear motor, H-bridge attached to the controller. This control unit controls the automatic braking system depending upon the distance measurement. Braking system works with the help of the gear motor.

3.2. Sensing leading to the closure of mirrors

The side view mirrors may get destructed in heavy traffic areas due to the collision of mirrors with unnoticed objects or even in congested areas due to narrow roads. For the prevention of such loss, it is necessary to detect these circumstances in real time. For this module, choosing a sensor is a crucial part as it reveals the performance of the system. The aspect of the sensor which comes to sense in this module is the real-time performance of the detection and communication of information. Ultrasonic (US) sensors [2] are broadly used in applications for distance measurements. Ultrasonic (US) sensors are frequently used for mid-range distance measurements.

Applications of these sensors include navigation systems (human, mobile robot and vehicles) as obstacle avoidance, distance measurement, counting devices (e.g., weight watcher, product assembly), surveillance system, object detection, edge detection, and military applications. These sensors were chosen because of their high resolution, robustness, lightweight and low cost. The use of these sensors also provides a better cost performance ratio compared to other sophisticated imaging systems, such as the ones based on stereo vision camera, GPS or laser scanning summarizes some technical specifications of the sensors used in this research. The target surface [6] ideally needs to be perpendicular to the direction of propagation of the pulses. But from the observations, it is seen that accurate distance measurement is possible even if the angle between the target surface and direction of propagation of pulses is up to 25°.

This system can be divided into two parts, which can be considered as transmitter and receiver. The transmitter part contains sensors, conditioning circuit, microcontroller Trigonometry functions are used to determine the distance between the user and obstacle using ultrasonic sensor. After sensing the information is provided to the controller which determines the distance of the object is below a threshold value or not. If the object distance is near, a decision would be taken further to close the side mirrors thus preventing loss. This is also applicable in congested areas.

3.3. Voice controlled braking system

Voice controlled system consist of two parts speech recognition system and control system. Speech recognition system analyses human instructions and passes correct commands to the control system. In speech recognition, system catches all voice commands from a user and then it checks in the database to ensure its correctness. For short applications, Speech recognition system works on pattern matching which is faster than other techniques. In pattern matching analyzed commands are matched with stored commands in the database. After this, commands are converted into an appropriate form which is understandable by actuators. But for complex applications voice recognition system works as shown in figure:

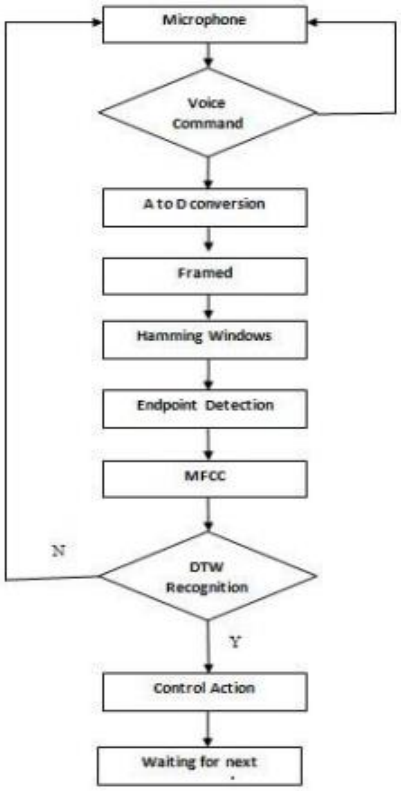

FIGURE 3.FLOWCHART FOR VOICE CONTROLLED BRAKING

In the above figure, Speech recognition involves feature extraction from the acoustic signal. Feature extraction [4] involves two techniques which involve Mel Frequency Campestral Coefficients (MFCC) and the linear prediction coefficients (LPCC). In these two techniques, the MFCC parameter is faster and accurate than LPCC. Both techniques involve Dynamic Mme Warping (DTW) which is based on pattern comparison, Hidden Markov Modeling (HMM) which is based on statistics model, Neural Networks (NN) which is based on neural network. An important aspect in this system is the recognition accuracy.

Simple isolated words recognition is more accurate. For this less time is required as well as it requires less powerful

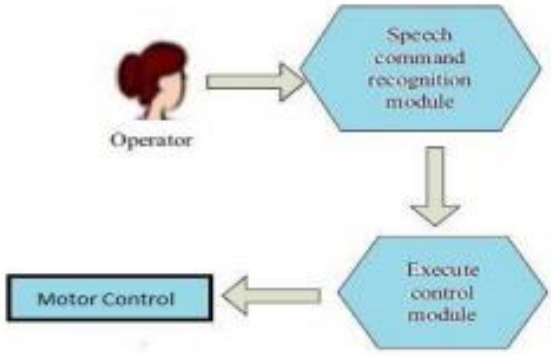

FIGURE 4 WORKING OF VOICE CONTOLLED BRAKING

hardware. For example, just the word “brake”. Considering all these parameters, DTW is appropriate as it is more accurate for isolated words and real-time application.

4. RESULTS

TABLE I

Module	Specification	Result by proposed system
1	Obstacle detection leading to slowing down of vehicles	Distance is measured by array of ultrason sensors continuosly.If obstacle detecte within threshold range by any of th sensors; the speed of the car slows dow and on removal of obstacle, and the c starts its movement again.
2	Sensing leading to the closure of mirrors	Distance is measured by ultrasonic sensor continuosly.If obstacle detected within threshold range, the motor controls the movement of the mirror and closes the mirror and on removal of obstacle, the mirror opens again.
3	Voice controlled braking system	On reception of voice commands from user, the car performs movements like braking and initiation of car.

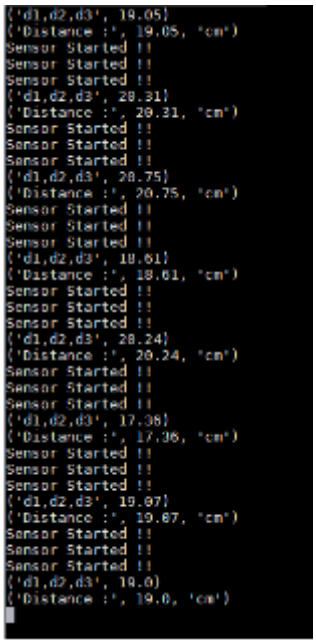

FIGURE 5.MEASUREMENT OF DISTANCES USING ULTRASONIC SENSORS

4. CONCLUSION

.In this paper, we have tried to implement some cost efficient techniques which are simple as well as operate in real time. The main focus of the paper is based on the analysis of the information sensed by sensors. This smart control will help in automatic action performance in case of lag in driver reaction times and will save lives which are lost in accidents

5. ACKNOWLEDGMENT

We would like to take this opportunity to thank our internal guide Prof. Sonali Lunawat for giving us all the help and guidance we needed. We are really grateful to them for their kind support. Their valuable suggestions were very helpful.

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Biometric based license checking system and signal automated system.

(May 2019)

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ABSTRACT Survey says that accidents happened mostly by unlicensed person. Fingerprint authentication or recognition refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify individuals and verify their identity. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern. In this project, we use the Finger print authentication scheme which is a non-imitable biometric authentication scheme. By using this biometric authentication, we can prevent the non-licensed person from driving. User is first registered and then provided with the login details and connected with bank & RTO using Aadhar.

INDEX TERMS Aadhar, biometrics, fingerprints, RTO

1. INTRODUCTION

Nowadays traffic congestion and traffic signal violation are serious issues in many metropolitan cities. Such problem result into collision of vehicles at traffic signals. An efficient traffic management technique is needed to reduce waiting and travelling time. In modern life we have to face with many problems such as traffic congestion, traffic jams, road accidents, collision of vehicles, traffic light violation etc. It is said that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are main reasons for increasing traffic jam.

1.1 ESP8266

It is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability. And used for Wi-Fi connection to Ardino uno. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.

1.2 Fingerprint Scanner

Scanners make use electricity to determine patterns. As a finger rests on the touch-capacitive surface, the device measures the charge, ridges exhibit a change in capacitance, while valleys produce practically no change at all. It work by capturing the pattern of ridges and valleys on a finger. The information is then processed by the device's pattern matching software, which compares it to the list of registered fingerprints on file. A successful match means that an identity has been verified.

1.3 Ardino uno

Ardino boards are able to read inputs light on a sensor, a finger on a button and turn it into an output - activating a motor, turning on an LED or setting of instructions to the microcontroller on the board

2. Literature Survey

A. ***Avinash Shinde,Rounak Sathe , Prakash Sutar, Prof.R.Sadakale,"UTOMATIC E-CHALLAN GENERATION FOR TRAFFIC"***

Automatic E-challan generation for traffic violation is a PLC based project. The purpose of this project is to control the traffic violations by accurately penalizing the traffic violators. This will minimize the work of traffic police. This project is useful for controlling two types of traffic violations 1.Traffic signal violations.2.Toll-collection lane rule violation. In the first stage the vehicles that run a red light will be identified using a RFID reader. The RFID reader will input the PLC by scanning the tag placed on the vehicles. The database will be created in the program. When the RFID scanner inputs the vehicle, the PLC will immediately compare the barcode detected with the inputs fed into the database.

B. ***D.Archana Thilagavathy,prasanna R.,Rama p." Finger print based license authentication scheme for Indian scenario"***

The proposed system, use of the Finger print authentication scheme which is a non-imitable fingerprint authentication scheme. This fingerprint authentication, we can prevent the non-licensed person from driving. system consists of a smart card capable of storing the finger print of a particular person

C. ***Ajay Patil, Sayli patil, Shrinath patil, Vishal Meshram."Fingerprint based license checking for auto-mobiles"***

Driving license system is a very difficult task for the government to monitor .The proposed system will capture all the citizens' images, and then images will be scanned and recorded. Whenever a citizen crosses the traffic rules, the police can scan his image and can collect penalty / fine from the defaulter. Using this method, the police can track the history of the driver Biometrics studies commonly include fingerprint.

3. System Architecture

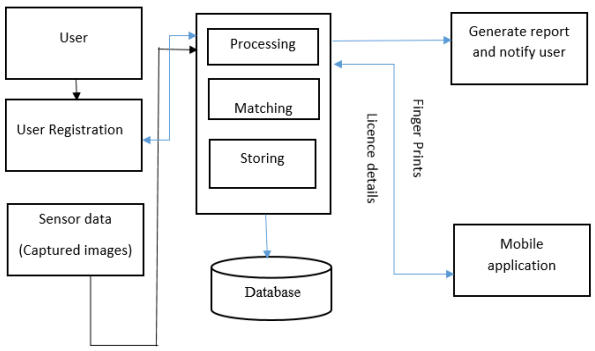

Fig1: System Architecture

User: The drivers will register themselves in RTO system with all the data and fingerprint credentials, also all the police officers will register in system for generating the login Ids and passwords for getting the access of android system.

Processing: Matching: The system will get the fingerprint credentials of the drivers from the android application, now system has to check for exact same fingerprint match against incoming fingerprint match .if the match is found it checks for the id related to that fingerprint. Now when we have the id of the drivers all the information related to that id against in the system will be extracted from the database and send back to android application as the output from server.

On the other side for android application, if license is generated against the fingerprint then we can say that this is authenticated driver. The data from sensors will also be feeder to the system for generating the fine amount when the signal violation at any instance the sensors capture the data and sends this extracted data to processing unit now based upon the extracted data system ahs to give particular drivers details and fine will be charged against this credentials .

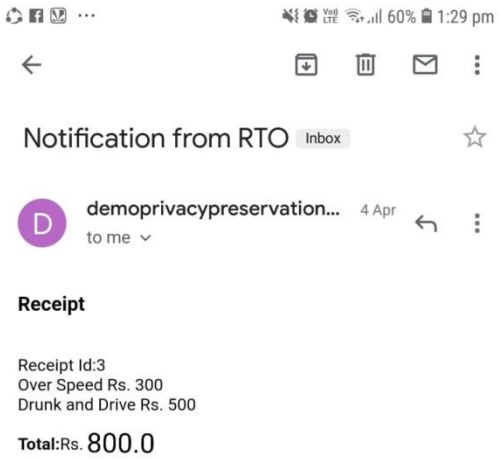

Fig no.2: Output.

4. Proposed System

Dataset consist of data of all the citizens those who have the license , also the other details like name , Bank account details , Address , Email Address , Phone no Fingerprints of drivers with license are stored in database, also the database have details of all the RTO policemen's working in Different areas , their ids , name, address, phone no. etc. Different RTO Rules and regulations will be fed into the system by RTO officers along with that the appropriate fine amount for rules.

Optical character recognition of mechanical or electrical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image Widely used as a form of information entry from printed paper data records whether passport documents, invoices, bank statements, computerized receipts, business cards, mail, printouts of static-data, or any suitable documentation. it is a common method of digitizing printed

texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as cognitive computing, machine translation, (extracted) text-to-speech, key data and text mining. OCR is a field of research in pattern recognition, artificial intelligence and computer vision. Early versions needed to be trained with images of each character, and worked on one font at a time. Advanced systems capable of producing a high degree of recognition accuracy for most fonts are now common, and with support for a variety of digital image file format inputs. Some systems are capable of reproducing formatted output that closely approximates the original page including images, columns, and other non-textual components.

Storing:

System will store all the data of users, RTO police officers, fingerprint data of users and Rules and regulations data of system in the database files that are linked with the system.

Sensor data:The data gathered from the camera and fingerprint sensors will be extracted and given to processing unit for further use of the data. The fingerprints of the drivers will be used to identify the particular driver and the images captured by camera will be given to OCR system for extracting the data from image and charge the fine to particular driver who has disobeyed the traffic signal rules.

Android Application: This will be the onsite application used by the authorized RTO police officers. Here these police officers have to login into the system first. Then if they find any drivers not following the traffic rules they can take fingerprint of that driver, server will send the license of the driver if the driver has registered with the system. If the license is not generated from system means the driver is not a authorized driver from RTO, in this case fine will be charged to this type of drivers. also sometimes this may happen that the driver has the license but has broke some RTO rules in that case the police officer will mark on the rules broken by driver and then the fine will be calculated and deducted from the drivers account , Also the receipt for the same will be sent to drivers email account

Generation of reports:

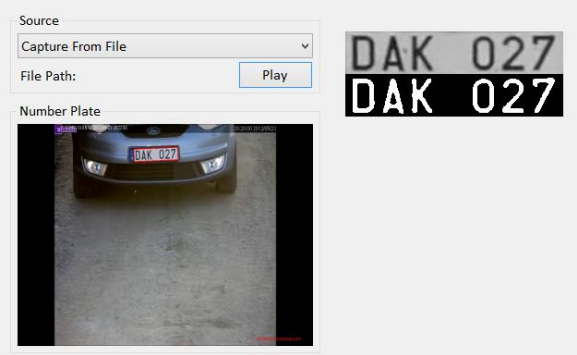

Fig 3: Output

5. Conclusion

As the final output, Following RTO rules are very mandatory which causes accidents so licensing is very important as it is for the safety of users. Fine will be charged for not following the rules. As the bank accounts are linked with Aadhar and RTO the amount is been deducted for the same.

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E-COMMERCE SITE USING CHATBOT (May 2019)

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ABSTRACT For Visual impaired people it's robust to undertake and do on-line wanting. We've got a tendency to area unit developing system that helps blind people to decide on colour of clothes beside categories like material, size, patterns etc. by practice Automatic speech recognition module. It translating of spoken words into text practice deep learning methodology. It successfully replaced mathematician mixture speech recognition and has writing at Associate in nursing increasingly larger scale. the foremost aim of this project is to propose we have a tendency to be an net a we've got an inclination to ban internet wanting application significantly for blind people through that they will choose in spite of they have by just speaking a sentence and to implement this we area unit on the point of integrate deep learning methodology and cluster

INDEX TERMS Voice Reorganization, TTS (Text To Speech), Gaussian Mixture.

1. INTRODUCTION

Over the last few years, Chat bots have contend a outstanding role as human-computer interfaces. Chat bots area unit typically composed of 3 modules: the interface, AN interpreter, and an information base. Arouse defines Chabot as a program that makes an attempt to simulate written voice communication, with the aim of a minimum of quickly casual the human into thinking they were reprove another person. Basically, Chabot could be a colloquial agent that may move with user during a given subject mistreatment the linguistic communication. Several chat bots are deployed on the net for the aim of education, client service website, guidance, recreation. Existing illustrious chat bots area unit ALICE, dish and Clever each. These people area unit taking facilitate from beloved or friends every each for his or her needs. Its powerful| troublesome a tricky for blind people to decide on clothes with utterly totally different colours or they notice tough to on-line looking. A system is developed to assist blind those who automatically recognizing vesture patterns and hues. Camera-based wear vesture wear covering consumer goods} article of vesture wear covering commodity pattern recognition might be a problematic attributable to many clothing pattern and corresponding large intra class variations. Existing texture analysis ways that concentrate on textures with variations in viewpoint and scaling. The extent of accuracy in vesture pattern recognition cannot win by texture analysis ways that. Here, we've an inclination to introduce a system to assist colour blind people to choose wholly utterly different vesture colours aboard different categories. The system contains three major components: 1) info that contain vesture footage, a transducer for speech command input 2) speech device that convert the input speech into text format 3) show of succeeding things on the screen of desktop or wearable laptop computer aboard speech. The system methodology the voice input, captured voice input is acoustic sound waves that area unit to be regenerate into the character string format for linguistics interpretation.

2.Literature Survey

Paper 1. Assistive Clothing Pattern Recognition for Visually Impaired People
Author Name: Xiaodong Yang ,Shuai Yuan , YingLi Tian.

Description: Choosing garments with complicated patterns and colours is a difficult task for visually impaired individuals. Automatic article of clothing pattern recognition is additionally a difficult analysis downside due to rotation, scaling, illumination, and particularly massive infraclass pattern variations. We've got developed a camera-based image system that acknowledges article of clothing patterns in four class's plaid, striped, pattern less, and irregular and identifies eleven articles of clothing colours. The system integrates a camera, a mike, a computer, and a Bluetooth headphone for audio description of article of clothing patterns and colours. A camera mounted upon a try of glasses is employed to capture article of clothing pictures. The article of clothing patterns and colours are described to blind users verbally. This method will be controlled by speech input through mike. to acknowledge article of clothing patterns, we propose a completely unique Run Signature descriptor and a schema to extract applied math properties from ripple sub bands to capture global options of article of clothing patterns

Paper 2: From Smart Objects to Social Objects: The Next Evolutionary Step of the Internet of Things
Author Name: L. Atzori, A. Iera, and G. Morabito

Description: Iris recognition verification is one amongst the foremost reliable personal identification strategies in statistics. With the fast development of iris recognition verification, variety of its applications are proposed as yet together with time group action system etc. during this paper, a wireless iris recognition attendance management system is meant and enforced exploitation Dogman's algorithmic program (Dogman, 2003). This method based mostly statistics and wireless technique solves the matter of spurious group action and the hassle of birth the corresponding network. It will create the users' attendances a lot of simply and effectively.

Paper 3. Review on Speech Recognition with Deep Learning Methods
Author Name: Rubi, Chhavi Rana**.**
Description: The most common mode of communication between humans is speech. As this is often this can be often the foremost most well liked manner, humans would like to use speech to act with machines together. That's why, speech recognition has gained numerous recognition. Many approaches for speech recognition exist like Dynamic Time warp (DTW), Hidden mathematician Model (HMM). The main objective of this paper is printed a three stage neural integrated model speech signal sweetening and use the decomposition integrated HMM model for speech feature transformation. For the feature extraction of speech distinct wavelength work on (DWT) has been used that provides a set of feature vectors of speech wave kind. The work has been done on MATLAB and experimental results show that system is during a position to acknowledge words at sufficiently high accuracy.
Paper 4: Problem Solving Chatbot for Data structure

Author Name: Akhil Shah, Bhrgav Jain, Bhavin Aggrawal
Description: Intelligent chatbot, is a system which can interact with humans and answers questions on a certain domain. Today, the challenge is to build a system which will resemble human brain. Generally, the brain stores the memory in a decentralized manner across the brain with the help of neuron as opposed to a centralized manner in computer file system. There are short term and long-term memory storage with different priority based on variety of situation. The system can take inputs in written or voice format and respond the question from a knowledge base. In most cases a chat bot does not have problem solving capabilities. Our system can solve data structure problems using deep neural network (DNN). With a given dataset the system can provide services to access data in format such as arrays, stacks, queues and trees. Based on these data structures we can solve problems like traversing lists, reversing numbers and translating language of syntactic divergences.
Paper 5. Accessible Shopping Systems for Blind and Visually Impaired Individuals: Design Requirements and the State of the Art
Author Name: Vladimir A. Kulyukin, Aliasgar Kutiyanawala
Description: Independent grocery searching is one among the foremost functionally difficult tasks for visually impaired and blind people. Several helpful searching systems are developed to handle the matter of blind grocery searching. During this article, we have a tendency to establish many style necessities for helpful searching systems and analyze existing approaches to envision however well they meet them. Our objective is to shed some lightweight on potential analysis and development directions for the accessible blind searching community and to supply designers of accessible searching solutions analysis tools which will be used as initial points of comparison.

3.Proposed system

The projected system is "Ecommerce primarily based on-line buying Visually Impaired folk's mistreatment Speech Recognition". the most aim of this objective based primarily application is to alter the unfit specially visually impaired peoples to access the ecommerce based platform that area unit most generally used for on-line getting of things or product currently a days. However it's quite difficult task for visually impaired peoples to use this ecommerce primarily based framework for on-line searching. thence so as to permit unfit peoples specially visually impaired peoples to use this ecommerce on-line searching web site for getting of product associate with none limitations we tend to area unit developing an ecommerce primarily based application mistreatment speech recognition to eliminates or reduces the varied sensible difficulties that the visually impaired peoples stumble upon.

4. System Architecture

Procedure
Process 1: Admin- Admin Login with admin name and password.
Process 2: Admin- Admin adds and views all information.
Process 3: User -Registration and Login. Buy product and pay money
Output:
O=Generate the report every user with Illegal buy product.

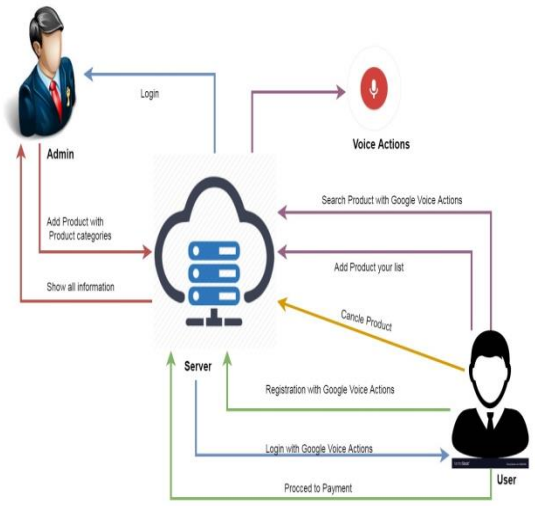

Figure 1. Proposed System Architecture

5. Algorithm

1. FLITE Algorithm

Speech synthesis is the artificial production of human voice. A computer system used for this task is called a speech synthesizer. Anyone can use this synthesizer in software or hardware products. The main aim of text-to-speech (TTS) system is to convert normal language text into speech. Synthesized speech can be produced by concatenating pieces of recorded speech that are stored in a database. TTS Systems differ in size of the stored speech units.

2. Hidden Markov models Algorithm

HMM are widely used in science, engineering and many other areas (speech recognition, optical character recognition, machine translation, bioinformatics, computer vision, finance and economics, and in social science)

The Hidden Markov Model (HMM) is a variant of a finite state machine having a set of hidden states, Q, an output alphabet (observations), O, transition probabilities, A, output (emission) probabilities, B, and initial state probabilities, Π. The current state is not observable. Instead, each state produces an output with a certain probability (B). Usually the states, Q, and outputs, O, are understood, so an HMM is said to be a triple, (A, B, Π).

Hidden states $\boldsymbol{Q} = \{ q_i \}, i = 1, \ldots, N$.

Transition probabilities $\boldsymbol{A} = \{a_{ij} = P(q_j \text{ at } t+1 \mid q_i \text{ at } t)\}$, where $P(a \mid b)$ is the conditional probability of a given b, $t = 1, \ldots, T$ is time, and q_i in $\boldsymbol{Q}$. Informally, $\boldsymbol{A}$ is the probability that the next state is q_j given that the current state is q_i.

Observations (symbols) $\boldsymbol{O} = \{ o_k \}, k = 1, \ldots, M$.

Emission probabilities $\boldsymbol{B} = \{ b_{ik} = b_i(o_k) = P(o_k \mid q_i) \}$, where o_k in $\boldsymbol{O}$. Informally, $\boldsymbol{B}$ is the probability that the output is o_k given that the current state is q_i.

Initial state probabilities $\boldsymbol{\Pi} = \{p_i = P(q_i \text{ at } t = 1)\}$.

6. Mathematical Model of our system

Formula:

$$a = \sin^2(\varphi B - \varphi A/2) + \cos \varphi A * \cos \varphi B * \sin^2(\lambda B - \lambda A/2)$$

$$c = 2 * \operatorname{atan2}(\sqrt{a}, \sqrt{(1-a)})$$

$$d = R \cdot c$$

Consider S is a System.

S={I,P,O}

Where

I= input,

P= Procedure

O=Output

Input

U=No of User

u=u1, u2, u3,….,u nth

D =Speech to Text

Procedure

Process 1: Admin- Admin Login with admin name and password.

Process 2: Admin- Admin adds and views all information.

Process 3: User -Registration and Login. Buy product and pay money

Output:

O=Generate the report every user with Illegal buy product.

7. Working of our system

In this website the input is taken in the form of voice the speech to text conversion is done. The whole website is the voice based. We buy the different types of the product. The system contains three major components: 1) database which contain clothing images, a microphone for speech command input. 2) speech converter that convert the input speech into text format. 3) display of resulting items on the screen of desktop or wearable computer along with speech. The system process the voice input, captured voice input is acoustic sound waves that are to be converted into the character string format for semantic interpretation.

8. screenshots of our system

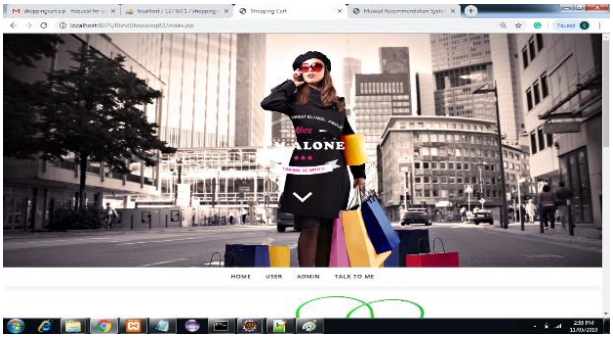

Figure 2. Home page of ecommerce site

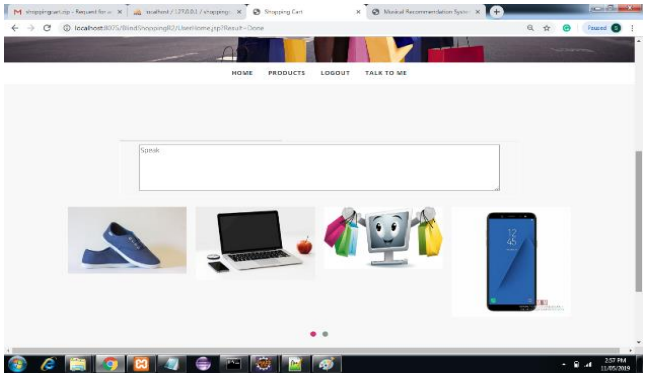

Figure 3. Product search page

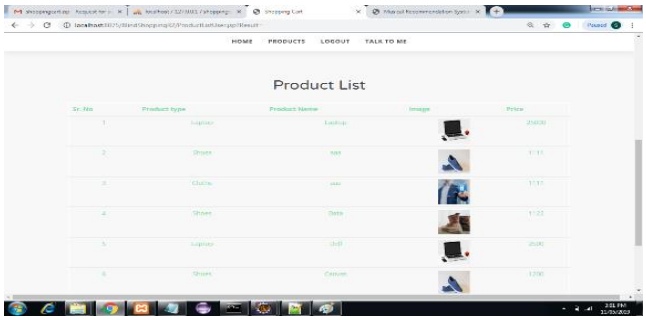

Figure 4. Product list

9. Conclusion

The proposed system is developed to provide to purchase the product through the voice is will reduce the time to read all description about the system. Through the voice we can placed the order.

10. Acknowledgement

I would like to take this opportunity to thank my internal guide Prof. Nilesh Korade for giving me all the help and guidance I needed. I am really grateful to them for their kind support. Their valuable suggestions were very helpful. I am also grateful to Prof. Dr. Archana A. Chaugule, Head of Computer Engineering Department, PCCOER for their indispensable support, suggestions. In the end our special thanks to Principal Dr. H.U. Tiwari for providing various resources such as laboratory with all needed software platforms, continuous Internet Connection, for our project.

11. References

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AI–IoT Based Self Organizing Approach of Multiple Robots(Swarm Robotics) (May 2019)

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ABSTRACT In many applications like vehicle control, medical applications, robotic movement control, etc.; distance measurement of an object is used. This can be done using a variety of sensors- Ultrasonic, IR, radar, laser, etc. Measurement using ultrasonic sensors is the cheapest and its reliability among several others is very high. In this paper we discuss the uses of these sensors in small robot applications and compare them for a small automobile prototype using controller, to provide an output for automatically finish work without any human interaction. Here we use AI (Artificial Intelligent) and IOT (Internet of Things) concept in this proposed system.

INDEX TERMS Sensors; Ultrasonic Sensors; IOT; Obstacle Detection

1. INTRODUCTION

Self-organized multi robot systems have a lot more benefits compared to single robot systems where the coordination and cooperation with the server is more. This results in less human involvement and more precision in responses to full-fill a determined task or operation using inter-bot communication. Here server acts as an intermediary between the bots by using self-organizing map approach. Tasks to robots are assigned without any human involvement considering a dynamic environment. Various methods are proposed to control a swarm of robots and most methods and algorithm are defined to control robots in a dynamic environment. The algorithm focuses on binding swarm of robots to perform distributed formation control.

Server-bot communication is carried out in a two way process which involves invoking the swarm by the server and then consecutive calls to the swarm for further robot manipulation. The detection of load is done by loading bay which recognizes the load and sends the particular information to the server, which then acts according to the given task. The system learns from every task , if the same task repeats server will send the required number of bots to carry out the task automatically. The information regarding the operations will be managed by server into the databases the server and user can fetch the information whenever needed. The database will have fields like load id, load weight, number of bots per load, etc. and this whole information will be accessed by the administrator using his login information.

2. LITERATURE SURVEY

[1] Farshad Arvin, John C. Murray, etal reviewed in their paper swarm robotics as an interesting concept to provide a robust robotics system by exploiting large numbers of identical robots. Swarm algorithms are mostly inspired from social behavior of insects and other animals. The best example is given by social animals such as ants, though not very intelligent on an individual level perform tasks such as building, brood care, foraging etc. using cooperation. In their project, they have developed a micro robot named “Colias”. It uses a circular platform with a diameter of 4 cm. Long-range infrared modules with adjustable output power allow the robot to communicate with its direct neighbors.[1]

This concept allows coordination of simple physical robots to cooperatively perform tasks. Autonomous and decentralized control of the swarm systems are achieved by providing well defined interaction rules for individual robots.

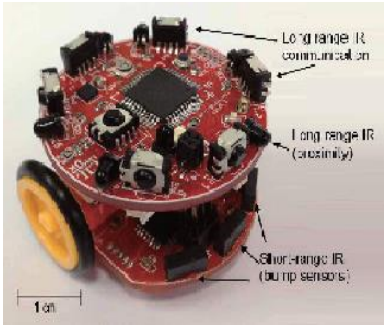

Fig 2.1 Microbot Robot

[2] Yara Khaluf, Emi Mathews, Franz. J Rammig devised in their paper that communication between robots is an important requirement of the swarm platform. In addition, modularity of the robot provides flexibility to be used in different swarm applications. Since, swarm behaviors usually operate in long term scenarios, low power consumption in the design is a must. Cooperative task always include the concept of sharing :space sharing, time sharing, resource sharing etc. This sharing necessitates coordination in various aspects such as motion coordination, manipulation coordination, message exchange coordination and others to prevent deadlocks or task failures.[2] In their paper ,they want to deploy a robotic swarm to track mobile objects in a dynamically changing environment .The swarm collectively tracks the movement of the objects and collects other information of interest about the moving object. The mobile object tracking uses wireless networks.

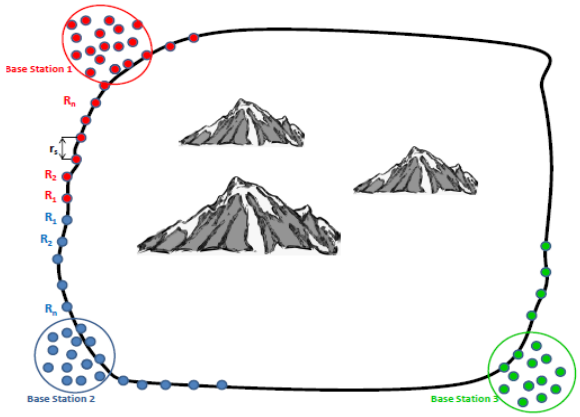

Fig:2.2 Object tracking with swarm robots

3. PROPOSED SYSTEM

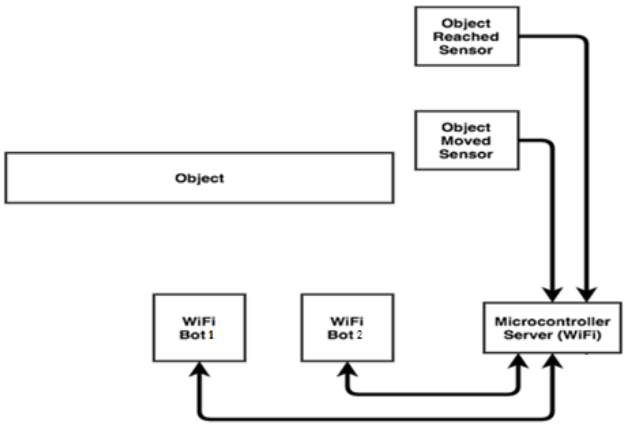

Fig:3.1 System diagram

The system is inspired by swarm behavior in real ants. Self-organized multi robot systems have a lot more benefits compared to single robot systems where the coordination and cooperation with the server is more. This results in less human involvement and more precision in responses to fulfill a determined task or operation using inter-bot communication. Here server acts as an intermediary between the bots by using self-organizing map approach. Tasks to robots are assigned without any human involvement considering a dynamic environment..

4. Block Diagram

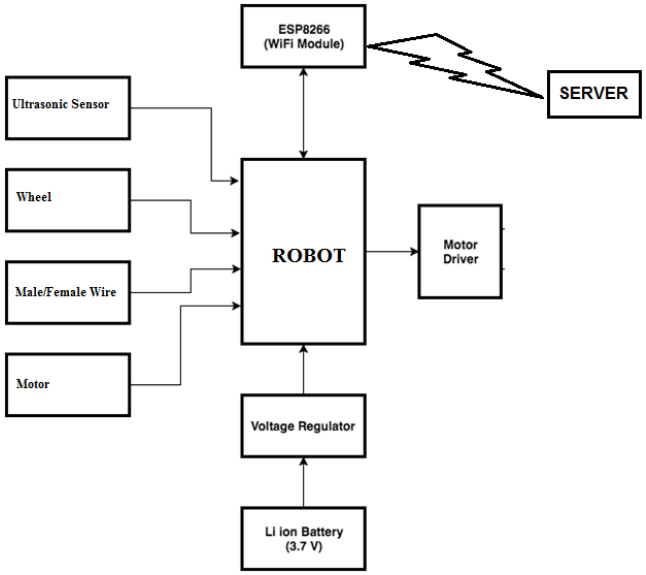

Fig:4.1 Block diagram

Extensive work has been done based on swarm studies producing a number of models and corresponding applications intended to solve optimization problems such as routing in goods and production company for shifting the goods one location to another and the problem in which an optimal route must be calculated to push up the any goods box one location to another. AI is need in work optimization in industrial automation. Now days in industrial automation is so fast but human interaction is must for the goods company for shifting box one location to another, so we design the new solution to the self-communication robot without human interaction using the AI.

5. MATHEMATICAL MODEL

Let S be Closed system defined as,
S = { Ip, Op, Ss, Su, Fi, A}

To select the training documents and give the path of the folder and perform various actions from the set of actions A so that Su state can be attained.

S ={Ip, Op, Ss, Su, Fi, A}
Where,
Ip={sensor value, robot value}
Where,
Dtr - Set of training data
Dts – Set of testing data

Set of actions = A={F1,F2,F3,F4} Where,
F1 = Activate
F2 = Server Communication
F3 = Robot Functioning
F4 = Movement function

Ss- Set of robot's activity states
Su- success state is when a robot finishes the work Fi- failure state is when a robot does not push the box and server communication.

8. Working of our system

Whenever an object is detected, the Ultrosonic sensors senses the object. The signal of object detection is sent to the server. Then the server sends the signal to the first bot so the bot tries to push the object. If the reached sensor senses the object, then the first bot itself is sufficient to push the object. In the other scenario, if the first bot is not able to push the object then the server sends a signal to the second bot. Now, both the bots try to push the object.

9. Conclusion

The system removes the inclusion of human intervention. The system will function autonomously when it detects a load and the robots will perform their related tasks.

10. Acknowledgement

I would like to take this opportunity to thank my internal guide Prof. Sonali Lunawat for giving me all the help and guidance I needed. I am really grateful to them for their kind support. Their valuable suggestions were very helpful. I am also grateful to Prof. Dr. Archana A. Chaugule, Head of Computer Engineering Department,PCCOER for their indispensable support, suggestions. In the end our special thanks to Principal Dr. H.U. Tiwari for providing various resources such as laboratory with all needed software platforms, continuous Internet Connection, for our project.

11. Future Scope

The Proposed system can be extended by using passive infrared sensor (PIR sensor) , so that it can distinguish between living and non-living object .In this system we are using two robots, we can extend the system by increasing number of robots.

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PROF. SONALI S. LUNAWAT

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A Web-Based Emergency Alert System (May 2019)

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ABSTRACT In today's developing world where vehicles on the traffic are on the rise, Accidents remain one of the major cause of accidents. Reasons for occurrence of accidents can be of varying parameters, some of the reasons include not following the traffic rules, drink and driving, rash driving, etc. Whenever an accident occurs post-occurrence scenario remains a crucial time period as it can determine the life and death of persons involved in accidents. If medical aid is not provided at time, it can result in death of the persons met in accidents. Existing system include reporting of accidents with eh help of helpline numbers, toll-free numbers. Though they can provide relief to the victims at some point they may tend to fail in protecting the victims. Police personnel who arrive at the scene sometimes get confused on how the accidents occur as they do not have the evidence of how the accidents occur, whether it was a collision, vehicle coming from wrong direction or any other causes. To address all these issues we are presenting with an emergency alert system in this paper. Billions of people all over the world now own a smartphone with a good camera. This system is implemented in two phases-an android application which will capture the image of the accident and the web based system which will be at the back-end providing alerts to hospitals, police stations and fire-stations. The image will be captured by the user who will have the android application installed on his smartphone. Once the image is captured the user will upload it to the server /backend which will send an alert to nearby police stations and hospitals so that quick action can be taken. The captured image will contain the date, time and location where the incident took place. By implementing the system we tend to reduce the time of reporting and quick dispatch of the emergency services to the accident location.

INDEX TERMS Camera, GPS (Global Position System), Android App Development, MySQL

1. INTRODUCTION

Accidents are one of the leading causes of death in developing as well as developed countries. Many people who meet with accidents die on spot is due to delay in providing medical aid after the accident has occurred. This delay can be attributed to many factors such as delay in calling emergency services, lack of responsibility among the onlookers who tend to just look on, problems in network connectivity, etc. Inorder to address all these issues this emergency alert system is proposed and implemented. This system will use the GPS for getting accurate location and will contain the time-stamp and date stamp when the image is captured by the user using the android application. After uploading the captured image there will be an alert sent to nearby hospitals, police stations and fire-stations considering the area were the accident is occurred. By introducing this system we tend to improve the efficiency of accident reporting and save more human lives.

2. EXISTING SYSTEM

The existing system provides solutions in the form of Help-lines, Toll-free numbers, Control-Room help-line, etc. Existing system provides certain solutions which provide efficiency till a certain amount. At certain scenarios these systems may fail to address the solution properly. So Inorder to address the post-accident scenario we are proposing a web-based emergency alert system.

3. Proposed system

The system that we are proposing is known as an Web-based emergency Alert System which basically work when a user captures the image uploads it to the server, when the system receives any kind of image it sends an alert to the police-stations, hospitals using k-NN algorithm and haversine formula. The hospitals then respond by acknowledging the alert or the alert will be forwarded to next nearest hospitals and police stations.

4. System Architecture

This systems involves four important participants, they are the user who has the android application installed on smartphone. Hospitals, police stations and fire stations will first have to register and login on our system to prevent misuse. They will be having the backend of the system through which they will receive the alerts whenever an incident/accident has taken place. The personnel deployed at police stations will have to acknowledge the alert and deploy the team immediately. The images captured will be stored in a database.

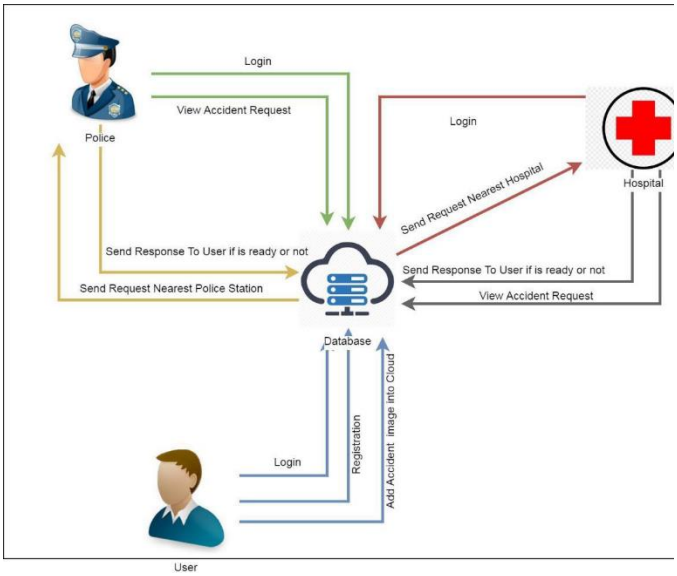

Figure 1. Proposed System Architecture

5. MATHEMATICS

In our system we are taking help of concept in mathematics known as haversine formula. The Haversine formula determines the great-circle distance between two points on a sphere given their longitudes and latitudes. Important in navigation, it is a special case of a more general formula in spherical trigonometry. The equation of this formula is as follows

$$d=2r\arcsin*\sqrt{hav(\varphi 2-\varphi 1)+\cos(\varphi 1)\cos(\varphi 2)hav(\lambda 2-\lambda 1)}\text{ --1}$$

6. k-NN Algorithm

k-NN algorithm is a classification based algorithm and used in machine-learning and applied fields. It is also named as lazy algorithm as it does not contain an explicit training phase. k-NN algorithm is very beneficial as it does not require little or no prior knowledge of distribution data. We can say that k-NN algorithm is very much based on how close the features resemble our training data-set and perform the classification accordingly. It is also useful in detecting the outliers in a given data-set. Basically, it classifies the neighbors based on distance functions

7. Mathematical Model of our system

System Description:

Input:
u=No of user
u=u1, u2, u3….u nth
GPS =Global Position System
Camera

Process:
Process1: User- User Registration and Log in
Process2: User Take accident Picture with current location
Process3: Police- Log in and View Accident Location and Take Action.
Process4: Hospital- Log in and View Accident Location and Send immediate Ambulance Services.

Output:
O=Generate the report of every accident.

8. Working of our system

Whenever an accident occurs, the user who is present will capture the image of the accident and upload it to the server. The image will contain the location in the form of longitude and latitude, time and date. At the backend the system will store the image in the database and send an alert to nearby hospitals using the haversine formula. After getting the alert the personnel present in hospitals will acknowledge the alert and deploy the team immediately. If the hospital is not able to provide immediate assistance it will forward the alert the next nearby hospital. This will be effective in cities and certain location where the probability of occurrence of accident is more.

8. Results and screenshots of our system

We have tested our application for the same whenever an accident occurs, the user who is present will capture the image of the accident and upload it to the server. The system takes couple of seconds for uploading which may incase depend on data connectivity. The necessary alert were sent to emergency services. Our application performed well during testing and provided the appropriate results

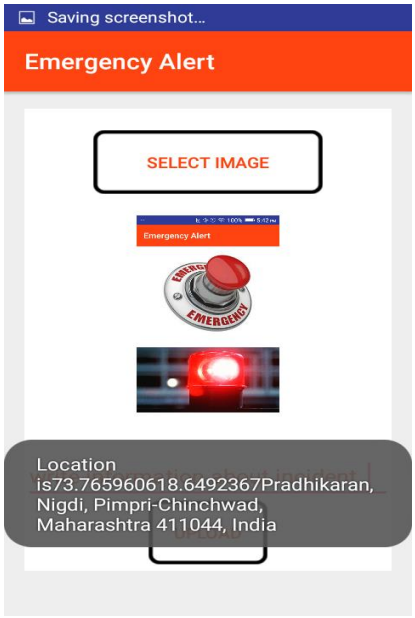

Figure 2.Test image displaying the location of the incident occurred while uploading the image

9. Conclusion

The proposed system is developed to provide the information about the occurred accident and the location of the accident .It helps to easily provide assistance to the victim. This system uses GPS module to locate the vehicle. The results of the proposed systems are satisfactory.

10. Acknowledgement

I would like to take this opportunity to thank my internal guide Prof. Jameer Kotwal for giving me all the help and guidance I needed. I am really grateful to them for their kind support. Their valuable suggestions were very helpful. I am also grateful to Prof. Dr. Archana A. Chaugule, Head of Computer Engineering Department, PCCOER for their indispensable support, suggestions. In the end our special thanks to Principal Dr. H.U. Tiwari for providing various resources such as laboratory with all needed software platforms, continuous Internet Connection, for our project.

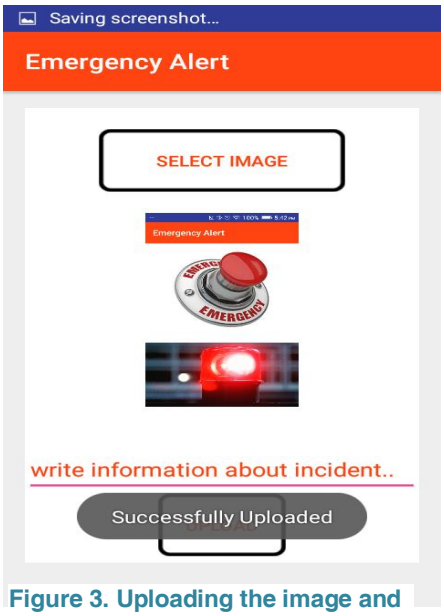

Figure 3. Uploading the image and description of accident module

11. Future Scope

The Proposed system can be extended by using sound sensor, so that it becomes more accurate and efficient to detect and avoid the accident. By introducing deep-learning methods We will be trying to automate the process of capturing the accident image by installing devices at specific locations where there are high chances of occurrence of accidents.

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He is member of professional societies like ACM, ISTE and LIMSTE. He is on editorial board and review panel of various journals and conferences. He has given expert talks on concepts in Compiler Design in various Colleges. He is also an Journal reviewer member of Advances in Science, Technology and Engineering Systems Journal.

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Automatic Shopping Cart with Advanced Billing System (May 2019)

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ABSTRACT In today's world shopping experience is becoming convenient as the world has become digitalized. This is one of the conveniences that will be providing with new and easy shopping experience. To reduce the waiting time in a long queue for the payment of purchased items, the project team is developing an automated shopping cart with advanced billing system. The system scans the product placed into the cart and accordingly generates the lump sum amount. This system consists of screen, camera, microcontroller, etc. Products will be captured by camera and will be processed using image processing. The user has to place the product into the cart, camera will capture the image of the product and this image will be compared with the images stored in the database. Once the image is matched with the database image, the product price will be displayed on the screen.

INDEX TERMS Image processing, tensor flow, Open CV, Euclidean distance

1. INTRODUCTION

Object detection refers to the capability of computer software systems to locate objects in an image or scene and identify each object. Object recognition is a key output of machine learning algorithms. One of the key features of "Automated Shopping Cart" is Machine Learning. What is "Automated shopping cart with advanced billing system"? The system includes a screen which will display the amount of the products present in the cart. These products are added until the user finishes shopping.

To detect and describe local features of an image scale-invariant feature transform (SIFT) is used. Key points of objects are first extracted from a set of reference images and stored in a database. By individually comparing each feature from the new image to the image in the database and then finding candidate matching features based on Euclidean distance, an object is recognized in a new image. True matches that pass all the tests can be identified as correct with high confidence.

2. LITERATURE SURVEY

A. Object Recognition in Shopping Cart

Authors :- Pradeep Gurunathan, Vishal Guruprasad, Ganveer N

The paper provides algorithm which successfully detects and identifies multiple grocery items using the Scale Invariant Feature Transform (SIFT) and image matching techniques. The method of generating key points favors grocery items with unique features. Integrating object detection techniques based on color into the algorithm would expand the type of detectable items rather than limiting the algorithm to items with unique labels and uniform shapes.

B. Smart Shopping Cart For Automated Billing Purpose Using Wireless Sensor Networks

Authors :- Udita Gangwal, Sanchita Roy, Jyotsna Bapat

It describes the implementation of a reliable, fair and cost efficient Smart Shopping Cart using Wireless Sensor Networks and Image Processing techniques. It uses a passive sensor to reduce the communication requirement. The experimental set-up is tested for various test cases, with various products tested for all the possible cases mentioned in broadcast technique to communicate with the Base Station as each cart is associated with a unique ID. The system is cost-effective as it requires only one passive sensor (the load-cell) and a camera-based barcode scanner (which is way cheaper than any other type of barcode scanners) per cart.

C. Smart Trolley In Mega Mall

Authors :- J. S. Awati, S. B. Awati

Microcontroller based design, has acquired the status of most happening field in electronics. This is highly specialized field that has the power of integrating thousands of transistors on single silicon chip. The microcontroller based trolley automatically follows the customer. Also it maintains safe distance between customer and itself. It gives number of products in trolley and total cost of the products on the spot.

3. SYSTEM ARCHITECTURE

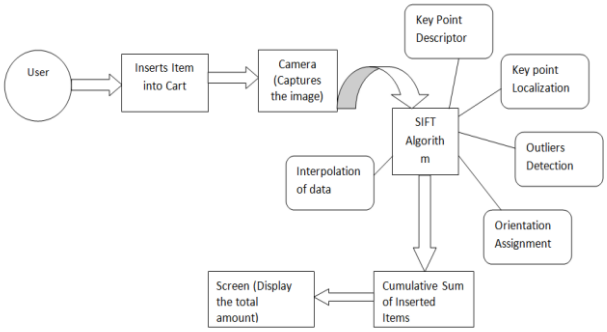

Fig 1. System Architecture

4. PROPOSED SYSTEM

The system includes a shopping cart with a detection sheet placed on one side of the cart. A camera of 3 megapixels is placed on the opposite side of the detection sheet. Whenever user puts a product into the cart, it crosses the detection sheet. Once the product crosses the sheet, camera will capture the images. These images are compared with the images present in the database using SIFT algorithm. Once the images are matched, the correct product will be recognized and the corresponding amount will be displayed on the screen. If the user removes any product, images are captured again as it crosses the sheet and compared with the database images. After product recognition the respective amount is reduced from the total amount. The camera will not capture images of the products present in the vicinity of the cart. Thus, the conundrum of scope of visibility is resolved. The payment mode depends on the grocery store or shopping mall authorities.

4.1 SIFT(Scale Invariant Feature Transform)

SIFT feature descriptor is invariant to scaling, orientation, illumination changes and distortion. SIFT's first step is keypoint localization in which the contrast of each point is calculated. The points to be rejected are the ones which have low contrast (and are therefore sensitive to noise) or are poorly localized. A detailed fit of the accurate points, scale, curvature and ratio is performed. The next step in the algorithm is interpolation of nearby data points using Taylor expansion. The position is accurately determined for each candidate keypoint. The points with less contrast are discarded using the Taylor value. In the next step, each keypoint is assigned to one or more orientations based on local image gradient directions. This step helps achieving invariance to rotation as the keypoint descriptor can be relative to this orientation. Thus we achieve invariance to image rotation. In short, we assigned orientations to keypoint locations at particular scales. A descriptor vector is computed for each keypoint such that the descriptor is highly invariant to illumination and 3D viewpoints. Hence, the main stages are feature detection, matching, indexing, clustering and outlier detection.

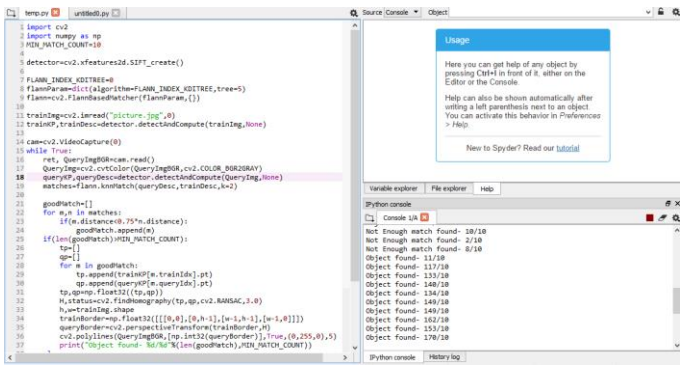

Fig 2. SIFT Implementation

4.2 PyCharm

PyCharm is the most popular IDE for Python created by Czech company, Jet brains which focuses on creating integrated development environment. PyCharm offers some of the best features to its users and developers such as smoother code completion and advanced debugging. When coding in python, you can check the last commit in PyCharm easily as it has the blue sections that can define the difference between the last commit and the current one. In PyCharm, all the installed packages are displayed with visual representation. This representation includes list of installed packages. It also has ability to search and add new packages. Local History in PyCharm always keeps track of the changes and gives complete details of what is needed to be rollback and what is to be added. PyCharm also consists of various Keymaps to show the most-used commands in the editor. Interpreters are included in

PyCharm to create a new project with new features as the way it is needed. A virtual environment can be created in your system as the way you need it. You can also inherit global site packages in the dialog box. Interpreters are available on Python Package Index (PyPI). They can be easily installed using pip install command. PyCharm supports interface support with various types of databases. Once a user grants access to the created database, it provides schema diagram of the database with SQL writing tools which provide code completion.

There are various hardware components used in the system as follows:

A **printed circuit board** (**PCB**) mechanically supports and electrically connects electronic components using pads, conductive tracks and other features made from one or more sheet layers of copper laminated into sheet layers of a non-conductive substrate.

Potentiometer(10k ceramic) is essentially a voltage divider used for measuring electric potential.

Raspberry Pi 3 Model B is a tiny credit card size computer. It is the fastest and most powerful device. It comes with a 1.2GHz quad-core ARM Cortex-A53 and 1GB LPDDR2 RAM.

Connecting wires are used for connection the various components. Also 3 pin, 4 pin, 2 pin female connector is also used.

5. CONCLUSION

Thus, a system called "Automated Shopping Cart with Advanced Billing System" is developed using SIFT algorithm, Image Processing, Machine Learning. The computational time will be greatly reduced by using above technologies. In turn, the waiting time of the user will be reduced and the shopping experience will be enhanced.

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[2] Smart shopping cart for automated billing purpose using wireless sensor networks

Authors :- Udita Gangwal, Sanchita Roy, Jyotsna Bapat

[3] Smart trolley in mega mall

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Insurance Telematics and Automotive Cyber Monitoring (May 2019)

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ABSTRACT Now-a-days as we open the newspaper, we find at least one news of a road accident. With vehicles becoming increasingly affordable, there has been a surge in the number of vehicles on roads on an average all over the world. Accidents bring devastation upon victims, causing loss of precious time and money. It has been established, after extensive research, that a majority of accidents become fatalities because of lack of communication to the concerned medical authorities and the consequent lack of immediate medical support. This application helps sense the possible occurrence of an accident on the road, with the help of sensors attached to the vehicle. This occurrence will be immediately communicated to the concerned people so that further action can be taken without any further delay.

INDEX TERMS Sensors; Ultrasonic Sensors; IOT; Obstacle Detection

1. INTRODUCTION

A typical economic transaction involves a known and quantifiable service or product being provided for a particular selling price. When purchasing insurance cover, a policyholder pays an insurer a premium to purchase a policy, which is an agreement that stipulates conditions under which the in-surer would pay for own or third party damages within a stipulated timeframe. Conventional automotive meet insurance differs from a typical economic transaction with respect to two key aspects. Firstly there is no knowledge of the magnitude of the service provided since the amount of claims paid (if any) is unknown. Secondly, by paying a lump sum premium depending on demographic and judgmental factors, drivers pay the same premium independent of usage. Boardoff and Noel (2008) compare this to a buffet restaurant that encourages more eating and explain that current conventional pricing encourages more driving which in turn increases claims and therefore premiums.

Following components will be required to design the system.

1.1 Accelerometer Sensor

An accelerometer is electromechanical device that measure acceleration forces. These forces may be static, like the constant force of gravity pulling at our feet, or they could be dynamic-caused by moving or vibrating the accelerometer.

1.2 Alcohol Sensor

An Alcohol Sensor is device that detect whether the person is drunk or not.

1.3 Switch

Switch is sensor used to detect whether the driver has wear seat belt or not.

1.4 Load Cell

Load cell is used to check the intensity of pressure on break.

1.5 Ultrasonic Sensor

Ultrasonic sensor is to check the distance between two vehicles.

2. Literature Survey

A. Bing Shun Lim, SyeLoongKeoh, Vrizlynn L. L. Thing

Have reviewed in their paper as Vehicles today are relying more on technologiesto bring about fully autonomous features. The conventional wirings within are being simplified into a network of electronic components, and this network is controlled via advanced sensing of the environment to make decisions in real-time.

B. ArunGeorge ; T. P. MithunHaridas

stated in their IEEE paper as Road accidents rates are very high nowadays, especially two wheelers. Timely medical aid can help in saving lives. This system aims to alert the nearby medical center about the accident to provide immediate medical aid. The attached accelerometer in the vehicle senses the tilt of the vehicle and the heartbeat sensor on the user's body senses the

abnormality of the heartbeat to understand the seriousness of the accident.

C. *R. A. Jain, AboliPhalke, Abhishek Murthy, RuchikaKhadatkar*

stated in their paper as the more we try to make our lives easy and luxurious the more hazardous it gets. The advancement of technology also plays a significant role. With the improvement of the growth of traffic and thus road accidents count has reached to an enormous scale. This rate of fatalities and serious injuries leads to loss of human lives.

3. System Architecture

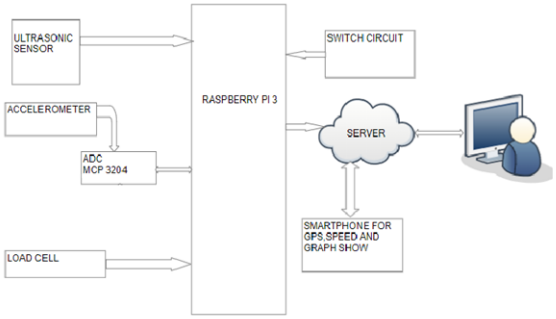
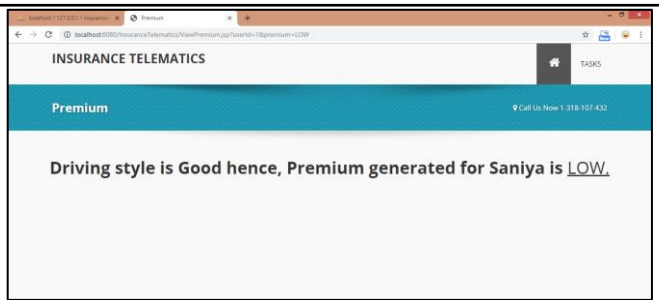
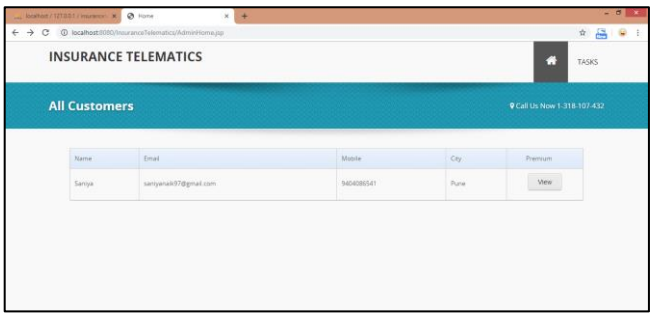


Fig1: System Architecture

4. Proposed System

The sensors listed above as shown in block diagram will take the data as input from the car & its parts. Speed and location is obtained from GPS of smartphone. For this API to get the location from androidandroid.location.LocationListener is used. This data will be processed inside the Raspberry Pi controller & tallied with the data stored in the server i.e. threshold values. A threshold level or value of each sensor will be decided on the trial and error basic which is programmed in Java. This data will be sent to the server via the internet (HTTP).Processed over there to charge the user with the appropriate premium fees. This premium along with all parameters will be visible on the web page for the user as well as for Insurance Company. Web page is complete Graphical user interface, where user can access all his driving history.





5. Conclusion

Here in proposed work, system is designed with sensors, in order to detect the speed violation, braking response, seat -belt awareness, alcohol consumption and fall detection to analyse the vehicle accidents and driver's driving behaviour, to calculate the telematics based premium. Pay as per your use is innovation focused by insurance telematics. Use of sensors and smartphone for measurement makes the system more feasible and trustworthy for the user as well as for insurers.Differential insurance premium i.e. premium is different for each user according to their driving habits, is the key feature of insurance telematics. It is sustainable because, it gives more benefits to the driver, who will follow the safer driving habits. Graphical analysis makes the proposed system different from other models.System analyse the three parameters i.e. ultrasonic distance, speed and breaking to investigate the pre-accident scenario

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Prediction of Human Behavior from Handwriting (May 2019)

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ABSTRACT Graphology is a method for identifying, evaluating personality traits by handwriting. Professional Handwriting analysts are called Graphologists. Handwriting is often called as Mind Writing or Brain Writing. It reflects human's thought-process through his handwriting Accuracy of Handwriting depends upon intellectual of the Graphologists. The proposed System focuses on developing a software for predicting human behavior. In this paper a method has been proposed from baseline, slanting of letters, looping of letters, pen pressure and height of the letters. The system uses Convolutional Neural Network (CNN) for prediction of human nature.

INDEX TERMS Behavior detection, Image Processing, feature extraction, CNN.

INTRODUCTION

Throughout history, scientists, philosophers, artists and others have been interested in the relationship between the handwriting and the writer. This attempted to relate specific handwriting elements to specific human traits. It took a while. In 1910, Milton Newman Bunker, a shorthand teacher, in Kansas, let his curiosity get the better of him. He wanted to know why, as a penmanship student, he had put wide spaces between his letters and long finals on his words. He began to study the graphology. In 1915, Bunker made his unique discovery. He recognized that each of his students formed shorthand strokes in a unique manner. He suddenly and clearly realized that it was not the letter which had a trait meaning but the strokes – the shape of the formations within the letter. Graphology suggested that an O with an open top – that is a space opening, indicated a person who would speak very openly and often. He checked and found this to be true. He thought, however, that logically, other letters with the same circle formation (a,g,d & q) should have the same meaning and after checking carefully he found that he did. After traveling thousands of miles, and interviewing thousands of people and examining more than half a million handwriting specimens in his lifetime, the copyrighted American System of handwriting analysis – Graphoanalysis was born.

OBJECTIVES This paper aims to predict human behavior through handwriting analysis. Convolutional layers apply a convolution operation to the input, passing the result to the next layer. The convolution emulates the response of an individual neuron to visual stimuli.

LITERATURE REVIEW **[1]** Esmeralda C. Djamal projected Autography movement emulate the written element of each individual's periodicity and design. By analyzing all fundamentals of handwriting and interpreting them, using typical of graphology author could initiate a chart of the writer's character attribute, sentimental constitution and gracious design. In graphological analysis, an image is separated into two accession that graphics attributes and partition digit each character. In this research, author employ graphical accession based on signature and digit of character of consumption scheme using many-frame algorithms and artificial neural networks (ANN). The image crack into two space: the signature occupied on nine appearance and consumption scheme of letters digit space. On each space preprocessing is performed to improve the recognition accuracy. ANN classifier is applied on five features of impression which outcome has exactness of 56-78% and four appearance of the impression that disclosure using many frame algorithms result 87-100% exactness.

[2] Sandeep dhang on Handwriting Analysis of Human Behavior Based on Neural Network, Graphology or Handwriting analysis is a scientific method of identifying, evaluating and understanding of anyone personality through the stroke and pattern revealed by handwriting. Handwriting reveals the true personality including emotional outlay, honesty, fears and defenses and etc. Handwriting stroke reflects the on-paper draw of each individual's rhythm and Style. The image split into two areas: the signature based on three features and application form of letters digit

area. In this research performance evaluation is done by calculating mean square error using Back Propagation Neural Network (BPNN). Human behavior is analyzed on the basis of signature by using neural network

[3] Javier Galbally, Julian Fierrez, Marcos Martinez-Diaz, R´ejean Plamondon E´cole Polytechnique de Montre´al focus on "Quality Analysis of Dynamic Signature Based on the Sigma- Lognormal Model". In this paper author distinct that various personal ethics can be precisely illuminate as a set of influential describe sequenced together by a Markov chain. To diagnose personal ethics from sensible data and to deduce personal ethics over a few seconds time, author then use these influential Markov layouts. To ensure the virtue of this designing avenue, creator report an experiment in which, author was able to achieve 95precision at predicting automobile drivers" subsequent actions from their starting preparatory movements.

[4] In this author distinguish a new behavioral biometric technique based on human computer communication. Author urbanized a system that captures the user communication via a lighten, and uses this observable information to verify the individuality of an individual. Using analytical pattern credit techniques, author developed a sequential classifier that processes user interaction, as reported by the user identity is considered real if a predefined accuracy level produced, and the user is classified as a pretender otherwise. Two statistical models for the features were tested, namely Parsing density opinion and a unimodal disposal. The system was checked with different numbers of users in order to assess the scalability of the proposal. Experimental results show that the normal user communication with the computer via a pointing device entails behavioral information with particular power.

[5] Proposed a paper addressing problem of personal authentication through the use of autograph recognition is described in this paper. There are two method of verification: online and offline signature verification. The dynamic methods covered the analysis of the shape, speed, stroke, pen pressure and timing information. While the stationary methods involve general shape recognition techniques. The paper inclined a sharp historical outline of the extant methods and it presents some of the recent research in the field. In this paper the problem of exclusive testimonial through the use of signature perception is considered. Twain on-line and offline methods have been described.

PROPOSED METHODOLOGY

Graphologist identify human nature with a piece of handwritten handwriting. The accuracy of handwriting analysis depends on how skilled the graphologist is. Even though manual handwriting has been effective it is costly and prone to fatigue, hence the proposed methodology focuses on developing a software for behavior analysis which can predict personality traits with the help of computer without human interference. The mostly used features of handwriting for prediction of personality traits are baseline, thickness, pen pressure, height etc. In this paper, the baseline, pen pressure, letter height and slant of letters has been considered for predicting personality.

Baseline: It is the line along which the writing flows

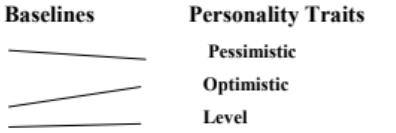
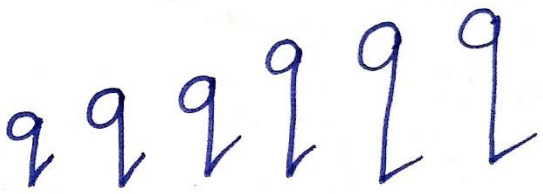


Figure.1: The baselines representing different personality traits of the writer

Pen Pressure: Amount of intensity applied while writing.

Height: It is the total vertical length of letters.



Slant: It is the inclination of letters.

Below are the implementation steps involved in Handwriting analysis.

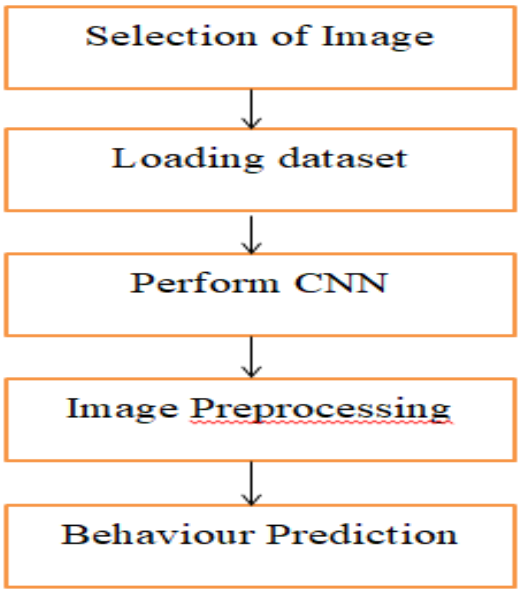


Fig1. Overall Architecture

1. Image Pre-processing

Image processing is done with an aim to improve the image data that suppresses unwanted distortions or enhances some image features important for further processing.

Image processing task is divided into 5 groups. They are:

1.Visualization - It observe the objects that are not visible.

2.Image sharpening and restoration - It is used to create a better image.

3.Image retrieval - It seek for the image of interest.

4.Measurement of pattern - It measures various objects in an image.

5. Image Recognition - It distinguish the objects in an image

a. Gray Scale

Grayscale image also known as black-and-white image is the one in which each pixel of the image carries intensity information. Gray scale image has only two colors: Black and white. The converted grayscale image might lose contrasts, sharpness, shadow, and structure of the color image. Also the luminance of a pixel value of a grayscale image ranges from 0 to 255

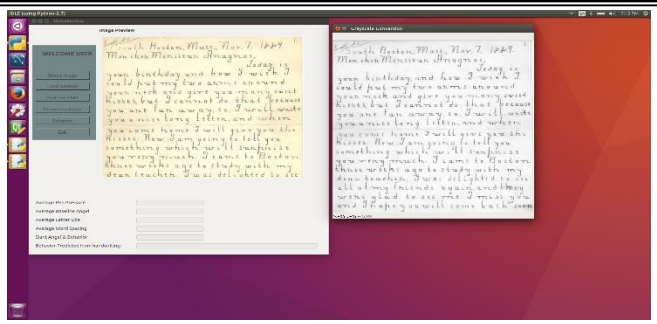


Fig2. Gray Scale

b. Bilateral Filter

A bilateral filter is non-linear, edge-preserving, and noise-reducing smoothing filter for images. It also replaces the intensity of each pixel with a weighted average of intensity values from nearby pixels. This weight is based on a Gaussian distribution. Typically, the weights depend not only on Euclidean distance of pixels, but also on the radiometric differences (e.g., range differences, such as color intensity, depth distance, etc.). This preserves sharp edges.

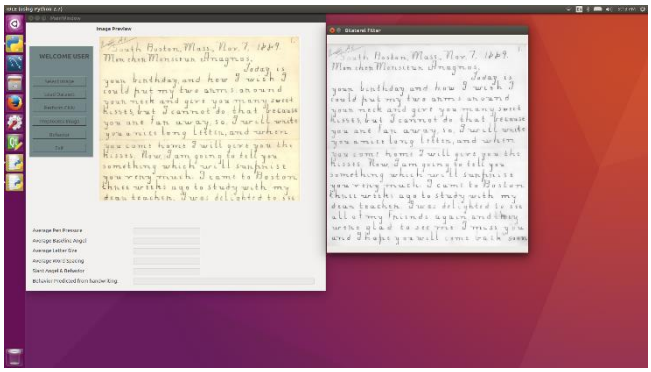


Fig3.Bilateral Filter

c. Canny Edges

Canny edge detection is a used to extract important structural information from different objects and also reduce the amount of data to be processed. The general criteria for edge detection include:-

1. Detecting the edge with low error rate, this means that the detection should accurately catch as many edges shown in the image as possible.

2. The edge point detected from the operator should accurately localize on the center of the edge.

3. A given edge in the image should be marked once, and wherever possible, image noise should not create false edges.

To satisfy these requirements Canny used the calculus of variations - a technique which finds the function which optimizes a given functional. The optimal function in Canny's detector is described by the sum of four exponential terms, but it can be approximated by the first derivative of a Gaussian.

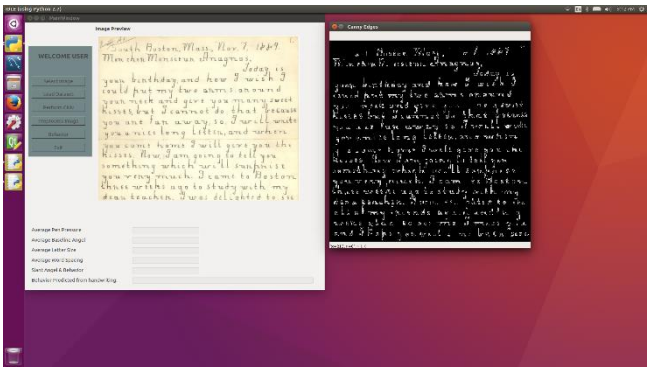


Fig4. Canny edges

2. Convolutional neural network(CNN)

Convolutional neural network (CNN or ConvNet) is a form deep learning and it is most commonly applied to analyze visual imagery. It use a variation of multilayer perceptron's designed to require minimal preprocessing. It is also called as shift invariant or space invariant artificial neural networks (SIANN), based on their shared-weights architecture and translation invariance characteristics. Convolutional network was inspired by biological processes in which the connectivity pattern between neurons is similar to the organization of the animal visual cortex. Individual cortical neurons respond to stimuli only in restricted region of the visual field known as the receptive field. The receptive fields of different neurons partially overlap such that they can cover the entire visual field. CNNs use little pre-processing compared to other image classification algorithms which means that the network learns the filters that in traditional algorithms were hand-engineered. This independence for prior knowledge and human effort in feature design is a major advantage. They have applications in image and video recognition, recommender systems, image classification, medical image analysis and natural language processing. A CNN consists of an input and an output layer and multiple hidden layers. The hidden layers of CNN typically consist of convolutional layers, pooling layers, fully connected layers and normalization layers.

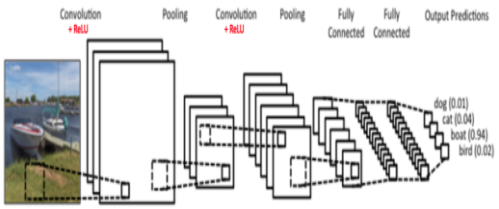


Fig6. simple ConvNet.

The Convolutional Neural Network in Fig. is similar to the original LeNet and classifies an input image into four categories: dog, cat, boat or bird.
There are four main operations in the ConvNet shown in fig. above:
1. Convolution
2. Non Linearity (ReLU)
3. Pooling or Sub Sampling
4. Classification (Fully Connected Layer)

An Image is a matrix of pixel values.
Typically, every image can be represented as a matrix of pixel values. Channel is conventional term used to refer to a certain component of an image. An image from a standard digital camera will have three channels – red, green and blue – you can imagine these channels as three 2d-matrices stacked over each other (one for each color) and each having pixel values ranging in 0 to 255.

The Convolution Step
ConvNets derive their name from "convolution" operator. The primary purpose of Convolution in case of ConvNet is to extract features from the input image. Convolution refers to the spatial relationship between pixels by learning image features using small squares of input data. We will not try going into the mathematical details of Convolution here, but will try to understand how it works over images.
As we discussed above, every image can be considered as matrix of pixel values. Consider a 5 x 5 image whose pixel values are only 0 and 1 (note that for a grayscale image pixel values range from 0 to 255 and the green matrix is a special case in which pixel values are only 0 and 1):

1	1	1	0	0
0	1	1	1	0
0	0	1	1	1
0	0	1	1	0
0	1	1	0	0

1	0	1
0	1	0
1	0	1

Also, consider another 3 x 3 matrix as shown. Then, the Convolution of the 5 x 5 image and the 3 x 3 matrix can be computed as shown in the animation

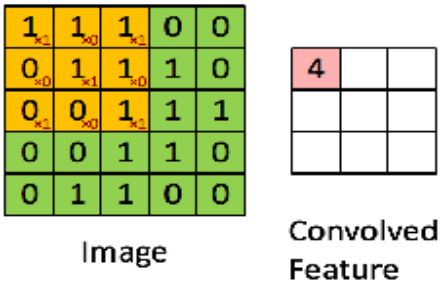


Fig7. The Convolution operation. The output matrix is called Convolved Feature or Feature Map.

Let's take a moment to understand how the computation for the above one is being done. We slide the orange matrix over the original image (green) by 1 pixel (also called 'stride') and for every position, we compute element wise multiplication (between the two matrices) and add those multiplication outputs to get final integer which forms single element of the output matrix (pink). Note that 3×3 matrix "sees" only a part of the input image in each stride.
In CNN terminology, 3×3 matrix is called 'filter' or 'kernel' or 'feature detector' and the matrix formed by sliding the filter over image and computing the dot product is called the 'Convolved Feature' or 'Activation Map' or 'Feature Map'. It is important to note that the filters acts as feature detectors from the original input image.
It is evident from the animation above that the different values of filter matrix will produce different Feature Maps for same input image. For example, consider the input image.

Introducing Non-Linearity (ReLU)
An additional operation called ReLU has been used after every Convolution operation in Figure above. ReLU stands for Rectified Linear Unit and is a non-linear operation and the output is given by:

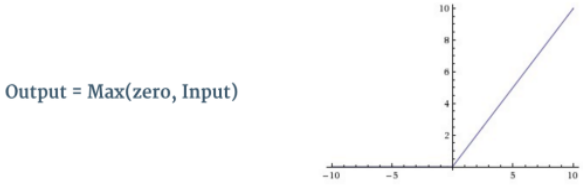


Fig8. The ReLU operation
ReLU is an element wise operation (applied per pixel) which replaces all negative pixel values in the feature map by zero. The purpose of ReLU is to introduce non-linearity in our ConvNet, since most of the real-world data would want our ConvNet to learn that would be non-linear (Convolution is a linear operation –element wise matrix multiplication and addition, so that we account for non-linearity by introducing a non-linear function like ReLU).

The Pooling Step
Spatial Pooling (also called subsampling or down sampling) reduces dimensionality of each feature map and retains the most crucial information. Spatial Pooling has various types: Max, Average, Sum etc.
In Max Pooling, we define spatial neighborhood (for example, a 2×2 window) where we take the largest element from the rectified feature map within the window. In average pooling, we take the average (Average Pooling) or sum of all elements in that window. In reality, Max Pooling has been shown to work better.
The image shows an example of Max Pooling operation on a Rectified Feature map (obtained after convolution + ReLU operation) using a 2×2 window.

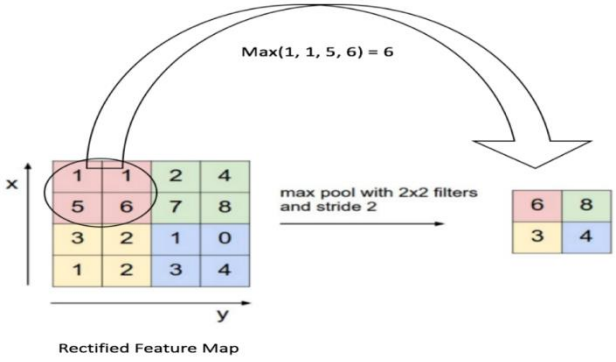


Fig 9. Max Pooling.
We can slide our 2 x 2 window by 2 cells (also called 'stride') and take the maximum value in each region. As shown in Figure, this reduces the dimensionality of our feature map.

CONCLUSION

A simpler method has been proposed to predict the personality of a person by exploring his handwriting. The system extracts features from breaks, size, space between words, baseline, loop of 'e' and few other features like pressure, margin, slant and dot distance in 'i'. The proposed system can be used as a twin tool by graphologist to improve the accuracy and anticipate the behavior s of a person faster. The estimated weighted accuracy of 93.77 % is achieved.

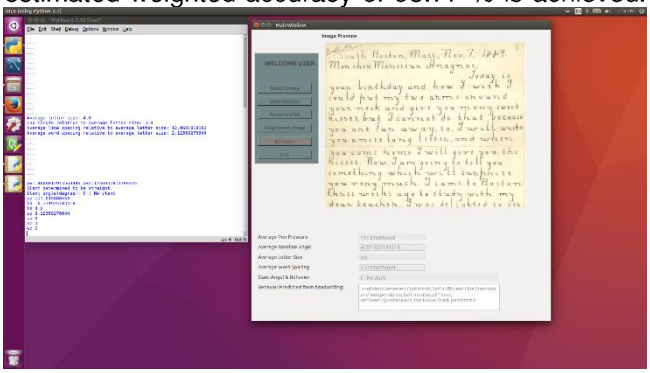


Fig10. Prediction

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Online Speech Recognition System (May 2019)

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ABSTRACT Online speech recognition system is an important advancement in the field of automatic speech recognition systems. The study on various technologies have been there in the research for more than five decades like the Hidden Markov Model (HMM), Gaussian Mixture Models and feature extraction models like Linear Predictive Cepstral Coefficient (LPCC).This System accepts a speech input from themicrophone and the speech captured through microphone is compared with database containing phrases, words and phonemes and the matched speech is converted to text and displayed on the text field.

INDEX TERMS HMM, LPCC, NLP, Automatic Speech Recognition

1. Introduction

The ultimate dream of speech recognition is to enable people to effectively interact with the modern computer systems and to provide a basic human-computer interaction with simple techniques and tools. Some of these typical applications include voice dialing, call routing, data entry and dictation, command and email writing with speech aid. With the help of an online speech recognition system the speech will be automatically converted to text with the HMM and LPCC algorithms and provide the users with hectic free solution to the speech processing.

1.1 Media Recorder API

Media Recorder API is a voice input API which is used for taking speech input from the user. It helps in reduction of noise from the speech of the user. It is used for various speech processing software and libraries.

1.2 Chrome Extension

A Chrome browser extension is a small software module for customizing a web browser. Browsers typically allow a variety of extensions, including user interface modifications, ad blocking and cookie management. These are separate type of modules.

1.3 HMM and LPCC

HMM and LPCC are algorithms for finding probability extraction and feature extraction respectively. They work in parallel for speech recognition process. These are low level algorithms that work on small datasets.

2. Literature Survey

A. *Dong Yu, Li Deng, "Automatic Speech Recognition"*

The book provides two standard methods for speech modeling which are Hidden Markov Model and Deep Neural Network Approach. The method of which speech technology to be used is based on the system being developed. Main Focus is given to deep neural networks based on their highly speech recognition capabilities

B. *Miss. Prachi Khilari, Prof. Bhope V. P, "A Review on Speech To Text Conversion Methods"*

This paper contains the type of vocabularies to be used based on different feature extraction models. Speaker dependent model specific systems is being implemented. Speech production process and Speech perception process is explained. Hidden Markov Model is used for probability comparing of multiple valued sentences. HMM training is provided to most probable valued sentence.

C. *Harshita Gupta, Divya Gupta, "LPC and LPCC Method of Feature Extraction in Speech Recognition System"*

This paper includes two major features feature extraction methods known as LPC and LPCC based on the type of complexity of the size of database. For small scaled database systems with efficient speech recognition system LPCC is usually preferred and for high scaled database system the use of MFCC is widely being used. LPCC is generally used for speech recognition along with good statistic models like Hidden Markov Model.

3. System Architecture

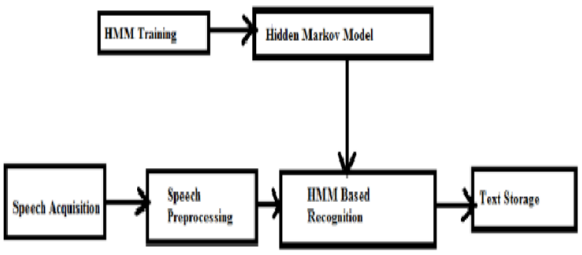

Fig1: System Architecture

4. Proposed System

The system includes a browser and a microphone. The user gives a speech input through microphone and the speech received through microphone is pre-processed to remove noise. A feature extraction method known as LPCC is being used. The extracted features are passed to HMM algorithm as input. HMM algorithm is used for sentence formation. Sentence being formed by extraction of grammar rules from database. After completion of sentence formation multiple probable sentences gets generated. HMM algorithm picks the sentence with highest probability. The output gets displayed on selected text field minimizing typing efforts.

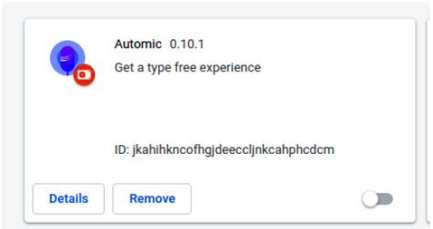

Fig2: Automic Extension

4.1 Input to microphone and pre-processing

With the use of the Media recorder API the speech is taken as the input to the system. By using modern active noise control is generally achieved through the use of analog circuits or digital signal processing. Adaptive algorithms are designed to analyze the waveform of the background aural o non-aural noise, then based on the specific algorithm generate a signal that will either phase shift or invert the polarity of the original signal. This effectively reduces the volume of the perceivable noise.

4.2 HMM Training

Hidden Markov Model algorithm is a statistical Markov model in which the system being modeled is assumed to be a Markov process with hidden states. In Markov Model the state is directly visible to the observer, and therefore the state transition probabilities are the only parameters, while in the Hidden Markov model, the state is not directly visible, but the output dependent on the state is visible. The task is to compute, given the model's parameters and a sequence of observations, the distribution over hidden states of the last latent variable at the end of the sequence.

4.3 LPCC

It is a variant of linear system and is abbreviated as Linear Predictive Cepstral Coefficients. Speech systems developed based on these features have achieved a very high level of accuracy for speech recorded in a clean environment without the interruption of noise and outliers. The features extracted from database using the energy values of linearly arranged words or phrases equally emphasize the contribution of all frequency components of a speech signal.

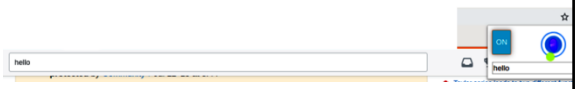

Fig3: Output

5. Conclusion

The proposed system is developed to convert the user given speech to text using mainly two important algorithms namely HMM and LPCC and as it is an online extension system it is compatible to be used in almost all websites and it will be useful in many applications including voice enabled email, voice enabled searching etc.

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Health Risk prediction using AI (May 2019)

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ABSTRACT Artificial intelligence aims to mimic human cognitive functions. It has been bringing a paradigm shift to healthcare, due to increasing availability of healthcare data and rapid progress of analytics techniques. We survey the current status of AI applications in healthcare and discuss its possible future. AI can be applied to various types of healthcare data which can be in structured and unstructured format. There exists popular AI techniques including machine learning methods for structured data, such as the classical support vector machine and neural network, and the modern deep learning, as well as natural language processing for unstructured data. Some important disease areas that use Artificial intelligence tools include cancer, neurology and cardiology. Artificial intelligence applications include early detection and diagnosis, along with prediction and prognosis which are reviewed.

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INDEX TERMS AI, machine learning, health care

1. INTRODUCTION

These days, individuals give careful consideration on their physical conditions. They need higher quality and more customized medicinal services benefit. In any case, with the restriction of number of talented specialists and doctors, most medicinal services associations can't address the issue of open. Step by step instructions to give higher quality health care service to more individuals with restricted labor turns into a key issue. Doctor's facility data frameworks normally produce enormous measure of information which appears as numbers, content, outlines and pictures. “On demand” access to high performance computing and large health care databases will support and sustain our ability to achieve personalized medicine. The IBM Jeopardy! Challenge, which pitted the best all time human players against the Watson computer, captured the imagination of millions of people across the world and demonstrated the potential to apply AI approaches to a wide variety of subject matter, including medicine. The combination of AI, big data, and massively parallel computing offers the potential to create a revolutionary way of practicing Evidence-based, personalized medicine. All medical knowledge including the continuous addition of new and important scientific information cannot be processed and stored by a single human brain. Physicians learn thousands of different diseases in medical school and are expected to remember and apply a substantial subset of these in daily practice. But it is impossible for an individual physician to keep current on the broad spectrum of new data and discoveries and to reliably recall and utilize that information at all relevant time points. With the advancement of information mining, increasingly medicinal services administration applications are put into benefit.

Our proposed framework is moreover one of medicinal services administration applications, which could be extremely commonsense to fulfill the rising interest of human services. In this paper, we construct a self-benefit expectation framework to recognize individuals with potential wellbeing hazard utilizing their normal physical examination records.

2. PROPOSED SYSTEM

Our proposed framework is one of medicinal services administration applications is to fulfill the rising interest of human services. In this paper, we construct a self-benefit expectation framework to recognize individuals with potential wellbeing hazard utilizing their normal physical examination records. We apply different machine learning strategies, including decision tree, naïve bayes.Furthermore, our framework can consequently gather new information while running, at that point re-prepare the model and enhance framework execution utilizing these information.In our proposed system we build an website to help individuals as well as doctors to predict potential diseases.The dataset includes wide variety of symptoms leading to various diseases.The individual user has to login into the website and has variety of symptoms to select from.The model system then predicts the corresponding disease.The doctor is the admin and has the control of all users.Users can be made active/inactive by the admin.The users frequency of checking certain diseases helps build a graph indicating the future analysis of possible diseases he/she can have.

3. IMPLEMENTATION

In this paper the implementation is based on AI-assisted Prediction on potential Health risks.A successful AI system must possess the machine learing component for handling data.The sophisticated algorithms then need to be trained through healthcare data before the system can assist physicians with disease diagnosis and treatment suggestions.

3.1. Naive bayes:

Naive Bayes is a simple technique for constructing classifiers models that assign class labels to problem instances, represented as vectors of feature values, where the class labels are drawn from some finite set. Naive Bayes classifiers assume that the value of a particular feature is independent of the value of any other feature, given the class variable. For some types of probability models, naive Bayes classifiers can be trained very efficiently in a supervised learning setting. In many practical applications, parameter estimation for naive Bayes models uses the method of maximum likelihood; in other words, one can work with the naive Bayes model without accepting Bayesian probability or using any Bayesian methods.

Naive Bayesian Classifier:-The naive Bayesian classifier works as follows:

(a) Let T be a training set of samples, each with their class labels. There are k classes, C1, C2, . . . , Ck. Each sample is represented by an n-dimensional vector, X = x1, x2, . . . , xn, depicting n measured values of the n attributes, A1, A2, . . . , An, respectively.

(b) Given a sample X, the classifier will predict that X belongs to the class having the highest a posteriori probability, conditioned on that is X is X is predicted to belong to the class Ci if and only if

P(Ci|X) > P(Cj|X) . . . . . (1)

for 1 j m, j = i.

Thus we find the class that maximizes

P(Ci|X) . . . . . (2)

is maximized is called the maximum posteriori hypothesis. By Bayes' theorem.

P(Ci|X) = P(X|Ci)P(Ci)/P(X). . . . . (3)

(c) As P(X) is the same for all classes, only

P(X|Ci)P(Ci) . . . . . (4)

need be maximized.If the class a priori probabilities, P(Ci),are not known, then it is commonly assumed that the classes are equally likely, that is,

P(C1) = P(C2) = . . . = P(Ck), and we would therefore maximize

P(X|Ci) . . . . . (5)

Otherwise we maximize

P(X|Ci)P(Ci) . . . . . (6)

Gaussian Naïve Bayes

This is as simple as calculating the mean and standard deviation values of each input variable (x) for each class value.

mean(x) = 1/n * sum(x) . . . . . (7)

Where n is the number of instances and x are the values for an input variable in your training data.

We can calculate the standard deviation using the following equation:

standard deviation(x) = sqrt(1/n * sum(xi-mean(x)^2)) . . . . . (8)

Probabilities of new x values are calculated using the Gaussian Probability Density Function(PDF).

When making predictions these parameters can be plugged into the Gaussian PDF with a new input for the variable, and in return the Gaussian PDF will provide an estimate of the probability of that new input value for that class.

pdf(x, mean, sd) = (1 / (sqrt(2 * PI) * sd)) * exp(-((x-mean^2)/(2*sd^2))) . . . . . (9)

Where pdf(x) is the Gaussian PDF, sqrt() is the square root, mean and sd are the mean and standard deviation calculated above, PI is the numerical constant, exp() is the numerical constant e or Euler's number raised to power and x is the input value for the input variable.

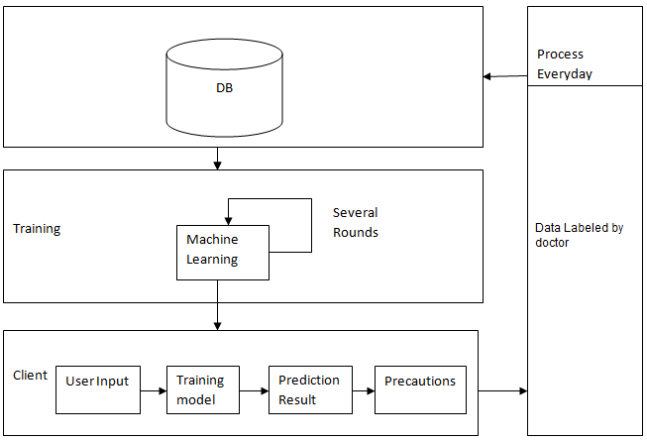
4. MATHEMATICAL MODEL

Where,
Q = input data (Regular Checkup)
CB = classify the data
C = according to classified data match the disease
PR = predicted result
UB = precautions
Set Theory Let S be a system which find exact match disease record and precautions.
S = In, P, Op, Identify Input In as In = Q
Where, Q = input data
Identify P as P = CB, C, PR
Where, CB = classify the data
C = according to classified data match the disease
PR = predicted result Identify Output Op as Op = UB
Where,
UB = precautions After preprocessing the request, system decides particular disease. If it is identified then

system suggests the Precautions according to disease = Failures and Success conditions.

- Failures: Huge database can lead to more time consumption to get the information. Hardware failure and software failure.
- Success: Search the required information from available in Datasets. User gets result very fast according to their needs.

5. ARCHITECTURE DIAGRAM



DB- database contains all the dataset related to modules such as user registration and login, admin login , diseases dataset as well as user records.

Disease dataset- attributes of symptoms such as skin rashes, nose bleed, nodal infection and so on.

User records- user diseases history.

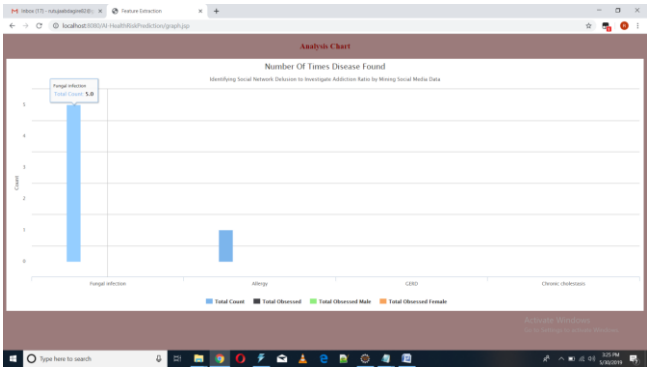
Training – Here the tuples of labeled classification are given for training.

Machine learning model- Classifier used for training is Naïve bayes.

Client-
User input-The user gives input in form of various symptoms which are present in the disease's dataset.This unclassified and unlabelled tuple is given to the training model.The result is predicted in the form of the disease name.The user is shown a set of precautions to be taken.

5. RESULT

The user selects a set of symptoms from the given interface.This data is sent to the classifier to train and predict. The users frequency of checking certain diseases helped build a graph indicating the future analysis of possible diseases he/she could have.



6. CONCLUSION

We reviewed the motivation of using Artificial Intelligence in healthcare, presented the various health-care data that AI has analyzed and surveyed the major disease types that AI has been deployed. We then discussed in details the major category of AI devices i.e. Machine Learning. For ML, we focused on the classical techniques: Naïve bayes.This gave us the accuracy of 94.20%.

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Virtual Trial Room (May 2019)

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ABSTRACT Whenever accident occurs, the nearby people call the ambulance. The problem related with this is that the victims depend on the mercy of nearby people. There is a chance that there is absence of people near the accident spot or people who are around neglects the accident. This is the flaw in the manual system. So, to overcome from this flaw of manual system, we came with an Idea of a system which will detect an Accident and will send the related information of user /driver to the nearby police station, Hospitals and Also to their Relatives. Our system uses inbuilt sensors in smartphones, i.e., accelerometers. These differences combined with position can determine whether the accident occurred or not, that can provide emergency communication and location tracking services in a remote car that meets an unfortunate accident or any other emergency situation. Instantly after an accident or an emergency, the system either starts automatically or may be triggered manually. It initiates communication and shares critical information like location information, a set of relevant images taken from prefixed angles etc. with appropriate server or authority. Allocation of interactive realtime multimedia communication, real-time location tracking etc. has also been integrated to the proposed system to monitor the exact condition in real-time basis.

INDEX TERMS Location tracking, Android Application, Accident Spot, Alert, Notification.

1. INTRODUCTION

In recent years road safety is an important area for research and action programmed has received a great deal of scientific attention. Progress has been made on several different fronts but in one area there would appear to be a serious lack of interest or, at the very least, a paucity of published information and informed debate. This area concerns the degree to which our thinking and our solutions are combined into a particular view of technology and society. They are castigated to produce view of technology and society.

2. Literature Survey

1. TITLE: Recommendations of the DG eCall for the introduction of the pan-European eCall

Published by: eCall Driving Group With fatalities on the road across the EU of more than 40.000 people every year, the European Commission recognizes that the current measures towards reducing the fatality number is not enough. In the White Paper on European transport police from 2001, the European Commission proposed that the European Union should set itself the target of halving the number of road fatalities by 2010. One of the initiatives from the European Commission is the establishment of the eSafety Forum, which is a joint industry/public initiative for improving road safety by using new Information and Communications Technologies. The overall objective is to join forces and to build up a European strategy to accelerate the research and development, deployment and use of Intelligent Integrated Safety Systems including Advanced Driver Assistance Systems (ADAS) for increasing road safety in Europe.

2.TITLE: Towards Vehicular Sensor Networks with Android Smartphones for Road Surface Monitoring.

Published by: Girts Strazdins, Artis Mednis, Georgijs Kanonirs, Reinholds Zviedris and Leo Selavo Android is one of the most popular smartphone platforms at the moment, and the popularity is even rising. Additionally, it is one of the most open and flexible platforms providing software developers easy access to phone hardware and rich software API. We envision Android-based smartphones as a powerful and widely used participatory sensing platform in near future. In this paper we examine Android smartphones in the context of road surface quality monitoring. We evaluated a set of pothole detection algorithms on Android phones with a sensing application while driving a car in urban environment. The results provide first insight into hardware diff erences between various smartphone models and suggestions for further investigation and optimization of the algorithm, sensor choices and signal processing.

3.TITLE: Providing Accident Detection in Vehicular Networks Through OBD-II Devices and Android-based Smartphones.

Published by: Jorge Zaldivar, Carlos T. Calafate, Juan Carlos Cano, Pietro Manzoni By combining smartphones with existing vehicles through an appropriate interface we are able to move closer to the smart vehicle paradigm, offering the user new functionalities and services when driving. In this paper we propose an Android based application that monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents. Our proposed application estimates the G force experienced by the passengers in case of a frontal collision, which is used together with airbag triggers to detect accidents. The application reacts to positive detection by sending details about the accident through either e-mail or SMS to predefined destinations, immediately followed by an automatic phone call to the emergency services. Experimental results using a real vehicle show that the application is able to react to accident events in less than 3 seconds, a very low time, validating the feasibility of smartphone based solutions for improving safety on the road.

3. System Architecture

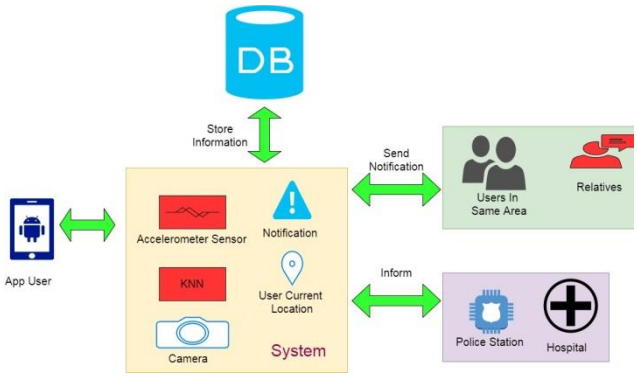

Fig1: System Architecture

4. Proposed System

In proposed system, our system place user's mobile on desk at the time of driving. Accident is detected with the help of accelerometer sensor. When accident is occurred, it checks accident is occurred or not by sending alert notification to application user. If user responds to system with confirmation that user is ok then system will be in normal mode. If user gives no response or tells that user is not ok then system will take photo from front camera and with current address sends all information to nearest hospital, police station and user relatives. A. User: In this module user register into the system. All information (Name, Mobile No., UID No., License No., and Password) of user stored into data based. User places the mobile in car. This application also shows accident spots. So, user can take precaution about accident.

B. Admin: After detecting accident, system will alert to user and take the response if user doesn't response to system then system consider that accident actually occurred. System will collect accident spot information (Location, Username) and then stored into database. After collecting data, the system searches the nearest hospital and police station. C. Inform nearest hospital and police station: System at the background searching the nearest location of police and hospital. After searching done system request successfully send to that police station. In this model user current location used to find nearest hospital and police station.

D. Inform to relatives and other user: After detecting accident system inform to nearest user to avoid the traffic. System also inform to relatives by sending SMS. Relative's mobile number is store at user registration.

Figure 2: Working of ultrasonic sensor

Ultrasonic Sensor is used for detecting presence of an object, that object can be user. Ultrasonic Sensors or Ultrasonic transducers are type of acoustic sensor. Transmitters are used to convert electrical signals into ultrasound, receivers can convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

figure 3: ESP8266 Microcontroller

The ESP8266 is a microcontroller having low cost microchip with full TCP/IP and microcontroler stack capability that allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands.

5. Conclusion

Result shows that the application developed is able to correctly fulfill its purpose within a short time period. Overall time required to perform all the tasks, including the delivery of an SMS with the accident details, followed by providing the nearby police station and hospital details and providing them an alert message of the user accident with exact location of user, is taking short time period.

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Electronic and Telecommunication Engineering

Title of Papers (May 2019)

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ABSTRACT Diabetic Retinopathy (DR) is one of the main causes of blindness and visual impairment in developed countries, stemming solely from diabetes mellitus. Current screening methods using fundus images rely on the experience of the operator as they are manually examined. Automated methods based on neural networks and other approaches have not provided sensitivity or specificity above 85%. This work presents a Image Processing based method that directly identifies hard exudates and dot haemorrhages (DH) from 100 digital fundus images from a graded database of images using standard Image Processing techniques, and clinical observation and knowledge. Sensitivity and specificity in diagnosis are 95-100% in both cases. Positive and negative prediction values (PPV, NPV) were 95-100% for both cases. The overall method is general, computationally efficient and suitable for further clinical trials to test both accuracy and the ability to the track DR status over time.

INDEX TERMS Enter key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords

1. INTRODUCTION

Diabetic Retinopathy (DR) is one of the main causes of blindness and visual impairment in developed countries. The prevalence of retinopathy and vision threatening retinopathy in the US are 40.3% and 8.2% respectively for diabetic adults 40 years or older (TEDPRG, 2004). The number of people with diabetes is expected to double in the next 15-30 years due to obesity, aging populations and inactive lifestyles, with over 80% of diabetic individuals affected.

Energy	$E_n = \sum_i \sum_j f_{ij}^2$, in which f_{ij} indicates the $(i, j)^{th}$ entry in GLCM
Contrast	$Con = \sum_i \sum_j (i-j)^2 f_{ij}$
Entropy	$Ent = -\sum_i \sum_j f_{ij} \log_2 f_{ij}$
Homogeneity	$Hom = \sum_i \sum_j \frac{1}{1+(i-j)^2} f_{ij}$

2. GUIDELINES FOR MANUSCRIPT PREPARATION

3. MATH

If you are using *Word,* use either the Microsoft Equation Editor or the *MathType* add-on (http://www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). "Float over text" should *not* be selected.

A. EQUATIONS

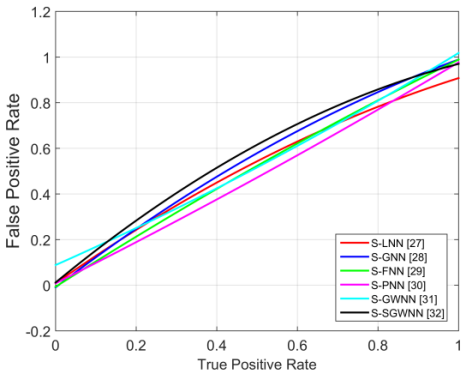

Fig. 1. ROC analysis for proposed and conventional classifiers

4. GUIDELINES FOR GRAPHICS PREPARATION AND SUBMISSION

The overall architecture of the proposed model is given by Fig. 1. The suggested scheme involves three phases: Segmentation, Feature Extraction, and classification. The fundus image, U is given as input, from which the abnormalities such as, Exudates, Haemorrhage, Intra Retinal Micro vascular Abnormalities (IRMA) and Microaneurysm are segmented using DBSCAN The obtained segmented image Se is then offered for feature extraction, where the GLCM and GLRM features are extracted.

4) TABLES

Data charts which are typically black and white, but sometimes include color.

TABLE I

Author [citation]	Adopted methodology	Features
Georgios *et al.* [1]	RF approach	❖ Better reliability ❖ Improved discriminative probability
Pratumgul *et al.* [2]	NN	❖ Improved sensitivity ❖ Better specificity
Gupta *et al.* [3]	RF approach	❖ High sensitivity ❖ Enhanced specificity
Kumar *et al.* [4]	AD approach	❖ Better sensitivity ❖ Improved specificity
Thomas *et al.* [5]	Fundus photography	❖ Improved accuracy ❖ Better photographic outcome

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B. MULTIPART FIGURES

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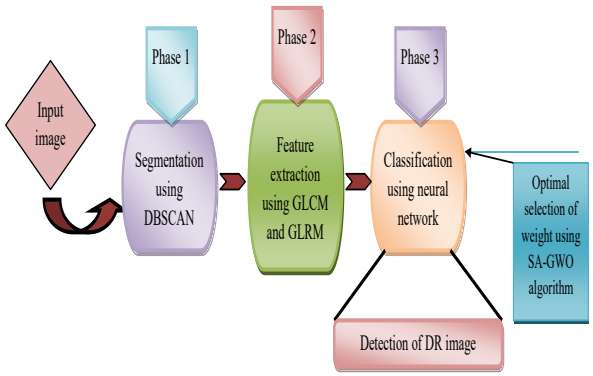

C. FILE FORMATS FOR GRAPHICS

Format and save your graphics using a suitable graphics processing program that will allow you to create the images as PostScript (PS), Encapsulated PostScript (.EPS), Tagged Image File Format (.TIFF), Portable Document Format (.PDF), or Portable Network Graphics (.PNG) sizes them, and adjusts the resolution settings. If you created your source files in one of the following programs you will be able to submit the graphics without converting to a PS, EPS, TIFF, PDF, or PNG file: Microsoft Word, Microsoft PowerPoint, or Microsoft Excel. Though it is not required, it is strongly recommended that these files be saved in PDF format rather than DOC, XLS, or PPT. Doing so will protect your figures from common font and arrow stroke issues that occur when working on the files across multiple platforms. When submitting your final paper, your graphics should all be submitted individually in one of these formats along with the manuscript.

5. CONCLUSION

A This paper has proposed a novel technique called SA-GWO for detecting the type of DR that involves three phases, known as, segmentation, feature extraction, and classification. Here, DBSCAN was exploited by which the input fundus image was segmented. In addition, GLCM and GLRM features were extracted from the segmented fundus image from which the optimal features were chosen by SA-GWO

Acknowledgement

The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ... .” Instead, write “F. A. Author thanks ... .” In most cases, sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page, not here.

REFERENCES

[1] Georgios Leontidis, “A new unified framework for the early detection of the progression to diabetic retinopathy from fundus images”, Computers in Biology and Medicine, vol. 90, pp. 98-115, 1 November 2017.

[2] Weeagul Pratumgul, Worawat Sa-ngiamvibool, “The Prototype of Computer-Assisted for Screening and Identifying Severity of Diabetic Retinopathy Automatically from Color Fundus Images for mHealth System in Thailand”, Procedia Computer Science, vol. 86, pp. 457-460, 2016.

[3] Garima Gupta, S. Kulasekaran, Keerthi Ram, Niranjan Joshi, Rashmin Gandhi, “Local characterization of neovascularization and identification of proliferative diabetic retinopathy in retinal fundus images”, Computerized Medical Imaging and Graphics, vol. 55, pp. 124-132, January 2017.

[4] P.N. Sharath Kumar, R.U. Deepak, Anuja Sathar, V. Sahasranamam, R. Rajesh Kumar, “Automated Detection System for Diabetic Retinopathy Using Two Field Fundus Photography”, Procedia Computer Science, vol. 93, pp. 486-494, 2016.

Frequency and Time Forum Award, the Carl Zeiss Research Award, the William F. Meggers Award and the Adolph Lomb Medal (OSA).

Advanced Military Spying and Bomb Disposal Robot

Paratane Deepali[1], Shinde Pranjal[2], and Jadhav Vishesh[3]
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ABSTRACT This paper represents the wireless robot which performs bomb diffusing and detection operation. The bomb searching and diffusing system work with the help of experts. This robotic system works with the help of wireless technology. the bomb diffusing experts control the robotic system using IP Web Cam Application. We have used four DC motors for Arm controlling purpose. Here we have used metal detector and chemical sensor for the bomb detection purpose. With the help of this project, we save life of bomb experts and the lives of ordinary people.

INDEX TERMS GUI, MATLAB Software, IP Web Cam Application, Robotic Arm.

1. INTRODUCTION

Here we are going to design a robot which is capable of detecting the bomb and even marking their exact location. Here robot will be controlled wirelessly. Here RF module will be used. Main application of RF module is to communicate wirelessly. This communication may be accomplished through radio frequency communication.
Generally, An RF module is a small size electronic device, that is used to transmit or receive radio signal between two devices. The three main task in this project is as follows-

1.Detecting
2.Spying
3.Diffusing

Here we used camera for spying purpose. This wireless camera basically used for live streaming and video feedback. The night vision cam- era is also used so that the night will get a clear image. For detecting we are using the metal detector and chemical sensor. Spying is pro- vides the exact location of the bomb. And for the diffusion purpose the Arm is used. This bomb diffusing robot can handle simple tasks like cutting wires, lifting light object etc. robot takes commands from the user in the form of control signals and perform the required action.

Next important part of this project is to create the Graphical User Interface (GUI). The Graphical User Interface is a human computer interface. It consists of icons, menus, buttons, etc. Most of the modern applications like electronics gadgets like mobile phones interact with user through GUI. GUI uses buttons, menus, message boxes, etc. Controlling can be done through GUI. The following steps are representing the steps for creating Graphical User Interface-

Step 1- Go in command window and type "Guide" then the guide window will pop up.

Step 2- Then click on "Blank GUI" and then "OK". Now blank window will pop up on the screen.
Step 3-That blank window will be known as GUIDE layout editor.
Here we can design layout of a GUI by dragging and dropping the components from left.
Step 4- File ->Preferences->Guide->matlab GUIDE preferences and tick the one box,2 and 4 box which will be of the (show name of the component, show file extension, add comments).
Step 5- We can resize the template which will not be changed it will be fixed. And if we want to change this property than we will go in Tools -> GUI option -> Resize behavior (choose the App option).
Step 6 - we can add couple of components to GUI.
1.add"ares".
2.add "panel" where push buttons will be placed.
3.allignments of the buttons can also be done.
4.we can change the properties of the GUI.
This can be done by double clicking of an object (or) going to view -> property inspector where property inspector will allow us to view and set the property: -
i) we can change GUI name property -> name=[xyz]
ii) panel name i.e. title can also be changed, so double click on the panel -> changed the title.
iii) Then double click on push buttons to change their name string.
iv)We can also add tool bar buttons using tool bar editor like (zoom in, zoom out, rotate, etc.).
v)After the GUI is created, we can run the GUI by clicking the green button.
vi)It will generate a MATLAB file which displays a GUI. Click on that file and save it.

Then the program will be generated as well as we can see the GUI what we generate in the editor.

2. LITERATURE SURVEY: -

1.'Low Cost Radio Frequency Controlled Robot for Environmental Cleaning' (2015) -

'Low Cost Radio frequency Controlled Robot for Environmental Cleaning' by M.Muthiah, Rk. Sathiendran, K.Nirmal published in the year 2015, used RF controlled robot for the cleaning in hazardous areas like Chemical Labs, Radiation Factories, etc. and even in home applications [1].

2.'Design and Implementation of a RF Controlled Robotic Environmental Survey Assistant System' (2014) -

'Design and Implementation of a RF Controlled Robotic Environmental Survey Assistant System' by Md. Shamsul Alam, Insan Arafat Jamil, Khizir Mahmud and Najmul Islam published in 2014, focused on use of RF robots for environmental survey which involved data collection and logging and sensors to sense the hazardous compounds in the vicinity [2].

3."Design and Implementation of a Bomb Diffusing Surveillance Robot using RF Technology" (2013)-

"Design and Implementation of a Bomb Diffusing Surveil- lance Robot using RF Technology" is paper by Reddy Pannnala; DR. R.V. Krishnaiah is an author of this paper, this paper published in 2013. Advantages of this project are a robot that can be controlled by hand gestures and by a RF remote. This project is much useful for mines detection, surveillance applications. In this project RF module is use so that range is very small. "Bomb Detection and Diffusion in Planes by application of robotics", Prashant Limje, Shailesh Khekale is an author of this paper, this paper published in 2013. Advantage of his project is, they have idea dynamic3D videogame is realized, the paper provides the reference for the mission to find and retrieve a bomb placed inside an airplane. But it is Difficult to achieve reliability [3].

4."Hand Gesture Recognition Bomb Diffusing Surveillance Robot" (2012)

"Hand Gesture Recognition Bomb Diffusing Surveillance Ro- bot" is paper of Sagar Radive, Neha Lokhande, Apoorva Kamat, Shubhrojit Chakraborty, Vishal Pande National Conference on Emerging Trends in Engineering & Technology 2012 the hand gesture recognition makes the robot more user friendly but also there is need of Improvising the range of wireless communication so as to be able to put to a wider use. A Multipurpose Robot for Military Tribute to the Defense Ministry is paper of V. Prasanna Balaji & H. Goutham, International Journal on Theoretical and Applied Research in Mechanical Engineering (IJTARME), 2013 this also helps on remote bomb detonation and automatic bomb detection. Our robot also has terrain climbing facility so that it can be used in hilly regions. Future aim is to reduce the response time to a greater extent [4].

5.'Robust Stabilization of Wheeled Mobile Robots Moving on Uncertain Uneven Surface' (2006) –

'Robust Stabilization of Wheeled Mobile Robots Moving on Un- certain Uneven Surface' by Xiaocai Zhu, Guohua Dong and Dewen Hu and Zixing Cai published in 2006, used dynamics of the system to stabilize the robot (WMRs).

From the referred papers we have learned that the range of RF module is sufficient for low key applications, these applications can depend in the various field they are to be used. The components to be used can vary depending on the applications like cleaning purposes, Environmental surveillance, etc. The accuracy, reliability, and flexibility can be taken in use for the RF robot.

All the factors of stability, transmission of signals, cost-efficient robot is satisfied. The use of RF control can be helpful in the long range of activity and can be used efficiently. The disadvantages for the referred papers are that stability turns out to be the main problem due to obstacles in the travelling path. Considering all the references the advantages are that: RF based wheeled robot has been efficient for the use over uneven surfaces. Commercially these features can also be used for intelligent control systems. During the implementation of the system, a radio button will also be added to the GUI interface to make it a line follower robot.

Robust Stabilization of Wheeled Mobile Robots Moving on Uncertain Uneven Surface' focuses on stability of wheeled mobile robots (WMRs) which is more than legged robots. The control design is carried out for the dynamic model of unicycle, the most common and simplest among WMRs. The need of such WMRs has been necessity of the age; they can be used in field operations such as for rescue and search applications. By this we can be sure that less human harm is done in rescue operations.

From the referred papers we have learned that the range of RF module is sufficient for low key applications, these applications can depend in the various field they are to be used. The components to be used can vary depending on the applications like cleaning purposes, Environmental surveillance, etc. The accuracy, reliability, and flexibility can be taken in use or the RF robot. All the factors of stability, transmission of signals, cost-efficient robot is satisfied. The use of RF control can be helpful in the long range of activity and can be used efficiently [5].

6.Design and Implementation of a Mobile Robot used in Bomb Research and Setup Disposal.

In this study, a mobile robot which can be used for bomb research and dispose of a bomb setup with a remote control has been designed and achieved. Also, a visual operator interface program has been written in Qt- Creator environment which supports different operating systems so as to carry out remote control and tracking the mobile robot. The whole hardware on mobile robot has communicated with operator center successfully and the robot has been made ready. As seen from experimental results, the mobile robot can direct to suspicious packet fast, focus on it with its camera and fire its AK-ER weapon aiming at suspicious packet to disarm bomb setup [6].

7.DC Servo Controlled System Design on Bomb-Disposal Robot Algorithm.

The research on DC servomotor control system for bomb-disposal robot is proposed in the paper, which is based on PID control and PWM output for the DC motor drive. The research designed PID control for 8 DC servomotors drive in the bomb-disposal robot, and the optimize PID parameters are determined by experiment. In the design the DC servomotor control system is an embedded system, where the encoder signals input and PWM output are processed by the PC 104 embedded system. The PID control model and the PWM generator mod- el is simulated by MATLAB Simulink in the research [7].

8.Bomb disposal Robot Discarding explosive through wireless controlled method.

The whole operation of the robot can be performed wirelessly from a computer. DC servo motor is used as actuator of the arm, and the servo is controlled by the PWM signal generated by microcontroller. This report is concerned with the mathematical modeling of a 6 DOF robotic arm along with the methodology of the entire prototype development. Architectural and circuitry development are separately deliberated. This prototype has few limitations in practical point of view, but improvement in design, dexterity, DOF can enhance the chance to implement in real life application [8].

3. BLOCK DIAGRAM: -

3.1 Transmitter

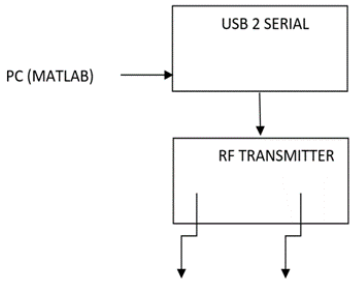


Fig: Block Diagram-Transmitter

3.2 Receiver

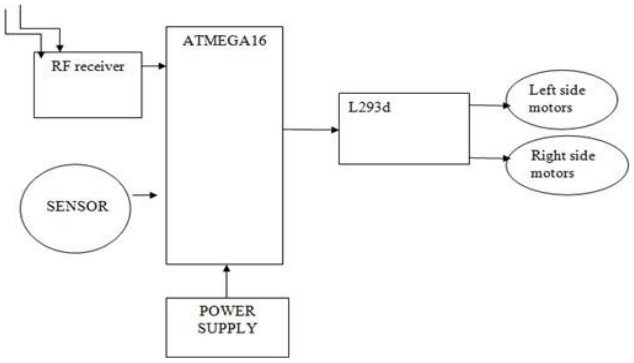


Fig: Block Diagram-Receiver

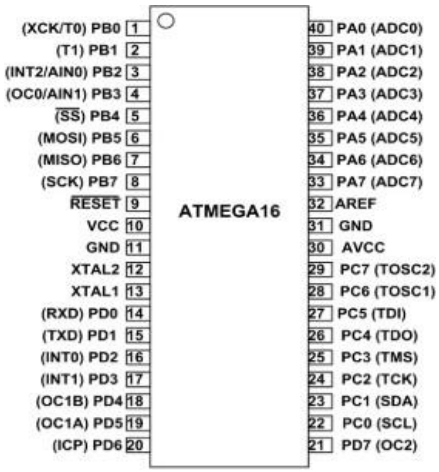
3.3 Explanation of Block Diagram-

Here in the block diagram as we can see the user gives instruction to the robot by using the DC (MATLAB) that instruction is further given to the USB to Serial block will convert the instruction in the form of control signal than that signal will be given to the RF Transmitter and that signal will be passed to the RF Receiver. RF Receiver and proximity sensor output will be given to the controller ATMEGA 16 and the power supply will also be given to the controller. Output signal of the controller will be given to the motor driver IC L293D, that one motor driver IC will control the two DC motors.

4. HARDWARE USED: -

4.1 ATMEGA 16 Controller
4.2 Metal Sensor
4.3 RF Transceivers
4.4 DC motor
4.5 L293D motor driver IC
4.6 LCD
4.7 Power supply
4.8 IP WebCam
4.9 Battery
4.10 Robot Assembly

4.1 ATMEGA 16 Controller-



Controlling of DC motor using Atmega16 is easy. Atmega 16 is 8bit high performance microcontroller. It is a 40-pin microcontroller. It has low power. Operating voltage range of Atmega 16 is 1.8 to 5.5V. The program memory type used in Atmega 16 is flash and it has 16 Kb of program memory size.

4.2 Metal sensor-

A metal detector is an electronic instrument which is used to detect the presence of metal nearby.

Metal detector circuit consist of LC circuit, proximity sensor, LED and Buzzer.

4.3 RF transceiver-

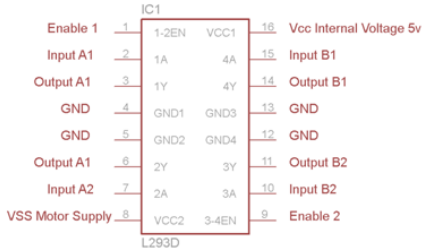
This is an FSK transceiver module, which is design using the Chip- con IC(CC2500). It is a true signal chip transceiver. It is based on 3 wire digital serial interface and an entire Phase Lock Loop.

4.4. DC Motor-

DC motor of 150 rpm @12V is used. Voltage of DC motor is in between 6 to 12 V. It is a low-cost motor having a single shaft. We have use Dc motor because servo motor does not rotate freely like dc motor.

4.5 L293D -

L293D is a motor driver IC, it allows DC motor to drive on either direction, one motor driver IC can operate two DC motors. It is a 16 pin IC.



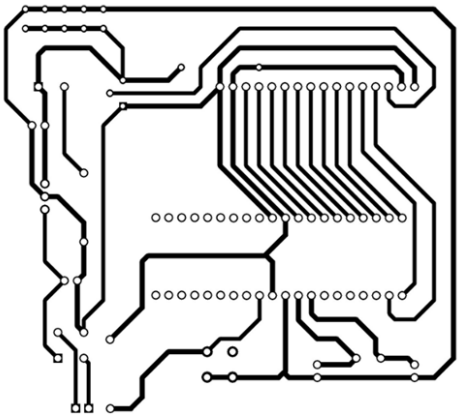
4.6 Power supply -

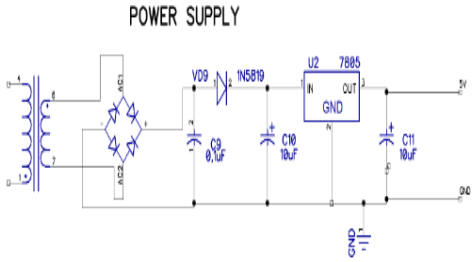
Transformer is the first block in the power supply. Transformer will convert the ac signal to step down or step up into an AC form. Hence transformer is also known as AC to AC converter. Output of the transformer is given to the rectifier. rectifier convert ac signal to the pulsating DC means ripples will be present so the output of the rectifier is given to the filter. Band filter will remove the ripple and convert it in the pure form.

5. PCB LAYOUT: -

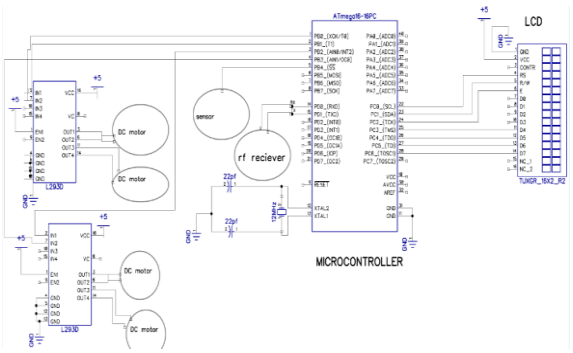
6. POWER SUPPLY:

-





6. CIRCUIT DIAGRAM: -



1.Live streaming
2.Bomb detecting and diffusing operation.
3.Spying.

7. CONCLUSION-

The advanced Bomb Disposal Robot has been designed in such way that it is capable of detecting and diffusing the bomb and even marking their exact location. It performs three different tasks like detecting, spying, diffusing.

REFERENCES

[1] https://ieeexplore.ieee.org/document/4350500.
[2] https://ieeexplore.ieee.org/document/8275193.
[3] https://ieeexplore.ieee.org/document/7856510.
[4] https://ieeexplore.ieee.org/document/7976932.
[5] https://ieeexplore.ieee.org/document/8261366.

Automatic Weed Killing Robot for Agriculture Purpose and Insect Killing (May 2019)

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[4]Dept. of E&TC Engineering, Pimpri Chinchwad College Of Engineering and Research, Ravet, Pune, Maharashtra, India, 412101

ABSTRACT Comprehensive review of autonomous robotic weed control systems, reported that systems for plant detection and their classification (crop vs. weed) conferred the best technical challenge for development of a victorious weeding mechanism. Methods for precision weed control also needed further development. Although the few fully autonomous robotic weeding systems that had been developed at the time showed promise for reducing hand labor and/or pesticide requirements, none had been successfully commercialized. Since then, technology has advanced and a number of other machine-driven weeding machines area unit commercially offered. This paper describes some of these devices and provides an update on the current state of robotic weeding. Commercial robotic weeding machines utilize one of several means to kill weeds including mechanical, flame or herbicidal spray. Classifying plants as either crop or weeds is difficult with system accuracy of around only 70%, even under ideal conditions. There are many ways to identify crop plants in digital images, but typically this is done by first analyzing a captured imaged and classifying each pixel in the image as being either a plant or a non-plant part using some type of green threshold technique. Herbicides are used worldwide to manage agricultural weeds. Over 95% of herbicides reach a destination other than their target crops, because they are sprayed or spread everywhere in the agricultural fields. This causes many unwanted effects on environment, humans and other living organisms. The automatic weed control systems provide efficient method of weed removing within the rows and inter rows. The machine vision system has been used to detect and differentiate the weeds from the crop. Guidance system has been used to track the rows with accuracy and to control a row cultivator and an autonomous agricultural robot in real-time. Mechanical methods of automatically removing weeds from the sideline two basic designs are used: a mechanical knife removes weeds from the inter rows and rotating hoe are used to remove the weeds from the within rows. The proposed system is helpful to avoid the usage of herbicides in the agriculture field and also replaces the shortage of labor.

INDEX TERMS- Machine vision; Guidance System; Semantic segmentation; Agriculture.

1. INTRODUCTION

India is the seventh largest country in the world and the second biggest in Asia after China. Inspite of being a country of huge size, India is a country of Agriculture and has a wide range of soil types depending on the climatic condition of the region, it has land area of about 15,200kms and a coastline of 7,516kms. India measures 3214 km from north to south and 2933 km from east to west and farming being the backbone of the economy [1]. The country experiences different ranges of temperature from Arctic cold to dessert from heavy rainfall to scanty rainfall. India has farm produce which satisfy 17.6 billion population of its own primarily. Even if a lot of improvement is done in farming technology with respect to the machinery and the farming methodology or the improved variety of the seed used in actual, still there is no significant improvement in the weed killing techniques [2]-[4]. Now actually what is a weed? A weed can be generally stated as anything which grows along with crop on the field irrespective of the actual crop is known as weed. In the developing countries or countries like India which is a price sensitive market,

traditional method is more preferred as the machinery are expensive and the availability of skilled operator is difficult at times. Weed is still one of the most prominent problem on the field if farming is concerned, a study suggests initially there is no harm to the actual crop from weed during the time span of 3-4 weeks after sowing but after that race for the survival starts as need for more space, more nutrients, more sunlight and more water is felt. [5]-[7] Weed initially decreases the growth speed of the actual plant due to sharing of the resources, according to a study it was found that the yield of crop with presence of weed into the field was around 30-80%lower per hectare compared field with no weed.

As the report suggest India witnessed a total grain production of 277.49mn tonnes in the fiscal year 2017-2018 and 31.5% was lost or the yield was reduced due to presence of weed in the farm.

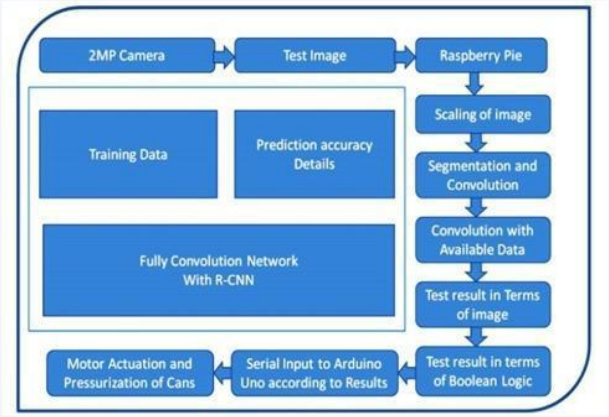
That means the actual production would have been if weed were not there = 402.15mn tonnes

If this 31.5% would have been converted into a successful yield then an additional 2.63 billion population could have been served with food.

Hence, a successful weed management system is required to increase the yield of the crops lost due to weed presence. The system should be smartenough to classify between the weed and actual crop, it should be an automated system so as to reduce the

labour work on the farm, such a system would be known as Automatic Weed Killing Robot [9]. This system will reduce the human activity on the farm, it will increase the speed of work as machines can work under any conditions from extreme rainy season, to extreme cold and extreme hot seasons. The system will consists of a processing board, it will be responsible for all the processing and the image enhancing work to be carried on the plant, the captured will be compared with the test image already present in the system and the action will be taken depending on the decision passed by the processor.

2. BLOCK DIAGRAM



BLOCK DIAGRAM

CAMERA

Whenever the robot will be powered on, the Camera which is of 5MP will start capturing the images of the plants in field.

Test Image

A reference image will already be stored in the memory unit of the Weed killer, this will in identifying the type of weed if, there is any weed present in the robot.

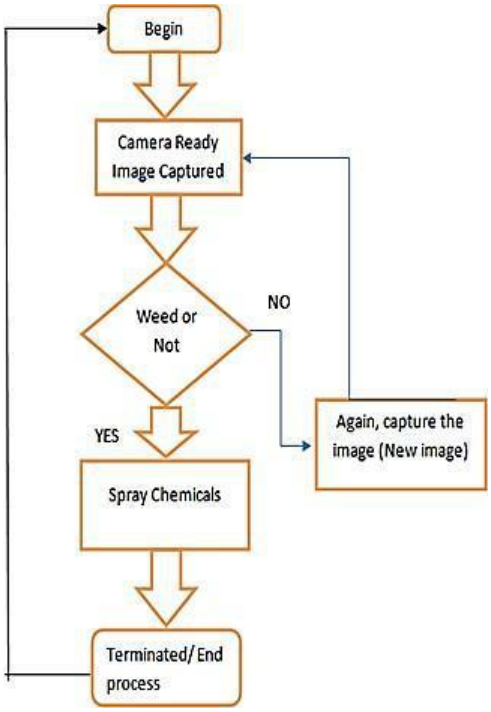
·Raspberry Pi

The raspberry pi unit is the heart of the weed killer, all the processing and decision related to robot will be taken by the raspberry pi unit. The processing will include many steps such as segmentation of the captured image, comparing the captured image with the image of a plant with weed and different convolution and windowing techniques to enhance the quality of the image.

Arduino Uno

The Arduino is the second processor used in the weed killer which is an open source platform based processor. The Arduino will deal with the actions to be performed upon the inputs provided to it via raspberry pi. The actions which may be performed are spraying of the chemicals or the movement of the robot to the next crop if weed is no detected in the corresponding crop.

3. FLOW CHART



Flow chart plays the major role in determining the flow of the project execution.

It gives the clear idea of execution of project.

It also helps in spotting the error if any in the execution process.

The flowcharts of the Automatic Weed Killing Robot consist of:

- As the flowchart suggests the robot will start it's operation as soon as the start button is pressed.
- The camera will start capturing the image and will analyze the with the test image if any present.
- If weed is present then spraying action of chemical will be done.
- If weed is nor present the robot will move on and futher images will be captured.

4. CIRCUIT DIAGRAM

- Every The 3.2 inches color LCD connects to the Rasberry Pi 3 B+ with SPI Interface for the graphics and touch information. It has 3

Buttons which can be allotted to any function as per user requirement.

- These buttons connect Rasberry Pi 3 B+ with GPIO pins. The camera interface is with dedicatedly provided Camera Serial Interface (CSI).
- The Arduino will connect to the Rasberry Pi 3 B+ with Serial Port.
- The Serial Port at the Rasberry Pi 3 B+ is software based USB Serial Port. At the Arduino side, the Serial Port is hardware serial port (D0 & D1).
- 3 Relays will be used. Relay 1 takes input from Arduino at pin D2. Relay 2 takes input from D3.
- Relay 3 input will be connected to the switch which controls +5VDC power rail to the Rasberry Pi 3 B+ and Arduino.
- Two motors connect to the provided output terminals (Y1_A, Y1_B & Y2_A, Y2_B). Input for motor driver shield connects to the 1A,1B & 2A, 2B on the shield side and on the Arduino side it connects to D6, D7, D8, D9. Relay 1 output channel connects to solenoid 1, Relay 2 output channel connects to solenoid 2.

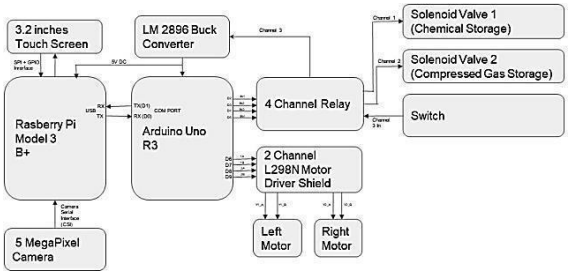


Fig.3.Circuit diagram

5. SOFTWARE USED

Different software such as Ubuntu, Matlab, Realterm, Notepad++, VNC, Pycharm, Gedit.

6. METHODOLOYG

- Open-CV (Open supply laptop Vision) is library of programming operate principally geared toward period laptop vision.
- Originally developed by Intel, it was later supported by Willow Garage (which was later acquired by Intel).
- The library is cross-platform and free to be used beneath the ASCII text file BSD license.
- Open-CV was engineered to produce a typical infrastructure for laptop vision applications and to accelerate the utilization of machine perception within the industrial merchandise.
- These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, remove red eyes from images taken using flash etc.
- Raspberry pi will be the computing hardware of the system, it will be responsible for computing the necessary enhancement in the image will would be captured by a camera mounted on the robot.
- The system will perform the necessary actions based on the decisions given from the system after comparing with the test image pre- loaded into system.
- The pneumatics system will be responsible for controlling the spraying movement of the chemicals stored in the storage tank.
- The To-and-Fro movement of the robot will be controlled by the Arduino board based on the inputs received from the Raspberry Pi.

7. RESULT

Fig.5.Result

The image below shows the color extraction of from Gray scale to RGB.

8. CONCLUSION

We will be learning to solve an integrated approach of different Engineering discipline such mechanical, electronics and control engineering to build a useful product which can solve the problem of farmers. With the help of the project there will be high possibility of restricting the use of chemicals in the farm and resolve other harmful effect such as loss of fertility of land due to excess chemicals and contamination of ground water. The technology will be much more human friendly and the electronics can be used for betterment of farmers to increase the productivity. The farmers will be better at handling farming activities and will be able to focus more on the management and increasing the yield. There will be faster development phase. The Farmers will be able to reduce chemical use resulting in reduced

expenditure and higher profits. Also lesser use of chemicals increase soil quality and prevent ground water contamination. Not only farmers will be able to use and increase their productivity but even government organizations and public and private sector industries will be able to control weeds and pests in their premises. The overall benefits this system holds is countless. Further a more accurate and precise machineries can be viewed in next few years which will advanced by the industrial experts and engineering students. This system includes use of knowledge of mechanical, electronics and computer science. By inclusion of knowledge from each stream with scientific knowledge, the system has a larger space for the development

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Smart BRT Sentinel Using DIP (May 2019)

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ABSTRACT Gate Logic Controller is used to control the operation of automatic boom gates and motorized gates and doors. The modules receive control signal from external devices (that is, the images processing unit, proximity sensor.) that determine the control output to the gate motor. While a vehicle is over this loop the controller will not allow the barrier to lower. The working principle of the boom barrier gate is, boom barrier is made up of pole or bar which pivoted form a fixed point to move in a vertical direction. This bar or pole allows to block access of any vehicle of even a person through an entry gate. Since boom barrier are most commonly used at check points, they are also referred to as boom barrier gate. Concept of Image Processing is the basic concept used in this project. Due to this project other vehicles (that is car, vans, etc.) entering the BRT section will be stopped. While the buses, ambulance, police vans will be allowed. These can be done completely by images processing.

INDEX TERMS At-mega 16; Automatic boom gate; Boom barrier; BRT lane; Buses; Digital Image processing; Reduce accidents.

1. INTRODUCTION

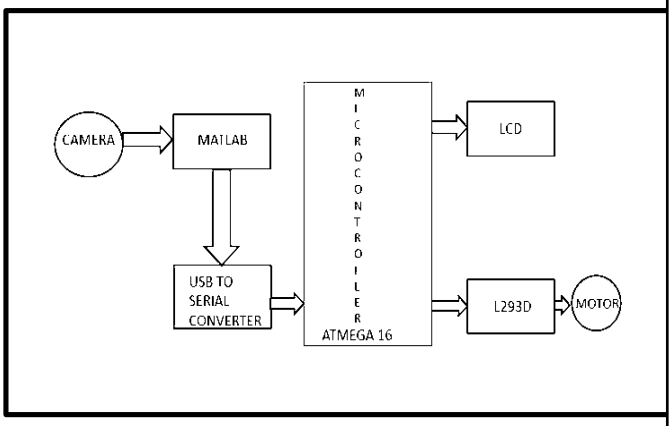
This project consist of Bus Rapid Transit that is ,BRT which is also a bus way or a transit way, a bus based public transport system which is design to improve capacity and reliability relative to conventional bus system. This system of BRT includes roadways which are completely dedicated to buses, and gives priority to bus at intersections where bus can interact with the in road traffic. This design feature is used to reduce the delay caused by the passengers who are boarding or leaving the buses, or purchasing the fares .The BRT sys-tem aims to combine the capacity and speed of metro with flexibility, lower cost and simplicity of bus system.

Boom Barrier Works as: The Boom Barrier is a Bar or Pole placed at a pivot to move and up down which helps in order to control access of vehicles in a building. It is used for both Commercial as well as residential purpose. The Operation of an Automatic Security Gate or Boom Barrier varies with respect to size, Shape and Operation. If you want to Protection for your Home or Business a boom Barrier is an added Security. It ensures that you are in control of vehicle movement within your premises. Boom Barrier makes much it harder to get in and out easily.

Boom Barrier includes various types of Mechanical Components. It can a be integrated with the help of access Control Systems such RFID, Bio-metric system which is used to automate the process of entry into premises. It restricts access to People whose Identity cannot be verified by a Smart Card, RFID Card Reader or Bio-metric Sensor. This Boom Barrier Security Gates have been designed to handle Single Door, Multiple Doors, Film Theater Security Electronic Door Lock or a Hospital Security Block

System to control the entry and the exit of Vehicles. Basically this Software also controls each and every movement with the help of its integrated Hardware as well as Mechanical Components.

2. BLOCK DIAGRAM



The camera is used for detection of devices and recognition of different vehicles from long-distances. The mat-lab programming software used to decide the correct detection of the vehicle and do the programming accordingly. The USB to Serial Converter is used for connecting the mat-lab to the controller. The images captured by mat-lab are send to the microcontroller using USB to Serial converter. The microcontroller is the main functioning body of the all the devices. All the connections are given the microcontroller and main decision regarding opening the gate is done by the microcontroller. The control panel consists of gear box. Limit switch, Ac motor and spring balance. All these together form one unit known as control panel. The role of gear box is speed control at a desired speed, the limit switch will be

responsible for limiting the height of the boom barrier it should not exceed 90degree angle, and the ac motor is responsible for providing the necessary thrust to the boom barrier. The LCD is basically used for displaying the message on the screen. The motor in the block diagram is used to open or close the boom barrier.

3. FLOW CHART

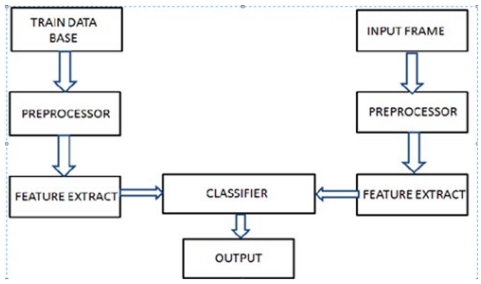


Fig.2.Flow Chart

Flow chart plays the major role in determining the flow of the project execution.

It gives the clear idea of execution of project.

It also helps in spotting the error if any in the execution process.

The flowcharts of the Smart BRT sentinel consist of:

• Basically, camera is used to detect the image of the vehicle entering the BRT section.

• This data is given to the mat-lab software through which the comparison of data is done.

• This is further given to the USB to serial converter.

• The microcontroller is used for interfacing of the components together.

• The message will be displayed by the LCD regarding the vehicle recognition.

4. CIRCUIT DIAGRAM

Every power supply is used to run the circuitry which helps to complete the task of microcontroller. .Energy can be obtained from various sources as per load requirement; this includes electrical energy for transmission systems, energy required by battery or through the solar power. A rectifier is used to convert AC main supply to required DC voltage. The ripples are removed.

There may be requirement of constant output voltage, but the voltage provided by many energy sources will vary with changes in load impedance.

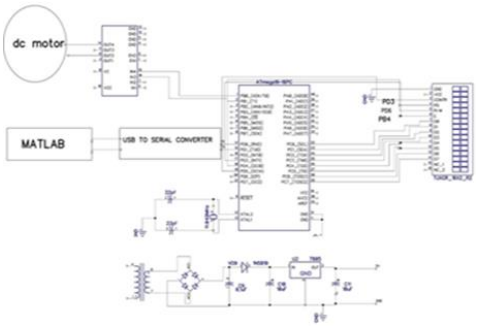


Fig.3.Circuit diagram

A constant output voltage is required in many power supply applications, but the voltage provided by many energy sources will vary with changes in load impedance.

The DC Motor must be of following features:

100RPM 12V DC Motor With Gear Box ,8 MM Shaft, Same Size Motor Available In Various RPM, 12kgcm torque, No Load Current= 500mA (max), load current = 700ma, Heavy Duty Metal Gear, Recommended for ROBOCON Events.

The Motor Driver must have following features:

supply voltage required for operation can be up to 46v, low saturation voltage, complete dc current can be up to 4A, logical "0" input voltage up to 1.5 v (high noise immunity) , over temperature protection, High operating voltage, which can be up to 40 volts.

The LCD has following features:

Slim TFT module designed for 1U rack mount equipment (2.2” TFT).IPS displays (2.4” TFT LCD, 7.0” TFT), High bright LCD displays (7.0” TFT), Resistive and capacitive touch screens (2.8” and larger TFT modules).

The camera must be of following features:

Fully Compatible with Both the Model A, Model B and Mod-el B+ Raspberry P, 5MP Omni vision 5647 Camera Module, Still Picture Resolution: 2592 x 1944, Video: Supports 1080p @ 30fps, 720p @ 60fps and 640x480p 60/90 Recording, 15-pin MIPI Camera Serial, 15-pin MIPI Camera Serial Interface - Plugs Directly into the Raspberry Pi Board the Size must be of: 20 x 25 x 9m, Weight 3g.

5. SOFTWARE USED

For creating a circuit layout or PCB layout Dip-trace software can be used .Various tutorials are provided in order to learn the software for the programmer. It is software which captures various PCB designs like single PCB, double PCB, multilevel PCB, etc.

MATLAB is a high-performance language which is used for technical computing. It helps to integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include: Application development, including Graphical User Interface building.

Schematic capture in the Proteus Design Suite is used for both the simulation of de-signs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations. The micro-controller simulation in Proteus works by applying either a hex le or a debug le to the micro controller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design

6. METHODOLOYG

Concept of image processing is basic concept used in this project. Due to this the other vehicles (i.e. cars, vans, etc.) entering the BRT section will be stopped. While the buses, ambulance,
Police vans will be allowed. This can be done completely by image processing.
The image below shows the color extraction of from RGB to grey scale image

7. LAYOUT

8.

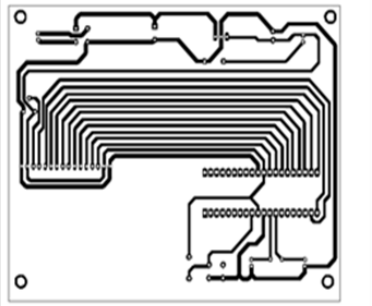


Fig.4. Layout

The layout of this is design in dip trace software using all the function described above.

9. RESULT

Fig.5.Result

The image below shows the color extraction of from RGB to grey scale image.

10. CONCLUSION

Hence we learnt and concluded that learning the integrated approach in engineering is the main benefit of our learning. The reduction in the wastage of human resource and proper utilization of them in other work. The project aims at reducing the accidents caused due to human error and also gives the possibility of totally eliminating it. The project aims at providing the all weather system for operation and improves the system reliability.

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Auto Dual Converter To Improve Power Factor (May 2019)

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ABSTRACT Dual converter-the name itself says it is a converter and reverse converter. In a dual converter, converters are connected together back to back ,converter works as rectifier while other reverse converter works as inverter. Now here, in this project using a capacitive load we will be improving the power factor .A proposed approach to improve the power factor of single-phase rectifiers and to regulate the output voltage against the change in grid voltage and load is presented. This converter topology is evaluated the basis of performance and its salient features like simplicity, low cost and high performance are discussed to analyse its applicability. The proposed control strategy is bridged, has a transformer and output current sensor-less and consists of only two Bi-directional IGBTs and two diodes. The voltage regulation is achieved by a simple voltage divider to communicate to a controller to control the duty cycles of pulse width modulated signal.

The field of Power Electronics mainly deals with the conversion of power from one form to another and the change from one voltage level to another by using different power electronic converters. There are many control strategies used in the converters to aid this conversion. Another important aspect of using power converters is conditioning. Conditioning of signals helps us to ensure clean and pure, i.e. free from harmonics, input and output signals. It is not possible to obtain absolutely clean signals, but there are ways and means to reduce the harmonic content, the simplest of which is the use of a simple low-pass LC filter.

INDEX TERMS Quadrant operation of dual converter, Dual converter circuitary, Power Factor, Converter Circuitary, Need of switching in circuits, Proposed Methodology.

1. INTRODUCTION

Dual converter- the name itself indicates that it has two converters in it. It is an electric device mostly found in variable speed drivers. It is a power electronics control system to get either polarity DC from AC rectification by the forward converter and reverse converter. In a dual converter, two converters are connected together back to back.One of the bridge works as a rectifier (converts AC to DC), another half bridge works as an inverter (converts DC to AC) and connected commonly to a DC load. Here two conversion processes take place simultaneously, so it is called as a dual converter. The dual converter can provide four quadrant operations. The four quadrant operation is shown below.

Principle of Dual Converter : The dual converter basic principle of operation can be explained with reference to the simplified equivalent diagram of the DC circuit shown in the figure below. In this simplified representation, two assumptions are made. Dual converters are ideal that means they produce pure DC output terminals without containing any ripples.Each two-quadrant converter is assumed to be a controllable direct voltage source, connected in series with a diode.Here Diode D1 and D2 represent the unidirectional current flow characteristics of the converters. However, the direction of current can be in any way. Let us assume, the average output voltage of the converter 1 is V01 and converter 2 is V0. To make the output voltage of the two converters in same polarity and magnitude, the firing angles of the thyristors have to be controlled. The field of Power Electronics mainly deals with the conversion of power from one form to another and the change from one voltage level to another by using different power electronic converters. There are many control strategies used in the converters to aid this conversion. Another important aspect of using power converters is conditioning. Conditioning of signals helps us to ensure clean and pure, i.e. free from harmonics, input and output signals. It is not possible to obtain absolutely clean signals, but there are ways and means to reduce the harmonic content, the simplest of which is the use of a simple low-pass LC filter.

2. GUIDELINES FOR MANUSCRIPT PREPARATION

Basic power Factor:

Power factor (PF) is defined as the ratio of the real power (P) to apparent power (S), or the cosine (for pure sine wave for both current and voltage) that represents the phase angle between the current and voltage . The power factor can vary between 0 and 1, and can be either inductive (lagging, pointing up) or capacitive (leading, pointing down). In order to reduce an inductive lag, capacitors are added until PF equals 1. When the current and voltage waveforms are in phase, the power factor is 1 (cos (0) = 1). The whole purpose of making the power factor equal to one is to make the circuit look purely resistive (apparent power equal to real power). Real power (watts) produces real work; this is

the energy transfer component (example electricity-to-motor rpm). Reactive power is the power required to produce the magnetic fields (lost power) to enable the real work to be done, where apparent power is considered the total power that the power company supplies.This total power is the power supplied through the power mains to produce the required amount of real power.

Poor power factor of operation implies ineffective use of the volt-ampere ratings of the utility equipment such as transformers, distribution lines and generators. Also, it places a restriction on the total equipment load that can be connected to a typical home or office wall-plug with specified maximum r.m.s current rating.

Desirable features of a power factor correction techniques:

Input side features:

1. Sinusoidal input current with close to unity PF operation.
2. Reduced EMI.
3. Insensitive to small signal perturbations in the load

Output side features:

1. Good line and load regulation
2. Low output voltage ripple.
3. Fast output dynamics (i.e., high bandwidth).
4. Multiple output voltage, levels if needed by the application.

The active PFC technique, which involves the shaping of the line current using switching devices such as MOSFETs (metal oxide semiconductor field effect transistors) and IGBTs (insulated gate bipolar junction transistors), is a result of advances in power semiconductor devices and microelectronics.

There are four conversion circuits that are used in the majority of today's power electronic circuits.

1. Rectification (ac-to-dc)

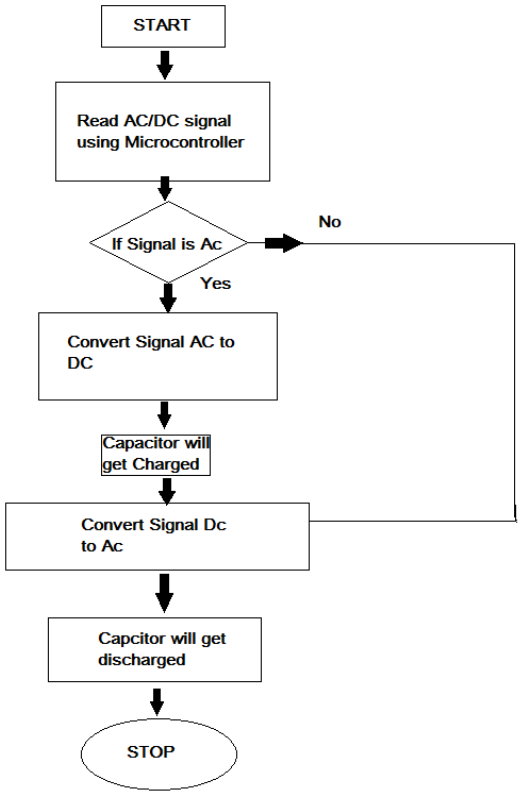
2. Inversion (dc-to-ac)

3. Cycloconversion (ac-to-ac, different frequencies) or ac controllers (ac-to-ac same frequency)

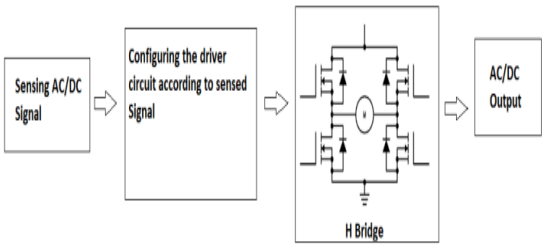
4. Conversion (dc-to-dc)

3. Flowchart

Previous version of a dual converter were less efficient and bulky ,contain separate converter and inverter block . The upgardation to the converters gave rise to auto dual converters which consisted of both the blocks in same circuit. The resultant of this upgrade reduced the power factor of the system thus for the improvement the methodology used is addition of capacitor bank for adjusting load of the system. Here , basically the circuit with switches will be used as conveter at the same time for other condition it will be used as a inverter. We know converter converts AC signal to DC and inverter converts DC signal to AC. Now here, microcontroller plays an important role to detect the signal and make its conversion. Now if the incoming signal is AC then microcontroller will sense it and will make circuit to work as converter. Microntroller will be programmed to do so.

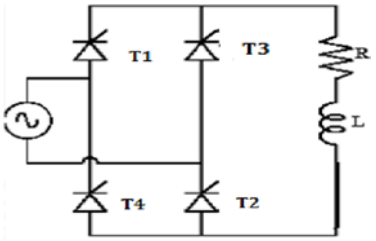


4.Proposed Methodology

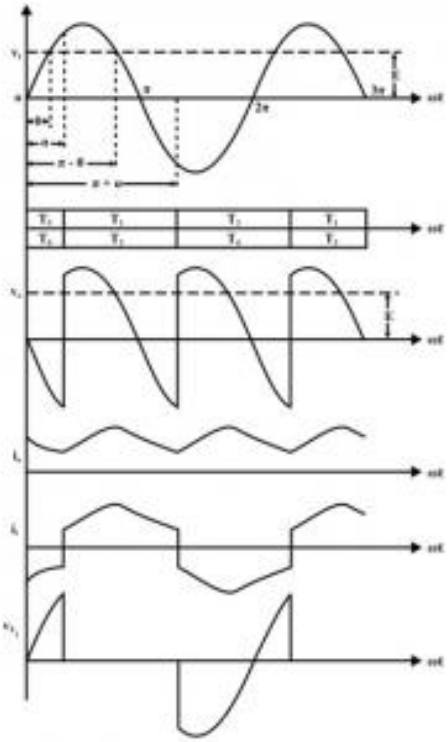


Now when incoming signal is DC microcontroller will sense it and will make circuit to work as inverter to this condition. Again here microcontroller is attached to capacitor, where capacitor will help to increase power factor. This auto dual converter circuitary will function without any manual interference.

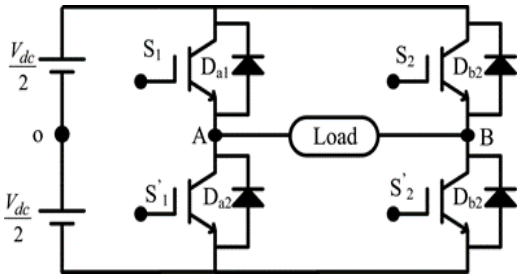
4. Converter Circuit



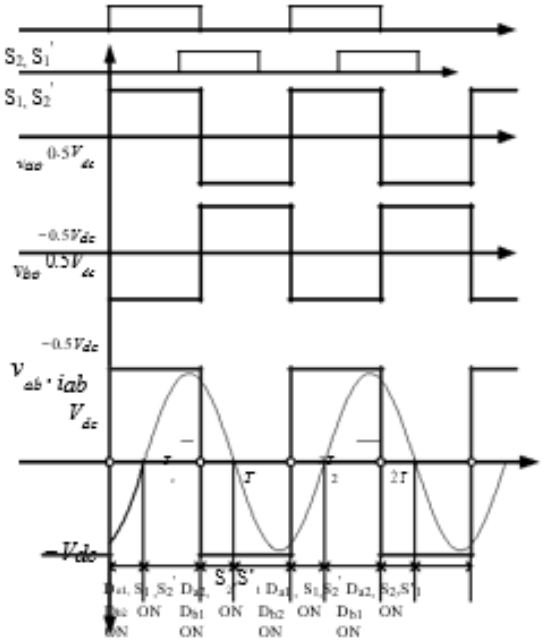
Waveform for converter circuitry



4.2 Inverter Circuit



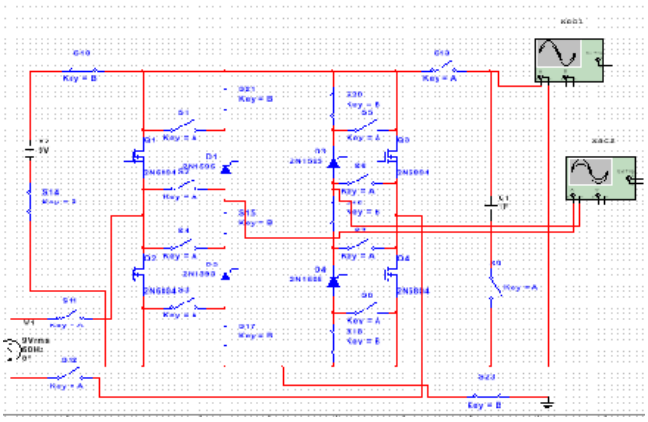
Waveforms of inverter circuitry



Features	Atmega328/p
Pin Count	28/32
Flash (Bytes)	32K
SRAM (Bytes)	2K
EEPROM (Bytes)	1K
Interrupt Vector Size (instruction word/vector)	1/1/2
General Purpose I/O Lines	23
SPI	2
TWI (I^2C)	1
USART	1
ADC	10-bit 15kSPS

Features of Atmega 328

B. MULTIPART FIGURES



Entire circuitary of Auto dual converter To Improve Power Factor

5. CONCLUSION

Thus, we are implementing an Auto dual converter. Through this project we can improve the power factor of converter automatically. This project can be used in various real time application. The requirement for Bi-directional converter in industry, commercial and day-to-day life applications has been analyzed initially. Based on it, many research paper were collected, read and den came to know that there is large scope to develop a bi-directional converter with optimized parameters and solutions. For the research work, few parameters like power factor of front end AC-DC converter, DC link voltage regulation of rectifier are chosen.

ACKNOWLEDGMENT

We are greatly indebted to my seminar guide Prof. Kiran Napte for his able guidance throughout the course of this work. It has been an altogether different experience to work with him and we would like to thank him for his help, suggestions and numerous discussions.

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E-Rationing Management System (May 2019)

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ABSTRACT The rationing distribution system also called as PDS (Public Distribution System) distributes food to the end users. Here, we have proposed a system E-rationing management system. The existing conventional Ration card system consists of three categories of cards based on the user's income and the information is updated manually which leads to unfair practices. In this system a QR code is initially generated for each new individual user, as a unique identification of that particular user only. The QR code will contain the entire details of the particular user. Similarly the users database is stored which will also be carried by the concern admin person. It will be a smart card that will have QR code which will be scanned by any smart phones every time the person visits the ration shop. The customers details, amount of commodities has been taken and amount remained will be checked after every scanning and be displayed on computers. Further, the required grocery items are selected as per the amount allocated and provided by weighing it through load sensors. This quantity is deducted from total allocated quantity and the data is updated in particular customers account in the system. This discusses strategy to control diversion of items for avoiding malpractices and corruption, for its successful application E-management way. The main objective is to enhance the visibility, transparency, accessibility and efficiency of the system.

INDEX TERMS Digitized web applications, E-ration card, load sensor, Quick Response code, Transparency between government (admin) and consumers.

1. INTRODUCTION

Ration cards issued by government enable users to buy fuel, food, etc at subsidized rates. The existing system consists of a ration book of three categories. The permissible or allocated quantity is decided based on the family income and number of family members. The three categories are below poverty line, above poverty line and card for the poorest of the poor people. There are three different colors allotted for these three categories that are yellow, orange and white. The existing system has some drawbacks. It requires manual work, which is tedious and fraudulent. Sometimes the customers buy extra goods on the name of other people. And also the retailers practice forgery by not selling the required quantity of goods. Hence we go for the proposed system. In this system, we use QR code for authentication purpose. In this system, we provide each customer with a unique QR code after registration. All the details of the customers will be stored in a database. Personal details such as name, address, quantity bought and the quantity remained. There are different login credentials for government who is admin and customers. Customers can get his details by logging into the customer login page. After that scanning of QR code is done. It will ensure the identification of customer. After purchase, database will be automatically updated. The advantages of the proposed system are there is reduced manpower, the limitations of existing system have been overcome and also transparency is maintained between the government and customer. This author described that the system uses barcodes. It consists of two databases, one for storing user's personal information and other for storing the purchase details. But damaged barcodes cannot be scanned and they need special equipment for scanning. [1]This author described that the system is designed by replacing conventional ration card by RFID based smart card reader and interfaced it with ARM. But the drawback is that damaged RFID cards cannot be used. [2] This author described that the system uses RFID card which acts as a ration card and Biometrics. The consumer scans the RFID card and the thumb impression is used for authenticating the consumer. [3]This author described that the system uses biometrics for authenticating the consumer, also the government and local database is updated according to goods supply. [4]This author described that the system uses RFID and GSM technology to send SMS notifications. The drawback for the system is that the RFID cards damaged then the authentication of the person is lost and also the data. [5]

2. BLOCK DIAGRAM

The smart E-ration card system is designed for interface between desktop systems, effective GUI and well user friendliness will be major design considerations. We are utilizing the database to store the various information of the customers which includes their personal details, allotment of grocery items and check of every allotment will be done and be updated every time the customer buys from ration shop.

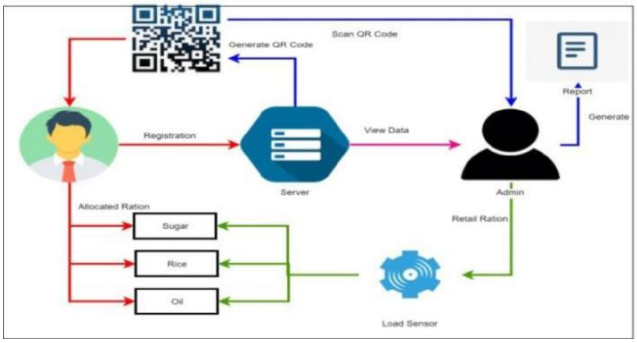

FIGURE 1. BLOCK DIAGRAM

In this paper, firstly the user or customer will go through the registration by filling a form including personal details. Then a user ID and password will be generated after the successful registration of the customer, the details will be stored in the database which will be helpful for the admin (government) to maintain and keep the track of his purchase and will be updated in his account accordingly. Then a QR code will be generated which will be always carried by the customer during his purchase. After scanning the QR code, OTP will be generated so as to maintain security to assure the items are gained by the authorized person only. The software system will be interfaced through a controller to interconnect with the Load sensor. This load sensor is used so as to achieve accurate amount of grocery items to the customer directly linked through its database, where it shows the detail of his purchase.

3. DATA FLOW DIAGRAM

A data flow diagram (DFD) is a graphical representation of flow of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system. It can also be used for visualization of data processing (structured design). A DFD shows what kind of information will be to the input and output of the system, where the data will come from and go and where the data will be stored. Sections, sub-sections and sub-subsections are numbered in Italic. Use double spacing before all section headings and single spacing after section headings.

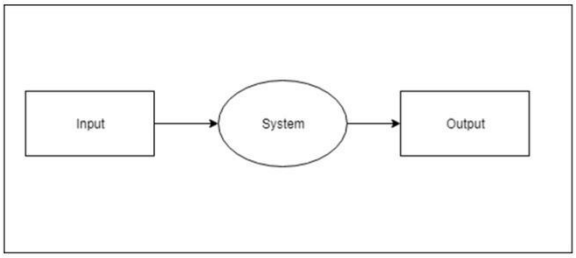

FIGURE 2 . DFD 0

The DFD 0 figure interprets the input and output interacting to the system which will perform their own functions smoothly.

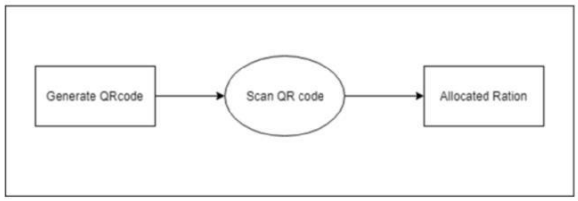

FIGURE 3 . DFD 1

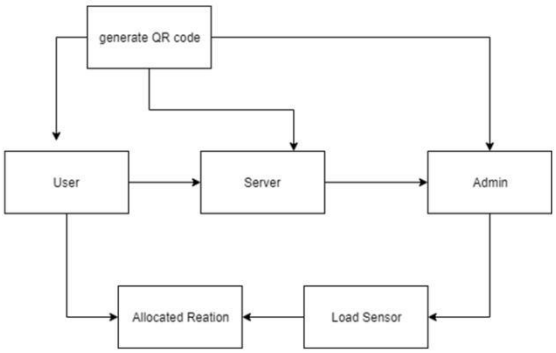

FIGURE 4. DFD2

4. ENTITY REPRESENTATION MODEL

An Entity Representation (ER) model defines one of the types of flowchart that illustrates how entities, such as people, objects or concepts are related to each other in a system.

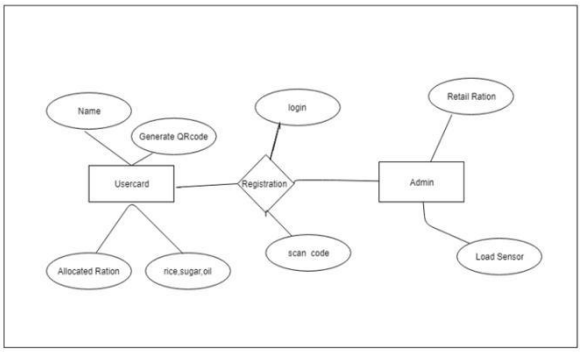

FIGURE 5 . ER MODEL

The ER diagram consists of two main entities user and admin. Entities are referred to as attributes. All attributes defines the ER model and have values. The user entity is the customer purchasing grocery from ration shop by using E-ration card, while the admin is the government authority to handle the items while assigning to the customer.

5. CONCLUSION

This paper contains the existing system and their drawbacks. It has solutions to these drawbacks and detailed working of proposed system using QR code and sms getaway. This system is very accurate, which is used for real time applications. Thus, on the basis of literature survey and by analyzing the existing system, we have came to a conclusion that the proposed system will not only aid the government agencies but will also help to digitize the system in turn help to deploy resources efficiently to the citizens.

ACKNOWLEDGMENT

Prajakta S. Shinde, Shraddha K. Zagade and Kautubhi S. Shukla thank Dr. Prof. Rahul Mapari (Head of Department of Electronics and Telecommunication Engineering) and Project Guide Mrs. V. S. Kumbhar for their valuable guidance and providing facility during progress of project. Last but not least we are thankful to all those who help directly or indirectly to develop this project and complete it successfully.

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Agricultural Commodities Marketing Network (May 2019)

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ABSTRACT The increased use of internet and its easy accessibility has had a major impact on every sector of e-commerce. The traditional method open to the farmers in India is to sell away their surplus produce to the village traders. These village traders sell the farm produce to the retailers who in turn sell the same farm produce at higher prices in the retail market. Farmers have to go for distress sale of their farm produce to the traders at very low prices. The middlemen claim a good amount of margin thereby reducing the return of the cultivators. The website which we designed will act as a unique and a secure way to perform agro-marketing.

INDEX TERMS-accessibility, agriculture, customer, elimination of middlemen, farmer, marketing network, maximum profit

INTRODUCTION

The great concern of traditional agricultural marketing is that most of the time customers have to travel long distances to get agricultural products and getting the right quality is not ensured. A lot of efforts are wasted both in terms of time and money. More and more business houses are implementing websites providing functionality for performing commercial transactions over the web. It is reasonable to say that the process of shopping on the web is a becoming a common place. It is the buying and selling of goods and services or the transmitting of funds or data over any electronic network, primarily the internet. The vision of this project is to ensure a fair price to the farming community by devising new techniques and by making use of online markets. An application, that servers as a platform for movement of agricultural products from the farms directly to the consumers and ensuring maximum profit to farmers as against the low prices given to them by retailers or middlemen. This web application provides privilege for both farmers and consumers to buy and sell the required farm products without the involvement of a middleman and its right profitable price. Hence, it provides freedom of pricing and a freedom of access

1. Literature Review

Agriculture in India has directly or indirectly continued to be the source of livelihood to majority of the population. Indian agriculture has seen a lot of changes in its structure. Indian agriculture can be balanced and made efficient through proper and better management practices. The present study brings out past and present scenario of agricultural marketing prevailing in India, its challenges and future recommendations [1]. Evidence has shown that smallholders do participate and make a sizeable contribution to the production of high-value food commodities, but their links to markets are not strong [2]-[3]. The success of the green revolution, however, lowered real prices of cereals and induced the need to divert land and labor resources to non-cereal activities in order to prevent further declines in prices and income in rural areas [4]-[7]. But in spite of all the revolutionary schemes and development strategies in India implemented by the government it is observed that the actual farmers are not being benefited fairly from the trade and a majority of the profit is not gained by the farmers.

Sr. No.	Year of Publication & Authors	Methodology Used	Limitation /Drawback
1.	Justin Yifu Lin,1992.	Employs province level data to assess the contributions of de collectivization price adjustments and other reform China's agricultural growth in the reform period	The effect of other market-related re forms on productivity and output growth was very small
2.	P. S. Brithal , A. K. Jha, H. Singh, 2007.	Linking small holders to market	Difficulty in tracing down the small holders
3.	Shakeel-Ul-Rehman, M. Selvaraj and M. Syed Ibrahim,2012	Indian agriculture can be balanced and made efficient through proper and better management practices	Past and present scenario of agricultural marketing prevailing in India makes it challenging
4.	Saurabha A Ghogare, Priyanka M Monga,2015.	Sending SMS via SMS gateway for daily alert.	Only information about the weather conditions is given, no information about the potential buyers.

Table-1 Literature Survey

2. Existing System

The traditional method open to the farmers in India is to sell away their surplus produce to the moneylenders or to village traders. These village traders sell the farm produce to the retailers who in turn sell these goods to the consumers directly in the retail market. The limitation of such trade is that the farmers have to go for distress sale of their farm produce to the traders at a very poor price. The middlemen claims a good amount of margin and thus reduce the returns of the cultivators.

3. Proposed System

The main objective of this project is to help farmers ensure greater profitability through direct farmer to farmer, farmer to customer & farmer to dealer communication. Our project deals with respect to the farmer's benefit of getting their products sale at a best price online. Here, the main users of this website are farmer, customer, dealer and admin. Farmers will get unique interface where they can perform marketing, get the correct rates of the market, get in touch with SMS or Email and gather knowledge of different

schemes and get pay online. It will provide market wise, commodity wise report to the farmer in interactive way.

4. Methodology

A. Architecture Diagram

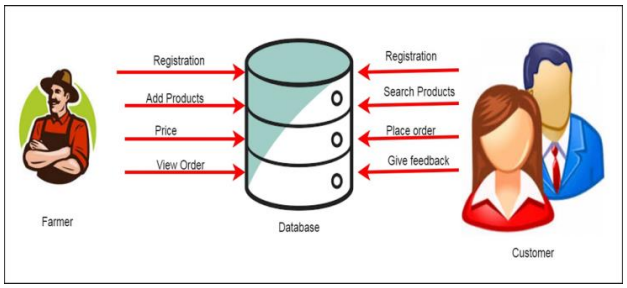

Figure1. Architecture diagram

The above diagram is the architecture diagram which is the graphical representation showing the components of our system which are a part of the architecture and clearly define the principles, elements and components. The three main entities of our system are the farmer, customer, and database. The admin will monitor the different activites taking place on the website on a regular basis.The trade will be carried out between the farmer and customer. The farmer and customer will both login into the website and will be authenticated via an OTP to carry out the further actions. On successful login, the farmer can add products for selling and the customer can view them for purchase.

B. Flow Diagram

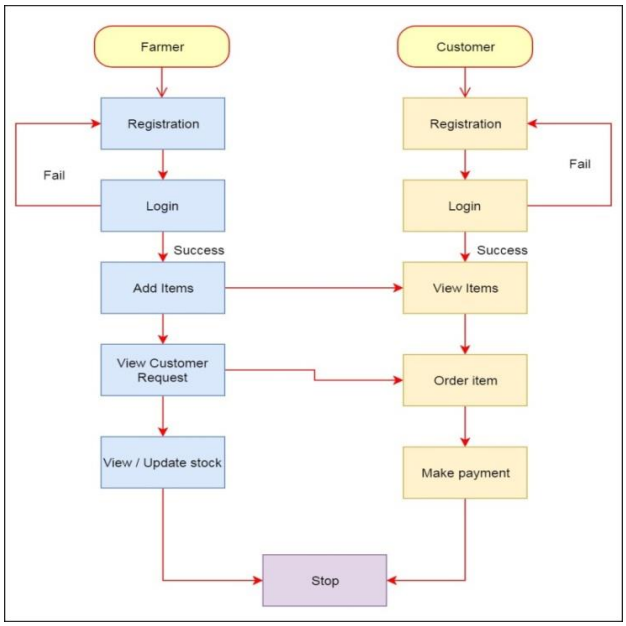

Figure 2. Flow Diagram

Farmer:

1. The Farmer will first register on the website specifying fields such as username, password, location, mobile number.
2. The next step will be authentication which is via OTP. The farmer will receive the OTP on the registered mobile number which he has to verify.
3. After verification the registration will be successful.
4. When using the website next time the farmer has to login using registered username and password.
5. If the username and password is correct the login will be successful.
6. If login fails the farmer has to register again.
7. After successful login the farmer can add new products to his account for display and purchase.
8. The registered consumers who have viewed these products and desire to purchase it will post a request to the farmer for acceptance or denial.
9. Depending upon the request the farmer will check the availability of products and act accordingly.
10. If the farmer accepts the request he will process the order and notify the consumer that his request has been accepted.
11. After receiving order confirmation from consumer, the farmer will further process the order for delivery.
12. After delivering the product the farmer will view and update his stock.

Consumer:

1. The Consumer will first register on the website specifying fields such as username, password, location, mobile number.
2. The next step will be authentication which is via OTP. The consumer will receive the OTP on the registered mobile number which he has to verify.
3. After verification the registration will be successful.
4. When using the website next time the consumer has to login using registered username and password.
5. If the username and password is correct the login will be successful.
6. If login fails the consumer has to register again.
7. After successful login, the consumer can view various products uploaded by the farmer.
8. The consumer has the feature of viewing and sorting the products according to the filters such as location, pricing, product type, etc.
9. When the consumer comes across the desired product, he can place a request for the same specifying the quantity and expected delivery time.
10. If the farmer accepts the consumer's request the consumer can proceed with the order.
11. While ordering the consumer can payment either by cash on delivery (COD) or by using net banking or credit/debit card.

5. Software Requirement

Operating system	:	Windows XP/07/08/10.
Programming Language	:	JAVA/J2EE
IDE	:	Eclipse Kepler
Database	:	MYSQL, XAMPP
GUI	:	HTML, CSS

6. Advantages

I. The middlemen and commission agents will not be involved.
II. The farmers will be able to sell the produce at self determined prices.
III. The consumer will also get the commodities at low price.
IV. The farmers will be able to diversify into high value crops and off season vegetables due to assured buying.
V. The customer will have the advantage of getting fresh and good quality commodities from the farmer itself without paying extra prices.

Home Page:

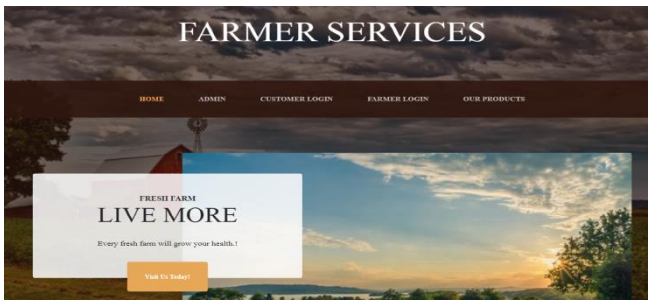

Figure 4. Home Page

Farmer Registration Page:

Figure 5. Farmer Registration Page

Farmer View Products Page:

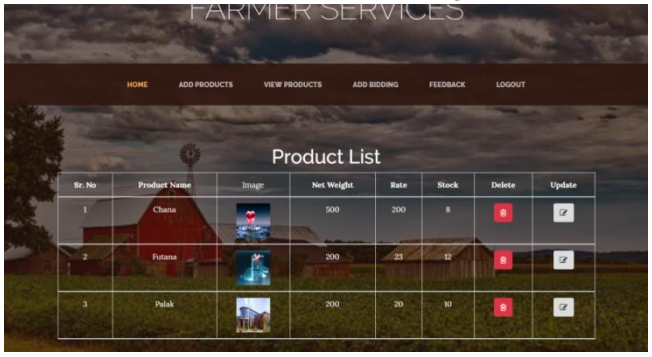

Figure 6. Farmer View Products Page

7. Results and Discussions

The proposed website for farmer services will look as follows:

8. Conclusion

The "E-Farming: An E-Commerce Site for Agricultural Product" is successfully designed and developed to fulfil the necessary requirements, as identified in the requirements analysis phase, such as the system is very much user friendly, form level validation and field level validation are performing very good. The old manual system was suffering from a series of drawbacks. The present project has been developed to meet the aspirations indicated in the modern age. It is very helpful for computerization or doing automation of a personal information management system. This program helps reduce the manual method and stress which is done by a person and that is time consuming and lengthy process. With this application user's information are stored very efficiently in a secured database.

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SMART ELECTRICAL VEHICLE (May 2019)

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ABSTRACT System is very beneficial as it reduces the use and consumption of petrol and diesel to a huge extent. This system will automatically generate power by the rotations of the wheels. There will be a lithium-ion battery which acts as a main source of energy to our equipment. That battery will be charged once in a fortnite and it will continuously provide energy to the automobile. When the battery is charged for the first time. It provide immence power to the wheels to run. There will be a magnet and the Electric flux produced by that magnet will be cut by the rotating wheels and according to faradays law of electromagnetic induction there will be a induced current which will again charges the batteries. This is how the process goes on. Due to the increased penetration of electric vehicle and photovoltaic system, additional application for home/building energy management system is needed to determine when and to charge an electric vehicle is an individual home/building. This project presents a smart Electric Vehicle charging method for smart transportation services with photovoltaic system. The project consists of electric vehicle charging algorithm for smart transportation services. The proposed electric vehicle charging algorithm to determine the optimal schedules of electric vehicle based on predicted photovoltaic system output and fuel consumptions. The implemented prototype application for transport services can provide electric vehicle charging according to user preferences. In this work is proposed the design of a system to create and handle Electric Vehicles (EV) charging procedures, based on intelligent process. Due to the electrical power distribution network limitation and absence of smart meter devices, Electric Vehicles charging should be performed in a balanced way, taking into account past experience, weather information based on data mining, and simulation approaches. In order to allow information exchange and to help user mobility, it was also created a mobile application to assist the EV driver on these processes. This proposed Smart Electric Vehicle Charging System uses Vehicle-to-Grid (V2G) technology, in order to connect Electric Vehicles and also renewable energy sources to Smart Grids (SG). This system also explores the new paradigm of Electrical Markets (EM), with deregulation of electricity production and use, in order to obtain the best conditions for commercializing electrical energy.

INDEX TERMS Enter key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords

1. INTRODUCTION

In India, the automobile industry is one of the key sectors driving economic growth. More than 25 Million vehicles including passenger vehicles, commercial vehicles, three wheelers and two-wheelers were produced in FY17, reporting a jump of 5.41% from the previous fiscal. However, it is also one of the biggest contributors of pollution, which incidentally keeps the country's capital shrouded in smog for several months every As India hurtles towards an apocalyptic future, the Indian government is now racing to switch to all-electric cars by 2030. System is very beneficial as it reduces the use and consumption of petrol and diesel to a huge extent. This system will automatically generates power by the rotations of the wheels. There will be a lithium-ion battery which acts as a main source of energy to our equipment. That battery will be charged once in a fortnite and it will continuously provide energy to the automobile. Furthermore, the use of hub motor and continuously use of power from 60V battery made the system to next extent. One of the chief features of electric vehicles is that they can be plugged into off-board power sources for charging. Essentially, there are two types of EVs: all-electric vehicles (AEVs) and plug-in hybrid electric vehicles (PHEVs). AEVs, in turn, consist of battery electric vehicles (BEVs) and fuel cell electric Vehicles (FCEVs). Both BEVs and FCEVs are charged from the electrical grid and are also usually capable of generating electricity through regenerative braking. This system will automatically generates power by the rotations of the wheels. There will be a lithium-ion battery which acts as a main source of energy to our equipment. That battery will be charged once in a fortnite and it will continuously provide energy to the automobile. Furthermore, The use of hub motor and continuously use of power from 60V battery made the system to next extent.

2. MATERIAL AND METHODS

Chasis:

A chassis is the internal framework of an artificial object, which supports the object in its construction and use. An example of a chassis is a vehicle frame, the underpart of a motor vehicle, on which the body is mounted; if the running gear such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a rolling chassis. In the case of vehicles, the term rolling

chassis means the frame plus the "running gear" like engine, transmission, drive shaft, differential, and suspension.

An under body (sometimes referred to as "coachwork"), which is usually not necessary for integrity of the structure, is built on the chassis to complete the vehicle.

For commercial vehicles, a rolling chassis consists of an assembly of all the essential parts of a truck (without the body) to be ready for operation on the road.[3] The design of a pleasure car chassis will be different than one for commercial vehicles because of the heavier loads and constant work use.[4] Commercial vehicle manufacturers sell "chassis only", "cowl and chassis", as well as "chassis cab" versions that can be outfitted with specialized bodies. These include motor homes, fire engines, ambulances, box trucks, etc.

Throttle:

Regulates the power flow from batteries to the engine.It basically based on automatic technology.It connects the accelerator pedel to the engine pad.It is based on closed loop algorithm.Electrical problems and leaky vacuum can leads to throttle failure.

Hub Motor:

Very less complicated to design vehicles using hub motors.Easily to get motion in clockwise and anticlockwise directions.Less weight as compared to other motors.We have both brushed and brushless modes of operation.

CDI unit:

Based on the concept of passing electric current over capacitor.CDI ignition starts with generating a charge and storing it.The charging and discharging is done within a fraction of time.

Abbreviations and Acronyms

Abbreviation is used for “SEV” as Smart Electrical Vehicle and “CDI” is used for capacitor discharge unit.

3. BLOCK DAIGARM:-

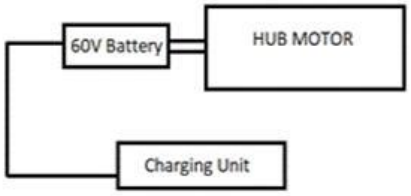

Fig :1 Block Diagram of Electrical Vehicle

Fig:2 Shows the hub motor

4. DISCUSSION

The smart electric vehicle reduces the air pollution. It also saves the fuels. It is very cost effective. It also requires the less maintenance. Smart electric vehicle provides more efficiency. They are nature friendly. They can reduce the use of non-renewable sources. Since, non-renewable sources are conventional in nature means they will vanish someday. So, we can say that smart electrical vehicle can be proved to be boon in the future years. The concept of using 60V battery and hub motors can make out the system more efficient and smooth operation of the vehicle can be achieved. So this can be achieved by using the proposed concept of smart electric vehicle.The following list outlines the different types of graphics published in IEEE journals. They are categorized based on their construction, and use of color / shades of gray:

5. CONCLUSION

A Smart electric vehicle decrease the pollution level and also saves the fuel. Electric vehicle gives more efficiency. This paper describes work that has been developed in order to provide a conceptual system to assist and manage
Electrical Vehicles (EV) charging process. This proposed Smart EV Charging System uses Hub Motor technology, in order to connect not only Electric Vehiclesbut also to reduce the uses of non-renewable energy sources, to Smartly. The new paradigm of Electrical Markets (EM), with deregulationof electricity production and use, is also explored in thisdeveloped system, in order to optimize the prices of sellingor buying electrical energy, to or from the electrical network.In the proposed Smart Electrical Vehicle Charging

System, theintroduction of mobile applications will facilitateconnectivity user's interaction. A conclusion mightelaborate on the importance of the work or suggestapplications and extensions and reduce some ill-effects of conventional vehicles in the society.

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Real Time Identification of Crop Disease, Pest Damage and Nutrient Deficiency System (May 2019)

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ABSTRACT- This report presents a survey on identification of different crop diseases using segmentation performed and the disease identified will be displayed on LCD, along with the essential fertilizers needed for the treatment of the disease. Once the disease is identified, there will be a mechanism for automatic sprinkling of fertilizers. The purpose of implementing such a system is to reduce the efforts of the farmers and to provide them with good yield in appropriate time. Farmers need not monitor the crops continuously. Moreover, manual monitoring of crops and their disease identification requires more time and expert supervision. The accuracy of the results obtained from expert supervision may not be reliable. In small villages, due to unavailability of experts, naked eye observation becomes costly as well as time consuming. So, analyzing these major drawbacks of naked eye observation, we have implemented a cost effective system which provides with accurate disease identification and their treatment in appropriate time.

Index Terms-Disease detection , MATLAB Software , Atmega16 controller , Pesticide Sprinkling.

1. INTRODUCTION

The method which gives less accuracy and is considered as a slow approach for detection of plant disease is based on naked observation. Due to availability of experts in various countries, detection of plant disease is expensive. It requires more chemicals for curing which are toxic to animals, insects and birds which are considered to be helpful for agriculture. Detecting the symptoms of diseases in early stages is an important part of automatic detection. In this paper, a MATLAB based system is used where we focused on leaf diseased areas along with image processing techniques. It starts with image capturing. Both the healthy and unhealthy images are captured and stored. Further these images are sent for image enhancement then for segmentation using the K-means clustering method for the formation of clusters. For training and classification various features are extracted. Hence diseases are recognized. This paper gives brief summary on importance of plant disease detection. It also provides a review on crop disease detection techniques . It provides methodologies used in the proposed system based on MATLAB. Hence, it finally provides an experimental result.

Authors mentioned the technique of apple fruit disease detection with various diseases such as apple blotch and apple rot. Euclidean distance is Used to find the infected region and then fruit Image conversion from RGB to L*a*b color space Takes Extracte place. Texture features , color & shape are d and for fusion of more than two features feature level extraction is carried out. Global color histogram and color coherence vector are the two features to be extracted. Texture features such as Gabor Features, Local binary pattern, complete local binary pattern and local ternary pattern are used. Finally random forest classifier is applied for classification result[1].

Authors have used the technique of apple fruit disease detection and diseases such as : Blotch Fungal disease ,Rot Infections, Apple Scab are used. After image acquisition means method, detection in the region of interest and selection of only infected part takes place. After this process, extraction of features takes place along with the storage of database using support vector machine [2].

Authors mentioned the technique of Pomegranate diseases such as: , Anthracnose, Bacterial Blight and Alterneria. Pre-processing involves morphological operations, filtering and RGB and image resizing. YCbCr, L*a*b, and HSV are used for creating clusters in segmentation. Color, texture features and morphology are used for extraction and texture and morphology is used in for obtaining boundary of image using gabor filter. Minimum distance classifier (MDC) is used for training and classification of diseased or non- diseased image whereas shape vectors are extracted from healthy fruit image [3].

Authors mentioned the technique of mango fruit disease detection. They provided the video for mango fruit disease and histogram is computed by converting original image into binary.In image segmentation, Watershed algorithm is used to

identify the defected regions and then features extraction takes place using blob extraction through the template matching algorithm . Normalized correlation method is used for disease classification and then displays the defected region in the image[4].

Authors described technique for sugarcane leaf disease detection and various diseases such as : Downy mildew , Red stripe Red rot Brown Spot ,Sugarcane Mosaic and Downy Fungal. Pre-processing involves the conversion of RGB to grayscale removing the unwanted images. Location of the Potentially infected and Healthy area takes place by segmentation. Various disease detection techniques such as Multiclass SVM, Linear , Non-linear and are applied [5].

Authors mentioned the technique of Tomato leaves diseases detection and diseases such as : Early Blight & Powdery mildew. Pre-processing of the image involved various techniques such as background removing for image enhancement, image resizing ,smoothness, noise removal and image isolation . For feature extraction purpose of the feature vectors in classification, Gabor wavelet transformation is used which is applied in the Laplacian Kernel , Cauchy Kernel and Invmult Kernel in SVM for the purpose of training for disease identification & output decision [6].

Authors presented various techniques where pre-processing takes place by removing objects & spot detection algorithms & noise in image. Configuration of boundary takes place in segmentation for finding the leaf infected part. After this process, color co-occurence methods and H&B components are used for extraction of various features. Formation of binary images takes place from grey images using the Otsu threshold algorithm and then classification of diseases takes place along with identification through both back propagation network and artificial neural network[7].

Authors used the techniques for the detection of Scorch disease & Spot wherein conversion of color values to space value & creation of color transformation structure takes place. Removing of the masked cells from the boundaries by making of green-pixels after applying K-means method takes place. Extraction of the colour features such as Texture & edge colour, and finally for recognition and disease classification neural network is used[8].

2. BLOCK DIAGRAM

2.1. *Camera*

We can determine image quality from the following three elements : image processing engine performance, CCD image sensor pixel count and performance and Lens performance.

2.2. *MATLAB*

The proposed system starts by capturing the digital high resolution images and then storing the healthy and unhealthy images.

2.3. *USB to serial communication*

PL2303 chip is used for communication. It is a small USB to TTL serial tool. It can be used to connect some serial device to PC via USB port.

2.4 Microcontroller

Leaf disease algorithm detects the disease and passes to the microcontroller. Atmega 16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family.It is a 40-pin IC which uses only low power for working. So,it is suitable for embedded system design which uses 5V DC power supply.

2.5 Relays

Relay functions as AC power switches, and keep the control signals electrically isolated. Relays are used for controlling motor such as solid-state relay

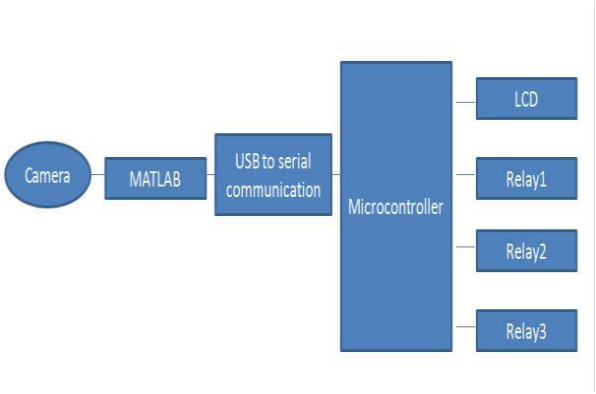

Figure 1 : Block Diagram

2. PROPOSED METHODOLOGY

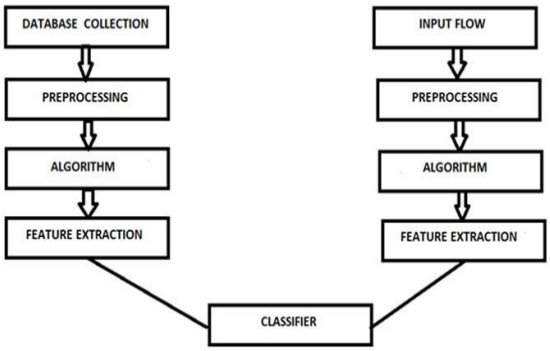

Figure 2 : Proposed methodology

A. Image Acquisition / Database Collection-

Image acquisition is a method in which digital image is processed and is captured using digital camera and stored in digital media for further processing of MATLAB operations. It is also used for retrieving an image from hardware , and then it is passed for further process. Using digital camera we captured healthy and diseased images of leaf and crop.

B. Image preprocessing-

Image preprocessing is used for improvising the image data which contains an unwanted distortion. This method uses various techniques such as Filtering of noise, Image conversion, changing image size and shape, morphological operations and
enhancing image. Usage of various MATLAB codes for enhancing the contrast, resizing of the image and RGB to grayscale conversion is done for further operations like creating clusters in segmentation.

C. Image Segmentation-

This method is used for converting digital image into many segments and then image rendering take place. In this method , for partitioning of images into clusters ,we used K-Means clustering method, wheras classification is carried out by minimizing the sum of square of distance between data objects and clusters.

D. Feature Extraction-

In this procedure, desired feature vectors such as Morphology, color, texture and structure are extracted. This method involves number of resources which are required for describing a large set of data, and from this data statistical texture features are decided using the GLCM formula. Number of gray levels are the essential part in GLCM. The statistics are arranged in the order of first, second and higher for number of intensity points in each combination.

E. Training & Classification-

SVM works on the principle of maximizing the minimum distance from the separating hyper-plane to the nearest example. Basic SVM supports only fundamental classification, whereas in extension multiclass classification is possibly used. Additional constraints and parameters are added in these extensions for optimizing the problems so as to handle the separation of different classes.

4. CIRCUIT IMPLEMENTATION-

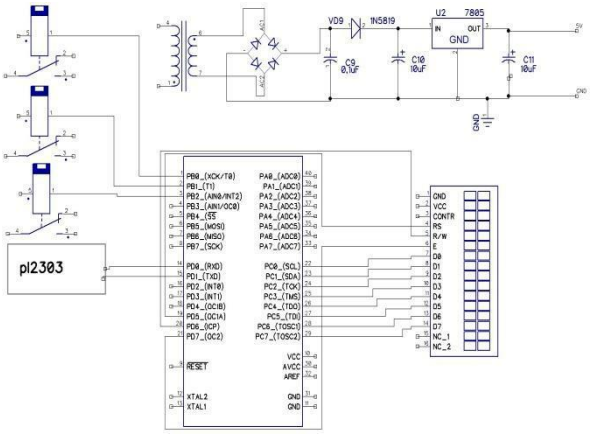

Figure 3 : Circuit Diagram.

5. SOFTWARE IMPLEMENTATION-

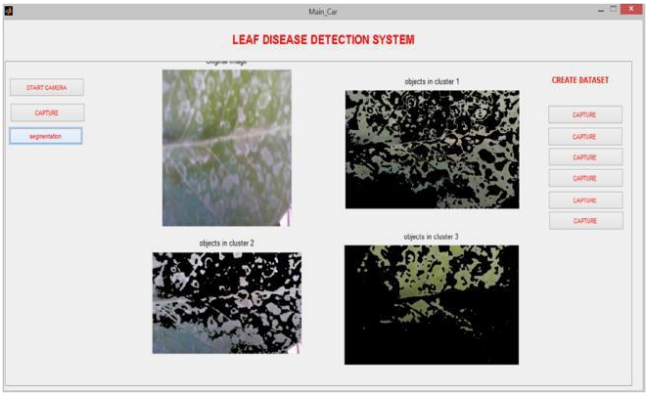

Figure 4: Graphical user interface.

6. CONCLUSION

This paper provides the identification of crop diseases and their treatment in cost-effective way. The leaf disease can restrict plant growth, resulting in reduced yields and loss of vigor by using image processing we can find out the type of the disease and according to that disease the system can spray the pesticides on the crop. K-means clustering algorithm and SVM techniques are the methodologies used in the proposed system.

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BIKE AUTOMATION (May 2019)

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ABSTRACT This paper represents the Bike Automation system. This system consist of voice recognition chip to automate the bike controls. Also this system provides total security to bike. Security is provide to bike with the help of GPS and GSM module. This system will help to recover the stolen bike.

INDEX TERMS VOICE RECOGNITION CHIP, GSM & GPS MODULE, EXPRESS PCB.

1. INTRODUCTION

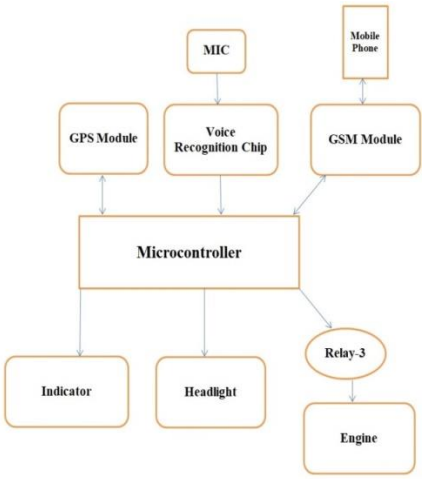
Automating software systems reminds me of teaching a kid to ride a bicycle. A hands-on phase, in which you directly control the process, segues into a hands-off phase as the kid, having internalized the skill, asserts control. During that segue, however, there's a complex negotiation Control is traded back and forth in varying degrees, governed by a sensitive two-way feedback mechanism. The automatic bike turning signal system based on a microcontroller (MCU) available in the market is expensive and difficult to program. Here is a simple and inexpensive circuit that you can build yourself .The circuit is used to indicate left or right turns for a bike or two-wheeler. Two identical circuits are needed, one for left and one for right. Current mechanical key in the motorcycle is prone to bulger, being stolen or misplaced Intelligent biometric voice recognition as means to replace this mechanism is proposed as an alternative. The proposed system will decide whether the voice is belonging to the user or not and the word utter by the user is 'On' or 'Off'. The decision voice will be sent to Arduino in order to start or stop the engine. . The recorded voice is processed in order to get some features which later be used as input to the proposed system. The Mel-Frequency Cepstral Coefficient (MFCC) is adopted as a feature extraction technique. The extracted feature is the used as input to the SVM-based identifier. Experimental results confirm the effectiveness of the proposed intelligent voice recognition and word recognition system. It show that the proposed method produces a good training testing, 99.31%and 99.43%, respectively.Moreover, the proposed system shows the performance of false rejection rate (FRR) and false acceptance rate (FAR) accuracy of 0.18% and 17.58%, respectively. In the intelligent word recognition shows that the training and testing accuracy are 100% and 96.3%, respectively. After review of past and existing techniques followed in Bike Automation, we developed and propose a bike automation system using voice recognition chip. Proposed system comprises of voice recognition chip, GSM,GPS modules, microcontroller section, relay. System is designed for controlling headlight and indicator by voice command. GSM and GPS module is used for tracking vehicle. Relay is used to turn off the bike engine. This can be achieved by simply sending SMS. Voice recognition chip is used for operating bike appliances (horn, indicator). we are storing some commands in VR chip for example left, right. If rider want to take left turn he just have to give command" LEFT" , then left indicator will turn on for some time. Command from rider will work as input signal to the controller. Then controller will take a relative action which is mention in program. A Voice-Input Voice-Output Communication Aid, recognizes the disordered speech of the user and builds messages, which are converted into synthetic speech. The speech is processed and recognized by a speech recognizer. Mean recognition accuracy is 67%.

2. LITERATURE SURVEY: -

Till the date there are lots of security anti-thefts system for four wheelers such as central locking system Anti-lock braking system - ABS, EBD, if someone anyhow manages to open the door and tries to start the ignition with master key, the engine gets shut off within 5–10 minutes. But what about the two wheelers do they really have any security system for that? Being two wheelers greater in number than four wheelers, don't have any security for it. Even at times when someone's bike gets stolen, he or she simply gives a police complaint and would hope for getting their assets in few days, but that day never comes, so here a novel, simple and economical system which will make human lives easy and reliable for their valuable assets. Human beings always want to make their lives comfortable by making intelligent system which works faster, very efficiently than humans. This paper can gather the information such as current position of bike through GPS and GSM, in case of an accident by alerting the family member by sending the message on default number saved on chip, thus it would help to inform police or ambulance to reach at accident site so that a person in

adverse condition can be saved if possible with the instantaneous first aid help. Most of the time people those caught in accident don't get the immediate medical help and can be made survived by this system. Due to lack of first aid and emergency medical help there is huge increase in death rate due to road accidents of two wheelers. Another important security which is needed is antitheft which will keep burglars away from our assets bing stolen.This system avoids false emergency call in case of safe conditions or sometimes bike may get fall down statically due to any reason or due to improper handling by users thus the vibrations made by piezo disc does not exceeds its critical value set for detection of an accident. If and only if accelerometer shows critical values along with piezo-disc exceeding its critical point vibrations accident is detected and call is made to default mobile number. The side stand automation will avoid the accident when user carelessly leaves the side stand in unreleased position while driving and loses balance. When the side stand is left in unreleased position it will give an indication that it is unturned and the user just has to press a switch that will turn the stand connected to the stepper motor and will maintain safer condition. Most of the stolen vehicles are dismantled and sold there is no chance of the owner getting their bike back when theft. Certainly, there are many cases in which the stolen bike is sold in the neighboring states.

3. BLOCK DIAGRAM: -



4.2 GSM Module
4.3 GPS
4.4 Voice recognition chip
4.5 Voltage regulator

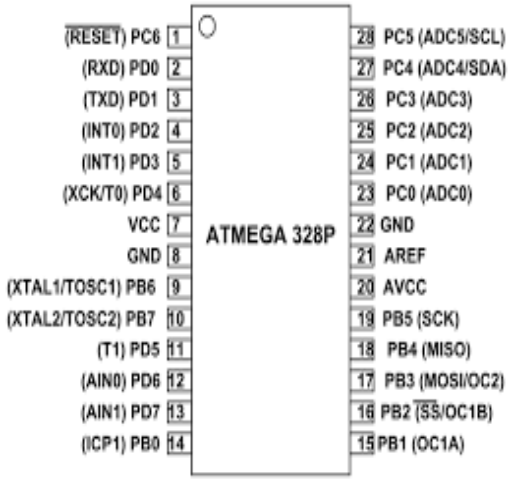
4.1 Arduino Uno Controller-

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. We design this board using Express PCB.We can control the right and left indicator by only the voice command. We will not n need to push the switches that are present on handle of bike .by using voice recognition chip we will achieve this by listening voice commands voice recognition chip will send the signal to controller further controller will control the indicator ,headlight as well as horn of the bike. Global positioning system (GPS) module will help to locate the bike position , it will keep sending the position of bike after every 30 min and immediately after the bike starts. We will use GSM module to send the bike location through microcontroller to the number which will be placed in the GSM module the GPS and GSM will work together to locate the position of the bike, in case the bike will be stolen by anyone the this system plays an important role to locate the bike

The mic will be placed in the user's helmet ,also the user can give the command through the headphone. This command will be collected by voice recondition chip and processed through the microcontroller depending on which instruction or command user give the microcontroller is concern to fulfill that instruction ,the horn and indictor are also interfaced to microcontroller so we can control indicator.

4. HARDWARE USED: -

4.1 Arduino Uno



The Arduino Mega is a microcontroller board based on the ATmega1280. It has 54 digital input/output pins of which 14 can be used as PWM outputs, 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. . It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started

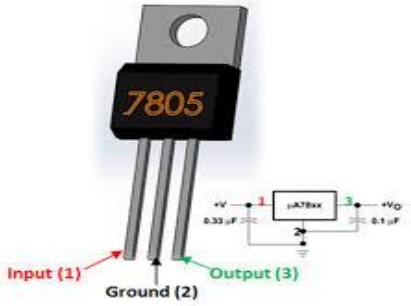
4.2 GSM Module -
GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

4.3 GPS -

The GPS receiver gets a signal from each GPS satellite. The satellites transmit the exact time the signals are sent. ... So given the travel time of the GPS signals from three satellites and their exact position in the sky, the GPS receiver can determine your position in three dimensions - east, north and altitude.

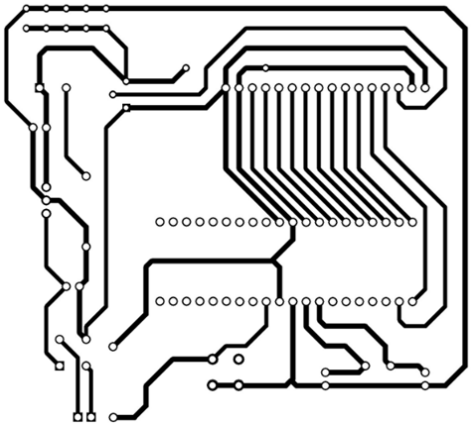
4.4. Voice recognition chip -
An ADC translates the analog waves of your voice into digital data by sampling the sound. The higher the sampling and precision rates, the higher the quality. To convert speech to on-screen text or a computer command, a computer has to go through several complex steps.

4.5 Voltage regulator -



IC 7805 is a 5V Voltage Regulator that restricts the output voltage to 5V output for various ranges of input voltage. It acts as an excellent component against input voltage fluctuations for circuits, and adds an additional safety to our circuit

5. PCB LAYOUT: -



6. ADVANTAGES

- Wireless systems
- System scalability
- Save time
- Smart Riding
- Navigation and Bike Tracking

6. CONCLUSION-

The bike automation using controller has been controlled by Voice Recognition Chip(VRC). The designed system not only monitors the sensor data, bike-appliances, but also actuates a process according to the requirement. This will help the user to analyze the condition of various parameters of bike. It will help to recover the stolen bike. This will provide total security to bike.

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IOT Based Smart Water Distribution and Leakage Detection System Using WSN (May 2019)

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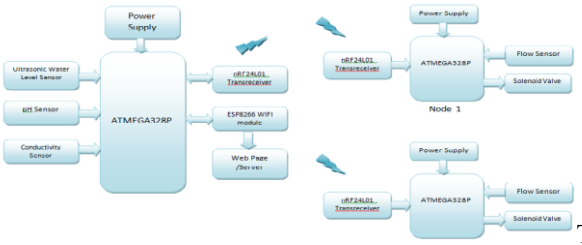
ABSTRACT Water is the lifeline for nature and all living beings. It is the most valuable and scarce resource and hence systematic management of this resource is vital for social and economic development of any country. Wastage of water is the major concern across the country, and the main reason behind this is improper supply of water system and poor management. From past decades, needs of water have increased unpredictably in India. Along with increasing population, demand of water supply is also increasing and has become a major challenge for world. Climatic changes, urbanization, and wastage has further depleted the resource. Importance should be given to conservation, consumption and management of this valuable resource. The idea of connecting everything by wireless technology sums up IOT. In this project, system presents an IOT based design for water monitoring and control approach which supports internet based data collection on real time bases. The system addresses new challenges in the water sector flow rate measuring and the need for study of the supply of water in order to manage water wastage and encourage its conservation. The proposed system monitors the water in the reservoir by using ultrasonic sensor and measures the flow of water as well as the quantity of water being distributed with the help of flow sensor. Along with it, the system also measure the quality of water distributed to every household by deploying pH and conductivity sensors. The traditional water metering systems require periodic human intervention for maintenance making it inconvenient and often least effective. This project is an innovative step to digitalize the water supply system, throughout the cities as well as villages. A step which sets a platform to improve the water supply system, and helps everyone to "Save Water".

INDEX TERMS Water distribution; Water resource management; Leakage Detection ; ARM; Sensors; IOT; WSN; Web Page

1. INTRODUCTION

In some water-related field such as pre-flood warning system, irrigation system, electricity powerhouse, and research, water level information is a very important issue. Usually, water level measurement was done manually, however this can be not effective due to some difficulties like problem to reach the measurement site, human error, etc. Some automatic water level measurement systems have been made using mechanical sensors such as resistive sensor, capacitive sensor, or magnetic sensor, but these sensors have to do direct contact with water that makes their life span shorter because of corrosion. On the other hand, this system uses ultrasonic sensor that can measure the water level without direct contact with water, which makes its life span longer. Now a day's different types of smart sensors are developing for the safety and security in emergency management strategy. Smart water management is only possible with help of IOT which includes the applications in monitoring the flow of water, Management of valves, fault detection within valves, Data analysis through Observations from different meters etc. in conventional method for each and every individual processes we require the human power and observation skills. To overcome these IOT plays the major role.

2. BLOCK DIAGRAM



The system enlisted in the paper consists of Controller ATMEGA328P, Ultrasonic Water level sensor, pH sensor, Conductivity sensor, Flow sensor, nRF24L01 Transceiver, ESP8266Wi-Fi module, Power supply, IOT plat-form, Web Page.

The working of the proposed system is explained as below. In this system, controller ATMEGA328P and different sensors are used along with Internet of Things concept. Firstly, all sensors which are interfaced with controller will sense the parameters related to water such water level using Ultra-sonic sensor, flow rate using Flow-rate sensor, quality of water using Conductivity and pH meter and also detects the leakage during distribution using Flow sensor. Reservoir side module calculates water present in it and sends data regarding water level present in reservoirs to central office on daily basis. This module contains ultrasonic sensor to sense the water level and communicates with controller to process operation such as calculation of water present in reservoir and volume data is send to central office using IOT. The rate of flow of water during the distribution period is sensed by the flow rate sensor and the sensed data is send by the controller to the web page. Along with the water level and flow rate the quality of the water and conductivity is also tested using pH meter and conductivity sensor. All these sensed parameters are further given to the control-ler ATMEGA328P for processing. The controller will receive this data and send it to the internet through serial communication. Inter of Things is the advanced concept which we are going to use for this system. Basically, a web page will be created where the data will be monitored and managed from the server room.

3. METHODOLOGY

In the proposed system we are using AVR AtMEGA328P, ESP8266 Wi-Fi module, nRF24L01, pH sensor, Conductivity sensor, Ultrasonic sensor and Solenoid vales. The system is based on IOT platform with wireless sensor networks, so we will have the benefits of IOT as well as wireless sensor net-work. For IOT platform we are using ESP8266 Wi-Fi Module, which works at 2.4 GHz Frequency with 1Mbps data transfer rate which is used to upload the sensors data such as temperature, pH, water level and flow rate, amount of water in and out from the branch as well as status of solenoid valves. With the analysis of water flow in a particular branch we can detect the leakage in the pipeline and can cut-off the water supply in the branch with the help of solenoid valves. WSN system consists of wireless sensor nodes that sends the sensed data to the main node for that we are using nRF24L01 wireless transceiver each nRF24L01 module can communicate with 5 nRF24L01 modules at the same time we are using another of AtMEGA328P to create the nodes and control the solenoid valves and send the flow rate at each branch. All this data from the sensors of main node, flow rates from each and solenoid valves are uploaded to the website. We are using IOT platform with MATLAB analysis. It provides a channel which is used as a server for our system. In this way the system works with the help of wireless sensor network.

IV.CIRCUIT DIAGRAM & SIMULATION

THE FIGURE BELOW SHOWS THE CIRCUIT DIAGRAM OF PROPOSED SYSTEM.

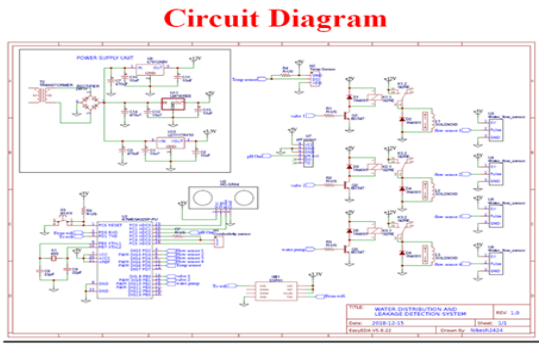
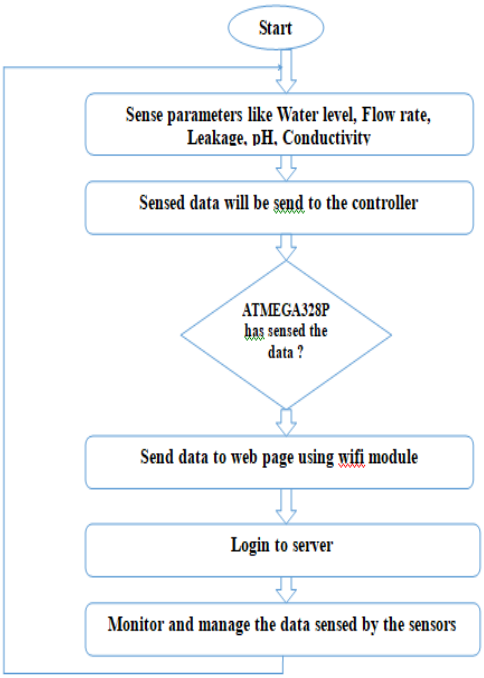


Fig.2.circuit diagram

4. FLOWCHART



5. CONCLUSION

This paper demonstrates the successful implementation of smart water distribution and leakage detection system along with wireless sensor network using IOT based approach which measures the level of water, quality of water, conductivity, pH and usage of water on real time basis. The main purpose is to focus on different applications of IOT in water resource distribution and management which reduce the human efforts and overcome the drawbacks in the conventional system. The main application of this system is for Municipal Corporation for proper distribution, monitoring and management without wastage of water. Leakage is the main parameter which will also be detected and a controlling action would be taken on it. Along with

this it can also be used in chemical factories, industries and for domestic application. In future we can also add the feature of automatic water billing which will be send directly to consumer on their registered number or e-mail id, and the consumer can pay it online through an android application.

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Building Health Monitoring System (May 2019)

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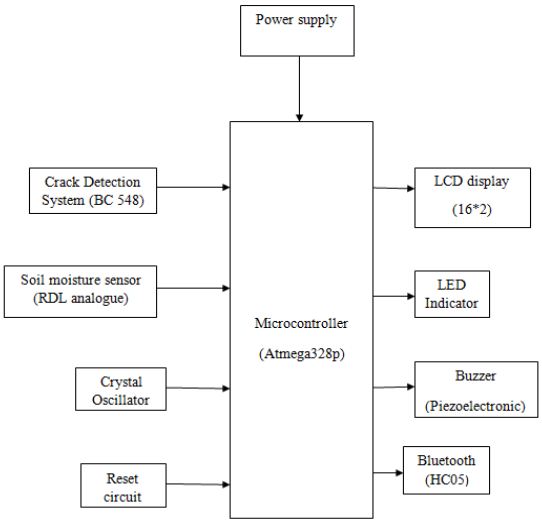
ABSTRACT This paper deals with Structural audit system. The requirement of structural audit is for maintenance purpose and repairs of existing structures whose life has exceeded the age up to 30 years to avoid any mishaps and safe the human life. It is widely used as a construction material being inexpensive, easy for construction, applications and because it is high strength and cost ratio. During this period there are many buildings and earlier have reduced strength in due course of time and because of structural deficiency, material deterioration, unexpected over loadings or physical damage. If, further use of such a deteriorated structure is continued it may be dangerous to the lives of all living beings. There is a need of appropriate actions and major for all such buildings to improve its performance and restore the desired functions of structure which may lead to increase its functional life. The structure pathology detection is an important security task in building constructions, which is performed by an operator to look manually for damages on the materials required for construction of the building. This task could be dangerous if the structure is hidden or not easy to reach. On the other side, embedded devices and wireless sensor network (WSN) are becoming popular and cost is less, enable the design of an alternative pathology detection system to monitor structures based on technologies. This article introduces a Bluetooth, WSN model system, autonomous system, easy to use and it consumes low power.

INDEX TERMS Structural Audit; Vibration Sensor; Testing; NDT method; Evalution.

1. INTRODUCTION

In India, there are many buildings which are old and can collapse anytime. If such structure is continued then it may affect the lives of humans and also surrounding habitations. So we should have to take appropriate action to improve the performance of structure. This will also restore the desired function of structures. Thus, it is almost important to perform structural auditing of existing buildings and to implement maintenance or repair work time to time which will increase the life of buildings and safety of the humans. To act more responsible and preemptive towards the ruined buildings, the municipal corporation must issued notice to the buildings structure and co-operative societies which have been completed more than 30 years to carry out mandatory structural audit and then submitted the audit report. Once we get the audit report immediately take the action on the all critical areas where the damage is detected It also helps us in delivering a strong building structure with low cost solutions and proper maintenance program. This paper deals with study of different parameter of structural audit including visual inspection. Non-destructive testing, core sampling and testing. It also emphasizes on different repairs and retrofitting measures to be used for buildings after structural audit. Structural Audit is an overall health and performance of building. Structural Audit is an important tool for understanding the real status of the old building. It ensures that the building and its premises are safe and there is no risk. It studies and suggests proper repairs and measures required for the buildings to perform better. Structural audit is done by an experienced and licensed structural consulant person. A purposed Structural Audit consists of: 1.To save human life and building. 2. To understand the condition of buildings. 3. To find critical areas to repair immediately. 4. To observe with Municipal or any permitted requirements. 5. To enhance life cycle of building by suggesting protective and correct measures. 6) To understand the health of your building and to project the expected future life.

2. BLOCK DIAGRAM



The system enlisted in the paper consists of following blocks: Controller Atmega328P, Crack detection sensor, Soil moisture sensor, Bluetooth module, LED, LCD display, Buzzer.

A. AtMEGA328p

The ATmega328p is based on the AVR enhanced RISC architecture. It is a low power CMOS 8-bit microcontroller. This empowers system designed to optimize the device for power consumption versus processing speed.

B. Sensors

In this paper used Soil moisture sensor, Crack detection sensor, tilt sensor etc. These sensors are used to monitor the different parameters of the rehalitation of building.

C. LCD Display

An LCD is an electronic display module in which we useliquid crystal to produce a visible image. The commonly used module in hardware is 16*2 LCD display. In structural audit we mainly used LCD to display the problems related to buildings.

D. BUZZER

This article used a Piezo buzzer. The buzzer is a device which is used to produce a sound. The main working principle of buzzer is that, when an electric potential is applied across a piezoelectric material, a pressure variation is generated at that point. A Piezoelectric material consists of piezo crystals in between two conductors.

3. METHODOLOGY

Structural audit consists of 2 methods:-

- Destructive met
- hod
- Non-destructive method

A. Destructive method

In this method detection is done manually like if there are crack present external and Internal wall. Cracks in beam and column, spalling of concrete, deterioration of structure building leakage if and get the deep knowledge about settlement in foundation, strata, settlement in soil etc.

B. NDT method

NDT stands for non destructive method mainly done is to audit process technically and with the help obtain data.

IV.CIRCUIT DIAGRAM & SIMULATION

The following diagram shows the circuit simulation of overall structural audit using the ATmega328p controller. The Software used for the simulation purpose is listed below:

- Proteus8 Professional
- Arduino IDE

The Proteus software tool is used for electronic design automation. Here this paper uses Proteus for PCB layout also for circuit simulation for manufacturing printed circuits boards. Arduino IDE includes all the software which will run all programs and communicate with an Arduino board.

Our project is Atmega328p based project which is mainly used the security purposed. In this project we are dealing with the evacuation of human form a structure to prevent loss of life. It is mainly for the civil engineers. In this project we have used the soil moisture sensors, vibration sensors & tilt sensors as the major reasons behind collapsing of structure are excess water present beneath. The foundation vibration due to natural calamities & flitting of building beyond a particular angle.

The sensors used in this project are integrated with Atmega328p development board with some of the ideal parameters. The output form every of the either sensors is received in Atmega328p microcontroller & all composed with these ideal range. If it exceeds those parameters it will raise an alarm within the structure to evaluate that structure at it is going to collapse soon.

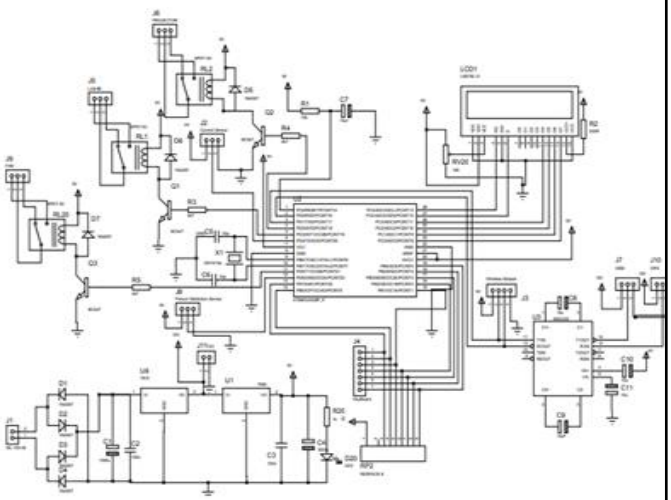
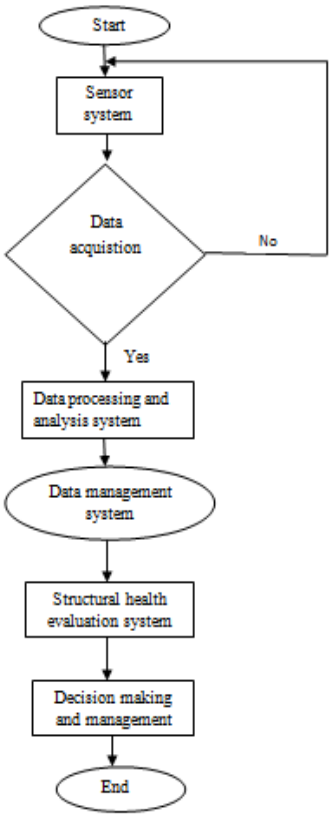


Fig.2.circuit diagram

4. FLOWCHART



5. CONCLUSION

From the consideration of all the above points we conclude that the lacking of structural are due to combined effects of carbonation, corrosion and due to continuous drying and wetting. The result survey tells us to conclude that suffering of building is widely spread. So it needs to be stopped to avoid complete collapse of the structure.

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Smart Helmet (May 2019)

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ABSTRACT A large number of people die everyday in the world due to road accidents. Our project Smart Helmet is an effective approach made to solve this problem of road accidents, which makes the biker more safe. Limit switch which is placed inside the helmet will detect whether the rider has worn the helmet on bike or not. If the biker has worn the helmet the bike will start and if not the bike will not start. Smart helmet uses GSM and GPS technology and provides help in case of accident. Nowadays bike riders in our country are increasing due to which many causalities occur due to negligence of wearing helmet. Our project makes compulsory to wear the helmet. If the biker is met with an accident then a SMS along with the location is sent to family members and ambulance in order to rescue him. Our project also aims at intelligence security providing awareness for wearing helmet and also provides prevention for human life safety. There is craze for motorbikes in today's young generation. Due to low prices middle class family prefer buying two wheelers rather than cars. As the two wheelers in our country are increasing, the road accidents are also increasing day by day, due to which many deaths occur, most of which occur due to most common negligence of not wearing a helmet. According to a survey of India, there are around 720 accidents occurring due to bike accidents per year. Not only accidents but also lack of proper treatment is another reason for deaths. In India out of the bike accidents deaths occurring annually, nearly half of the people die due to lack of treatment in proper time. The reasons for these deaths are late arrival of an ambulance, no person at the place of accident to call an ambulance etc. The objective of our work is that a bike rider must wear a helmet in order to start up his bike, otherwise the bike won't start. It also gives information about the location of accident with the help of GSM module to family and friends through a SMS. But only sending an SMS won't help the biker unless exact location of accident is also known. So as to know the location of an accident, we have used a GPS module which will send exact location of the accident through a SMS to family, friends or an ambulance using a microcontroller.

INDEX TERMS accidents, alcohol sensor, gps, gsm, microcontroller atmega 16, helmet, location, sms, mobile phone

1. INTRODUCTION

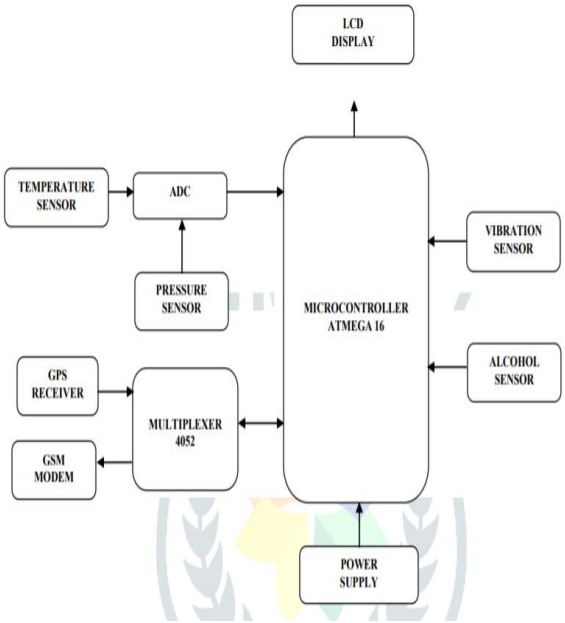
Nowadays road accidents are the leading cause of human deaths. A report of the World Health Organization says that road traffic injuries caused around 1.24 million deaths in the year 2010, which is slightly down from 1.26 million deaths in the year 2000. This report concludes that a person is killed every 27 seconds in a road accident. Out of the entire world, only 28 countries, which have 7% of the world's population have adequate laws which address the risk factors such as speed, drink, and drive, helmets, seat-belts, child restraints. World Health Organization revealed the first ever Global status report that said road accidents in India have earned distinct hesitation. India has overtaken China and now has the worst road traffic accidents worldwide with 130,000 deaths annually. Speed, drink and drive and very low use of helmet, seat-belts and child restraints in the vehicle were the main factors which were pointed in the report. Around the world, 40 people under the age of 25 die in road accidents. World Health Organization say that road accident is the second most important cause of death for the age group of 8 to 35 years. National Crime Records Bureau(NCRB) in their latest studies have stated that the total number of deaths every year due to road accidents has now passed the mark of 135,000. It further says that the drink and drive is one of the major reasons for road accidents. There is no check on drunken driving fatal accidents that occur outside the cities. When fully drunk unfortunately some drivers think they are capable of driving the vehicle. Unless the government comes up with a new set of rules of checking drunkenness on the road, these fatalities cannot be reduced. There is no effect of campaigns against drink and drive. 30 mg/ 100ml is the legal limit according to the Indian Motor Vehicle Act and recommends fines and/ or imprisonment for transgression. However due to poor implementation, and the little enforcement is non-visible, non-random in geographical coverage, and nonuniform. Very little attention has been given to the view of early detection and brief intervention. There is negligence at the level of primary health care providers, emergency facilities or the police. An electronic application is very much popular in the field of the automobile. Motorbikes are preferred over cars by the people because of various reasons such as lower prices of the components used and varieties available in the market. Hence there is a lot of concern and also becomes the major issue about road safety. Therefore to avoid drink and drive, the wearing of helmet must be the basic rule and should be made mandatory. We are designing a system which checks two conditions before the bike engine is turned ON. The system includes

Helmet sensing switch which is used to detect whether the biker is wearing a helmet or not. The system also includes an alcohol sensor which gives output to the MCU that whether the biker is drunk or not. A GSM module sends a message to the concerned person regarding his drunken condition if the biker is drunk. The engine will not turn ON if any of the two conditions is violated. In this system, we have used GSM module to send SMS to the family members, if in case the person meets to an accident and also to inform ambulance and police for the investigation of the accident. The basic idea is to inform about the rider wearing a helmet or not, whether the rider is drunk or not, and about the accident. We have used GSM technology to give information by sending SMS, using GSM module which has a SIM card slot to place the SIM and send SMS. In case of accident sending message only will not help the driver, where will the ambulance go to rescue the rider without knowing the location of the accident. So to overcome the problem we have also used the GPS module which gives it location to the microcontroller and the message is sent to the family members, ambulance and police along with the longitude and latitude of the location of the accident. Using this concept we can find the accurate position of the accident place and rescue the concerned person.

2. WORKING PRINCIPLE

In this smart helmet system Arduino Microcontroller is used. When the system is switched on, LED will become ON indicating that power is supplied to the circuit. The RF is used for start the bike which will first check whether the driver is drunken or not, if drunken it will not allow to start the bike. The small voltage of ignition of the bike is grounded. In normal condition when the helmet is worn the pressure sensor senses pressure and the RF transmitter radiates the FM modulated signal. The RF receiver is connected with the bike which receives the radiated signal and activates the relay .The relay removes the ignition wire from the ground and connects with the starter which starts the bike. When driver meets with an accident, the vibration sensor sends message to the microcontroller. The GPS module receives the exact location of the vehicle and gives the information back. This information will be sent to a mobile number through a message. This message will be received using GSM modem present in the circuit which will give information of longitude and latitude values. Using these values the position of the vehicle can be estimated. To run the GPS and GSM module, the Atmega 16 microcontroller is a very user friendly device which can be easily interfaced with any sensors or modules and is very compact in size. Some questions may strike the mind like, how will the system send the SMS using the GSM module and by keeping the GPS location in the SMS which is obtained from the GPS module. But when should all this is done? When accident occurs, how will the microcontroller detect the accident? This will be done by using a vibration sensor which is placed in the helmet. The vibration sensor is placed in the helmet to detect vibrations of the helmet. When the rider crashes, the helmet hits the ground and the vibration sensor detects the vibrations that are created when the helmet hits the ground and then the microcontroller detect the accident and it will send an SMS containing information about the accident and location of accident using GSM and GPS modules. Alcohol sensor senses the alcoholic content whether the rider drunken or not, if he drunken bike will not start showing as alcohol detected on LCD display.

3. MODELLING OF THE SYSTEM



It is an innovative concept which shuns out the possibility of starting a bike without wearing the helmet and avoid drunk driving. The helmet also acts as the second key to a biker. Besides, the smart helmet also incorporates the advanced technologies of accident sensing which informs the friends and family of the biker if, in case, he meets an accident and enables prompt medical attention to the victim.

The hardware setup includes the transmitter and receiver sections. The transmitter section has alcohol sensor, operational amplifier IC LM358, variable resistors, antenna and a RF transmitter module which contains microcontroller, encoder HT12 E, switches and two wires. The receiver section has a RF receiver module containing antenna, decoder HT12D, microcontroller Atmega16 unit, GSM module, GPS module, LCD display, power supply circuit etc.

Accelerometer (GY-61): An accelerometer is a device that senses changes in 3-axes x,y and z. Any change in the orientation of the sensor results in different readings from the accelerometer. Thus, this sensor will be mounted on the helmet and in case of an accident, it will get tilted along with the helmet sideways resulting in different readings than normal. These readings can be used to detect an impact or an accident. This module needs 5V power supply.

GSM Module (SIM900A): This module will be responsible for sending an alert SMS to a predefined contact in any case of an accident. It needs a SIM Card to be inserted to work, and also the SIM card needs to be in a proper coverage area. Any basic plan should be subscribed on the SIM card to make it able to send an SMS. This module needs 5V supply to function.

GPS Module (Neo 6M) :GPS module will collect the appropriate co-ordinates of the location in terms of latitude and longitude in case of a mishap. These co-ordinates will be sent to the microcontroller and to the GSM module to be inserted in the SMS, to send to the user. This module needs to be in a proper outdoor area to be in contact with the communication satellites. It needs 3.3 - 5V to function.

LCD Module (1602) : LCD module will be used to display the co-ordinates from the GPS module and to display the ambient temperature on it. It is 16 characters wide with 2 rows. It works in 4/8 bit parallel interface. It also has one backlight of any color (Green/Yellow/Blue/etc.). It needs a VCC of 5V. Atmega 16F: It is an 8 bit microcontroller. It has 4 ports, one port for analog and the other three are for digital. It operates on 2.7V to 5.5V. It is a 40 pin controller with various other features such as on-chip timers, comparators, ADC, JTAG, etc

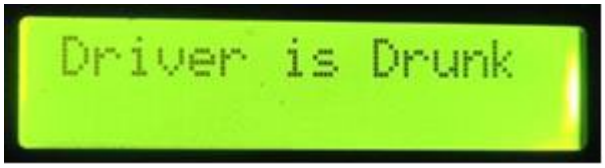
MQ-3 Alcohol Sensor: MQ-3 gas sensor is used for identifying the alcohol content from breath. It can be positioned just in front of the face which responds to various gases. It determines whether the biker is drunk or not. MQ-3 sensor has potentiometer to adjusting different concentration of gases. We calibrate the detector for 0.4mg/L of Alcohol concentration in air and use value of resistance as 200 KΩ. MQ-3 supports for both analog and digital. MQ-3 alcohol sensor has a 4 pins namely GND, VCC, A out, D out. Here we use digital output of this decided by our smart helmet system whether the biker is drunk or not.

5. RESULTS

We can see in the image that the components are mounted on the helmet. There are multiple modules attached on the helmet as we can see in the picture. One is the main PCB on which the main controller, power supply and other minor components are located besides it. The power supply (battery) is then connected to the components via wire which will power all the components attached to the helmet. All these components function together and the message is sent to the receiver. The GPS receiver needs to be in clear sight of satellites to receive the signals. Hence it needs to be placed on the outside. These components can't be placed inside as they might cause injury to the rider as there are sharp components.

In this photo other modules can also be seen attached to the helmet besides PCB. The other modules are GPS, GSM, accelerometer, alcohol sensor and others. The alcohol sensor is located on the front glass. This is done because it will immediately notice the presence of alcohol in the user's breath. On noticing the presence of alcohol, it will send the predefined SMS to a mobile number and the value of alcohol will also get displayed on the screen.

In above image the device displays warning on the lcd That the driver has not wore the helmet and the vehicle will not start if he/she does not wear it



In above image the lcd will display that the driver is drunk as it will detect alcohol with the help of alcohol sensor MQ3 and the vehicle will not start.

In above image lcd will display that accident has occoured with the location details of the place of accident to the family members and ambulance. The SMS will be sent with help of GSM and location will be detected by GPS.

6. CONCLUSIONS

In this project we have successfully designed a smart helmet system using GSM and GPS technology. The system makes compulsion of wearing helmet to start the ignition of vehicle. While riding if there is any sudden change in velocity then accelerometer will monitor the change and a message with the location of rider will be send to the predefined number using GSM module. The outcome of the project have showed that the bike ignition will start if the helmet is worn. Therefore it will automatically decrease the effect from accident and it can avoid bike thefts . Arduino Lilypad is good in controlling all the system and the sensors. Executing the wireless system which uses Radio Frequency Module to send signal from helmet unit to the bike unit which is better than wired link

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Voice Controlled Digit Writer For Handicapped People (May 2019)

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Abstract- Today, the only aim of technology seems to be- to reduce the human efforts to minimum. We have many electronics devices that reduce the mechanical work of humans. Humans, to be precise "the Gifted Humans" are fortunate enough to carry out their daily chores. But what about the physical disabled? Here is our small effort to make the 'ungifted' humans 'gifted', the "VOICE CONTROLLED DIGIT WRITER FOR HANDICAPPED PEOPLE". Never the less, it is as beneficial to the gifted humans as it is to be physically disabled. The voice operated robot is designed using Atmega328P. The robot architecture consists of two main parts- the electronic architecture and the software architecture. The commands that we give verbally is internally interpreted by the robot into low level machine commands which could be understood by microcontroller and the corresponding action is performed. The robot can perform many functions depending on the inputs given to it in the form of voice commands. The natural language of humans is recorded and converted into simple commands for its execution. The voice operated robot proves to be a valuable device to reduce human efforts and also, more importantly to reduce the gap between the gifted and the ungifted. Those who are physically handicapped can get their work done very easily through simple voice commands. It can also be used in industrial applications with much efficiency and more lifetime.

Index Terms- Atmega328P; Handicapped People; MFCC Algorithm; Voice Recognition; Voice Control Digit Writer.

1. INTRODUCTION

Voice Controlled Digit Writer is a robot whose motions can be controlled by the user by giving specific voice commands. The speech recognition software is running on a PC that is capable of identifying the voice commands. There are so many applications of voice controlled robot and our Digit Writer is one of them which will be helpful for handicapped people.

1.1. SYSTEM DESCRIPTION

1.1.1. Voice Control

When we say voice control, the first term to be considered is Speech and Recognition i.e., making the system to understand human voice. Speech Recognition is a technology where the system understands the words but not its meaning given through voice. Speech is an ideal method for robotic control and communication. The Speech Recognition circuit will outline, functions independently form the robot's main intelligence i.e. Central Processing Unit(CPU)

1.1.2. Use of Building Robot

Once we programmed, robots repeatedly performed functions with a high accuracy that surpasses that of the most experienced human operator. Human operators are, however, far more versatile. Humans can switch job task easily. Robots are build and programmed to be job specific. Robots are in the infancy stage of their evolution. Robots require a combination of elements to be effective; sophistication of intelligence, movement, mobility, navigation and purpose. Robots can work in all types of polluted environments, chemical as well as nuclear.

The paper we referred consists of new architecture that is Deep Convolution and Recurrent Writer(DCRW) for image generation by adapting the Deep Recurrent Attentive Writer(DRAW) architecture which is a sequential vibrational auto-encoder with a sequential attention mechanism for image generation. The main difference between DRAW and DCRW is that in DCRW we replace RNN encoder with CNN. The reason behind this modification is that CNNs are the state of the art of image processing in deep learning and their basic architecture is inspired from the visual cortex. Further, for the testing of proposed architecture experiments are performed on MNIST handwritten digits data set for generation of image and results are analyzed [1].

The second paper which we referred proposes an approach to offline text-sensitive writer identification on the basis of probabilistic generative model of isolated handwritten digits. The model parameters are

learned separately for each writer, and the writer of query samples is identified via a Bayes Decision Rule. Experimental results support the key ideas of the proposed approach [2].

Third paper is proposed of a novel framework Ensemble Projection (EP) for writer adaption. They employed EP as a feature transformation method which can be combined with different types of classifiers for unsupervised and semi-supervised adaption. Experiments on a handwritten digit data set demonstrate that EP learning can increase speech recognition rates significantly, both in the unsupervised and semi-supervised cases [3].

In fourth paper, an online system for recognizing handwritten Hindi digits are highlighted based on matching alignment algorithm. It illustrates every phase of the system in details which are: digits acquisition, pre-processing, feature extraction and recognition phase. The data set of the system were collected by 50 writers using a touch screen laptop with 50 samples of each digit. The result of testing the proposed system showed a high accuracy rate with an average of 96% [4].

1.2. ALGORITHM USED

As figure shows that we are going to use MFCC algorithm which stands for Mel-Frequency Cepstrum Coefficients. In sound processing, the mel-frequency cepstrum is a representation of the short term power spectrum of a sound, based on linear cosine transform of a log power spectrum on nonlinear mel scale of frequency.

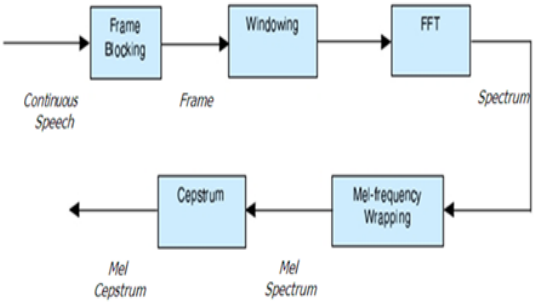

Figure 1: MFCC Algorithm

2. BLOCK DIAGRAM

2.1. Elements of Block Diagram

- MIC
  It is a transducer that converts sound into electrical signal. Microphones are used in many applications such as telephones, hearing aids, public address systems, for concert hall and public events, motion picture production, live and recorded audio engineering.

- Voice Recognition Module
  The voice recognition module is a compact and easy control speaking recognition board. This product is a speaker-dependent voice recognition module. It supports up to 80 voice commands in all. Maximum 7 voice commands should work at same time.

- Microcontroller(Atmega328P)
  The Atmega328P is a single chip microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8bit RISC processor core.

- Servo Motors
  A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. As Fig.2. shows that it consist of a suitable motor coupled to a sensor for position feedback.

- Battery and Charger
  An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones and electric cars. When battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode.

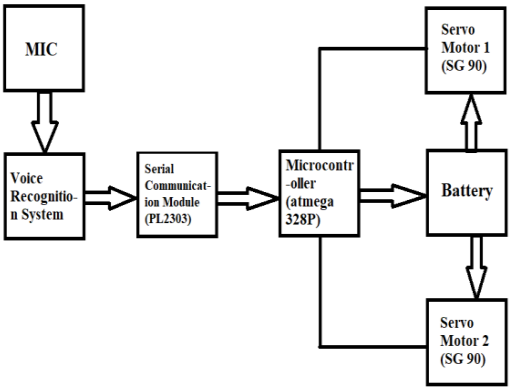

Figure 2: Block Diagram

3. PROPOSED METHODOLOGY

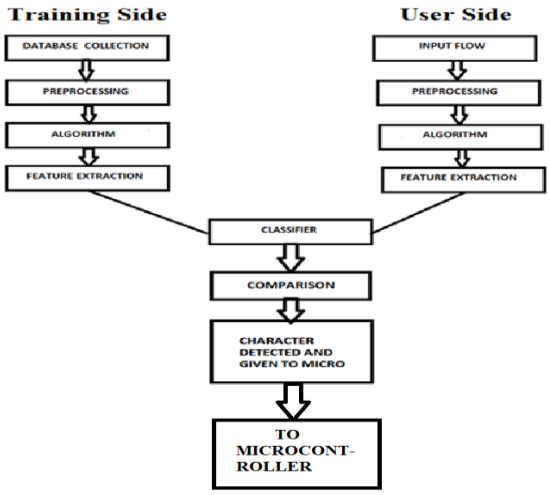

Figure 3: Proposed Methodology

3.1 Training side:

This side first user has to collect all the data. Then this data is stored and collected at certain location which will be processed further by using certain methodologies and technologies. At this stage the pre-processing of data is done. Then the algorithm that is sequence wise steps of how to execute the overall process is written which is helpful for understanding the process clearly. All the required features are then extracted after proper execution of algorithm. It is time consuming process but has to be done. It is necessary to go through all the steps and get all the features.

3.2 Testing side:

All the above things done are then kept for testing procedure where everything is tested stepwise and we can get the required output. After getting the input then all the data is then pre-processed. This stage is the second which is done after input stage. Again the same algorithm is executed stepwise which will go through all the basic steps properly for getting the required output. Last stage features are tested and verified then combining all the steps that is training as well as testing side it is given to classifier stage.

3.3 Combination of training and testing side:

All the features extracted are then sent to a classifier stage where it is classified according to certain rules and regulations. It is then classified and stored at certain location which can be referred later. After that they are compared with certain database stored. Comparison is also done on the basis of certain rules and regulations. Finally the digit is detected and given to microcontroller for further process. Then the controller will take specific action for the output.

4. Circuit Implementation

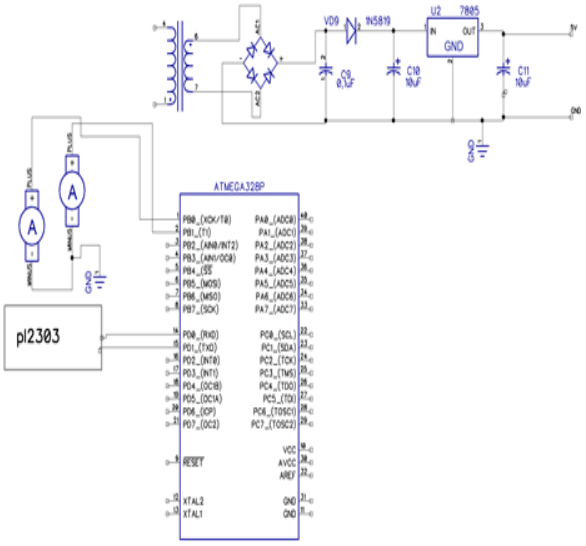

Figure 4: Circuit Diagram

5. SOFTWARE IMPLEMENTATION

5.1 Interfacing of GUI

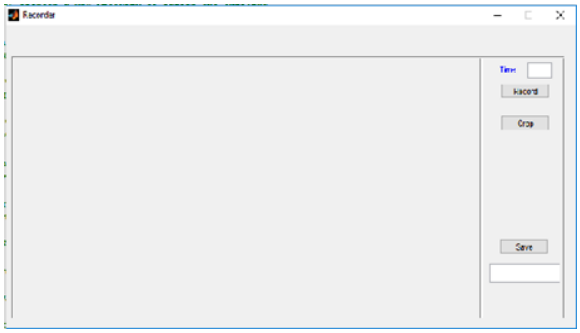

Figure 5: Interfacing of GUI

5.2 Recording of voice for creation of database

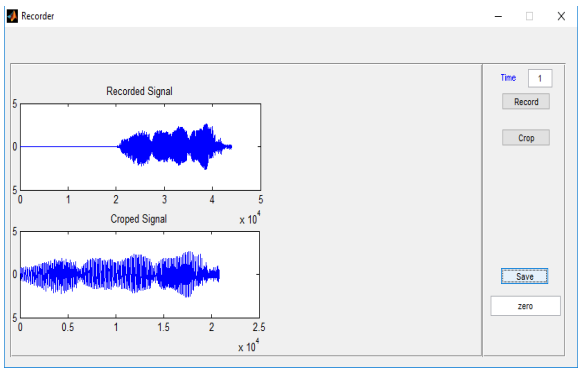

Figure 6: Database Creation

5.3 Extraction of features

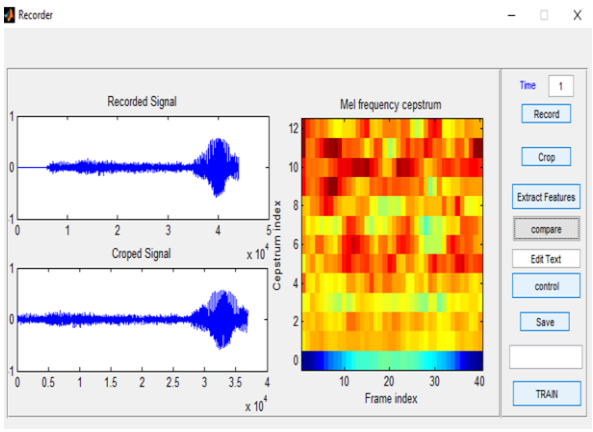

Figure 7: Feature Extraction

5.4 Comparison of features with trained voices

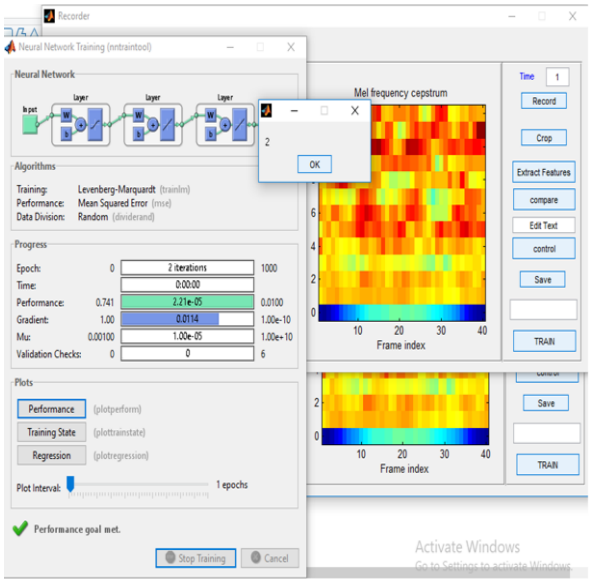

Figure 8: Performance goal met / results

6. CONCLUSION

The proposed system can be very helpful for disabled people. It will be the cost efficient system. The system will be easily carried anywhere due its light weight and small size. The voice recognition software will be having an accuracy around 75% in correctly identifying a voice command. But it will be highly sensitive to the surrounding noises. There will be a possibility of misinterpreting some noises as one of the voice commands given to the robot. Also the accuracy of word recognition reduces in face of the noise. The sound coming from motors will have a significant effect on accuracy.

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Smart border security using high speed vision technology (May 2019)

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ABSTRACT The aim of this work is to design the automated security system in order to detect, track and destroy the target for surveillance operations. The system can be operated in two modes, in which the target can be tracked automatically by using MATLAB based system. The image processing algorithms are implemented in MATLAB. The process starts by processing the video signal on computer by using the video camera, then the target is selected which can be tracked further by using different image processing techniques. After the selection of target, the micro-controller unit takes the decision to shoot any activity within its range. The gun is mounted on a tripod stand and its movement is controlled by using the motor. Once the target is selected is can be tracked by moving the camera and gun.

INDEX TERMS Border security; High Speed Vision Technology; Image processing; MATLAB; Microcontroller

1. INTRODUCTION

In these days security is the major issue for all over the world. Security is very important in order to protect vulnerable and valuable assets such as a person, dwelling, community and nation from any harm. International security issues are also very important, especially border and coast security to any country. The people of national security agencies, maritime Security organization, military forces and other forces sacrifice their lives to protect their country people.

The lives of forces are also very precious like other lives. So by using advance technologies, the forces can protect their nation superiorly with minimum life losses. In this modern era, computer base security equipment's are very popular among forces because they are more advance and safe for themselves. For example drone technology the "unmanned aerial vehicle" which is controlled automatically by computer is very popular these days. In this technology, the target is selected and hit by using computer based algorithms including image processing techniques.

Real time image and video processing for object detection and tracking has many important applications in the field of computer vision (B. Coifman et al., 1998), such as video surveillance, military purposes etc. the availability of high quality and inexpensive video cameras and the increasing need for automated video analysis has generated a great deal of interest in the areas of motion detection, object tracking and object targeted (A. Yilmaz et al., 2006) thus on a very high level, it is possible to identify three key steps in video analysis: detection of interesting moving objects, tracking of the detected objects from frame to frame, and analysis of the object tracks to recognize their behavior and targeted object accordingly.

2. BLOCK DIAGRAM

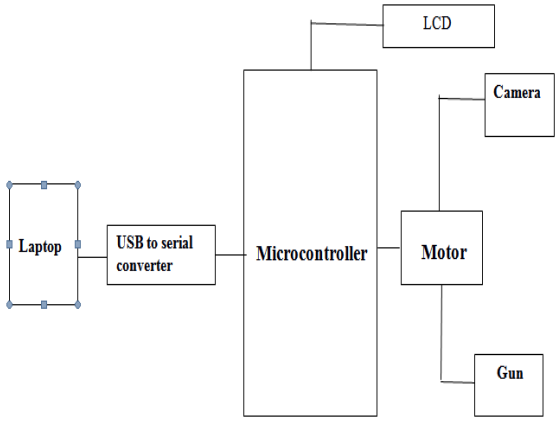

Fig.1.Block Diagram

This is a block diagram of smart border security using high speed vision technology. Camera helps to detect target from may miles away makes them ideal for border protection. gun is weapon used for defense in army. Here, in this project also we are using gun for protecting border from attackers.

3. CIRCUIT DIAGRAM

This is the circuit diagram of Smart border security using high speed vision technology. This design is implemented on DipTrace software

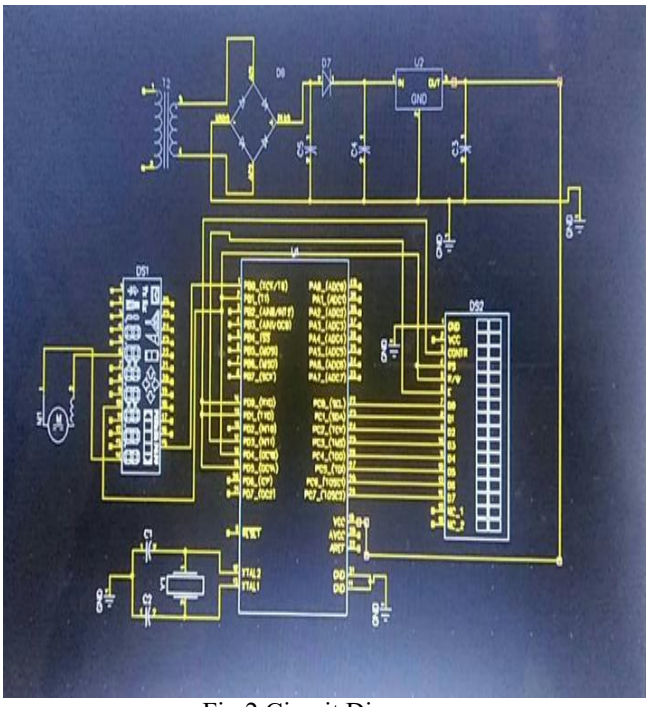

Fig.2.Circuit Diagram

4. FLOW CHART

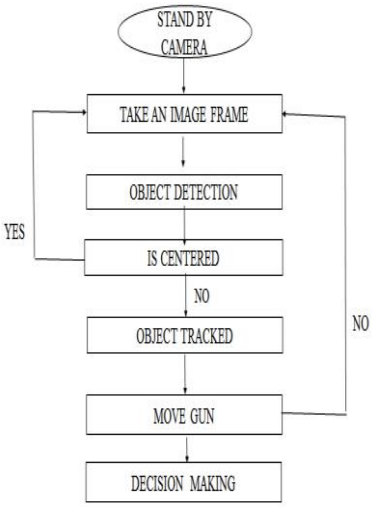

Fig.3.Flow Chart

This flowchart describes the flow of operations that are necessary for the system to work in the software part. The code is written as per the conditions shown in above flow chart.

5. METHODOLOGY

Proposed technique reliable as well as it requires less processing time. The algorithm employed in this work is based on the background subtraction object tracking algorithm. The background subtraction method is the common method of motion detection. It is a technology that uses the difference of the current image and the background image to detect the motion region and it is generally able to provide data included object information. Output of subtraction stage is binary image as, the complexity of the background, the difference image obtained contains the motion region along with noise. Therefore, noise needs to be removed using filter.In this methodology, we are using camera and gun.camera continuously monitoring the area.if any person is to be detected by camera gun also dircected towards that person and microcontroller will take an action to shoot that enemy.

6. SOFTWARE USED

For creating a circuit layout or PCB layout Dip-trace software can be used .Various tutorials are provided in order to learn the software for the programmer. It is software which captures various PCB designs like single PCB, double PCB, multilevel PCB, etc.

MATLAB is a high-performance language which is used for technical computing. It helps to integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include: Application development, including Graphical User Interface building.

Schematic capture in the Proteus Design Suite is used for both the simulation of de-signs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations. The micro-controller simulation in Proteus works by applying either a hex le or a debug le to the micro controller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design

7.RESULT

Fig.4.Operation

8.CONCLUSION

A real-time video of moving object detection and tracking is proposed, based on background subtraction. For object detection, we establish reliable background model, use threshold method to detect moving object and update the background in real time. At last the moving object is tracked by finding the area and centroid. A benefit of this method is that it is time efficient, and it works well for small numbers of moving objects. Video image data of the human body is processed, and its geometrical centroid is obtained in different time intervals. Then, the velocity is computed. In this way motion and presence of unauthorized entry of person is tracked and necessary actions are taken as per the severances of the matter.

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IOT Based Smart Water Distribution and Leakage Detection System Using WSN (May 2019)

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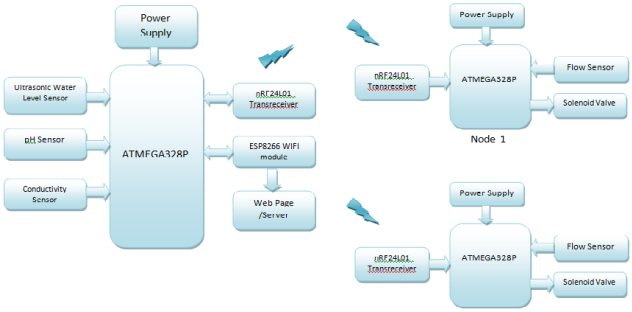
ABSTRACT Water is the lifeline for nature and all living beings. It is the most valuable and scarce resource and hence systematic management of this resource is vital for social and economic development of any country. Wastage of water is the major concern across the country, and the main reason behind this is improper supply of water system and poor management. From past decades, needs of water have increased unpredictably in India. Along with increasing population, demand of water supply is also increasing and has become a major challenge for world. Climatic changes, urbanization, and wastage has further depleted the resource. Importance should be given to conservation, consumption and management of this valuable resource. The idea of connecting everything by wireless technology sums up IOT. In this project, system presents an IOT based design for water monitoring and control approach which supports internet based data collection on real time bases. The system addresses new challenges in the water sector flow rate measuring and the need for study of the supply of water in order to manage water wastage and encourage its conservation. The proposed system monitors the water in the reservoir by using ultrasonic sensor and measures the flow of water as well as the quantity of water being distributed with the help of flow sensor. Along with it, the system also measure the quality of water distributed to every household by deploying pH and conductivity sensors. The traditional water metering systems require periodic human intervention for maintenance making it inconvenient and often least effective. This project is an innovative step to digitalize the water supply system, throughout the cities as well as villages. A step which sets a platform to improve the water supply system, and helps everyone to "Save Water".

INDEX TERMS Water distribution; Water resource management; Leakage Detection ; ARM; Sensors; IOT; WSN; Web Page

1. INTRODUCTION

In some water-related field such as pre-flood warning system, irrigation system, electricity powerhouse, and research, water level information is a very important issue. Usually, water level measurement was done manually, however this can be not effective due to some difficulties like problem to reach the measurement site, human error, etc. Some automatic water level measurement systems have been made using mechanical sensors such as resistive sensor, capacitive sensor, or magnetic sensor, but these sensors have to do direct contact with water that makes their life span shorter because of corrosion. On the other hand, this system uses ultrasonic sensor that can measure the water level without direct contact with water, which makes its life span longer. Now a day's different types of smart sensors are developing for the safety and security in emergency management strategy. Smart water management is only possible with help of IOT which includes the applications in monitoring the flow of water, Management of valves, fault detection within valves, Data analysis through Observations from different meters etc. in conventional method for each and every individual processes we require the human power and observation skills. To overcome these IOT plays the major role.

I. II.BLOCK DIAGRAM



The system enlisted in the paper consists of Controller ATMEGA328P, Ultrasonic Water level sensor, pH sensor, Conductivity sensor, Flow sensor, nRF24L01 Transceiver, ESP8266Wi-Fi module, Power supply, IOT plat-form, Web Page.

The working of the proposed system is explained as below. In this system, controller ATMEGA328P and different sensors are used along with Internet of Things concept.

Firstly, all sensors which are interfaced with controller will sense the parameters related to water such water level using Ultra-sonic sensor, flow rate using Flow-rate sensor, quality of water using Conductivity and pH meter and also detects the leakage during distribution using Flow sensor. Reservoir side module calculates water present in it and sends data regarding water level present in reservoirs to central office on daily basis. This module contains ultrasonic sensor to sense the water level and communicates with controller to process operation such as calculation of water present in reservoir and volume data is send to central office using IOT. The rate of flow of water during the distribution period is sensed by the flow rate sensor and the sensed data is send by the controller to the web page. Along with the water level and flow rate the quality of the water and conductivity is also tested using pH meter and conductivity sensor. All these sensed parameters are further given to the control-ler ATMEGA328P for processing. The controller will receive this data and send it to the internet through serial communication. Inter of Things is the advanced concept which we are going to use for this system. Basically, a web page will be created where the data will be monitored and managed from the server room

III. METHODOLOGY

In the proposed system we are using AVR AtMEGA328P, ESP8266 Wi-Fi module, nRF24L01, pH sensor, Conductivity sensor, Ultrasonic sensor and Solenoid vales. The system is based on IOT platform with wireless sensor networks, so we will have the benefits of IOT as well as wireless sensor net-work. For IOT platform we are using ESP8266 Wi-Fi Module, which works at 2.4 GHz Frequency with 1Mbps data transfer rate which is used to upload the sensors data such as temperature, pH, water level and flow rate, amount of water in and out from the branch as well as status of solenoid valves. With the analysis of water flow in a particular branch we can detect the leakage in the pipeline and can cut-off the water supply in the branch with the help of solenoid valves. WSN system consists of wireless sensor nodes that sends the sensed data to the main node for that we are using nRF24L01 wireless transceiver each nRF24L01 module can communicate with 5 nRF24L01 modules at the same time we are using another of AtMEGA328P to create the nodes and control the solenoid valves and send the flow rate at each branch. All this data from the sensors of main node, flow rates from each and solenoid valves are uploaded to the website. We are using IOT platform with MATLAB analysis. It provides a channel which is used as a server for our system. In this way the system works with the help of wireless sensor network.

IV.CIRCUIT DIAGRAM & SIMULATION

THE FIGURE BELOW SHOWS THE CIRCUIT DIAGRAM OF PROPOSED SYSTEM.

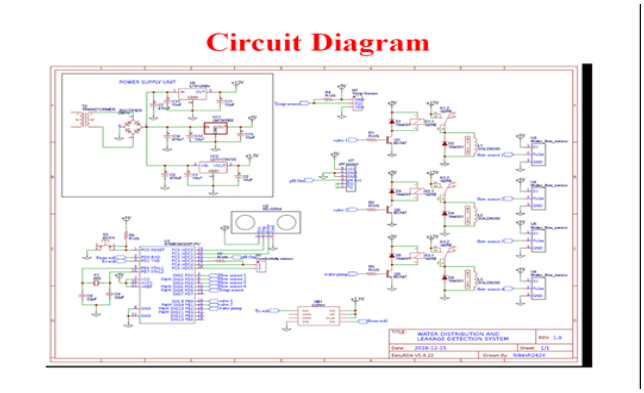
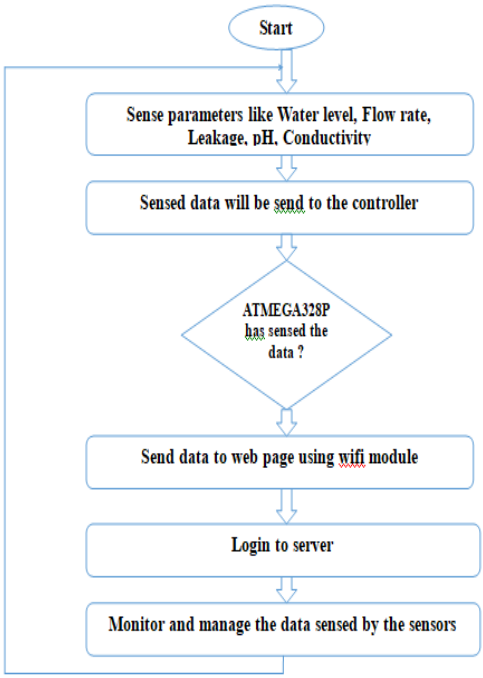


Fig.2.circuit diagram

V. FLOWCHART



VI. CONCLUSION

This paper demonstrates the successful implementation of smart water distribution and leakage detection system along with wireless sensor network using IOT based approach which measures the level of water, quality of water, conductivity, pH and usage of water on real time basis. The main purpose is to focus on different applications of IOT in water resource distribution and management which reduce the human efforts and overcome the drawbacks in the conventional system. The main application of this system is for Municipal Corporation for proper distribution, monitoring and management without wastage of water.

Leakage is the main parameter which will also be detected and a controlling action would be taken on it. Along with this it can also be used in chemical factories, industries and for domestic application. In future we can also add the feature of automatic water billing which will be send directly to consumer on their registered number or e-mail id, and the consumer can pay it online through an android application.

VII. OBSERVATIONS

1. Exact and accurate values of water flow and water level will be shown on this platform.
2. The system will monitor and manage the data on real time basis.
3. While monitoring it will check if there is any leak in pipeline, if any leak is detected controlling action will be taken.
4. The controller will send signal to the solenoid valve to close so as to stop the flow of water supply through that branch, and will prevent wastage of water.
5. Area wise water distribution will be done in respective time slots.
6. As wireless sensor nodes are used the sink node should be connected to the sensor nodes and manage the network if any sensor node fails.

VIII. RESULTS

1. As the flowchart suggests the system will start its operation as soon as the start button is pressed.
2. The sensors will start sensing the parameters such as the level of water, flow rate, quality and leakage during the distribution process.
3. The sensed data will be further send to the controller.
4. This data will be then send to the server/control room for monitoring and controlling action through a Wi-Fi module.
5. If any leakage is detected the system will perform controlling action by turning off 50 the solenoid valve.
6. The data will be managed, monitored and analyzed on real time basis.

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Communication through Helmet (May 2019)

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ABSTRACT: The Project aims at developing medium of wireless communication between two stations, the communication being made secure by encryption and frequency hopping. Wireless communication is one of the most active area of technology development of our time. This development being driven primarily by the transformation of what has been largely a medium for supporting voice telephony into a medium for supporting other services. The demand for new wireless capacity is growing at very rapid space. Although there are of course still a great many technical problems to be solved in wireline communications demands for new wireless for additional wireline capacity can be fulfilled largely with the addition of new private infrastructure such as additional optical fiber, routers, switches and so on. This project provides voice signal to the administrator. This is carried out by exchanging the information between the user transceiver module. This system is developed with Arduino Uno controller which is connected to the transceiver.

INDEX TERMS-Microphone, Speaker, Transmitter, Receiver, Antenna, Battery.

1. INTRODUCTION

The Project aims to establish two way communication i.e. Full-duplex wireless communication between two stations.The issue of security of the communication is addressed by encryption and frequency hopping. Specifically, we look at voice transmission wherein the voice signal is sample data reasonable rate and the quantized samples are transmitted in digital format. At the receiver end, the signal is reconstructed from the sample Voice transmission over a wireless channel is an important challenge in view of the high data rate required. Wireless transfer of ordinary data, in general, does not require a high bit rate and may be achieved easily. Real-time voice transmission, on the other hand, that the rate at which bits are being generated, be equal to the rate at which they are being transmitted. Unless speech coding algorithms are used, a data rate of 32kilobits/sec or 4kilobytes/sec is a reasonable requirement.

The paper has been divided into following parts viz, Introduction, Layout of paper Existing system, Proposed system Architecture , Algorithms and Technologies, Acknowledgement ,conclusion and References

2. EXISTING SYSTEM

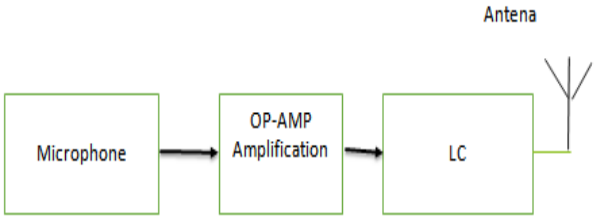
The Existing system provides certain solutions which provide efficiency till a certain amount. At certain scenarios these systems may fail to Established instant call. The existing system provides solutions in the form of call send, call received, etc. These systems may not provide efficient solution. So in order to instant call Establish scenario we are proposing a Frequency Modulation system.

3. PROPOSED SYSTEM

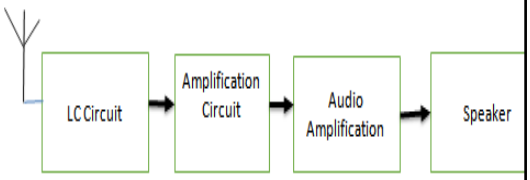
Time plays a very critical role while driving a racing car, If the racing car driver could not able to tell some problems while driving a car on time, they may faced Accidental problems. The Proposed system is a to established instant communication between driver and admin/member. It involves the following components/modules which are described in the Architecture diagram.

3.1 Proposed System Architecture

I) Transmitter



I) Receiver



A) The block diagram has been divided into two parts. one is transmitter part and another is receiver part. We should transfer analog voice

signal through transmitter. From transmitter side whatever we speak through microphone first it will be amplified by using transistor.

B) Once signal amplified it will passed to LC oscillation circuit. Generally LC circuit generates a particular frequency. In our system we will used two LC circuit for long distance range. As we increases the LC circuit it will be increased the range of Frequency.

C) Total three LC circuit has been used. Last one LC circuit for frequency transmition purpose. Antenna should be connected to last LC circuit.

D) There will be total three trimmer used for frequency tunning purpose.

Technologies and Algorithm Used

i. Full duplex modulation

Frequency modulation uses the information signal, Vm (t) to vary the carrier frequency within some small range about its original value.

3.2.1 Equation

FM: VFM (t) = vco sin (2p[fc+(Df/Vmo)Vm(t)] t + f)

3.3 Circuit Diagram

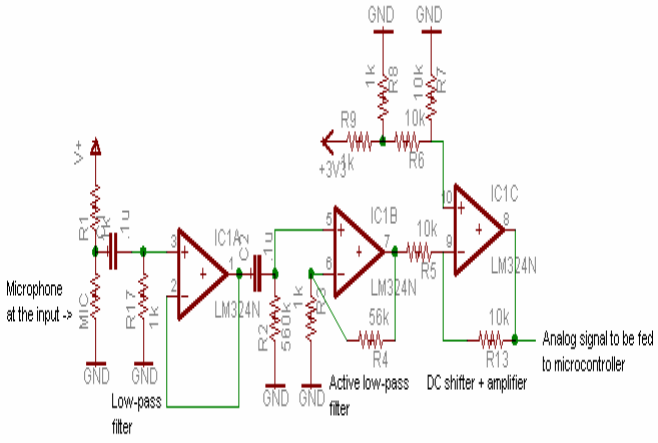


Fig : Tx side: Microphone converting voice to an electrical audio signal, and filtering followed by DC-shifting of the signal to fit working range of the microcontroller.

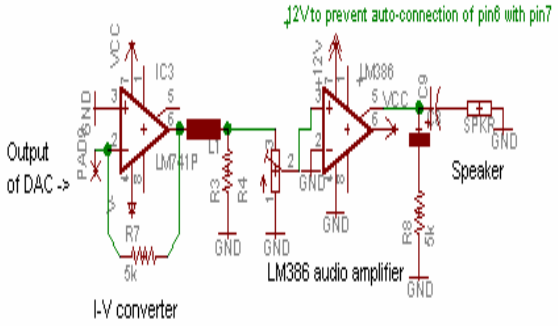


Fig: Rx side: The analog current output of DAC is converted to voltage via an I-V converter and then fed to an audio amplifier which is then given to speaker which reproduces the input voice signal

Design of circuit

The circuit design can be broken down into independent working modules. The modules that form the basic blocks of our circuit are as follows:

a) **Conversion of sound input into electrical signal**
A microphone is installed at the input. The output of the microphone, after being fed to a second order active low pass filter, to filter out high-frequency noise, is provided a suitable DC offset s that the signal, for the required range of sound input amplitude at the microphone, yields an output voltage value that fits into the input range of the A/D converter (0V-3.3V).

b) **Conversion into digital format**
The ATmega16L microcontroller is equipped with an in-built 8-bit analog to digital converter. We sample the signal at a rate of 2 kilosample/sec, taking 8 bits per sample.

c) **Encryption of digital data signal**
The encryption of the sampled digital data is carried out in software by modulo-2 addition of the input data with a constant byte string. This string is chosen (quite arbitrarily) to be 95 in the hexadecimal notation, or 1001 0101 in the binary notation. The encryption key is known beforehand, to the transmitter and the receiver only, and is therefore, hidden from the possible adversary. Encryption via modulo-2 addition with a fixed string has two major advantages:

- **A good encryption scheme for real-time encryption:** Real-time encryption of digital data necessitates availability of only a finite number of not-yet-transmitted requirements at both the transmitter and receiver side in addition to

producing delay due to both the processing in software required for encryption as well as the delay corresponding to the wait-period for transmitting blocks of data. Also, standard encryption methods such as RSA encryption require a large number of stored samples, to be effective enough, as, for a relatively small number of samples, RSA may be regarded as a simple look-up table. In addition, implementation of this is cumbersome, from the point of view of reproduction of a signal such as a voice signal that requires a constant rate of arrival (and departure) of samples. A trivial look-up table for every data input byte is a reasonable encryption scheme for real-time applications.

Easy to implement (in software or hardware): A look-up table would cost memory. The look-up table may be simplified further by usage of XOR with a constant pre decided byte string to generate the encrypted string. This makes encoding and decoding simple, as both require the same operation to be performed.

d) **Transmission of signal**
The encrypted data byte is sent to the wireless module by using the Serial PeripheralInterface. The chip transmits the data byte by using Direct Spectrum Spread Sequences(DSSS) an provides an interrupt to the microcontroller

e) **Additional security due to frequency hopping**
The transmitter and receiver periodically change the frequency of transmission and reception in a pattern that is hard-coded in both of them and hence, known to them beforehand. This stage could **NOT** be implemented because of issues discussed in the section. Frequency hopping could not be performed.

f) **Reception of signal**
The signal is received on the receiver chip which provides an interrupt to themicrocontroller indicating it to read the received byte.

g) **Decryption of the digital encrypted signal**
The receiver keeps generating the random strings by the same procedure as thetransmitter. As the encryption procedure is known to both, the encrypted strings receivedis easily decrypted. Decryption is carried by exactly the same process: modulo-2 additionwith the random string.

h) **Reconstructing the transmitted audio signal**
The decrypted samples correspond to the data samples at the transmitter end. Thesesampled values are fed to a digital to analog converter. The output of the DAC is filteredand finally provided to a speaker which reproduces the input voice signal. We note thatthe output fails to resemble the exact input because of the following:

- Quantization
- Strictly band-limited nature not applicable to voice signal
- Sample-and-hold kind of reproduction at the output

i)**Frequency hopping scheme**
The frequency range for transreception can be varied in the range of 2.4GHz to2.483GHz with 78 different possible values in between the two.We had intended to employ a simple hopping scheme wherein after every 20 samples, thefrequency is chosen to be the next in the set of four frequencies arranged in cyclic order.{f1=2.4GHz, f2, f3, f4=2.483GHz} This could not be implemented.

j) **Synchronisation Procedure**
For frequency hopping to be carried out, synchronisation becomes a very importantrequirement. The synchronisation method we devised was to send a known byte, say AAin hexadecimal, to the receiver after every 20 samples. This may act as a signal to thereceiver to change to the next frequency. As frequency hopping could not be implemented, this is not done either.

4. RESULT

Fig. 1. Transmitter

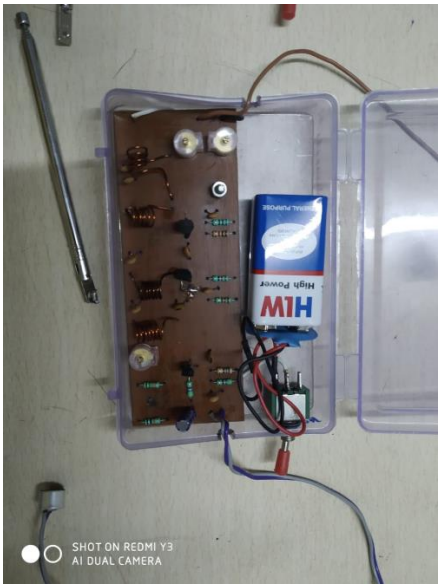


Fig.2. Receiver

5. CONCLUSION

We discuss in the "Tests" and "Test Results" section the experimentally observed conditions, under which the distortion due to the above are found to be negligible. In our case, however, voice input at the transmitter end is to a large extent, unrecognisable at the receiver end because of the low sampling rate, which itself comes about due to constraint in data rate. However, the duration of the words is recognized correctly. Morse code communication through voice, for instance, can be carried out .

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All Purpose Biometric Punch In System (May 2019)

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ABSTRACT This paper represents biometric punch in system ,which is used to record and authenticate individual's punch in.This punch in system uses Atmega 328 p ,since the recorded data is stored in the EEPROM. This punch in system makes use of biometric scanner which authenticates each and every user ,since it's hard to replicate fingerprints, this system offers more security over the conventional attendance system.The stored data is categorized with respect to the users in date and time format .This biometric punch in system allows organizations and institutions to manage and authenticate punch in records at low cost.

INDEX TERMS- ATMEGA328P;LCD;ArduinoIDE;Biometric Scanner.

INTRODUCTION

Here, In today's modern times where Automation saying it more appropriately, has replaced most of the time-consuming jobs and has led to a proper utilization of human power in other useful areas. The dominance of automation may be seen from the fields ranging from textile industry to military applications.
This project is about to study on biometric technologies and develop a hybrid student attendance system that based on fingerprint recognition of student in order to verify their attendance. In this system, mobile-based attendance system will be developed for student to scan their fingerprint with provided hardware for a purpose to verify their attendance in all classes. At the same time, sheets attendance system will be developed for admin/lecturer to view and analyze student attendance by generate the attendance report.
The main purpose to develop this project is to replace the current traditional attendance system by provide faster, accurate, and efficient system. With this new fingerprint recognition attendance system, it can eliminate some problems such as buddy signing, loss of attendance sheet, and control student skip class rate.
In developing this project, evolutionary prototyping had been applied as methodology that guides the direction of whole project development. Besides that, few fact-finding methods are used to collect the data for analysis such as survey questionnaire methods, review journals method, and observation method. Conventional attendance system followed in an educational system where the teacher call out the name of each and every student and mark the attendance causes time wastage during lecture time

1. Literature Review

Agriculture in India has directly or indirectly continued to be the source of livelihood to majority of the population. Indian agriculture has seen a lot of changes in its structure. Indian agriculture can be balanced and made efficient through proper and better management practices. The present study brings out past and present scenario of agricultural marketing prevailing in India, its challenges and future recommendations [1]. Evidence has shown that smallholders do participate and make a sizeable contribution to the production of high-value food commodities, but their links to markets are not strong [2]-[3]. The success of the green revolution, however, lowered real prices of cereals and induced the need to divert land and labor resources to non-cereal activities in order to prevent further declines in prices and income in rural areas [4]-[7]. But in spite of all the revolutionary schemes and development strategies in India implemented by the government it is observed that the actual farmers are not being benefited fairly from the trade and a majority of the profit is not gained by the farmers.

2. Existing System

The traditional method open to the farmers in India is to sell away their surplus produce to the moneylenders or to village traders. These village traders sell the farm produce to the retailers who in turn sell these goods to the consumers directly in the retail market. The limitation of such trade is that the farmers have to go for distress sale of their farm produce to the traders at a very poor price. The middlemen claims a good amount of margin and thus reduce the returns of the cultivators.

3. Proposed System

Fingerprint identification is based on two factors:
Persistence: the basic characteristics and features do not change with This paper discusses the design, implementation and evaluation of a biometric system for recording students' attendance using both fingerprint and iris readers (e-attendance system). The system allows students to record their attendance when entering a classroom. This information is then made available to the instructors through a web-based interface application. The major impact of the e-attendance system is the noticed drop in the students' absenteeism rate. In addition, the system provides a reliable solution to prevent any student impersonation, where a student claims to be another one either to fake attendance or to take an exam for him/her. This work demonstrates the need for an attendance tracking system that is based on multiple biometrics technologies, especially in a multi-ethnic academic environment with a large student population. Finally, additional security measures, mainly Firewalls and Intrusion Detection/Prevention Systems (IDS/IPS) are shown to be required to achieve

the needed level of protection for an e□cient and reliable implementation. This is the case since biometrics readers can be vulnerable to common attacks, mainly denial of service attacks, and can be targeted by malicious student the time.

Individuality: fingerprint of every person in this world is Unique

To store the data of student present in the Attendance machine we have to build software which can store the data and schedule the data as per the student record. The data is feed to the software with the help of cable MAX 232.

By the help of software the staff member can enroll the stu-dent class-test marks, attendance updates ,as per student record.

The Aim of the Project is to inform the Parent about the student Attendance and to aware them about the marks of Class-test or any Student Related Information. To Assure this Aim we have to Design an Website Which will give the Information to Parent of the Student Marks and there Attendance records.

Therefore Each student will be allotted an REG.NO Through which the student will be verified. Then all the In-formation Related to the student will be ported to the REG.NO. Such as Class-test marks, Attendance Updates. Each Parent will be Allotted a USER ID. And PASSWORD of the particular Student REG.NO .So that the parent can check the data of attendance as well as Class-Test Marks.

If the Staff Member has to give any Important Information directly to the Parent's they can Mail them on their USER ID So That The Parent's will be Aware of Student Updates in College.

RESULTS:

Fig.1.Project Photo

Fig.2.Project Photo-Side View

EXPLAINATION:

The completed project can be seen in the above pictures.

This attendance system is small in size as compared to its peers and its also quite portable,by using a transparent casing the data on the lcd is made easily visible. The compact size of the project makes it handy and hence easy to use. This low budet attendance system finds use in educational insitutes and small scale organizations .

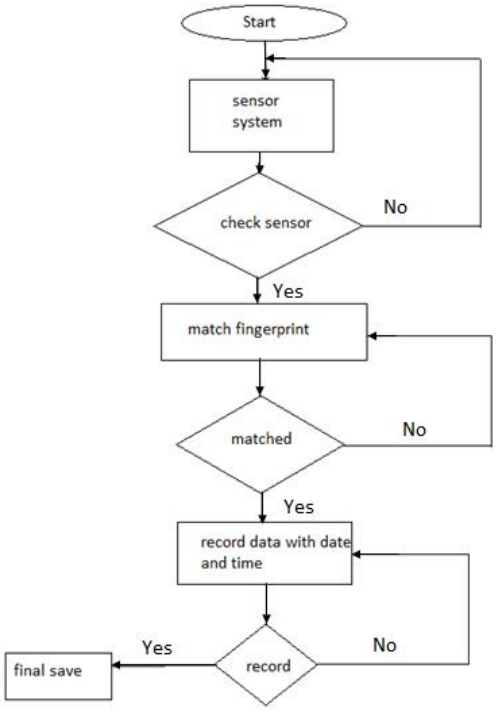

Fig.3. Flow Chart

Conclusion

In this paper ,we have tried to implement some cost efficient techniques which are simple as well as operate in real time. The main focus of the paper is based on the analysis of the information sensed by sensors .This smart system will help in maintaining the punch-in records of the individuals which may vary from educational institutions to commercial organizations ,saving time and effort.
Low cost , portability and ease of use offers the scope of commercialization of this system. It's applications may vary from educational institutes to commercial organizations.

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Mechanical Engineering

Design and Development Of Air Conditioning System Using VAR System

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ABSTRACT This paper presents design, development, and experimental study of a prototype of air conditioning system for truck cabin using waste heat from engine exhaust. It is estimated that a Evaporator work of 1 kW is considered to cool air from atmosphere. The potential of heat available in engine exhaust has been justified to operate the proposed system. A review of literature has been carried out in the field of automobile air conditioning and heat generated cooling technologies. The review suggested that adsorption refrigeration technology is a suitable technology for the proposed application.

The significance of the work is that it provides space pure water without much effect on the performance of the engine, essentially the fuel economy. Further the proposed adsorption cycle uses non CFC refrigerant and thereby have little effect on environment. It was decided to design and develop a prototype for 1 kW capacity powered by exhaust heat of engine. The design and development of the proposed adsorption system has taken shape in various stages.

Based upon requirement, design and development a 1 kW system is designed and the layout of the system in integration with a truck is proposed. The overall size and dimensions of the designed system are compact in nature, and thus integration of the proposed system on a transport truck will be practical and feasible.

This work is an innovative research work in the field of alternative refrigeration system, specifically adsorption refrigeration. The research contribution of this work can be used for the further developments in adsorption refrigeration to make it a technology of future. This system can be modified further for application of truck cabin cooling.

I. INTRODUCTION

Refrigeration is a process of removing heat from a low-temperature reservoir and transferring it to a high-temperature reservoir. The work of heat transfer is traditionally driven by mechanical means, but can also be driven by heat, magnetism, electricity, laser, or other means.

Types of refrigeration systems are:

Vapour compression refrigeration in which the refrigerant undergoes phase changes, is one of the many refrigeration cycles and is the most widely used method for airconditioning of buildings and automobiles. The input to the system is in the form of mechanical energy required to run the compressor. Hence these systems are also called as mechanical refrigeration system. It is also used in domestic and commercial refrigerators, large-scale warehouses for chilled or frozen storage of foods and meats, refrigerated trucks and railroad cars, and a host of other commercial and industrial services.

comprises of all the processes in the vapour compression refrigeration system like compression, condensation, expansion and evaporation. In the vapor absorption system the refrigerant used is ammonia, water or lithium bromide.

Vapour adsorption refrigeration, the refrigerants used have zero ozone depletion potential and very low global warming potential. Adsorption refrigeration is similar to absorption refrigeration, except that the refrigerant is adsorbed on to a solid material called adsorbent or sorbent. Since the adsorption system is thermally driven, any kind of acceptable heat energy, which can be obtained from combustion of fuel, waste heat from engine exhaust, or engine coolant can provide the necessary input to produce cooling effect. This flexibility in input energy sources makes the system attractive for exploring new potentials and energy conservation.

II. LITERATURE REVIEW

that, Ag/5A and Ni/5A zeolites with different amounts of metal (4, 10 and 20 wt.%) were prepared by wet impregnation method. The physicochemical characterization of the adsorbents was carried out by N2-adsorption.

The results showed that the incorporated metals were well distributed in different sites into the 5A zeolite, without a substantial modification of its crystal structure and morphological characteristics.

R kannan et al [9] In this work vapour adsorption type solar still was design fabricated and tested. A vapour adsorbent pipe network comprising activated carbon-methanol pair was integrated with basin. Loses from the bottom of still are considerably reduced due to sensible heat absorption by activated carbon and latent heat of vaporization by methanol. Also water circulated through inner tube of adsorbent bed is used as feed to basin thusenhancing the evaporation rate during day time . the increase in temperature of basin due to adsorbent bed and condensation of methanol vapor, of augments the evaporation rate during the night time also , sponges gravels sand and black rubbers were used in vapour adsorption type solar still for improving yield. Experimental results were compared with ordinary conventional basin type still. The governing energy balance equation for both conventional and vapour adsorption type solar still were solved analytically and compared with experimental results.

Sourav Mitra et al [10] This article presents theoretical analysis of heat and mass transfer in silica gel + water adsorption process using scaling principle. 2 dimensional columnar packed adsorber domain is choosen for the study with side and bottom walls cooled and vapour inlet from the top the adsorption process is initiated from cold wall with temperature jump of 15k where as water vapour supply is maintained at constant inlet pressure 1kpathe 1st part of study is dedicated to deriving relevant scales for adsorption process by an order of an magnitude analysis of energy, continuity and momentum equations.

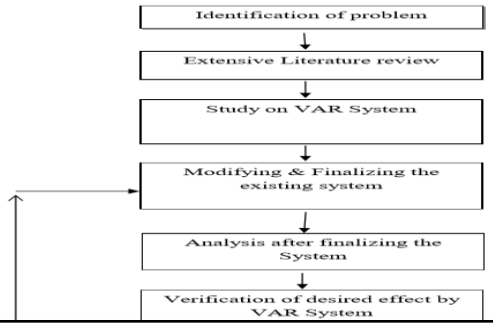
Rahul Gulati et al [11] The fossil fuel-driven electricity grid supplies space cooling, especially in tropical/temperate climate regions. The timing of the peak load closely coincides with the peak of available solar irradiance. Therefore, solar-driven space cooling can reduce the peak loads in a smart grid. Solar-powered, direct absorption refrigeration cycles fit well. The efficiency of this cycle can be enhanced through the use of new, engineered materials. This study analyses a model of ammonia-water based

The increased precision in computed free energies, then, can enable the detection of perturbations in free energies due to a weak field. This is useful because the weaker the field used in the indirect approach, the smaller will be the effects on the ensemble average of local densities. The increase in precision of the computed free energies can also help in interpreting the higher-order derivatives of the free energy profile. Thus, identification of the role of IFs in adsorption is a computationally challenging problem that can inspire the development of molecular simulation methods. Computational techniques other than molecular simulations, such as classical density functional theory (DFT), have been extensively used.

Harish U. Tiwari ert al [5] The vapour adsorption refrigeration cycle is found to be suitable for automobile air cooling especially for transport trucks. The heat potential in the exhaust has been analyzed and found to be sufficient enough for powering the proposed refrigeration system. The design procedure and heat balance equations applied to proposed system are also presented in the paper. The coefficient of performance is less but acceptable as the input is waste heat from exhaust.

The proposed system should be able to provide the necessary cooling of the cabin. The system should be able to put in practical use and will help in improving driving conditions for the driver. At the end of the work, we should be able to develop a system which will work as air cooling system for transport truck cabin without affecting largely on the mileage of the truck and the system should be environment friendly. We modified above system for water extraction from atmosphere instead of generating cooling effect. Harish U. Tiwari ert al [6] For automobile air conditioning normally vapour compression refrigeration cycle is used. The cycle run on engine power and consumes around 10% of the total power produced by the engine and thereby increases the fuel consumption (Lambert and Jones, 2006).

III. METHODOLOGY



V. CASE STUDY

3.1 Design of Prototype:

The working pair of Activated carbon and ammonia is found to be suitable and selected for the proposed adsorption refrigeration system. The material for the components of the adsorption system is selected as mild steel, considering compatibility with ammonia. The main components of the proposed prototype are basically heat exchangers and are designed by using heat transfer equations as described in the forthcoming sections. The heat available in engine exhaust of a petrol engine test rig, to be used for experimentation, is calculated. The heat available in engine exhaust is highly variable during the driving cycle, but usually more than 5 kW at a temperature of around 300oC near the engines exhaust manifold. The design pressure for condenser and evaporator are decided as 15 bar and 5 bar for water cooled condenser and evaporator. [2] The mass of the refrigerant required in the system is calculated for cooling capacity of 1 kW using Eq. (3.1). The maximum concentration of ammonia adsorbed by activated carbon is around 30 % by mass; from this the mass of required activated carbon is calculated using Eq. (3.2) [1]. The thickness of activated carbon is considered as 4 mm for optimum performance of adsorber [2].

3.2 Design & Development of adsorber:

Assumptions:

Maximum adsorber temp. Tad,max = 165oC
Minimum adsorber temp Tad,min = 75oC
Density of AC = 600 kg/m3

Specific heat of adsorber, Cpad = 1.033 kJ/kg K
Temperature range of adsorber ΔTad = 90oC
Density of steel as 7800 kg/m3.

Cycle time Δt = 450 sec

Refrigerating effect = 1 kW
Uncertaininy in ammonia (X2 - X1) = 4.44 %
Enthalpy difference in adsorber = 48.33J/Kg
Latent heat of evaporation of Ammonia L =1250 kJ/Kg

$m_r = (RE \div L) \times \Delta t$

$m_r = (1 \div 1250)*450$ $m_r = 0.369$ Kg

Considering 25% tolerance $m_r = 0.468$ Kg $m_{ad} = m_r \times (X2 - X1)$ $m_{ad} = 0.468 * 4.44$ $m_{ad} = 2$ Kg

Considering 25% tolerance $m_{ad} = 2.5$ Kg

Outer Radius ,Rad= 55 mm

Inner Radius r_{ad}= 35 mm .

Specific heat Cp= 0.503kJ/kg K

$Volume_{tube} = \pi(R2-r2)L$

$Volume_{ads} = \pi(0.055-0.035)*0.55$

$Volume_{ads} = 3.11*10\text{-}3$ m3

$Volume_{ads} = 3.11*10\text{-}3$ m3

$m_{tube} = (Desnisty*Volume)$

$m_{tube} = (7800*4.52*10\text{-}3)$

$m_{tube} = 2.4$ Kg

$Q_{sensible,heating} = [(m_{ad}(C_{pad} \times \Delta Tad) + (m_{ads} \times C_{pads} \times \Delta T_{ad})] \div \Delta t$

$Q_{sensible,\ heating} = [2.5(1.033 \times 90) + (2.4 \times 0.503 \times 90] \div 450$

$Q_{sensible,\ heating} = 0.87$ kW

$Q_{latent\ heating} = [m_{ad}\ (X2 - X1) \times (H2 - H1)] \div \Delta t$

$Ql_{atent\ heating} = [2.5*4.44*48.33] \div 450$

$Q_{latent\ heating} = 1.19$ kW

$Q_{adsorber} = Q_{asensible,heating} + Q_{latent\ heating}$

$Q_{adsorber} = 0.87 + 1.19$

$Q_{adsorber} = 2.06$ kW

The coefficient of performance (COP) of the system is defined as the ratio of refrigerating effect to the heat required for heating the adsorber bed, given by,

COP = (1÷ 2.06)

COP = 0.48

3.4 Design and development of condenser :

Design Calculations : Assumptions: p = 14-16 bar Temperature change of refrigerant ΔT = 10oC
tube diameter D = 14 mm and 1 mm thickness
m_r= 1.11*10-3 m3/sec
$h_{cond\ in}$ = 1650 KJ/Kg $h_{cond\ out}$ = 470 KJ/Kg

The heat to be removed in KJ/Kg the condenser is given by Eq. (3.18) $Q_{condr} = m_r (h_{cond\ in} - h_{cond\ out})$ (3.18)
Q_{condr} = 1.11*10-3 (1650 – 470) Q_{condr}= 1.30 kW

Area of the tube for obtained Qcondr : Q = U x (A) x ΔT
1.30 = 1000 *(A) *10 .: A = 0.135 m2

Length of the condenser tube : A = 2 πrL A = 2 π*0.006*L
L = 2.95 m

Development of condenser :

A 3 m long stainless steel tube of 14 mm diameter and 1 mm thickness is rolled as a coil and is inserted in rectangular box It isclosed at the one end keeping inlet and outlet for water.

Design and development of evaporator:

Design Calculations : The pressure to be maintained in the evaporator is 5 bar for which the saturation temperature of the refrigerant is 5°C.

Assumptions: pressure in evaporator, p = 5 bar
heat to be absorbed Q_{evap} =1 kW
Drop in temperature of water ΔT = 12°C
tube diameter D = 12 mm

Area of tube for heat transfer coefficient U= 700 W/ m2 K is given by: $Q_{evap} = U \times (A) \times \Delta T$ 1000= 700 *(A) *12 .: A = 0.012 m2
Length of the tube for the above area:
A = 2 πrL
A = 2 π*0.006*L
.: L = 3.15 m

Development of evaporator:

The heat to be absorbed by the evaporator is 1 kW the saturation temperature of the refrigerant is 5°C.[7] The overall heat transfer coefficient for refrigerant to water is 700 W/ m^2 K . The evaporator is fabricated similar to condenser with a 3.2 m long 12 mm dia. stainless steel tube.

VI. CONCLUSION

On the basis of analytical studies and literature review we can conclude that the VAR system is alternative to VCR system for air conditioning as well as water extraction purpose. VAR system has less manufacturing, operational & maintenance cost. As system input is exhaust energy which will not affect on performance of IC Engine. Mobility & less weight makes it more suitable for vehicles. This enhances the efficiency of the engines reducing the cost of the fuel required to run per kilometer.

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machine with pneumatic system for square drum (May 2019)

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ABSTRACT Pneumatics systems are extensively used in a wide range of industries and factories and manufacturing sector entities. Pneumatics system are noted for their simplicity, reliability, and ease of operation. Also they are suitable for fast and rapid application of force.

The purpose of this project is to therefore design a simple, easily operated pneumatic punching machine that is sturdy and strong. The pneumatic press tool has an advantage of working in low pressure, that is even a pressure of 6 bar is enough for operating the unit. The pressurized air passing through the tubes to the cylinder, forces the piston out whose power through the linkage is transmitted to the punch.

The work piece thus got is for required dimensions and the piece can be collected through the land clearance provided in the die. The die used in this is fixed such that the die of required shape can be used according to the requirement. This enables us to use different type punch dies resulting in a wide range of products. Different types of punch as requirement can be thus got. According to the work material the operating pressure can be varied.

INDEX TERMS

1. INTRODUCTION

As the traditional way of drilling or punching a hole was done manually which included a set of injuries. Even a small fatal step could cause a catastrophe. This gives an opportunity for developing and innovating a machine which would punch a hole manually eliminating the typical human errors. So the main challenge was to have a proper consistency in punching of a box. Hence to achieve this there were many parameters to be taken into consideration. At the first place we had to select a proper pneumatic cylinder which would deliver the desired pressure. The cylinder selected was (A63 64) from the janatics catalogue. This cylinder is a compact type and it can deliver a pressure ranging from 6-10 bar. Hence eight pneumatic cylinders are used for the two machines. One of machine is for the drum/box and the other is for the lid. For the proper alignment of the cap a key is provided.

In this machine pneumatic cylinder is used as a punching equipment. The compressed air from the compressor is used as the force medium for this operation. In the first position, air enters to the top of the cylinder and pushes the piston so that the punching is done. In the next position, air enters to the bottom of the cylinder and pushes the piston back, so that the return stroke is obtained.

2. PROBLEM STATEMENT

To design and develop seal hole punching machine with

3. PROBLEM DEFINATION

The task is to develop a machine which can punch the hole in corrugated boxes (paper fiber) automatically replacing the typical manual errors. The machine which is to be developed would be capable of punching 8mm and 10mm holes more efficiently.

4. COMPANY REQUIREMENT

- To develop a mechanism for punching ø8mm and ø10mm holes as per the need.
- To have a proper consistency in hole punching.
- To provide a holder for punch guide, this can be varied according to the height of the box lid
- Consistency in hole positioning.
- Handling safety.

5. OBJECTIVE

- Automation of manual drilling process.
- To develop a mechanism for punching Ø8mm and Ø10mm holes as per the need.

- The traditional way of drilling is with help of a skilled worker. This process was time consuming as well as it was not much accurate and consistent.

- The traditional way of drilling is to drill the holes one by one in cap as well as drum, which have 4 holes each.
- Also, the manual drill cannot be precise each time as it involves manual errors.
- Suppose, if a working requires 8 hrs to drill 100 boxes, traditionally, then this becomes a very time consuming process also the manual way is going to consume a lot of resources like electricity, wages of workers, etc

7. PROPOSED WORKING PRINCIPLE

- In this project we are using the pneumatic cylinder as punching equipment.
- The compressed air from the compressor is used as the force medium for this operation.
- In one position, air enters the cylinder and pushes the piston so that the punching is done.
- In next position, air enters again to the cylinder and pushes the piston return back, so that the return stroke is obtained.

8. CALCULATIONS

- **Calculations for Selection of Pneumatic cylinder[12]-**

Diameter of hole= 8mm & 10mm

Selecting 10 mm diameter of the hole to be punched.

L = Length of cut(Perimeter of shape) = π × Diameter of hole

$= \pi \times 10$

$= 31.41$ mm

Total thickness of the box (t) = 3 mm

Shear Strength of corrugated square paper drum [300 gsm]

Total Cutting Force = Length of Cut × Thickness × Shear strength

$$= L \times t \times T_{max}$$

$$= 31.41 \times 3 \times 0.65$$

$$= 61.2495 \text{ N}$$

Stripping Force = 15% of cutting force

$$= 61.2495 \times \frac{15}{100}$$

$$= 9.18 \text{ N}$$

Press Force = Cutting force + Stripping Force

$$= 61.2495 + 9.18$$

$$= 70.43 \text{ N}$$

The total force which is required to blank or pierce the corrugated paper drum is = 70.43 N

Pressure range of compressor = 6 to 12 bar

Selection of the cylinder:

Selecting working pressure of compressor = 6 bar

$$= 6 \times 10^5 \text{ Pascal.}$$

The output force = 70.43 N

We know,

$$\text{Pressure} = \frac{Force}{Area}$$

$$A_{cyl} = \frac{70.43}{6 \times 10^5}$$

$$A_{cyl} = 1.17 \times 10^{-4} \text{ mm}^2$$

We know,

$$A_{cyl} = \frac{\pi}{4} \times D^2$$

$$D^2 = \frac{A_{cyl} \times 4}{\pi}$$

$$D = \sqrt{\frac{1.17 \times 10^{-4} \times 4}{\pi}}$$

$$D = 0.0122 \text{ m}$$

D = 12.20 mm

9. WORKING METHODOLOGY

- Compressor is a device that converts power into energy. Power conversion is done with the help of electricity.
- We have used an electric compressor.
- As the application is pneumatic, we have selected 5X2 DCV.
- The application which is to be punched is

future scope the cylinder that we have selected can compensate the material change.

- The cylinder selection is done in such a way that it can generate power which can punch the metal box.
- The cylinder that we have selected is janatics (A63, 64) compact as per ISO 21287 standards.
- The selection of the punch holder is as per the required shape of the box.
- Design of the punch is such that it can punch the given shape.
- Key is provided for the proper alignment of the cap and the box.
- The compressed air from the compressor is used as the force medium for this operation of punching.
- In one position air enters the cylinder and pushes the piston so that punching is done.
- In the next position, as the ports of the DCV opens and the air enters the cylinder the piston is pushed to its return position so that the return stroke is obtained.
- In this way the punching operation of box is done.

10. MACHINE DESIGN

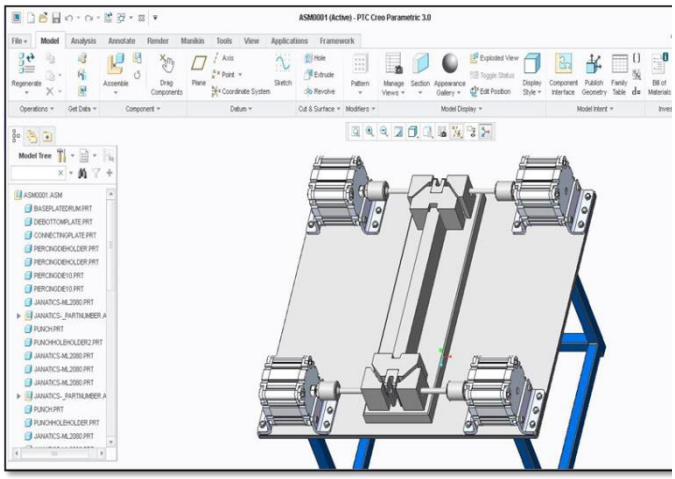

Fig : CAD Model for Pneumatic Punching Machine

11. FUTURE SCOPE

- As of now the machine is capable of punching corrugated boxes but in mere future if the material changes for e.g.: If the material changes from paper fibre to metal boxes this machine is also capable of punching the metal boxes.
- The design of the punch and the selection of the pneumatic is done in such a way that even if the material changes these two parameters remains the same.

12. CONCLUSION

For selection of auxiliary components like cylinder, compressor, punch holder, key, etc. we have developed a path of process by analysis to observe the working of seal hole punching machine. Following our project plan we have designed a rough prototype as well as a proper 3D model and purchased the primary components to start the manufacturing; and are working on testing and iterations.

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I have great pleasure in submitting the Research paper for Industrially sponsored Project on the topic, “DESIGN AND MANUFACTURING SEAL HOLE PUNCHING MACHINE USING PNEUMATIC SYSTEM FOR SQUARE DRUM (PAPER FIBRE)”.
It gives me immense pleasure to record my debt of gratitude and my warmest regards to my Guide Prof. N.S.Vele for extensive guidance and direction I have received from him throughout the progress of the work. The various values that we tried to learn from him shall remain a source of inspiration for me forever.
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An instrument to measure the center of gravity of an object

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ABSTRACT

In case of objects subjected to dynamic motion, along with other parameters, the center of gravity of that object is a considerable parameter which can affect the functionality and hence the life of that object. This paper is about an instrument which can measure the center of gravity of an object after it has been manufactured.

An object whose center of gravity is to be located is selected and it is placed at the center of the base plate. This is the first orientation of the object. The object is moved until all the reactions on the load cells are equal. Once the reactions come to be equal, the center of gravity of the object will be at center of the plate. This procedure is repeated for second orientation. Thus we get the two axis of center of gravity of the object in practical and their intersection is the center of gravity of the object. By using simple instrumental setup, consisting of base plate, load cells, display unit, we can measure the center of gravity of an object.

In case of space objects the center of gravity of the satellites, rockets is very essential to estimate its path further. Locating the CG of ships, submarine is essential to prevent from any flaws further.

INDEX TERMS: center of gravity, load cells, reaction

1. INTRODUCTION

Center of gravity of a material body is a point that may be used for a summary description of gravitational interactions. In a uniform gravitational field, the center of mass serves as the center of gravity. This is a very good approximation for smaller bodies near the surface of Earth, so there is no practical need to distinguish center of gravity from center of mass in most applications, such as engineering and medicine.

In a non-uniform field, gravitational effects such as potential energy, force, and torque can no longer be calculated using the center of mass alone. In particular, a non-uniform gravitational field can produce a torque on an object, even about an axis through the center of mass. The center of gravity seeks to explain this effect.

The utmost important parameters which should be known to measure the center of gravity are the weight of that object and the moment of it about the weighing points. Nowadays, the products that are to be manufactured are initially analyzed using FEA analysis in the software itself so that the failure effects can be noted and be verified. But still it is seen that after the manufacturing of the product, due to the imperfections in the manufacturing, the location of center of gravity of the object is not exact. Instead there is certain eccentricity produced. In cases of big rotating turbines, high speed shafts, satellites, and many more applications, the center of gravity is such a parameter which cannot be neglected at any cost. Also in case of submarines, ships, the center of gravity must be at its perfect position otherwise the stability of that objects will not be obtained and it can cause huge damage.

This instrument can locate the center of gravity of an object and if there is some eccentricity present, then it must be repaired such that the center of gravity is at correct position, and the component will work properly.

2. METHOD

There are various possible ways to locate the center of gravity of an object virtually before its manufacturing. But after the manufacturing of the product or object, when the object is to be used in the field where it is being given dynamic motion, then it is essential that the center of gravity of that object lies exactly where it Thus, to locate the center of gravity of practical objects, a simple technique can be used.

An object whose center of gravity is to be located is taken. The setup of the instrument comprises of base plate, weight sensors, legs, casing, leveling screw. The base plate is mounted on the casing which is attached to the legs. The load cells are used as weight sensors. They

setup is maintained as plane straight surface even when the surface is not as expected.

It is for sure that when the reactions on all the load cells are the same, then the center of gravity of the object is at the center. Initially, the plate is mounted on the casing and the reactions on all the four load cells situated at each corner of the square plate come to be the same. This states that the center of gravity of the base plate is at the center. Now, the load cells are calibrated to zero so that the weight of the object is only considered for locating the center of gravity of the object. The object is then placed on the base plate. The object is translated on the base plate till the reactions on all the load cells are equal. This translation of the object ends when the reactions are equal and the center of the plate is now the axis for the center of gravity location of the object. This point is located on the object. Now, the object is placed in second orientation. In second orientation also, the object is translated such that the reactions on the load cells are equal. This results into the center of gravity location from this plane. This point is located on the object.

The intersection of both the axis is the center of gravity of the object in practical. The CAD model of the object is already present for its designing purpose before its manufacturing. The center of gravity is known virtually in software. The center of gravity located practically is compared with it. If it comes to be the same, then the object is well manufactured. But if the point does not come to be the same, then there is an eccentricity in the center of gravity location. This eccentricity is undesirable for the objects that are to be used dynamically. Because a small eccentricity in the center of gravity location can cause a huge damage to the object as well as the environment in which it is used.

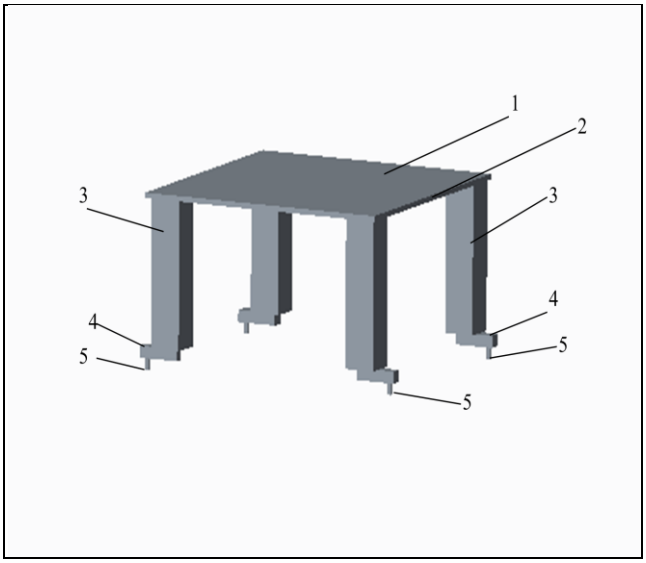


Figure a. Setup of Instrument

Table No. 1 List of components

Sr. No.	Components
1	Base Plate
2	Casing
3	Legs
4	Load cells
5	Leveling Screw

CONSTRUCTION

The instrumental setup is as shown in the figure above. The components in the setup are base plate, casing, legs, load cells as weight sensors, leveling screws, display unit. The base plate is mounted on the casing. The casing is attached to the legs. Load cells are attached beneath the legs. Leveling screws are mounted below the load cells to level the base plate so that the irregularities in the ground surface do not affect the base plate.

The base plate is made up of mild steel. It is square shaped plate. Base plate is rigid since no internal deformation is expected in the base plate. The dimensions of the base plate are 495mm*495mm*7mm. It plays a vital role in locating the center of gravity of the object since the object is placed on this base plate. As the object needs to be placed on the base plate thus, it is essential that the base plate is leveled properly.

The base plate is kept in a casing made up of mild steel. There are four legs to provide support. The plate is attached to the casing with bolted joints.

When the object is placed on the base plate, then the load is distributed uniformly along the surface of the base plate due to its rigidity. There are four load cells provided, each at four corners of the base plate. They are connected to the display units. The weight on the load cells is displayed on the display unit.

There are leveling screws provided beneath the load cells to level the setup when the ground surface is irregular.

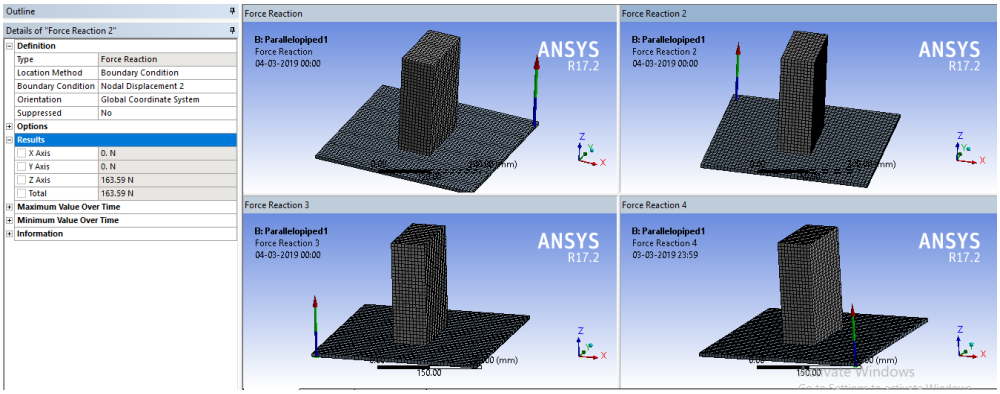
WORKING

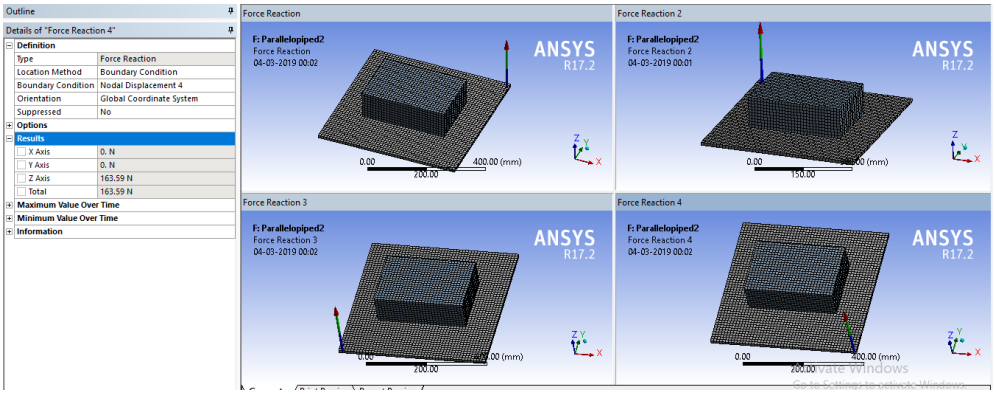
The base plate is leveled using a spirit level indicator. The load cells are connected to the display unit. They display the load coming on each load cell. When the reaction on the four load cells come to be equal, then it states that the center of gravity of the base plate is exactly at the center and the plate is leveled. The load cells are calibrated to zero value, such that the base plate load is considered as a datum and the display only shows the weight of the object placed on the load cell.

Further the object is chosen for locating its center of gravity. The object is placed on the base plate in its first orientation. It is adjusted such that the reactions on all the four load cells equalize to one value. When the reactions equalize, then it results in the center of gravity point to be at the center of plate. The point is marked on the object according to its orientation. Then, the object is placed in the second orientation. The same procedure is followed and the center of gravity point is located practically.

ANALYSIS ON SOFTWARE

The analysis is done on ANSYS software from where it is seen that when the reactions on the load cells are equal then the center of gravity of the object lies in the center of the plate. Below are the figures for two orientations of a cuboid.





CONCLUSION

By using simple and basic principle of Engineering Mechanics, the center of gravity of the object was measured by an instrument with two orientations of the object. The conceptual idea of aligning the center of gravity of both the instrument plate and the object to find the center of gravity of the object has been proved. Theoretically, the concept was verified by matching the results of FEA method in ANSYS and MATLAB program with the analytical results. Therefore, this instrument can be used to measure the center of gravity of objects. The experimental results show that the basic objective to measure the center of gravity of an object is satisfied by this instrumental setup. The equal reactions obtained by keeping the objects whose center of gravity position is already known, proves that this method is applicable for measuring the center of gravity of other objects.

This method includes adjusting the object on the instrument plate to align its center of gravity with that of the plate manually. This results in generating a human error and the adjustment of the object relies on the skill of the person working on it. To eliminate this error, provision of flexural mechanism can be given in the existing experimental setup. Flexural mechanism will result in automatic adjustment of the object on the plate. In this mechanism the load cells will sense the load on each leg and will provide a signal to the mechanism to adjust the object on the plate and align accordingly. This will give more accurate and precise results.

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I have great pleasure in submitting the paper on the topic, "***An instrument to measure the center of gravity of an object***". It gives us immense pleasure to record our debt of gratitude and my warmest regards to our Guide Prof.Kavidas K. Mate for his extensive guidance and direction we have received from him throughout the progress of the work. The various values that we tried to learn from him shall remain a source of inspiration for us forever. We would like to say thank you to our Project Coordinators, all teaching and non-teaching staff of Mechanical Engineering Department for their support and help.

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DESIGN & DEVELOPMENT OF LOW COST AUTOMATION FOR POLYHOUSE (May 2019)

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ABSTRACT The function of a Polyhouse is to create the optimal growing conditions for the full lifecycle of the plants. The objective of our project is to design a simple low cost automation for Polyhouse so that the plants may grow in any favorable conditions without any loss to farmers. This design can be used for controlling of temperature and humidity inside the Polyhouse, remove moisture from Polyhouse in rainy season and giving specific amount of sunlight by opening roof top, and uniform path for spraying the pesticides to plants by making less manual work .

INDEX TERMS Poly house, Green Houses, Cultivation, Temperature, Humidity, Spraying method.

1. INTRODUCTION

India is primarily an agriculture country. In India today varieties of crops are cultivated in different parts as per the climatic conditions, such as crops which required low climate are grown in the top part of the country ,while which required hot climate are grown in the west part of the country. Hence to provide proper climatic condition to the crops a new type of farming called as poly house farming has been developed. Its main aim is to provide better and suitable climatic conditions to the crops. It provides better income in short period of time with less labour. It reduces dependency on rainfall and makes the optimum use of land and water resources. Polyhouse farming can help the farmer to generate income by growing multiple crops within short period of time. [2]

Although traditional farming is prevalent in India, now new farming technology like Polyhouse farming provides better income. The greenhouse covered with simple polyethylene sheet is termed as Polyhouse. The function of a Polyhouse is to create the optimal growing conditions for the full lifecycle of the plants. It reduces dependency on rainfall and makes the optimum use of land and water resources. Polyhouse farming enables cultivation of crops that can give maximum yield on specific days and exotic crops that can't be normally grown in Indian conditions. Polyhouse farming enables cultivation of crops that can give maximum yield on specific days (e.g. roses on Valentine's day) and exotic crops that can't be normally grown in Indian conditions (e.g. coloured capsicum, broccoli, mushrooms). [5][3]

Flower size and stem length are two important factors that dictate the value of cut-flower roses. Optimization of rose cut-flower production requires the ability to predict the response of plants to various environmental conditions, particularly air temperature. Crop simulation models can be used to quantify crop growth by simulating the effect of temperature at various regimes (Lieth and Pasian, 1991). Temperature and light have been found to be the primary factors of rose crop growth and development. The number of days from bud break in 15◦C is about 3 times of that in 30◦C. [6] [1]

The temperature and humidity plays an important role in quality of flowers and value of flowers from the market. Important to note that if temperature inside polyhouse if increases from 28 degree to 40 degrees with two hours the flowers will reach from stage 1 to stage 4 thus the loss of value of flowers will be (150 – 30) = 120 Rs per bunch of flowers which is very high, hence there is a need to

control this temperature fluctuation by a suitable automatic method. [7]

2. PROBLEM STATEMENT

Presently there is no automation in this field. Manual control is done by use of blowers and windows that are again operated manually if the temperature is found to increase beyond the permissible limit. It is extremely important to control temperature and humidity inside the Polyhouse by using door opening and closing mechanism.

When there is change in season then it is necessary to maintain the temperature inside the Polyhouse for this purpose roof top mechanism is used in rainy season. Presently there is no such solution for farming in rainy season.

Pesticides are necessary for plants but this may harm to human being for avoiding infection we have to use spray mechanism so that it's not necessary for man to enter into the Polyhouse for spraying pesticides.

.

3. DESIGN

a. Vent Door Opening Mechanism

When the temperature or humidity increases above the specified limit both the blower and the vent door opening mechanism motor operates together. At first the when the motor of the door opening mechanism operates it turns the crank of the link such that the door open in the outward direction thereby creating way for the hot air out. Now blower blows the hot air out of the poly house though open vent door and fresh cold air enters the poly house that dilutes the in inside Polyhouse to bring down temperature and humidity back to normal or desired value.

When the temperature or humidity drop to the specified limit both the blower stops and the vent door mechanism returns back to original position thereby closing the vent doors

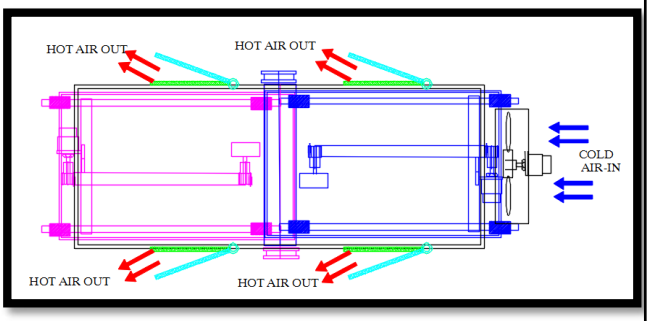

FIGURE: - 1. Schematic diagram of Door Opening Mechanism.

Motor selection:

Selection of motor is done from standard motors available in geared motors form:

The Geared motors are basically DC motors 12 Volt DC coupled to planetary gear set to amplify the torque available at the shaft end.

Motor selected for above application is:

Motor : 12 Volt DC motor, 18 rpm(output), 20watt---1:55 ratio geared

Geared motor

12 volt DC, 20watt, 18rpm output

Integral worm gear box (1:55) ratio

Output pinion 2module 10 teeth

- Design of Worm and Worm Gear (for operating door mechanism)

As the drive is capable of transmitting 30.51KW and we intend to transmit 0.02KW the drive is safe.

- Design of gear for crank shaft (for Door opening mechanism)

Gear Data

No. of teeth on pinion – 10

No. of teeth on gear – 30

Module – 1.5mm

b. Roof Top Mechanism:

When the rain sensor senses rain it operates the motor which rotates the timer belt drive, the belt moves the cover from right to left on the slider mechanism with help of linear slide bearing to give a very smooth operation in minimum time. Counter weight moves up and ensures that proper tension is maintained in unwinding of the over on the roller drum.

When the rain stops circuit operates the motor which rotates the timer belt drive , the belt moves the cover from left to right on the slider mechanism with help of linear slide bearing to give a very smooth operation in minimum time. Counter weight moves down and ensures that proper tension is maintained in winding of the over on the roller drum without any wrinkle.

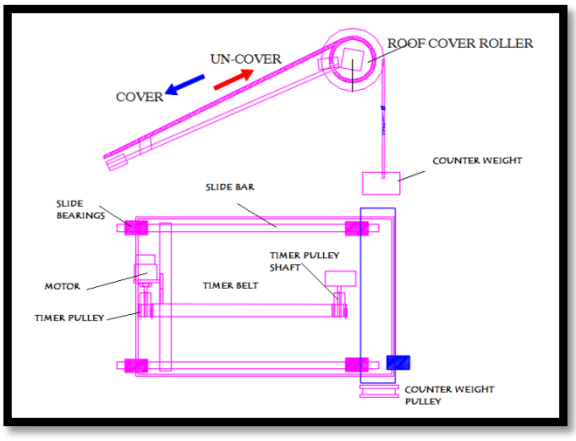

FIGURE:-2. Schematic diagram of roof top mechanism

Design of Bearing for Roller shaft of roof

In selection of ball bearing the main governing factor is the system design of the drive i.e.; the size of the ball bearing is of major importance; hence we shall first select an appropriate ball bearing first select an appropriate ball bearing first taking into consideration convenience of mounting the planetary pins and then we shall check for the actual life of ball bearing.

Ref. V.B. Bhandari- Design of machine Element (Page – 575, Table -15.5)

Designation – 6003

Principal dimensions (mm):

D= 35

B= 10

Basic load rating (N):

C= 6050

Co= 2800

It is found that required dynamic of bearing is less than the rated dynamic capacity of bearing.

Bearing is safe.

- Design of Gear Shaft

Ref: - PSG (1.10 & 1.12) + (1.17)

Designation: 40Ni2Cr1Mo28

Ultimate Tensile Strength – 800 N/mm^2

Yield Strength – 680 N/mm^2

It is found that $fs_{act} < fs_{all}$

Pinion shaft is safe under torsional load.

- Design of Pressure Roller Shaft

Material Selection

Designation: 13Ni3Cr80

Ultimate Tensile Strength – 800 N/mm^2

Yield Strength – 680 N/mm^2

Check for direct shear of crank pin

Shear stress = shear force / Shear area

$= 318 / (\Pi/4 \times (d^2))$

FIGURE – 5. Waterproof Temperature Sensor Cable

FIGURE – 6. Rain drop sensor module for Arduino

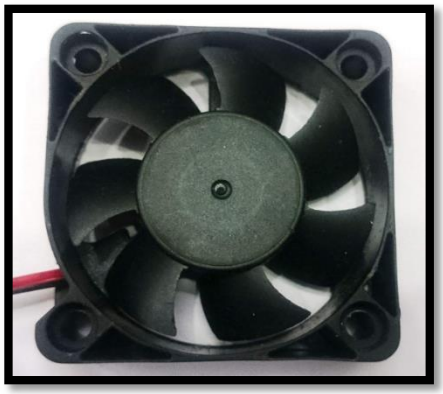

FIGURE – 7. Cooling Fan

FIGURE – 8. 16x2 LCD display

PROTOTYPE of POLYHOUSE

FIGURE – 8

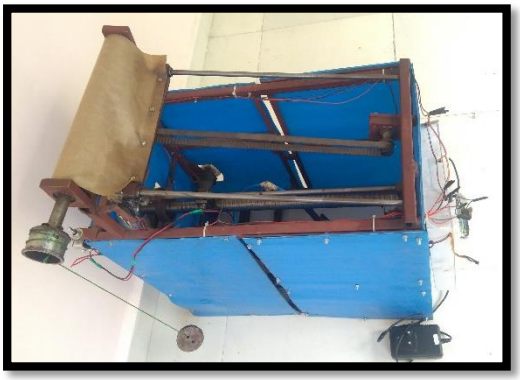

FIGURE – 9

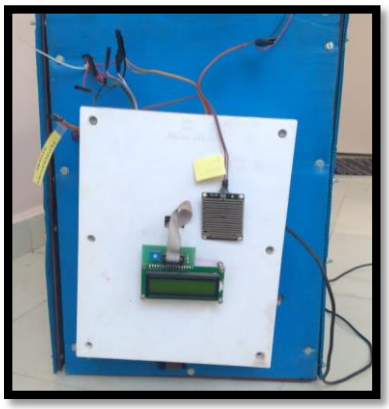

FIGURE – 10 Electric Circuit Kit

4. RESULTS

i. The temperature sensor senses the temperature and when the temperature exceeds 40 degrees celcius the doors open.
ii. When doors open simultaneously the fan also operates and the hot air is blown out through the open doors.
iii. When temperature drops, the doors close and simultaneously the fan also stops.
iv. The rain fall sensor senses water and the cover motor is operated, time required for covering is 3 to 5 seconds.
v. The rainfall sensor when loses water the un-covering takes place and time required for covering is 3 to 5 seconds.
vi. When the motor switch for the spray, mechanism is operated it operates the screw nut arrangement and the sprayer translates and simultaneously the spray motor injects water into nozzle and the spraying takes place.
vii. When the switch is reversed the nut translates backward.

CONCLUSION

The main advantage of this system is that it reduces manual work and there is no need of any external training to farmers. In Polyhouse, farming of a particular plant it is necessary to maintain the temperature inside the Polyhouse for proper growth of plants. To control temperature, we have used temperature sensor which senses and controls the closing and opening of doors. When the temperature increases above the pre-set values, door is opened till desired value is obtained.

In rainy season moisture gets accumulated on the sheet of the Polyhouse due to which specific amount of sunrays may not enter so roof top mechanism is used which is signalled by rain sensor module then the roof top opens and closes when it rains.

Spraying mechanism avoids human interference in the Polyhouse which prevents infection to the farmers and there is uniform spraying of pesticides to the plants.

FUTURE SCOPE

The number of channels can be increased to interface more number of sensors which is possible by using advanced versions of microcontroller. The system can be modified with the use of a data logger and a graphical LCD panel showing the measured sensor data over a period of time. These system can be connected to communication devices such as modems, cellular phones or satellite terminal to enable the remote collection of recorded data or alarming of certain parameters.

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Automation of Manual Vibration Testing Machine for Taper Roller Bearing. (May 2019)

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ABSTRACT The paper addresses the need for automation in production line. A detailed study of various components required for converting a manual bearing vibration testing machine to an automatic one is carried out. Function and Description of each component is studied. The components include conveyor belts, laser doppler vibrometer, pneumatic system, mechanical probe, timing and control sensors, speed control system, data analysis and storage unit. A method of selecting each component for automatic vibration testing machine is offered. Based on the structure of automated machine the initial set of alternate variants is defined and a formal model of automatic vibration testing machine is developed. Automation will significantly decrease the production time and increase the production rate of bearings.

INDEX TERMS Automatic vibration testing machine, conveyer belts, pneumatic system, laser doppler vibrometer, speed control system, optical sensors, actuators.

1. INTRODUCTION

In the 21st century upgradation has become must, so we need to upgrade all the previously manually operated machines into a fully automatic machines with new technologies. The problem with manual machines is low production rate, more time consumption at each process, human errors and high cost of production. All we need from a machine is high production in minimum period of time with less human interruption.

Automation covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input measurements and output control signals. In control complexity it can range from simple on-off control to multi-variable high level algorithms.

In the simplest type of an automatic control loop, a controller compares a measured value of a process with a desired set value, and processes the resulting error signal to change some input to the process, in such a way that the process stays at its set point despite disturbances. This closed-loop control is an application of negative feedback to a system. The mathematical basis of control theory was begun in the 18th century, and advanced rapidly in the 20th.

Vibration is a mechanical phenomenon whereby oscillations occur about an equilibrium point. The oscillations may be periodic, such as the motion of a pendulum or random, such as the movement of a tire on a gravel road.

1.1 PROBLEM STATEMENT

"To automate a manually operated vibration testing machine into a fully automated one by designing linear drives, sensors and conveyor mechanism."

1.2 OBJECTIVE

- To design a machine at optimum cost and to reduce the production time.
- To design a machine such that the production rate of bearings should be increased.
- To reduce human interference from vibration testing machine.
- To supply defect less product to customer.

1.3 METHODOLOGY

1. Observing and studying the working of Manual Vibration Testing Machine.
2. Thought process of placing various components i.e., Conveyor belt, Laser Vibrometer, Mechanical Probe, Actuators, etc.
3. Design of Proximity Sensors, Actuators, Laser Vibrometer, Mechanical Probe and Conveyor belt
4. Installation of above specified components along with controller system on the Manual VTM.
5. Testing the working of newly automated VTM.

1.4 MANUAL VIBRATION TESTING MACHINE

Manual vibration testing machine is a contact type measuring instrument machine, which uses a contact type mechanical probe driven by hand wheel to measure the amplitude of vibration of taper roller bearing (TRB). Load is applied on the bearing through loading cylinder which holds the outer ring and the spindle rotates inner ring of TRB simultaneously.

Fig 1.4: Manual Vibration Testing Machine

1.5 COMPONENTS FOR AUTOMATION

1.5.1 Laser Vibrometer:

To make the vibration measurement, the beam of a helium neon laser is pointed at the vibrating object generates a frequency modulation of the laser light due to the Doppler Effect. This modulation is recovered in the signal processing unit with the aid of suitable demodulators.

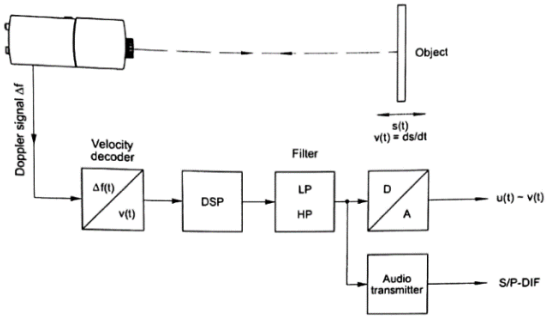

Fig 1.5.1.1: Schematic layout of Laser Vibrometer

1.5.2 Conveyor Belt:

A conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium—the conveyor belt—that rotates about them.

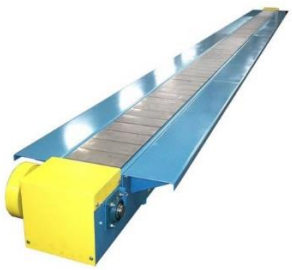

Fig 1.5.2: Conveyor belt

1.5.3 Proximity Sensor:

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A

oximity sensor often emits an electromagnetic field or beam of electromagnetic radiation (infrared, for stance), and looks for changes in the field or return gnal. The object being sensed is often referred to as the oximity sensor's target.

Fig 1.5.3: Proximity Sensor

5.4 Rodless Linear Drive:

odless cylinders have no rod, only a relatively long ston. Cable cylinders retain openings at one or both ds, but pass a flexible cable rather than a rod.

Fig 1.5.4: Rodless linear drive

the magnetic type, the cylinder is thin-walled and of a n-magnetic material, the cylinder is a powerful agnet, and pulls along a magnetic traveler on the tside. In the mechanical type, part of the cylinder tends to the outside through a slot cut down the length the cylinder.

5.5 Hydrodynamic Bearing:

ydrodynamic Bearings are named so because of the bricating principle involved in the bearings. Apart from e construction that acts as the bearing, the lubrication ays a very vital role in the construction to act as a aring. When sufficient quantity of lubricant is present tween two surfaces in which at least one surface tends move, the relative velocity of the moving surfaces tends to pump the lubricant between the two surfaces separating the two surfaces by a dynamic film of the lubricant.

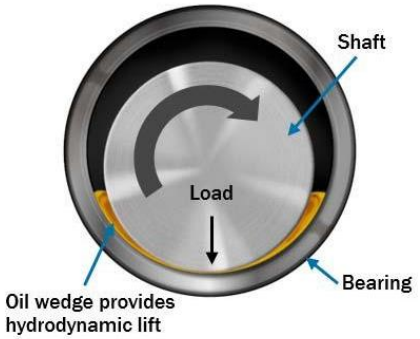

Fig 1.5.5: Hydrodynamic bearing

2. DESIGN

2.1 Design of Linear Drive:

2.1.1 Selection of Piston Diameter:

- Workpiece load=3.72 kg
- Stroke length = 372.5 mm
- Force F = m*g = 3.72*9.81 = 36.49 N
- Using FESTO Catalogue:
- Considering piston diameter of 32mm.
- Moving mass= 4042 g = 4.042 kg
- Theoretical force at 6 bar ,advancing = 483 N
- 50% of theoretical force = 241.5 N
- Static holding force with 32 mm piston = 500 N
- As the force of bearing is less than the 50% theo force selecting piston of 32mm.

Forces [N]						
Piston ∅	32	40	50	63	80	100
Theoretical force at 6 bar, advancing	483	754	1178	1870	3016	4712
Theoretical force at 6 bar, retracting	415	633	990	1682	2721	4418
Static holding force	500		2000		5000	

DFM-B with plain-bearing guide GF, cushioning P, PPV								
Stroke	Piston ∅ [mm]							
[mm]	12	16	20	25	32	40	50	63
Moving mass [g]								
10	201	283	–	–	–	–	–	–
20	216	302	506	715	1147	–	–	–
25	223	312	520	734	1176	1305	2217	2640
30	230	322	534	753	1230	–	–	–
40	245	342	586	823	1289	–	–	–
50	260	362	615	861	1347	1476	2567	2990
80	304	423	724	1022	1644	1776	3002	3426
100	333	463	781	1098	1764	1893	3189	3613
125	420	579	917	1289	2059	2188	3586	4009
160	472	649	1016	1422	2264	2393	3913	4336
200	530	730	1129	1573	2499	2627	4286	4710
250	–	–	1489	2017	3164	3293	5351	5774
320	–	–	1688	2283	3574	3703	6005	6428
400	–	–	1914	2587	4042	4171	6752	7176

Table 1: Festo Catalogue

2.1.2 Pusher:

- Design parameters needed for selection:
- Stroke length= 372.5mm
- Bearing weight = 3.72kg
- Selection of desired linear drive from FESTO catalogue
- Designation: DFM32-B-400-P-A-GF

2.1.3 Positioner:

- Design parameters needed for selection:
- Stroke length= 74mm
- Bearing weight = 3.72kg
- Selection of desired linear drive from FESTO catalogue
- Designation: DFM25-B-100-P-A-GF

2.1.4 Push-out:

- Design parameters needed for selection:
- Stroke length= 372.5mm
- Bearing weight = 3.72kg
- Selection of desired linear drive from FESTO catalogue
- Designation: DNC32-300-Q-PPV-A

2.2 CAD MODEL:

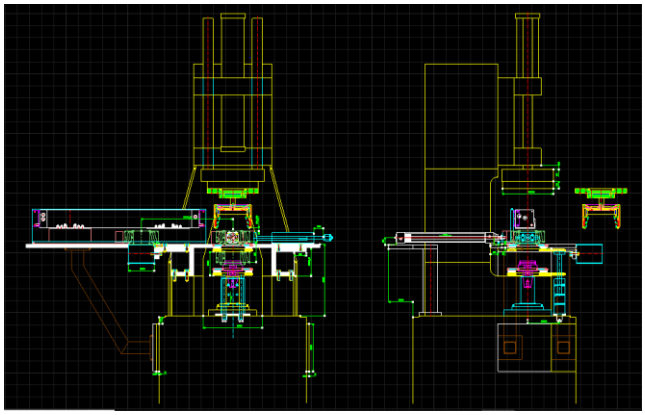

Fig 2.2.1: Auto Cad Drawing (Front View)

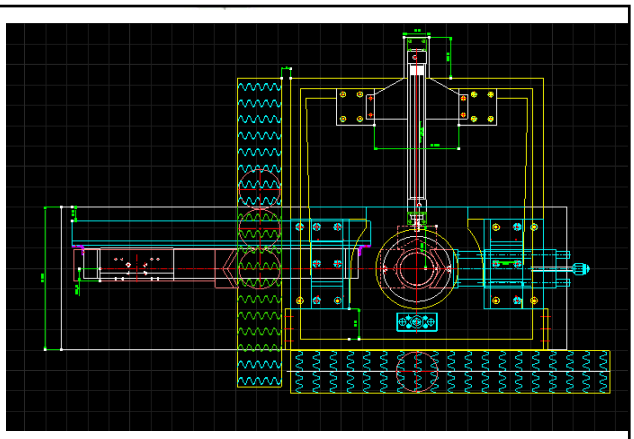

Fig 2.2.2: Auto Cad Drawing (Top View)

3. CONCLUSION

In this paper, the components for the automation of Vibr Testing Machine (VTM) are listed with their description. system specifies need for automation in VTM so as to improv accuracy, production time, productivity and which in turn re vibrations in machines and reduces human interference.

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AUTOMATION IN ACTUATION OF VALVES IN PRESSURE DIE CASTING(May 2019)

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ABSTRACT Die casting is a manufacturing process where molten metal is poured into a cavity and cooled to derive the desired component. In pressure die casting the molten metal is forced under pressure into the cavity and then cooled naturally. This forced flow allows to overcome many flaws and defects. The pressure is maintained until the metal is cooled. The cavity is made up of hardened steel which is machined such that the desired component can be developed.Most die castings are made from non ferrous metal, specifically zinc, copper, aluminium, magnesium, lead, pewter and tin based alloys. Depending on the type of metal being cast, a hot- or cold-chamber machine is used.Casting equipment's are costly and the investment is high. But, the rate of production is high and is only suitable for mass production of identical components.Traditional casting process has some drawbacks of porosity, surface defects, concavities,intrusion etc. These can be overcomed by pressure die casting The process is simple and needs just four steps for the final product. The surface finish is improved and application of mechatronic systems can help to improvise the quality of casting and life of die.

1. INTRODUCTION

In die casting the simultaneous consistency of quality and the speed of ejection are the major difficulties observed.This is the major challenge.For devices powered by hydraulics, we need to control speed and position for high output,and pressure inside the die for consistent quality. To release pressure we have multiple techniques. These include pneumatic cylinders and servo motors to automate the valves.The recent trend to develop a die casting design and device is the use of numerical techniques. Finite Element Methods (FEM) and Finite Difference Methods (FDM) are such techniques used for such simulation.The main reason for this recent trend is the development of fast and intelligent computers that can handle vast data with complex mathematical equations with minimum processing time. Different ‘what if’ scenarios can be verified simultaneously and rather quickly. One area for implementing these techniques is in the field of pressure die casting. More technically,to minimize the distortion at the parting plane as an effect of thermal and mechanical stresses in the die material, to control the flashing of molten metal to improve the dimensional accuracy of the part. Previous studies have numerically analyzed die and device parameters with known boundary conditions to simulate them and find methods to reduce distortions.[3]

1.1. DRAWBACKS AND ALTERNATIVE

In die casting process a huge pressure is created inside the mould when the hot metal is poured in. the conventional method to remove the pressure is to open the valve manually, which can be very dangerous. Operating person can come in contact with the hot gases released from the mould. To overcome this, new techniques can be adapted. Pressure and temperature sensors can be used to open the valve automatically.Thermal stresses are induced in the die due to the sudden contact with the molten metal. Controlling the temperature and pressure of the die to reduce thermal stresses.To design and manufacture a die casting system integrated with temperature and pressure sensor to control the thermal stresses in the die material.Through calculations set a benchmark for these values and operate the AC solenoid valve to release the molten metal back to the reservoir.

2. WORKING PRINCIPLE

The pressurized hot air is received into the die. This pressurized hot air is flown through pressure sensor to check the pressure. Thus it enters to the relay. The temperature of air is also checked with the help of temperature sensor. This will be then entered into the relay. The working of relay is controlled with the help of Aurdino.We set a value as benchmark values for pressure and temperature inside the chamber.These values are fed

reach the fixed values the AC valve is opened and the air is allowed to escaped. Hence, the temperature and pressure is maintained.

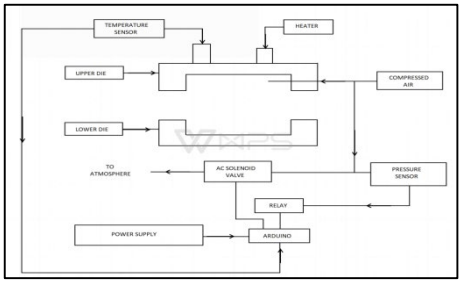


Fig (2).Conceptual diagram

3. COMPUTER AIDED DESIGN(CAD)

CAD has integrated tools than can draw the same with higher accuracy and speed and in moments those drawings can be converted into actual 2D sheets.

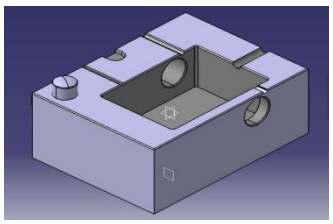


Fig (3.1) Lower Die

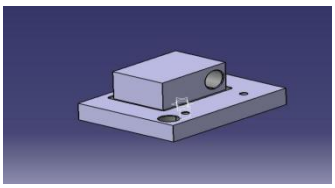
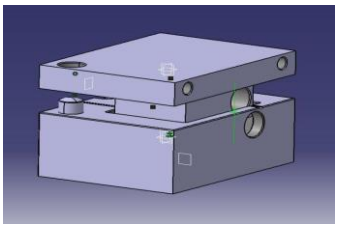


Fig (3.2) Upper Die



4. CALCULATION

Here we are going to purchase the available die from the market.Material properties for the material are gathered and the calculations are performed for different cases.Geometric values are measured manually and used in the calculations.Calculations are performed to decide the position of temperature sensor in the upper die. Hence dimensions for the same are measured and temperature distribution is calculated and verified through FEA software's as well.

4.1 DIMENSIONS OF THE UPPER DIE:-

Extrusion= 53 x 37 x 23 mm

Upper support= 95 x 70 x 14 mm

Thermal Conductivity-Three different values are considered for different carbon content; 36 W/m0C, 43 W/m0C and 54 W/m0C.

Temperature at inner surface= 700C and Temperature of atmosphere=220C

K= 44.8 W/m^{0}C

Position of sensor for slab in series				
L(m)	**A(m2)**		**R(th)v**	**T**
1	0.001431	0.00665	0.016638381	68.15470816
2	0.001431	0.00665	0.033276763	66.30941632
3	0.001431	0.00665	0.049915144	64.46412448
4	0.001431	0.00665	0.066553526	62.61883264
5	0.001431	0.00665	0.083191907	60.7735408
6	0.001431	0.00665	0.099830289	58.92824896
7	0.001431	0.00665	0.11646867	57.08295712
8	0.001431	0.00665	0.133107051	55.23766529
9	0.001431	0.00665	0.149745433	53.39237345

11	0.001431	0.00665	0.183022196	49.70178977
12	0.001431	0.00665	0.199660577	47.85649793
13	0.001431	0.00665	0.216298958	46.01120609
14	0.001431	0.00665	0.23293734	44.16591425
15	0.001431	0.00665	0.249575721	42.32062241
16	0.001431	0.00665	0.266214103	40.47533057
17	0.001431	0.00665	0.282852484	38.63003873
18	0.001431	0.00665	0.299490866	36.78474689
19	0.001431	0.00665	0.316129247	34.93945505
20	0.001431	0.00665	0.332767628	33.09416321
21	0.001431	0.00665	0.34940601	31.24887137
22	0.001431	0.00665	0.366044391	29.40357953
23	0.001431	0.00665	0.382682773	27.55828769
24	0.001431	0.00665	0.386263153	27.16120305
25	0.001431	0.00665	0.389843532	26.76411844
26	0.001431	0.00665	0.393423912	26.36703384
27	0.001431	0.00665	0.397004291	25.96994923
28	0.001431	0.00665	0.400584671	25.57286463
29	0.001431	0.00665	0.40416505	25.17578002
30	0.001431	0.00665	0.40774543	24.77869542
31	0.001431	0.00665	0.411325809	24.38161081
32	0.001431	0.00665	0.414906189	23.98452621
33	0.001431	0.00665	0.418486568	23.5874416
34	0.001431	0.00665	0.422066948	23.190357
36	0.001431	0.00665	0.429227707	22.39618779
37	0.001431	0.00665	0.432808086	21.99910318

5.1ANALYSIS

The solution of any physical problem can be obtained in three different ways via analytical, experimental and numerical methods. Analytical method is a classical approach gives 100% accurate results but applicable only for simple problems.second method is the experimental method and is used for actual measurement of physical quantities such as vibration measurement by FFT,principal stresses and strains by photo elastic or strain gauge rosette method etc. Lastly, numerical method and is the mathematical representation of physical problem gives approximate solution for the complex problems. Number of numerical methods are available for solving a physical problem such as FEM,FVM and FDM,etc. Finite element method is the most popular numerical tool for solving engineering problems .The method is general enough to handle any complex shape, any specifies material properties, boundary conditions and loading conditions.

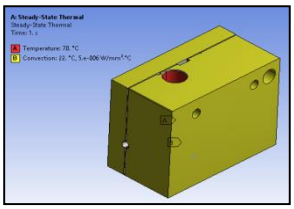


Fig (4.1)-Boundary condition

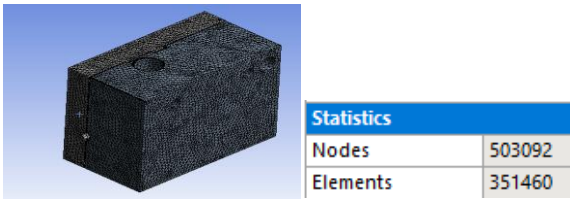


Fig (4.2) Meshing

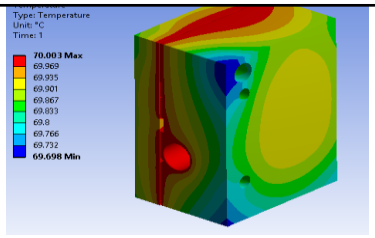


Fig (4.3.1) Temperature Distribution of Assembly

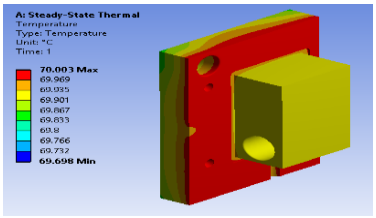


Fig (4.3.2) Temperature Distribution of Upper Die

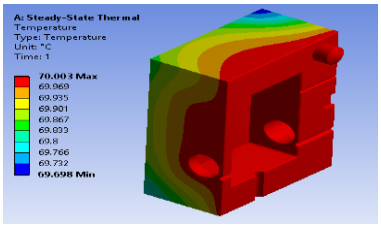


Fig (4.3.3) Temperature Distribution of Lower Die

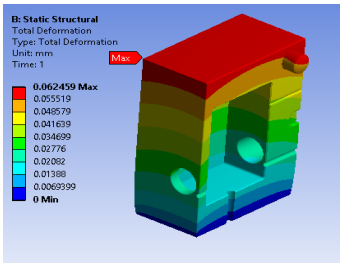


Fig (4.4) Deformation Lower Die

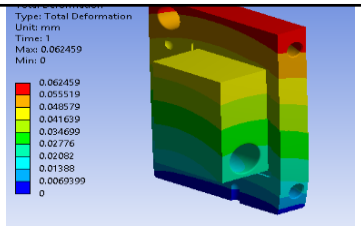


Fig (4.5) Deformation Upper Die

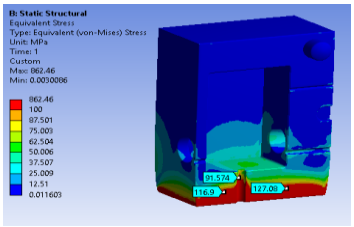


Fig (4.6) Equivalent Stress Lower Die

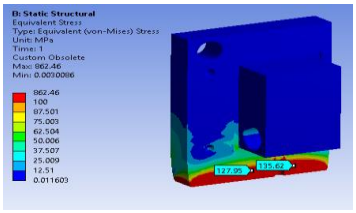


Fig (4.7) Equivalent stress upper die

5.1 RESULTS

Maximum Deformation is 0.52881 mm and that of minimum deformation is 0.

The maximum thermal stress is 6456MPa and that of minimum is 2.1174MPa.

Total heat transfer is 777.76W.

CONCLUSION

Through reverse engineering we have developed a CAD model and performed material testing for calculations. These have helped to decide the position of sensors and its cut-off values.Implementing the electronic system to this practical die has helped us for a better control of physical variables which has indeed helped us to control the thermal stress in the die and increase the life of die.

ACKNOWLEDGMENT

It gives me immense pleasure to record my debt of gratitude and my warmest regards to my Guide and HOD Prof.Dr.S.H.Mankar for extensive guidance and direction that we have received from him throughout the progress of the work. The various values that we tried to learn from him shall remain a source of inspiration for us forever.We wish to express my gratitude towards our Principal Prof Dr. H.U.Tiwari for giving this opportunity to design, manufacture and present our ideas and to use our college facilities.We are thankful to my family for their whole hearted blessings, support and encouragement towards the fulfilment of my work. We wish to record the help extended by my friends in all possible ways and active support and constant encouragement.

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Heat Transfer Enhancement of Diesel Engine Radiator Using CuO Nanofluid (May 2019)

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ABSTRACT In this article experimental investigation on forced connective heat transfer is carried on diesel engine radiator by using CuO/water nanofluid as a coolant. Three different volume fractions of 0.5%, 1% and 1.5% of CuO nanoparticles in nanofluid are studied. PVP is used as surfactant to increase stability of nanofluid. PVP is added 3% in volume concentration in each nanofluid. Experiment was perform on diesel engine setup which is used for genset. Heat transfer calculations were done by varying flow rate from 4 Lpm to 7 Lpm. The results showed that heat transfer rate increases as per the volume concentration increases. Also the specific heat of the nanofluid goes on decreasing as the volume fraction increases. It is observed that maximum heat transfer enhancement of 26.2% occurred at 1.5% volume concentration at 6 Lpm flow rate compared to base fluid. Also as the inlet temperature of nanofluid is increase heat transfer rate also increases.

INDEX TERMS CuO nanofluids, Radiator, Diesel engine.

1. INTRODUCTION

In an automobile lot of heat is produce due to combustion, only a portion of heat is utilized to produce the power rest of heat is wasted in the form of exhaust heat. If this exhaust heat is not removed, the temperature becomes too high which results in overheating and viscosity breakdown of the lubricating oil, wear of the engine parts, due to thermal stress on the engine components failure may occur in engine. So that a cooling system is required. The automobile engine utilizes a heat exchanger device termed as radiator.

A reduction in energy consumption is possible by improving the performance of heat exchange systems and introducing various heat transfer enhancement techniques. Conventional fluids, such as refrigerants, water, engine oil, ethylene glycol, etc. have poor heat transfer performance and therefore high compactness and effectiveness of heat transfer systems are necessary to achieve the required heat transfer. Nanofluids are the new window which was opened recently and it was confirmed by several authors that these working fluid can enhance heat transfer performance. In this report data is presented on an experimental investigation of the convective turbulent heat transfer characteristics of nanofluids (CuO water) with 0.5, 1.0, 1.5 vol. %. The heat transfer increased with an increase in particle concentration.

2. Experimental Set up

Experimental investigation of car radiator is carried out on a diesel engine experimental set setup present at college premises. The set up consist of VCT-10 37029 twin cylinder diesel engine of 10 BHP rating. The engine has rotational speed of 1500 rpm which is used to connected to a genset to produce electricity. The genset is connected to a 8 heaters. By turning on no. of heaters we can increase load on the engine. The outlet of water jackets is connected to a radiator through hoses. The radiator is a type of cross flow one fluid unmixed and other fluid mixed type. The radiator is used for the purpose of transferring the heat from the fluid which is in the tubes to the outside of the surrounding. There are several fins around the periphery of the tubes. The radiator is made up of aluminum material. The fins are also made up of the aluminum metal. The heat is transferred from the fluid to the tube by convection and from tube thickness to the fins by conduction and then from fins to air again by the convection. The forced convection takes place with help of the fan which is mounted behind the radiator.

3% PVP (polyvinylpyrrolidone) as surfactant is added in nanofluid to increase stability. The cooled fluid is again supplied to the engine through rotameter where the flow can be varied from 1 Lpm to 10 Lpm. The readings are taken at constant load keeping 4 heaters on so that we get the desire temperature rise at the engine cylinders. The is fluid is circulated through the system by using centrifugal pump.

3. Calulation and Rsults

3.1 Nomenclature

Sr. No.	Symbol	Meaning
1	Cp	Specific Heat
2	T_{hi}	Inlet Temperature of Fluid
3	T_{ho}	Outlet Temperature of Fluid
4	T_{ci}	Inlet Temperature of Air
5	T_{co}	Outlet Temperature of Air
6	ΔT_m	Logarithmic Mean Temperature Difference
7	Q	Heat Transfer Rate
8	U	Overall Heat Transfer Rate
9	M	Mass of fluid
10	A	Area of Radiator
11	Q_h	Heat Transfer Rate of hot fluid
12	Q_c	Heat Transfer Rate of cold fluid
13	m_h	Mass of hot fluid
14	m_c	Mass of cold fluid
15	Cp_h	Specific Heat of hot fluid
16	Cp_c	Specific Heat of cold fluid
17	Q_{avg}	Average Heat Transfer Rate
18	F	Radiator Correction Factor
19	R	Constant for Radiator Correction Factor
20	S	Constant for Radiator Correction Factor
21	Φ	Volumetric Concentration nanofluid
22	ϕ_p	Volumetric Concentration of nanoparticle
23	ϕ_b	Volumetric Concentration basefluid
24	P	Density of nanofluid
25	ρ_p	Density of nanoparticle
26	ρ_b	Density of basefluid
27	ΔT	Temperature difference
28	ΔT_h	Temperature difference of hot fluid
29	ΔT_c	Temperature difference of cold fluid

3.2 Calculations

Below formulae are used for the calculations:

Logarithmic Mean Temperature Difference

$$\Delta Tm = \frac{(Thi-Tco)-(Tho-Tci)}{ln[(Thi-Tco)/(Tho-Tci)]}$$

Density of nanofluid

$$\rho = \phi\rho p + (1-\phi) * \rho b$$

Specific heat of nanofluid

$$Cph = \frac{\phi*\rho p * Cp + (1-\phi)*\rho b*Cb}{\rho}$$

Heat transfer through water

$$Qh=mh*Cph*\Delta Th$$

Heat Transfer through air

$$Qc=mc*Cpc*\Delta Tc$$

Average Heat Transfe

$$Qavg=0.5*(Qh+Qc)$$

But $Qavg=U*A*F*\Delta Tm$

Where, A correction factor F is used to compensate errors in LMTD for cross flow.

$$R = \frac{Tco-Tci}{Thi-Tho}$$

$$S = \frac{Tho-Thi}{Tco-Thi}$$

$$F = \frac{ln[(1-R*S)/(1-S)]}{(1-1/R)*ln[1+R*ln(1-S)]}$$

From this formula U is calculated.

3.3 Experimental Readings

Table 3.3.1: Water mean temperature readings

coolant	LPM	T_{hi}(°C)	T_{ho}(°C)	T_{ci}(°C)	T_{co}(°C)	ΔT_m
water	7	56.80	53.33	38.53	49.23	10.7
	6	58.23	54.47	38.40	49.70	11.9
	5	58.90	54.00	38.53	50.83	11.3
	4	61.67	55.03	38.73	51.70	12.8
CuO 0.5% nanofluid	7	56.03	52.30	36.37	47.83	11.64
	6	57.30	52.80	37.90	50.23	10.50
	5	58.93	53.33	37.97	51.17	11.13
	4	61.60	54.03	38.13	51.80	12.60
CuO 1% nanofluid	7	55.57	51.37	35.70	48.83	10.5
	6	57.70	52.20	35.57	49.33	12.0
	5	60.43	53.06	35.93	50.80	13.0
	4	63.00	54.10	36.06	51.87	14.3
CuO 1.5% nanofluid	7	55.27	50.80	33.80	48.37	11.2
	6	57.33	51.43	33.87	49.23	12.2

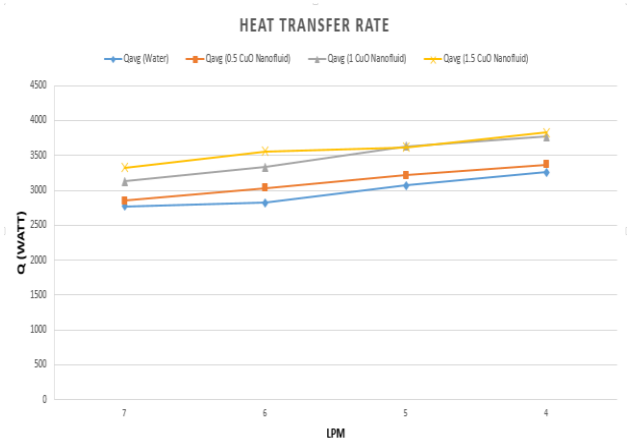
	5	60.17	52.23	33.77	48.90	14.5714		4	61.70	51.40	33.80	49.93	14.4

3.4 Results

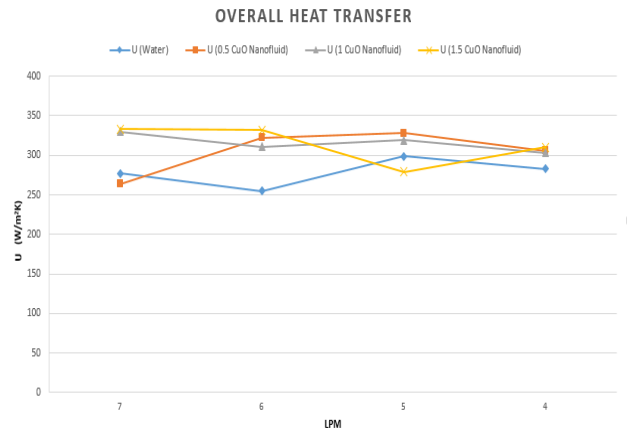
Using above formulae average heat transfer and overall heat transfer is calculated for all the 4 samples that is for water, 0.5%, 1%, 1.5% concentrations. The heat transfer enhancement by nanofluids is compare with base fluid water.

Lpm	Heat Transfer of Water	Heat Transfer of 0.5% nanofluid	Heat Transfer 1% Nanofluid	Heat Transfer of 1.5%	Overall Heat Transfer coefficient of Water	Overall Heat Transfer coefficient of 0.5% nanofluid	Overall Heat Transfer coefficient of 1% nanofluid	Overall Heat Transfer coefficient of 1.5% nanofluid
7	2771.349	2849.546	3126.735	3323.492	277.404	264.003	330.099	333.358
6	2821.118	3031.537	3334.254	3560.367	254.818	322.587	310.583	332.097
5	3067.287	3217.542	3631.782	3614.375	299.008	328.254	319.215	279.31
4	3258.15	3369.744	3767.597	3828.74	282.537	305.811	303.306	310.009

Table 3.4.5 Result Table of Heat Transfer (Q) and Overall heat transfer coefficient



Graph 3.4.6 Plot between Heat Transfer Rates vs. Discharge



Graph 4.7.2 Plot between Overall Heat Transfer Rates vs. Discharge

4. Conclusion

The experiment conducted on the Twin Cylinder Diesel Engine (VCT10) radiator by replacing the conventional coolant by the CuO nano fluid with surfactant proved comparatively effective. The results obtained so far is the evidence of increase in the effectiveness of the radiator. The following inferences can be drawn by demonstrating the experiment successfully:

1. The heat transfer rate of CuO nanofluid is greater than that of conventional coolant as the conductivity of the Copper is higher than the simple coolant.
2. The size of the radiator can be reduced in the case if we want same heat transfer rate as that of the conventional coolant.
3. The most important the NOx emission can be considerably reduced as the engine temperature is reduced below 11000C.

Thus we finally conclude that this experiment proved to be very beneficial in all- round aspects improving the overall engine performance covering all important aspects.

4. The maximum enhancement occurred is 26% in heat transfer rate at 1.5% volume concentration,
5. As per the concentration increases overall heat transfer coefficient increases and specific heat of the nanofluid also decreases.

5. ACKNOWLEDGEMENT

I have great pleasure in submitting the Report for Project on the topic, “Heat Transfer Enhancement of Diesel Engine Radiator Using CuO Nanofluid”. It gives me immense pleasure to record my debt of gratitude and my warmest regards to my Guide Prof. N. S. Vele for extensive guidance and direction I have received from him throughout the progress of the work. The various values that we tried to learn from him shall remain a source of inspiration for me forever.

I would like to say thank you to our Project Coordinators, all teaching and non-teaching staff of Mechanical Engineering Department for their support and help.

I am thankful to my family for their whole hearted blessings, support and encouragement towards the fulfilment of my work. I wish to record the help extended by my friends in all possible ways and active support and constant encouragement.

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Milk Vending Machine (May 2019)

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ABSTRACT In this modern world, everything has become computerized and atomized. The need of human in various Scenarios were overcome by machines. In India, the supply chain for milk little dairy agriculturists, normally owning one or two cows, deliver milk to the local collection point typically located at the village itself. From the processing plant the milk is distributed to warehouses in different localities inside the city from where it is supplied to the milk dealers of the city. The present situation of the milk distribution system must be changed because of the many issues like peoples need to be stand in the queue i.e. very time consuming and makes parking issue near milk dairy. Also for distribution of Milk and collecting the money Human involvement is needed. So we propose a system in which the milk vending system using server operated by an app/web. Orders of the milk is given on the application in smartphones by the customer and milk is dispensed to the customer by the machine. At present people needs to avoid human involvement, so we are developing smart milk vending system. This also becomes the part of smart city.

INDEX TERMS Server based system, App/web in smartphones.

1. INTRODUCTION

In the previous paying bills method for vending machine, the technology was developed to make a payment by using coins or notes or smart card. Here we are using website for paying the bill that will connected to servers. First the customer needs to create an account on the website and he will give a unique code so that the machine recognize the customer by the code given. To buy milk, customer has to visit the website and place the order of required milk and make the payment online through debit/credit card. Once the payment is confirmed customer will get the bill on website and necessary information. There will provision for scanning QR codes in the website. To get the milk customer needs to scan the QR code printed on the machine front side and thus machine will recognize the customer and will know the amount of milk customer needs. Customer needs to place a container at the outlet of the machine nozzle. Milk will be poured automatically and will stop once the specified amount of milk is poured.

A. Refrigeration Unit

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable (for example, “IEEE” in the title of this article).

1. Compressor
2. Condenser
3. Expansion Valve
4. Evaporator unit

Working

R134a refrigerant is used in our vapour compression cycle refrigeration unit. The compressor constricts the refrigerant vapour, raising its pressure and temperature and pushes it into the coils of the condenser on the outside of the refrigerator. When the hot gas in the coils of the condenser meets the cooler air temperature of the kitchen, it becomes a liquid. Now in liquid from high pressure, refrigerant cools down as it flows through the expansion valve into the evaporator coils inside the freezer. The refrigerant absorbs the heat inside the freezer when it flows through the evaporator coils, cooling down the air inside the fridge. Last, the refrigerant evaporates to a gas due to raised temperature, then flows back to the compressor, where the cycle starts all over again.

B. Sensors

All the sensors used will be connected to microcontroller that will control the whole machine. Following sensors are used into the machine:

1) Temperature Sensor: To detect the temperature and maintain it.
2) Position Control Sensor: Machine will deliver milk only after the container is placed at the end of the nozzle. It is a optical position control sensor having a laser at the end of the nozzle. Milk will be poured only after the container cuts the laser beam and will stop after the removal of container. This will avoid wastage of the milk due to accidental falling of the container or due to carelessness of the customer.
3) Flow Control Sensor: This sensor will be connected at the outlet pipe and will only allow only specified amount of milk by the customer. It will also control the flow velocity of the milk pouring from the nozzle.
4) Level sensor: If the milk in the refrigerator storage unit is less it will be sensed by the level sensor and will give warn the milk manager on the machine about the low level of the milk. Also will will switch of the refrigeration power source to avoid wastage of electric energy.

C. Networking

As the system is to be made fully automated, it can be done by the use of software base using the application or website with cloud based storage and effective communication and to keep record between the customer and the vendor of the amount of milk and its cost.
How do we achieve the automation?

It will ensure the customer to have security of guaranteed milk availability.
Thus it the app or website will be a indirect communication between the customers and the vendor so as to make the process more efficient and feasible both at the same time.

D. Software

It is the brain of the networking system. Software helps all the process to get carried out. It receives the information from the QR code and transmits it to the main server. The information is processed there and it is sent to the app or website and displayed there. The online payment process and other security reasons are being taken care from the software developer itself.

E. Cloud Storage

It is a simple space where data is being permanently stored and reused whenever necessary. As the data is not stored physically hence the risk of vanishing the data is minimum.

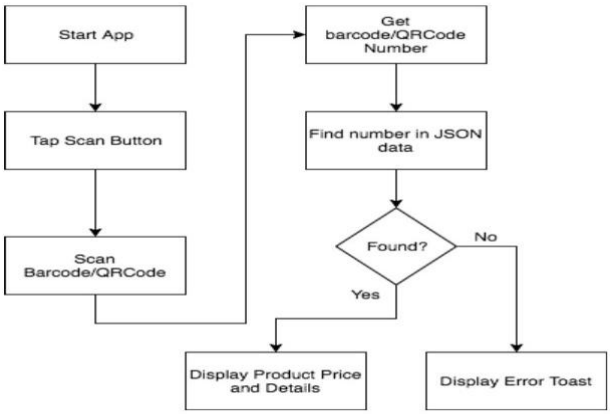

Figure 1: Working of QR code

2. OBJECTIVES

Our main objective is to establish direct contact between milk vendor and customer. Traditionally milk is supplied to the customers in milk pouches by companies. Company (or Agent) buy the milk from milk vendors at much cheaper rate than it is given to the customers. This will increase the profit of farmer and will also provide good quality milk to the customer. Additional uses of Milk Vending Machines are;

To know the requirement: By using our app based system, milk vendor will directly get to know about the requirement of a particular machine as he will be notified once the order is placed by the customer hence shortage will be avoided.

Go Cashless: Todays era is cashless and people are going digital. It is a need for todays man. Our machine works on server and application, this completely eliminates the use of cash for milk and thus providing high quality service with no hidden charges.

Product quality improvement: Milk bought from the shops in plastic pouches is initially processed and it losses it nutritional contents (Due to addition of water). By using vending machine, customer can directly buy milk from the machine which is filled by vendor.

Hygiene: As there is no direct connection between the supplied milk and respective person hygiene will be maintained

3. CALCULATIONS

We will need a refrigeration unit to maintain the desired temperature of the milk so that the quality of milk does not degrade. Chiller will be used in the machine to cool the milk. Following are the load calculations for the refrigeration unit of the milk vending machine-

A. Amount of heat removed/litre

$Q = mC_p(T_{in}-T_{req})$

$m = \varrho * v = 1.035*100 = 103.5$ kg

where, ϱ = kg/lit

C_p = kJ/kgK

T_{in} =30°C

T_{req} = 4°C

$Q = 103.5*3.632*10^3*(30-4)$

$= \underline{9773.712 \text{ kJ}}$ . . . . . (i)

Hence, Amount of heat removed from the refrigeration unit is 9773.712kJ

B. Heat flow Rate/Evaporator Capacity

$\dot{Q} = \frac{Q}{t} = \frac{9773.712}{30*6} = 5.4298$ kW

Where t = 30mins

Hence, Heat flow Rate/Evaporator Capacity is 5.4298 kW

C. Compressor Work

Selecting R134a Refrigerant

$h_1 = 249.53$ kJ/kg

$h_3 = h_4 = 106.19$ kJ/kg

As, $S_1 = S_2$

$0.9169 = S_g + C_p \ln(\frac{T2}{T1})$

$0.9169 = 0.9041 + 1.34 * \ln(\frac{T2}{313.15})$

$T_2 = 316.15$K or 43°C

Therefore, Compressor Work

$W_c = h_2 - h_1$

$h_2 = h_g + C_p (T_2 - T_1)$

$= 268.24 + 1.34 * (316.15 - 313.15)$

$h_2 = 302.26$ kJ/kg

$h_1 = 249.53$ kJ/kg

As $W_c = h_2 - h_1$

$= 302.26 - 249.53$

$W_c = 52.73$ kJ/kg . . . . . (ii)

Hence, Compressor Work is 52.73 kJ/kg

D. Heat in the evaporator

$Q_{in} = h_1 - h_4$

$= 249.53 - 106.19$ kJ/kg

$= 143.34$ kJ/kg. . . . . (iii)

E. Heat out in condenser

$Q_{out} = h_2 - h_3$

$= 302.26 - 106.19$

$= 1963.07$ kJ/kg. . . . . (iv)

F. Mass flow rate of Refrigerant

From equations (i) and (iii)

$\dot{m} (h_1 - h_4) = (mC_p \Delta T)$

$m * 143.34 = 5.4298$ Kw

Therefore, m = 0.03788 kg/s

Based upon the above calculated values chiller will be designed.

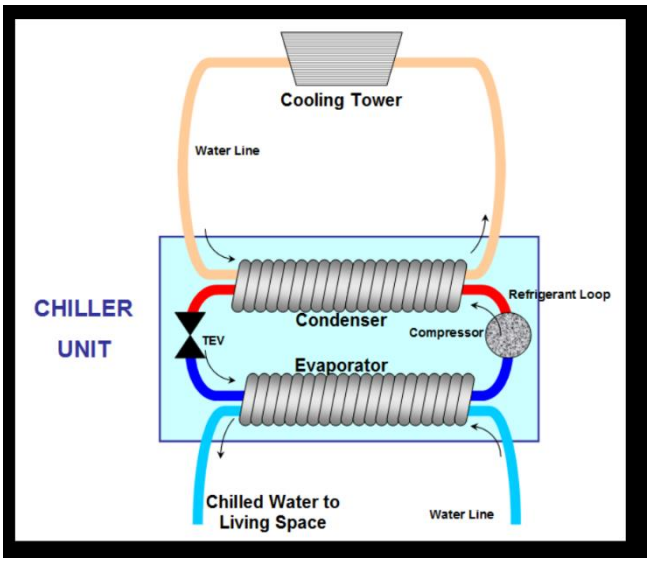

Figure 2: Working of Chiller

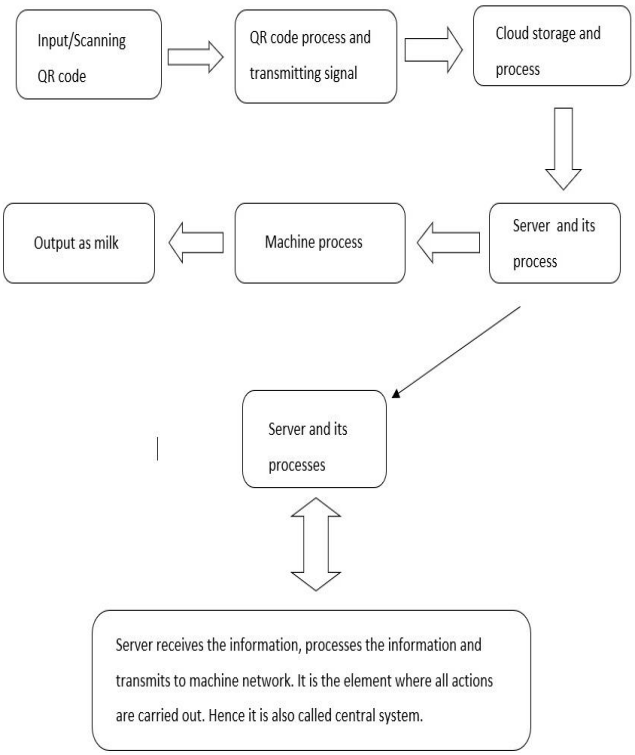

Figure 3 : Working of Milk Vending Machine

Figure 4: Actual Milk Vending Machine

Figure 5: Dispenser Unit

Figure 6. Dispenser unit

In our milk vending machine we will be using server operated by an app/web. Orders of the milk is given on the

application in smartphones by the customer and milk is dispensed to the customer by the machine. Customer has to pay for the required amount of milk into the website by using Bank transfer or e-wallets and also provide the necessary information onto the website. Then customer has to scan the QR code on the machine to redeem his milk that will be poured from the nozzle of the machine. We will be using various sensors and microcontroller to make the machine fully automatic.

G. CONCLUSION

The proposed design focuses on providing good quality milk to the customer and also increasing profits of the milk vendor. Our design also promotes transparency between the vendor and the customer as all the basic information about the milk is available on the website and thus will help the customer to get milk without adulteration. It will also help the producer about knowing the customer requirement beforehand balancing the supply and demand cycle and will avoid shortage of the milk in the machine or wastage of the milk due to leftover milk. Website will also keep a track of the milk being sold per day hence a datasheet is created for the producer letting him know about the total profit of the month.

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Turnover Device Fixture (May 2019)

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ABSTRACT

Fixture is a holding device used in industries for machining and assembly purpose in order to complete the product more efficiently and user friendly manner. The following content shows the difficulties faced by the workers while assembling the HN type Piston Compressor and the concept of designing a new efficient, safer and compact fixture. The new fixture is a Turnover Device (TOD) type of fixture that is designed for HN type of crank case of the Compressor block that would provide lesser assembling time, safer and compact than that of the previous fixture.

INDEX TERMS Compressor, crankcase, fixture, turnover mechanism

NOMENCLATURE

T - Torque (kg-mm)
F_f - Frictional Force (kg)
r_p - Radius of pinion (mm)
r_g - Radius of Gear (mm)
N_g - Speed of output ring (rpm)
N_p - Speed of pinion(rpm)
Z_p - Number of teeth on pinion
Z_g - Number of teeth on gear
Ø- Pressure angle
α- Helix angle
$Z`_p$ - Virtual number of teeth on pinion
$Z`_g$ - Virtual number of teeth on gear
Y_p - Lewis form factor for pinion
Y_g - Lewis form factor for gear
F_b - Bending stress (N/mm^2)
D_p-Diameter of pinion
D_g-Diameter of gear
b- Gear thickness (mm)
F_t-Tangential load
K_a - Application factor
K_m - Load concentration factor
F_{effe} - Effective loading
m_n - Normal module (mm)
v- Pitch line velocity
C.D-Centre Distance

INTRODUCTION

Fixture is a tool used specially to hold a work piece to perform machining operations on it. The position of the component should be fixed while machining if not errors in dimensions or unnecessary tapers size reduction may occur. Frequent checking, non-uniform quality of product, manual errors, time required for machining can be reduced by use of proper fixture assembly.

PROBLEM DEFINITION

1. To design and manufacture a turn-over device fixture for the assembly of HN-type reciprocating piston air compressor such as to have a desired rotating output speed of 2 rpm.

2. Also to reduce the slippage problems due to unbalanced center of gravity that occurs in the existing fixture.

3. To increase the overall safety of the operator during assembly of compressor.

DESIGN AND ANALYSIS OF INDEXING FIXTURE FOR PISTON COMPRESSOR BLOCK.

The fixture is to be rotated at 900 for assembly of compressor and material strength is identified to complete the requirement of load carrying capacity of the indexing fixture for compressor block of piston compressor and its behavior at dynamic condition.

•Strength of Gears required to carry the compressor block load.

•Minimize deflection required to sustain the load and braking load.

•Strength of rollers required to sustain suspension jerk and weight at the time of braking.

METHODOLOGY

1) Study of the working of existing fixture.
2) Surveying and study of speed reduction methods.
3) Selection of mechanism.
4) Design of Conceptual model on CAD software.
5) Design of gear box.
6) Analysis and validation of mechanism.
7) Optimization of mechanism.

WORK-PIECE

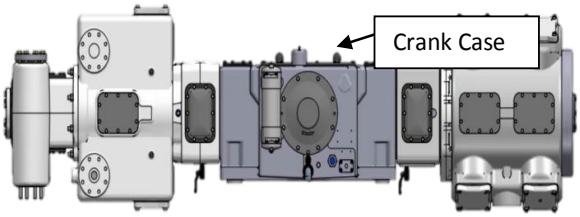

Fig.1 Workpiece to be mounted

EXISTING FIXTURE

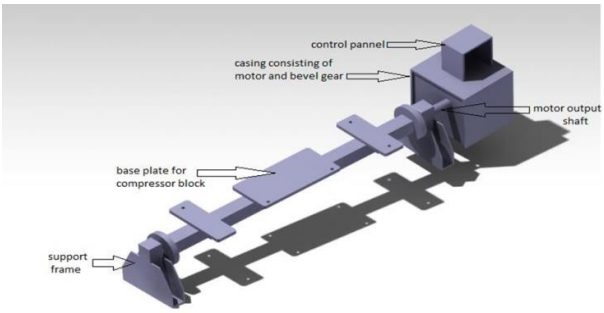

Fig.2 Existing Fixture

NEW DESIGNED FIXTURE

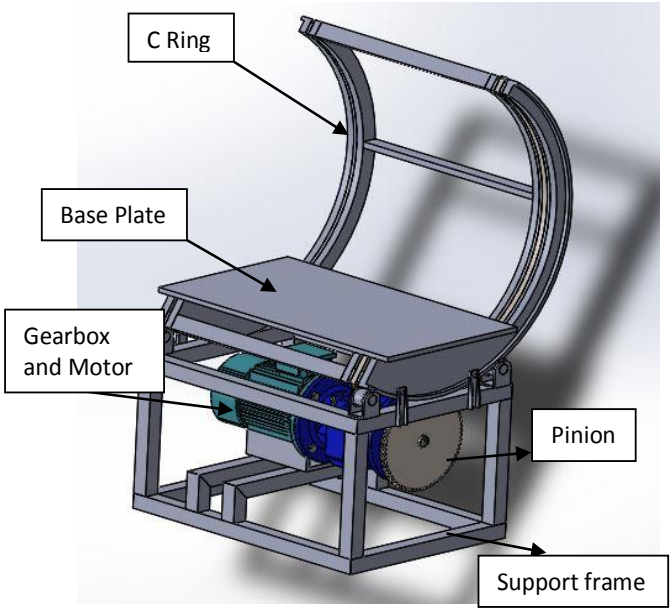

Fig. Concept Model

CALCULATIONS

As discussed in the problem statement, the compressor block, to be mounted on the fixture has max width of 920 mm. So the diameter of the output gear has to be more than that. This is for the operational and machining convenience.

4.1 Design of gear

Output speed = 2 rpm

Due to space constraints, diameter of ring gear more than 1000mm.

Selecting the diameter as 1300mm

C.D to be taken as 820 mm

Below is the explanation for above selections

As we had space constraints, that is, the center distance of the gear pair should not exceed 850mm and also for outer ring gear the diameter has to be more than 920 mm.

$$C.D = \frac{d_p + d_G}{2}$$

$$820 = \frac{D_P + 1300}{2}$$

$$\therefore D_p = 340mm$$

$$C.D = \frac{m(Z_P + Z_G)}{2}$$

$$Assuming\ M_n = 4$$

Helix angle $\propto = 32°$

$$G = \frac{d_G}{d_P} = \frac{n_P}{n_G} = \frac{Z_G}{Z_P}$$

$$G = 3.89 \approx 4$$

$$4 = \frac{n_p}{2}$$

$$\therefore n_{P=8\ rpm}$$

$$C.D = \frac{m_t(Z_P + GZ_P)}{2}$$

$$\therefore m_t = \frac{m_n}{cos\propto} = \frac{4}{\cos 32}$$

$$m_t = 4.71$$

$$C.D = \frac{m_t(z_p + Gz_p)}{2}$$

$$C.D = \frac{m_t\, z_p(1+G)}{2}$$

$$820 = \frac{4.71 \times z_p \times (1+4)}{2}$$

$$z_p = 69.63 \approx 70\ teeth$$

$$z_G = 4 \times 70 = 280\ teeth$$

S_{ut}=720 N/mm^2

$$\sigma_b = 240N/mm^2$$

$$F = \sigma_b . b . m_n . Y`$$

b= 10 m_n

$$Y` = 0.487 - \frac{2.87}{z_p`}$$

$$z_p` = \frac{z_p}{\cos^3\propto} = \frac{70}{\cos^3 32} = 114.77$$

$$z_G` = \frac{z_G}{\cos^3\propto} = \frac{280}{\cos^3 32} = 459.08$$

$$Y_p` = 0.484 - \frac{2.87}{114.77}$$

$$Y_P` = 0.4589$$

$$F_b = \sigma b_p . b . m_n . Y_p`$$

$$= 240 \times 10m_n \times m_n \times 0.4589$$

$$F_b = 1101.36\, m_n^2\ N$$

$$F_w = \frac{d_p . Q . b . k}{\cos^2\propto}$$

$d_p = \frac{m_n.2p}{cos\alpha}$

$= \frac{70 \times m_n}{\cos(32)}$ $= 82.542 m_n$ mm

Q= $\frac{2z_G}{z_p + z_G}$

Q= $\frac{2 \times 280}{70 \times 280}$ = 1.6

k=0.16× $\left(\frac{300}{100}\right)^2$ …for steel

k=1.44

$F_w = \frac{82.542 \times m_n \times 10\ m_n \times 1.6 \times 1.44}{\cos^2 32}$

$F_w = 2693.75\ m_n^2$

➢ **Design by Pitting failure:**

$F_{eff} = \frac{k_a . k_m . F_t}{k_v}$

k_a=1.5 … (Service factor)

k_m=1

$F_t = \frac{P}{V}$

P= 45×10³ N … (weight of component+ fixture)

V= 3.457 m_n, mm/sec

$F_t = \frac{45 \times 10^3}{3.457\ m_n}$

$K_v = \frac{5.6}{5.6 + \sqrt{v}}$

$K_v = \frac{5.6}{5.6 + \sqrt{3.457 m_n}}$

$K_v = \frac{5.6}{5.6 + 1.85\sqrt{m_n}}$

$F_{eff} = \frac{k_a . k_m . F_t}{k_v}$

$F_{eff} = \frac{1.5 * 1 * \frac{13017.06}{m_n}}{\frac{5.6}{5.6 + 1.85\sqrt{m_n}}}$

$F_{eff} = \frac{16.812 * 10^3 (5.6 + 1.85\sqrt{m_n})}{m_n}$

$F_{eff} = \frac{(94.151 * 10^3) + 2263.93\sqrt{m_n}}{m_n}$

Taking FOS= 2

F_w= FOS * F_{eff}

$2893.75 \times m_n^2 = 2 * [\frac{(94.151 * 10^3) + 2263.93\sqrt{m_n}}{m_n}]$

∴ m_n = 4.03

M_n= 4 mm

b= 10m_n = 40mm

$d_p = m_t . z_p = \frac{m_n}{cos\propto} . z_p$

$d_p = \frac{4}{\cos 32} . 70$ = 330.1mm

$d_G = m_t . z_G$= 4.71*280

d_G =1315.6 mm

d_G= 1316 mm.

h_a =1 m_n = 4mm

h_f = 1.25 m_n 5mm

C.D = $\frac{d_p + d_G}{2} = \frac{1316 + 330}{2}$

C.D = 823 mm.

4.2 Selection of motor

Torque required to rotate the ring gear assembly:

T= Ff * r1

Frictional losses between ring gear assembly and rollers (4 nos.) is considered as 19%

F_f= W * 1.20

F_f= 4500 * 1.20

F_f= 5400 kg

T= F_f * r1

T= 5400 * 165

T = 891000 kg-mm

T = 8910 N-m

Speed Calculations:

$\frac{Ng}{Nr} = \frac{R_1}{R_{ring}}$

$\frac{2}{N_r} = \frac{170}{650}$

N_l = 7.89 Approximately 8 rpm

Power = $\frac{2\pi NT}{60}$

Power = $\frac{2\pi * 8 * 8910}{60}$

Power = 7.5 kW

The power transmitted is 7.5 kW at pinion speed of 8 rpm.

ACTUAL MANUFACTURED FIXTURE

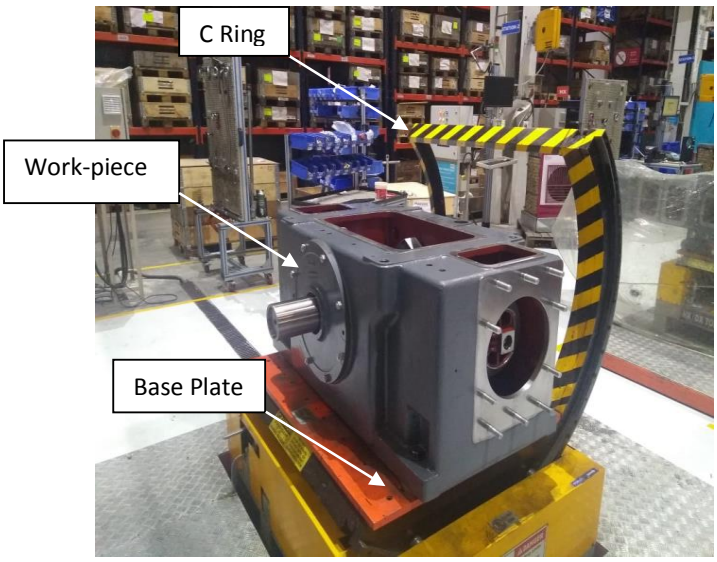

Fig. Actual Manufactured Fixture

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Using DC Injection Braking To Stop 3 Phase Induction Motor Connected With High Load (May 2019)

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ABSTRACT There are number of applications in the real-life scenario where one needs frequent start and stop of the machine running on electric motor. The motors in such machines continues to rotate even after the power supply is cut off due to inertia which is generated because of high load that is coupled to the motor. In order to reduce and stop these motors as per requirement, different braking techniques are used. These braking techniques can be classified as mechanical and electrical braking. In mechanical braking the speed of the motor is purely reduced by using various mechanical braking. Whereas in the electrical braking reverse torque is generated. In comparison with electrical braking, mechanical braking has many disadvantages, and hence electrical braking is preferred over mechanical braking. Dynamic braking is one of the electrical methods for stopping a 3 phase induction motor connected to high load within fraction of seconds. Stopping of motor is achieved by connecting it with Dc Injection Unit a type of dynamic braking immediately after it is turned off, and thereby rapidly stopping the motor.

INDEX TERMS; Dynamic braking, motors, DC Injection.

1. INTRODUCTION

Brake is a device used to generate an artificial frictional which is applied to moving member of machine, for stopping motion. For execution of braking operation, the brakes pad and disc absorb the kinetic energy from wheel. Braking systems are used for motor , electrical vehicle and IC engine vehicle for reduction of speed as required. In order to make it possible various braking techniques are used. These techniques are broadly classified into two types:

Mechanical Braking: - Drum brakes, Disk brakes, Band brakes, Pawl and Ratchet brakes

Electrical Braking: - Dynamic braking, Regenerative Braking, Plugging type braking.

Comparison between Electrical And Mechanical Braking Systems:

a. Electrical braking systems are used for functional braking (controlling the speed; bringing the load to standstill). Mechanical braking systems are used for emergency stopping.

b. Electrical braking is usually very smooth and comfortable. Mechanical braking is usually rough and uncomfortable.

c. No wear results from electrical braking. Mechanical braking on the other hand causes wear in the braking components and requires regular maintenance.

d. The electrical braking system cannot be used as a safety device. Most systems will require a mechanical braking system as a backup safety device.

A. SYSTEM UNDERSTANDING:

DC voltage is applied to the motor stator windings, creating a stationary magnetic field which applies a static torque to the rotor. This slows and eventually halts the rotor completely. As long as the DC voltage is applied to the windings, the rotor will be held in position and resistant to any attempt to spin it. In a thyristor-controlled injection braking unit, the DC voltage to be injected into the motor stator winding is obtained by rectifying the supply voltage. Two thyristors are connected as a phase controlled rectifier (PCR). The braking torque depends on the magnitude of the current, which can be varied by phase control of the of the thyristors. The DC current is set by a timer to continue for a few seconds, and then is switched off. The braking current decays, and after a delay of about 1.5 seconds the braking relay contactor opens again. At this point the motor can be restarted. In such a unit, there are typically two potentiometers, one to vary the braking torque from the firing circuit and the other to vary the time.

Literature has reported mainly two techniques of braking system for induction motor: the first is friction braking and the second is electrical braking like the dynamic, the reverse voltage (or plugging) and the regenerative ones. Essentially, braking is one mechanism to create a retarding torque by the removal of stored kinetic energy from a mechanical part of the system. The aim of this project was to improve the DC injection braking mechanism through a designed system separately connected and completely independent from the actual drive motor.

B. OPERATING PRINCIPLE:

When power is disconnected from the motor, the rotor spins freely until friction slows it to a stop. Large rotors and loads with a high moment of inertia may take a significant amount of time to stop through inherent friction alone. To reduce downtime, or possibly as an emergency safety feature, DC injection braking can be used to quickly stop the rotor.

A DC injection brake system can be used as an alternative to a friction brake system. DC injection brakes only require a small module located with the other motor switchgear and/or drivers, mounted in a remote and convenient location, whereas a friction brake must be mounted somewhere on the rotating system. Friction brakes eventually wear out with use and require replacement of braking components. DC brake modules do not have consumable parts and should not require maintenance. Friction brakes also require a method of actuation, requiring either a human operator or system controlled actuator, adding to the complexity of the system. A DC brake is easily integrated into the motor control circuitry.

Actually, the amount of braking torque is dependent on the amount of current injected into the motor, the slip as well as the motor class. The higher the DC level, the faster braking will be. But, in order to allow the induced motor's voltage to drop at a safe level, our module accurately and independently control the DC injection in terms of current.

Once the machine has come to rest, the controller disconnects the DC supply from the motor; the motor then remains in a passive state until it is deliberately re-started.

In an event of a potential accident, safety is assured by the DC injection braking, instantly cutting the AC supply to the motor and simultaneously injecting a predetermined amount of DC to bring the induction machine rapidly to rest within 10 seconds.

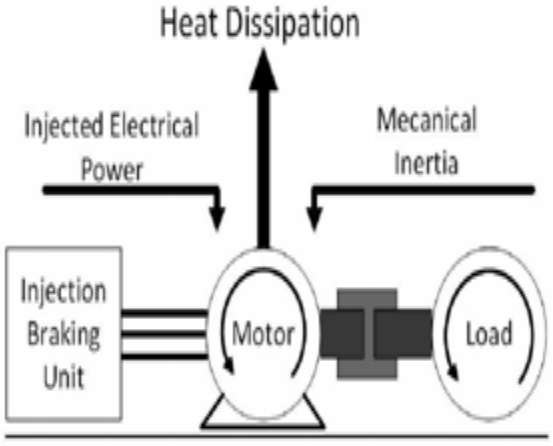

Fig. 1. Operating Principle

At this level, the direct current injection in to the stator induces a static magnetic field. From the motors air gap point of view and as the motor is disconnected, the static magnetic field opposes the rotating magnetic field stored by the rotor. From Lorentz law, we know that the interaction of the two fields creates a braking torque that resists the motion of the rotor by slowing it down and generates a voltage across the rotor conductors which is explained by Lentz law.

The disadvantages of this method are limitation of the maximum braking torque due to high call of current, the excess of motor heating and none-development of a holding torque at stop. Accordingly, it is recommended to adapt this technique only for emergency braking purposes and not for repetitive braking applications.

C. CALCULATONS:

i. Starting Torque of the motor connected to Centrifugal Separator-

The consumed electrical power of the motor is defined by the following formula:

$$P_{in} = I \times V$$

Where,

Pin – input power, measured in watts (W);
I – current, measured in amperes (A);
V – applied voltage, measured in volts (V)

Output mechanical power of the motor could be calculated by using the following formula:

$$P_{in} = \tau \times \omega$$

Where
Pout – output power, measured in watts (W);
τ – torque, measured in Newton meters (N•m)
ω – angular speed, measured in radians per second (rad/s).
It is easy to calculate angular speed if you know rotational speed of the motor in rpm:

$$\omega = \frac{2\pi N}{60}$$

where

ω – angular speed, measured in radians per second (rad/s);

N – rotational speed in revolutions per minute;

Hence,

$$T = \frac{hp \times 5252}{N} = \frac{5.5 \times 5252}{2880}$$

= 10.029 lbs-ft

= 12 N-m.

ii. Braking Torque Applied by DC Injection Unit-

a. CURRENT ESTIMATION.

- C=25% OF MOTOR OPERATING CURRENT(8.86Amp)
- I=10 times the C=C*10=2.215*10=22Amp.
- T=Stoppage time is 12 min earlier.
- As per the study if supplied dc current is doubled the duration needed is 2.82 times lesser.
- T1=T/2.82=4.25min.

b. BRAKING TORQUE

$$T = \frac{hp \times 5252}{N} = \frac{12.06 \times 5252}{2880}$$

= 20 lbs-ft

= 22 N-m.

D. WORKING & LAYOUT OF DC INJECTION UNIT.

A DC voltage is applied to the motor stator windings, creating a stationary magnetic field which applies a static torque to the rotor. This slows and eventually halts the rotor completely. As long as the DC voltage is applied to the windings, the rotor will be held in position and resistant to any attempt to spin it. The higher the voltage that is applied, the stronger the braking force and holding power. The DC current should only be applied for a few seconds or the motor will overheat.

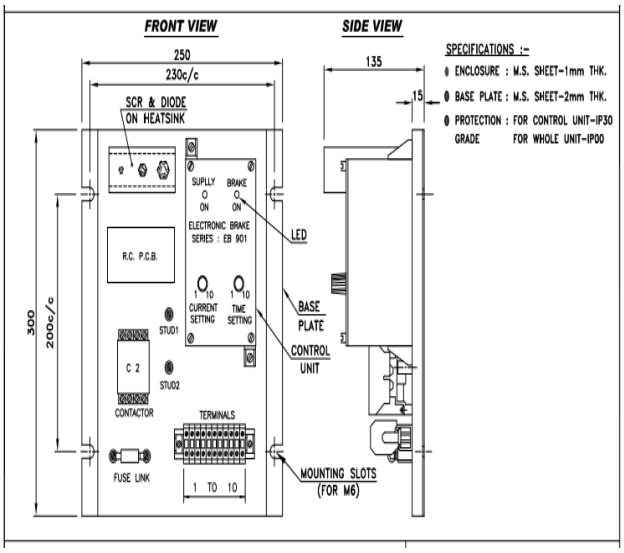

Fig. 2. Layout for DC injection braking system

E. CONNETION DIAGRAM WITH CENTRIFUGAL SYSTEM.

Fig. 3 shows the connection of DC injection circuit with centrifugal separator unit.

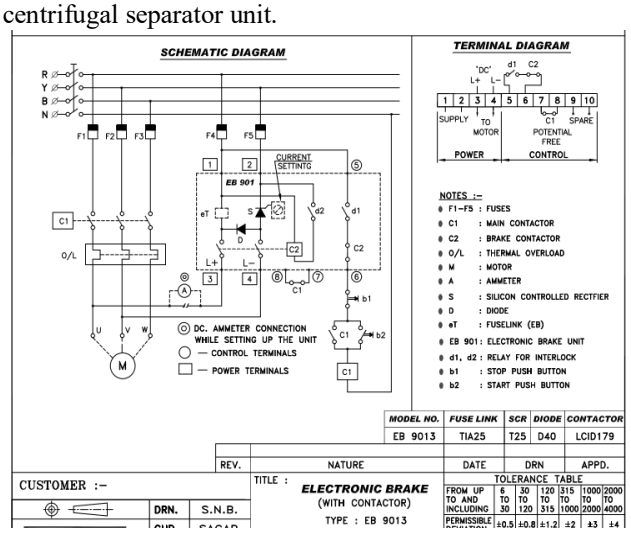

Fig. 3. Connection Diagram With Centrifugal System

F.RESULTS

i. EXPECTED RESULT BY THEORITICAL APPROACH

SR.NO.	SPEED (RPM)	STOPPING TIME (MIN)
1	2880	0
2	2500	0.75
3	2000	1.25
4	1500	1.75
5	1000	2.25
6	500	2.75
7	0	4

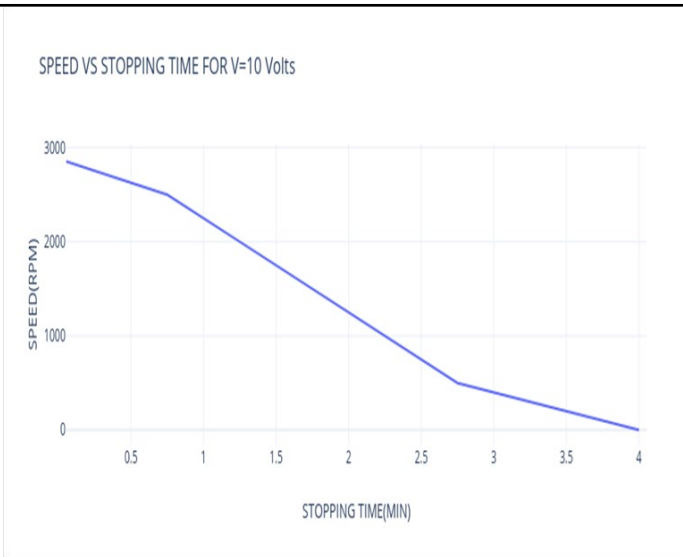

Fig. 4. Speed Vs Stopping time (10 Volts)

As per the theoretical calculations the expected stopping time of the motor was 4 minutes, by using the method of DC INJECTION braking. The graph of speed vs. stopping time shown in the fig. above represents the same.

ii. PRACTICAL RESULT OBTAINED WHEN VOLTAGE SUPPLIED WAS V= 5 Volts

SR.NO.	SPEED (RPM)	STOPPING TIME (MIN)
1	2880	0
2	2500	2
3	2000	4.5
4	1500	7.5
5	1000	9.5
6	500	11.5
7	0	13.4

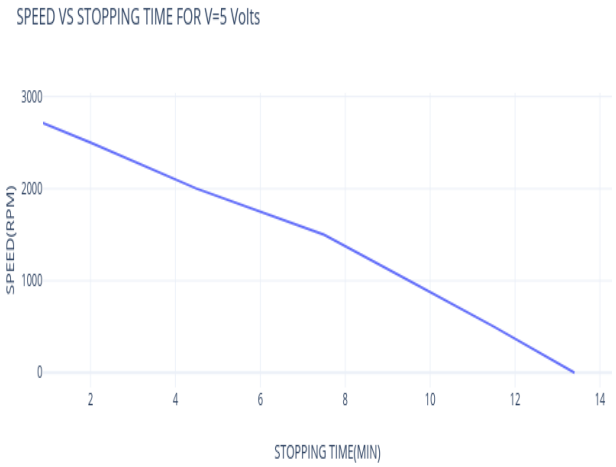

Fig. 5. Speed Vs Stopping time (5 Volts)

This graph is plotted after the practical application of DC Injection braking on separator system. The separator unit without application of dc injection braking takes about **14.3 minutes** to stop, and with the application of the dc injection braking it takes about **13.4minutes** to stop.

iii. PRACTICAL RESULT OBTAINED WHEN VOLTAGE SUPPLIED WAS V= 10 Volts

SR.NO.	SPEED (RPM)	STOPPING TIME (MIN)
1	2880	0
2	2500	2
3	2000	4.5
4	1500	7.5
5	1000	9.5
6	500	11.5
7	0	13.4

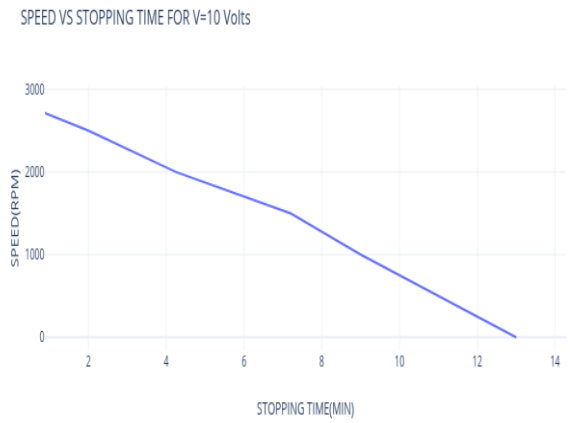

Fig. 6 Speed Vs. Stopping time (10 Volts)

This graph is plotted after the practical application of Dc Injection braking on separator system. The separator unit without application of dc injection braking takes about **14.3 minutes** to stop, and with the application of the dc injection braking it takes about **13 minutes** to stop.

G. CONCLUSION:

Dynamic braking is one of the most important braking techniques used for motor braking .Dynamic braking can be used to slow both direct and alternating current motors. Dynamic braking is sometimes referred to as magnetic braking because in both instances it employs the use of magnetic fields to slow the rotation of a motor. The advantage of dynamic braking is that there are no mechanical brake shoes to wear out. The disadvantage is that dynamic brakes cannot hold a suspended load. Although dynamic braking can be used for both direct and alternating current motors, the principles and methods used for each are very different. Dynamic braking is generally the use of the electric motors as generators when slowing the machine speed. It is termed rheostatic if the generated electrical power is dissipated as heat in brake grid resistors, and regenerative if the power is returned to the supply line. In conclusion, dynamic braking is a tremendous concept developed by engineers which makes the immediate and frequent motor braking under different or emergency conditions as required**.**

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Studying the deburring process of gears and develop smarter solution to reduce time and labour effort consumption

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ABSTRACT

The main aim of this work is to provide automatic mechanism for the "Deburring process" of Internal and External teeth of a gear in less time. For this purpose there are two motors in the system which plays crucial part. Indexing motor helps to rotate the gear, on which the deburring process will be done. The other motor RS-775 will rotate the deburring tool at certain rpm and will keep contact with the area of the gear where the burr is present. Both the motor will work simultaneously and perform the deburring process. We can control the speed of RS-775 motor using speed regulator. Simple arm is provided in the system, on which the RS-775 motor is fixed. Gear is placed below the RS-775 motor, which will rotate by indexing motor. A Pneumatic Cylinder is used to lift the arm after completion of the operation. It is placed below the arm.

INDEX TERMS: burr, deburring process, gear deburring, pneumatic arm lifter, semi automated system

1.INTRODUCTION

BURR

A burr is a raised edge or small piece of material remaining attached to a workpiece after a machining process. It is usually an unwanted piece of material and is removed with a deburring tool in a process called deburring. Burrs are most commonly created by machining operations, such asgrinding, drilling, milling, turningorbroaching.It may be present in the form of a fine wire on the edge of a freshly sharpened tool or as a raised portion of a surface; this type of burr iscommonly formed whena hammer strikes a surface. Deburring accounts for a significant portion of manufacturing costs. Burrs are sharp edges resulting from cutting and stamping operations. Althoughusually small in size, burrs can cause assembly problems, interfere with fluidflow, and are a common cause of worker injury. Burrs can also cause increased stresses and subsequent fatigue failure of the part.Burr removal, or "deburring", is a standard practice associated with virtually every segment of the manufacturing process.

TYPES OF BURRS:-

1) Roll-over Burr- The rollover burr is the most common type of burr. It is basically a chip that is bent rather than sheared, resulting in a comparatively large burr. This type of burr is also known as an exit burr because it is usually formed at the end of a cut in face-milling.

2) Tear Burr- A tear burr is the result of material tearing loose from the workpiece rather than shearing.

3) Cut-off Burr- The cut-off burr is a projection of material left when the workpiece falls from the stock before the separating cut has been completed.

4) Poisson Burr- The Poisson burr is a result of a material's tendency to bulge at the sides when compressed, causing permanent plastic deformation.

PROBLEM STATEMENT

The deburring process in case, internal gear performed manually consumes more time and also manpower required for the process is more.
We have gear having internal gear with buss as shown in figure b.

Figure b. Burr on Internal gear

OBJECT OF SYSTEM

- The object of the system and technique is to provide an Automatic system for the "Deburring process" of internal teeth & external teeth of a gear & replace it with the traditional methods.
- Another object of the system is to provide a solution which gives more Accurate & Precise finishing to the teeth of gear.
- Another object of the system is to reduce the time required for the "Deburring process".
- Another object of the system is to reduce the labour consumption for "Deburring process".
- Another object of the system is to ensure workers safety & eliminate the chances of damage to the gears.

SUMMARY OF THE SYSTEM

According to this System there is provided an Automatic system which performs the process called as "Deburring process" on the Internal as well as External teeth of a gear.
In this a powerful DC motor with high RPM & Torque is used for rotating a deburring tool which grinds the teeth & hence removes the burr. The diameter of the motor shaft should be big enough so that it won't break or Fail during operation. For controlling the speed of this motor a suitable VOLTAGE REGULATOR (PWM) is used.
An AC MOTOR is used for the Indexing purpose i.e. rotating the gear with uniform velocity so that every tooth on the gear is deburred. The speed of this motor should be very less for good finishing. The Initial Torque of the motor need not to be very high as it will increase once the RPM is reduced. For controlling its speed suitable VARIABLE FREQUENCY DRIVE (VFD) is used. The selection of this VFD is based on the Frequency of the motor.
Once the operation is completed, a PNEUMATIC CYLINDER lifts the arm connected to the motor for making system ready for next operation. A pneumatic cylinder is a linear actuator that works with compressed air. The main parts of cylinder are piston, piston rod, cylinder tube, gaskets and seals. Single acting

PREVIOUS METHODOLOGY

Due to milling and broaching processes performed during formation of gear teeth, there is also some burr present on the gear teeth. For deburring purpose, unique gauge for each standard size of gear was passed through the gear teeth. Due to passing of gauge through the gear, the roll over burr present on the gear teeth loosened. Further, other worker manually filed the teeth of gears to remove the burr present in the gear tooth and the burr is thrown out by passing pressurized air over it. All these processes required human efforts and more time was consumed. Some deburring machines which are semi-automated provide a small chamfer on the gear tooth which is not a part of design of the gear, so such deburring method was ineffective. Due to this, the gears deburred in such a way could be rejected. The above movement track cannot satisfy the requirements for the operation.

cylinders also have a spring inside the cylinder. A single acting cylinder works with compressed air to actuate the piston in one direction, and spring force to return to the base position. The cylinder has one port that is used for both purposes, to supply and vent the compressed air. To control the cylinder, a 3/2-way valve is used. 3/2-way means three ports and two positions: one port connects to the source of compressed air, one port is required as exhaust and the third port connects to the cylinder.

FEATURES OF THE SYSTEM

1. Multiple angle combination gives best performance with a particular angle set: Angle 1 is the angle between the vertical column and the arm while angle 2 is between T-joint inclination towards surface and angle 3 is the tool angle according to finishing angle.
2. Combination of pneumatic arrangement and exhaust air strikes on internal gear of previously deburred gear which acts like a pneumatic gun by using special arrangement which helps to clean the burr on gear after deburring.
3. Concurrent working of diamond coated finished tool, cutting tool and another finishing tool like sand tool; all these type of tools work with self weight and gravitational force and deburr the unfinished material curical corners or parts such that the quality of finishing changes on changing the weight of the arm.

2.EXPERIMENTAL SETUP

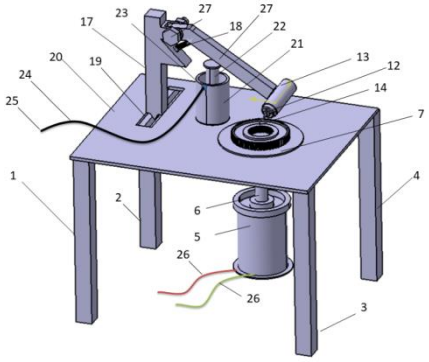

Figure d. CAD modelling of deburring machine

Figure f. Working prototype of deburring machine

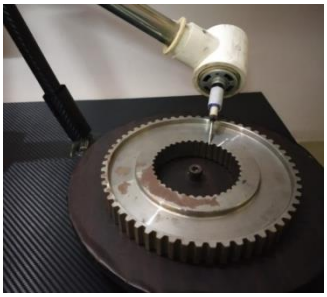

Figure g. Tool position while deburring gear tooth

CONCLUSION

The main aim of the above study is to understand the nature of internal, external gear deburring and finishing. This semi automated system integrated idea once developed has a lot of scope for the future development for industry, when it comes to help in automating the entire manufacturing line in the industry. It helps to improved productivity. Reduce the required time for the finishing as compare manual solution and also reduces the labour effort consumption.Hence, there is a rapidly growing market for this technique.

ACKNOWLEDGEMENT

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REVIEW ON COMPARATIVE ANALYSIS OF BALL SCREW & LEAD SCREW (MAY 2019)

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ABSTRACT A ball screw uses recirculating balls to minimize friction and maximize efficiency. Design of ball screw is more complex, and requires hardened precision bearing surfaces and a ball recirculation mechanism.

A lead screw has low coefficients of friction between sliding surfaces. Lead screw is compact in size. It offers design flexibility, corrosion resistant and can be made to self-lock for vertical applications.

It is possible to design lead screw in optimum way if it is in eccentric loading. The main difference between a ball screw and a lead screw is in the way the load is carried between the moving surfaces. With the increase of screw speed, ball screw pair of noise levels are increasing, and the higher the speed, the faster sound pressure increase. Lead screw has relatively straight-forward geometry, performance and offers flexibility to be adapted to the needs of most applications. While there are many applications that require the high stiffness, thrust capacity and absolute accuracy of ball screws.

KEY WORDS **Lead screw, ball screw, threads, efficiency, accuracy, friction**

1. INTRODUCTION

1.1. Lead screw

Lead screws are threaded rods that are fitted with a nut. There are many types of threads used, but commonly used in industry is the Acme lead screw. Because the ACME thread is an industry standardized thread style, it is easily interchanged with parts from various manufacturers. The basic function of a screw is to convert rotary input motion to linear output motion. The nut is stationary and as the screw rotates, the nut moves forward and backward. Lead screw drive systems are available in a variety of sizes and tolerances. Contact is primarily sliding, resulting in relatively low efficiency and a wear rate proportional to usage[6].

1.2. Details of lead screw

i. Lead screws can operate at 100% duty cycle at light loads and moderate speeds, or they can run at lower duty with either high load and low rpm or low load and high rpm, but not both.
ii. Lead screw has more backlash as compared to ball screw.
iii. The previously referenced PV factor is the product of the pressure and velocity between the nut and screw. It helps to determine the load, speed and duty cycle that the nut can handle.
iv. Lead screw is to move the turret lathe by a précised increment for every rotation of the screw. As a result of this it allows the machine to generate threads on a work piece and helps in generating precise dimensions, and also to maintain a constant rate of metal removal[6].

1.3. The advantages of a lead screw are as follows

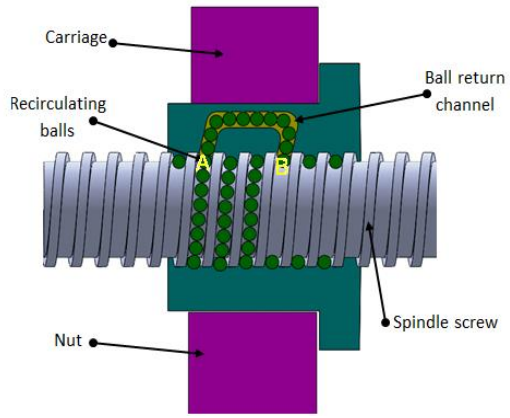
i. Large load carrying capability
ii. Simple to design.
iii. Easy to manufacture and no specialized machinery is required.
iv. Precise and accurate linear motion.
v. Smooth, quiet in operation.
vi. Low maintenance.
vii. They are self-locking.

1.4. The disadvantages of a lead screw are as follows

i. They have poor efficiency.
ii. Due to high friction between nut and screw, wear and tear is high.

2. RECIRCULATING BALL SCREW

The ball screw drive is an assembly that converts rotary motion to linear motion. It consists of a ball screw and a ball nut package as an assembly with recirculating balls. The interface between the ball screw and the nut is made by balls. With rolling elements, the ball screw drive has a very low friction coefficient, so the efficiency is greater than 90%. The forces transmitted are distributed over a large number of balls, giving a low relative load per ball comparatively [2]. Ball screw system is one of critical components in the advanced manufacturing with high accuracy requirement. Example- It is mostly used in CNC machine.



2.1. Advantages of recirculating ball screw

i. They have very high efficiency (greater than 90%).
ii. No stick and slip phenomenon which results in durability.
iii. It has negligible wear and tear.
iv. It requires less starting torque.
v. They can be used for high speed operations.
vi. They can be easily preloaded to eliminate backlash.
vii. Noiseless operation.
viii. They have high reliability and durability.
ix. Their load carrying capacity is more than power screw of the same size[6].

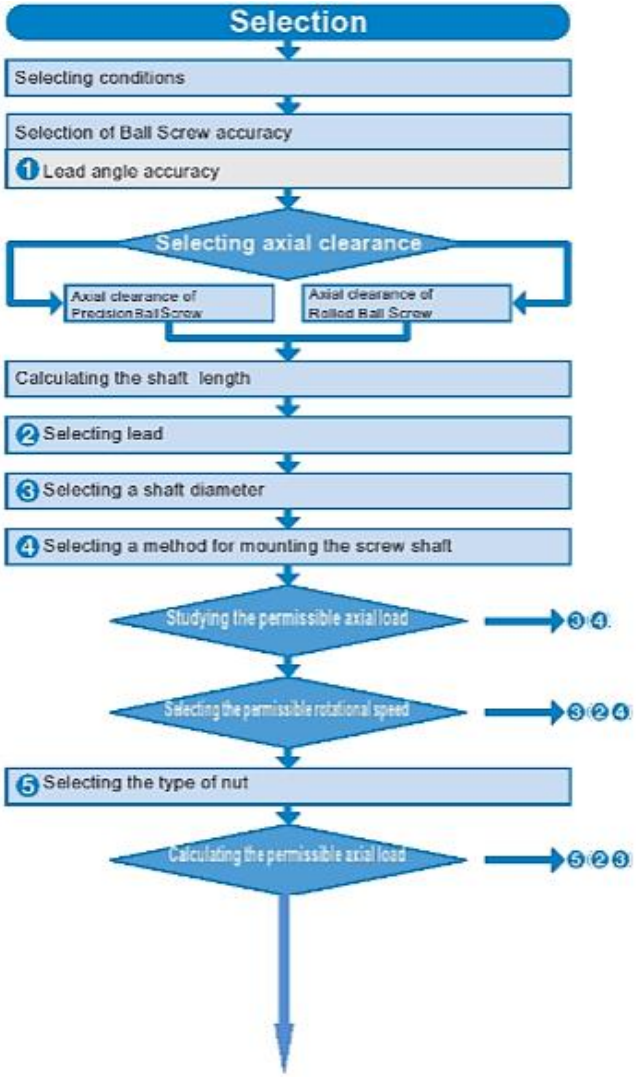
2.2. Disadvantages of recirculating ball screw

i. They are more costly than lead screw.
ii. Buckling of screw is serious problem at critical speed.
iii. They require thin film lubrication for satisfactory operation.
iv. They require periodic overhauling to maintain their efficiency.
v. They do not have self-locking properties [6].

3. METHODOLOGY

3.1 Ball screw selection

When selecting a Ball Screw, it is necessary to make a selection while considering various parameters. The following is a flowchart for selecting a Ball Screw [6].



3.2 Lead screw selection

1. Applied load

Axial load

$$F_b = f_b(\frac{d_r^4}{L_c^2}) \times 10^4$$

$F_b = maximum\ compressive(buckling)load$

$f_b = factor\ based\ on\ end\ support\ bearing$

$d_r = root\ diameter\ of\ screw\ (mm)$

$L_c = unsupported\ length\ of\ screw(mm)$

2. Critical speed

The critical speed will vary with the diameter, unsupported length, end fixity and rpm. Since critical speed can also be affected by shaft straightness and assembly alignment, it is recommended that the maximum speed be limited to 80% of the calculated critical speed.

$$n_c = f_c(\frac{d_r}{L_c^2}) \times 10^7 (min^{-1})$$

Where, $n_c = critical\ speed\ (RPM)$

$f_c = factor\ based\ on\ end\ support\ bearing$

$d_r = root\ diameter\ of\ screw\ (mm)$

$L_c = unsupported\ length\ of\ screw(mm)$

3. PV equation

$$P = \frac{F_A}{A}$$

Where, P= pressure between screw and nut (Mpa)

$F_A = axial\ load\ on\ nut\ (N)$

A= area of contact

$$V = l_{hr}.rpm$$

Where, V=linear velocity between screw and nut (m/s)

l_{hr} = helix length per screw revolution (m)

rpm = required rotational speed of screw

4. Consider back driving

$$T_b = \frac{(F.P.\eta_2)}{2\pi}$$

Where, $T_b = back\ driving\ torque\ (Nm)$

F = Axial load (N)

P = Screw lead (m)

$\eta_2 = reverse\ efficiency$

4. LITERATURE REVIEW

Wenjing Jinet.al (2013) discuss about the methodology for ball screw component health assessment and failure analysis. In order to classify the multiple failure modes, one full size ball screw testing machine is set up to duplicate different health conditions including four failure modes lubrication starvation, preload loss, ball screw profile wear, and re-circulation system failure. In this research study, the failure modes lubrication condition and preload loss - are studied. By applying the SOMMQE and MD to calculate the distance from testing samples to the normal baseline, this research analyses the patterns of health value distribution of different failure modes and gives some pattern indications for each type of failure mode [1].

Supriya Kulkarni et.al (2015) discusses the demand for faster and more accurate feed drive systems. As tried

and tested technology, ball screw drive systems are still used in a majority of machine tools due to their low cost and high degree of stiffness [2].

Xianghong Xu and Tao Yu (2015) have done the research on Ball Screw Pair for Noise Prediction that is based on the Virtual Lab and Experimental Verification. The analysis of ball screw pair in transient dynamics model based on the virtual acoustic prediction software is done. The acoustic finite element model is established in the Lab to extract the transient dynamics analysis. It concludes that the vibration response of the ball nut pair of time domain signals, and carries on the vibration signals of Fourier transform to obtain the frequency domain. As acoustic finite element boundary conditions are imposed to the acoustic model, which using acoustic finite element method. At last, the analysis of ball screw pair of outside sound field sound pressure value and experimental verification[3].

Robert Lipsett discusses why lead screws are the best fit for many linear motion applications and how to rightly apply them. It concludes that lead screws provide a versatile and economical linear motion solution. Lead screws have relatively straight-forward geometry and performance and offer the flexibility to be adapted to the needs of most applications. The demand for higher productivity requires machine tools to have faster and more accurate feed drive systems [4].
Zhe Du et.al (2016) has done the study of Dynamic characteristics of a ball screw with a load disturbance. The dynamic character of ball screw is the key factor that influences the machining accuracy of numerical control machine tool. To improve the dynamic characteristics of the NC machine tool, it is necessary to study the dynamic characteristics of a ball screw. In this paper, the kinematics of a ball screw mechanism is studied to find the dynamic process of the drive, and the load disturbance is considered to analyze the contact deformation based on the Hertzian contact theory. The velocity relationships among the ball, screw, and nut are analyzed, and the influence of the contact deformation on the dynamic characteristics is simulated and investigated experimentally. The results show that the relationships between the contact deformation, which is affected by the material characteristics, the contact angle, and the load of nut are nonlinear. The contact deformation is a factor that cannot be ignored when considering the dynamic machining error of high-speed and high-precision machine tools [5].

CONCLUSIONS

Reciprocating ball screw has high accuracy and precision motion as compared to lead screw. It has various advantages like high efficiency, reversibility, backlash elimination and high stiffness over a lead screw. Ball screw has negligible wear and tear whereas lead screw has comparatively high wear and tear. They both are used when it is necessary to change rotary motion to linear motion. Since the balls can rotate, there's less friction in ball screw as compared to lead screw.

However, the lower friction inherent in ball screw designs means they produce less heat, and therefore, can withstand higher duty cycles than lead screws can. In fact, duty cycle is only considered in ball screw selection when determining the amount of travel that the screw will achieve in its life. On the other hand, duty cycle and heat generation must always be taken into account when selecting a lead screw.

With recirculating steel balls to support the load, ball screws have a higher load capacity than comparably sized lead screws with plastic or polymer nuts. Lead screws with bronze nuts can drive heavier loads, but as the load increases, so does friction. And higher friction means lower duty cycle. Also related to load, ball screw sizing is based on the L10 bearing life equation, which provides a statistically proven estimation of the screw's life, in meters or rotations traveled. The wear characteristics of a lead screw make life nearly impossible to predict. Lead screws with plastic nuts can be selected based on their PV value, but this gives a range of pressures and velocities that the screw can withstand; not an estimation of life.

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Design of Braking System for Go Kart Vehicle (May 2019)

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ABSTRACT Design and formulation of mathematical calculations for the braking system of Go Kart vehicle. In addition, of good air bags, suspension system, better handling and safe cornering, there is another important system i.e. braking system, without which the vehicle cannot function. It is righteous to say without the braking system in the vehicle the passenger's life is in danger therefore it plays the vital role to the manufacturing of the vehicle. Go-karts have 4 wheels and a small engine. They are widely used in racing in US and also, they are getting popular in India. Our main focus is formulating the design of the high-performance braking system having considerable stopping distance, without showing fatigue crack on Disc rotor and to meet the general safety requirement.

INDEX TERMS Braking System, Go-Kart, Mechanical, Technology, Vehicle

1. INTRODUCTION

The brake disc is typically manufactured from cast iron, however in some cases it is made up of composites, and it is connected to wheel hub. The caliper having brake pads is mounted on the rotor. In order to stop the vehicle the brake pads must force towards the disc.

The force applied on brake pads is generally in three ways such as hydraulic, pneumatic and mechanical. Friction causes the disc and connected wheel to slow or stop.

Brakes convert motion into heat, and if the brakes get too hot, they become less effective and this phenomenon is called as brake fade. Disc brake development and it's utilize began in European nation in 1890's. Disc brakes provide higher stopping performance. A brake consists of a cast iron disc clamped to the wheel center and a fixed housing is mounted on brake disc called as caliper.

2. BACKGROUND OF BRAKES

Most brakes commonly use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed. For example, regenerative braking converts much of the energy to electrical energy, which may be stored for later use.

Since kinetic energy increases quadratically with velocity , an object moving at 10 m/s has 100 times as much energy as one of the same mass moving at 1 m/s, and consequently the theoretical braking distance, when braking at the traction limit, is 100 times as long. In practice, fast vehicles usually have significant air drag, and energy lost to air drag rises quickly with speed. Friction brakes on automobiles store braking heat in the drum brake or disc brake while braking then conduct it to the air gradually. When traveling downhill some vehicles can use their engines to brake.

When the brake pedal of a modern vehicle with hydraulic brakes is pushed against the master cylinder, ultimately a piston pushes the brake pad against the brake disc which slows the wheel down. On the brake drum it is similar as the cylinder pushes the brake shoes against the drum which also slows the wheel down.

3. TYPES OF BRAKES

A. Frictional

Frictional brakes are most common and can be divided broadly into "shoe" or "pad" brakes, using an explicit wear surface, and hydrodynamic brakes, such as parachutes, which use friction in a working fluid and do not explicitly wear.

Drum brakes generally can be found on older car and truck models. However, because of their low production cost, drum brake setups are also installed on the rear of some low-cost newer vehicles. Compared to modern disc brakes, drum brakes wear out faster due to their tendency to overheat.

B. Pumping

Pumping brakes are often used where a pump is already part of the machinery. For example, an internal-combustion piston motor can have the fuel supply stopped, and then internal pumping losses of the engine create some braking. Some engines use a valve override called a Jake brake to greatly increase pumping losses. Pumping brakes can dump

energy as heat, or can be regenerative brakes that recharge a pressure reservoir called a hydraulic accumulator.

C. Electromagnetic

Electromagnetic brakes are likewise often used where an electric motor is already part of the machinery. For example, many hybrid gasoline/electric vehicles use the electric motor as a generator to charge electric batteries and also as a regenerative brake.

Electromagnetic brakes slow an object through electromagnetic induction, which creates resistance and in turn either heat or electricity. Friction brakes apply pressure on two separate objects to slow the vehicle in a controlled manner.

Types On the basis of mode of operation.
-Air brakes
-Electric brakes
-Hydraulic brakes
-Mechanical brakes
-Vacuum brakes

4. COMPARISON

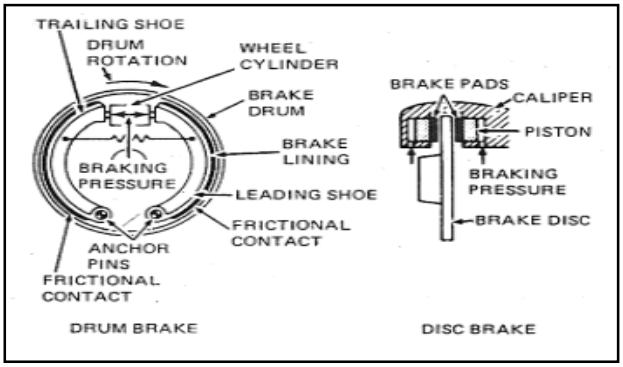


FIGURE 1. **Comparison between Drum and Disc Brakes**

TABLE I
COMPARISON BETWEEN DRUM AND DISC BRAKES

Disc Brake	Drum Brake
Friction pads are flat.	Friction lining are curved shape.
Friction surface directly exposed to air cooling.	Friction occur intenally & heat dissipate by conduction & convection.
More efficiency.	Loss of efficiency.
Light in weight.	Heavier in weight.
Better & anti fade characteristics	Poor anti fade characteristics.
Frictional area of pad is less.	Frictional area of pad is made.

5. BRAKING REQUIREMENTS

The brakes should be sturdy enough to stop the vehicle with in minimum distance in an emergency. The driver should have good control over the vehicle throughout braking and therefore the vehicle should not skid. The brakes should have smart opposing fade characteristics i.e. their effectiveness mustn't decrease with constant prolonged application. The brakes ought to have well anti fade properties.

6. COMPONENTS OF BRAKING SYSTEM

A. Pedal

Manual input force that can be applied on vehicle is around 200 N to 600 N but this force is not sufficient, so to increase this force we design pedal which provides the leverage by considering leverage ratio which we have consider 5:1

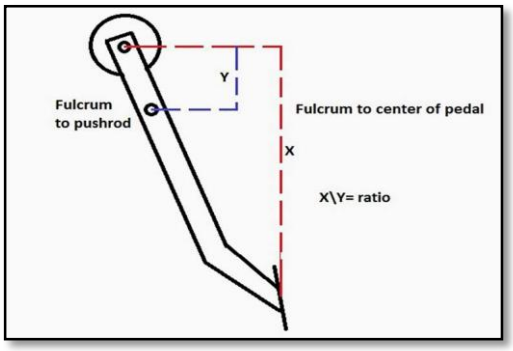


FIGURE 2 **PEDAL_1**

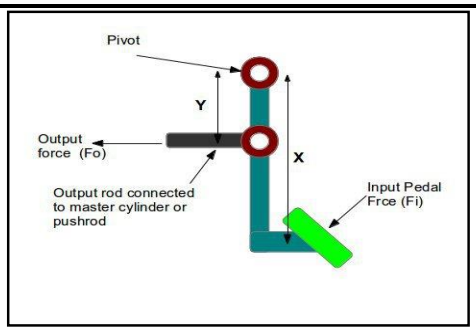


FIGURE 3. PEDAL_2

B. Master Cylinder

In automotive engineering, the master cylinder is a control device that converts force (commonly from a driver's foot) into hydraulic pressure. This device controls slave cylinders (Caliper) located at the other end of the hydraulic system.

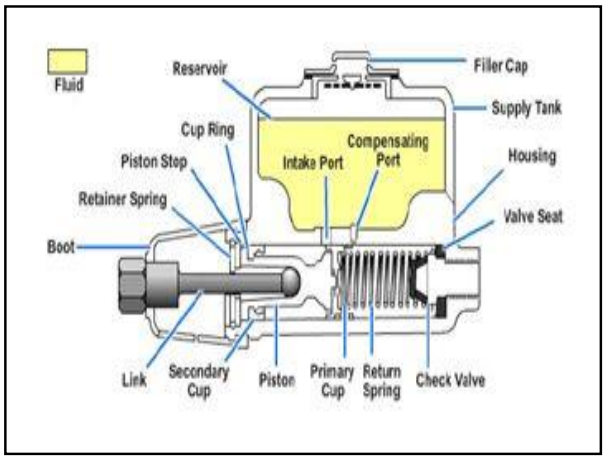


FIGURE 4. Diagram of Master Cylinder

As piston move along the bore of the master cylinder, this movement is transferred through the hydraulic fluid, to result in a movement of the slave cylinder. The hydraulic pressure created by moving a piston (inside the bore of the master cylinder) toward the slave cylinder compresses the fluid evenly, but by varying the comparative surface area of the master cylinder and each slave cylinder, one can vary the amount of force and displacement applied to each slave cylinder, relative to the amount of force and displacement applied to the master cylinder.

We are using two master cylinders, which consist of one inlet and one outlet. It consists of primary and secondary cups return spring, piston, reservoir etc. Reservoir is used as storage for brake fluid. BYBRE master cylinder is used in our braking system.

FIGURE 5. ACTUAL MASTER CYLINDER WITH RESERVOIR

C. Hoses

It is pipe which is used to connect master cylinder outlet with caliper..Brake hoses transfer the brake fluid from the master cylinder (brake fluid reservoir) to the brake calipers or wheel cylinders. When you apply the brakes, brake fluid causes the brake pads to press against the rotors, causing the car to slow down or stop.

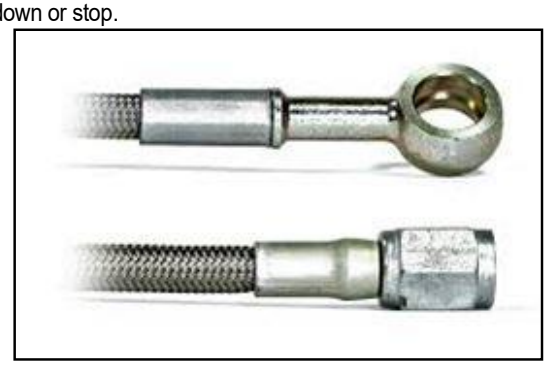


FIGURE 6. BRAKE HOSE

7. BRAKE FLUID

Brake fluid is a type of hydraulic fluid used in hydraulic brake and hydraulic clutch applications in automobiles, motorcycles, light trucks, and some bicycles. It is used to transfer force into pressure, and to amplify braking force. It works because liquids are not appreciably compressible. Brake fluids must have certain characteristics and meet certain quality standards for the braking system to work properly.

8. DESIGN

For braking system, we have used single hydraulic system working with KTM master cylinders and single pedal. One port actuates the brake calipers and one is connected to hydraulic switch for brake light indication. Braking system has a BYBRE® caliper with rotor to provide braking force.

A. Material selection

We select EN 8 material for good properties as below:

TABLE II
MECHANICAL PROPERTIES OF EN8 STEEL

Condition	Yield Stress x 10^6 Pa	Tensile Stress MPa	Elongation %

Normalized	280	550	16
Cold drawn (thin)	530	660	7

TABLE III
CARBON STEEL EN8 CHEMICAL COMPOSITION

Standard	Grade	C	Mn	P	S	Si
BS 970	EN8/080M40	0.36-0.44	0.60-1.00	0.05	0.005	0.10-0.40

C. Calculation

- Total Weight Of Vehicle
  = Mass of Vehicle x 9.81
  = 140 x 9.81
  =1373.4 N

- Static Weight On Front Axle Wf
  =140 x 0.40 x 9.81
  = 549.36 N

- Static Weight On Rear Axle (Wr)
  = 140 x 0.60 x 9.81
  = 824.04 N

- $wt = \left(\frac{a_v}{g}\right) \times \left(\frac{h_{cg}}{WB}\right) \times V_t$

  Where,
  Wt = The absolute weight transferred from the rear axle to the front axle
  G = The acceleration due to gravity
  hcg = the vertical distance from cg to ground

  Weight Transfer Wt = 199.5182 N

- Dynamic Weight On Front Axle Df
  = Wf + Wt
  = 748.8782 N

- Dynamic Weight On Rear Axle Dr
  = Wr -Wt
  = 624.5217 N

- Torque Required On Axle
  = Df x Coeff. Of Friction x Rolling Radius
  = 748.8782 x 0.6 x 0.8777
  = 394.3742 Nm

- Master Cylinder Input Force (Fmc)
  = Pedal Force x Leverage Ratio
  = 85 x 5
  = 425 N

- Master Cylinder Pressure
  = Fmc / Amc
  = 2.7611 MPa

- Clamping Force (Fcal)
  = Pmc x Acal x No. Of Piston
  = 5595.775 N

- Rotating Force
  = CF × Number Of Caliper Pistons × Coefficient Friction Of Brake Pads
  = 4476.620 N

- Braking Torque (Tn)
  = Rotating Force × Effective Disc Radius
  = 335.7465 Nm

- Braking Force
  = (Braking Torque /Tire Radius) × 0.8
  = 1442.0037 N

- Deceralation
  F = -ma (-ve sign indicates force in opposite direction)

  a = -BF/m
  = 10.3000 m/s^2

- Stopping Distance:
  $v^2 - u^2 = 2 \times a \times d$
  (v = 0 , u =80 kmph = 22.2222 m/s)

  Stopping Distance (d) = 3.3710 m

9. DRAFT IMAGES

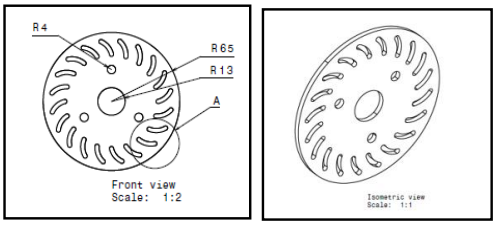


FIGURE 7. DISK DRAFTING

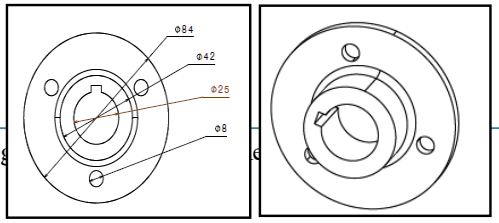


FIGURE 8. HUB DRAFTING

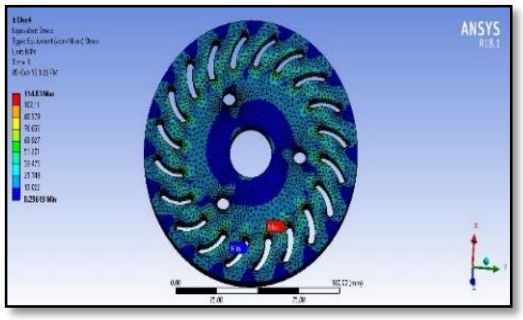


FIGURE 9. G.I. DISK STRESS

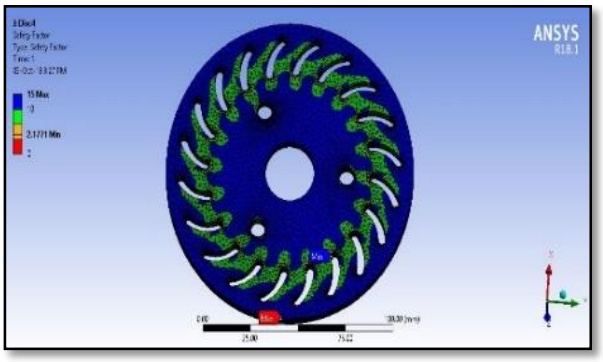


FIGURE 10. G.I. DISK DEFORMATION

FIGURE 11. G.I. DISK FOS

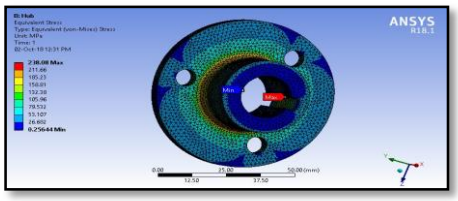


FIGURE12. HUB STRESS

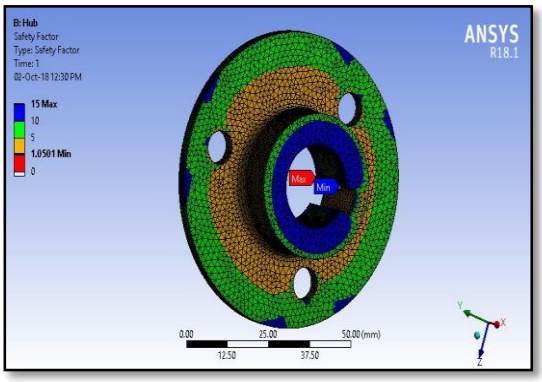


FIGURE 13. HUB FOS

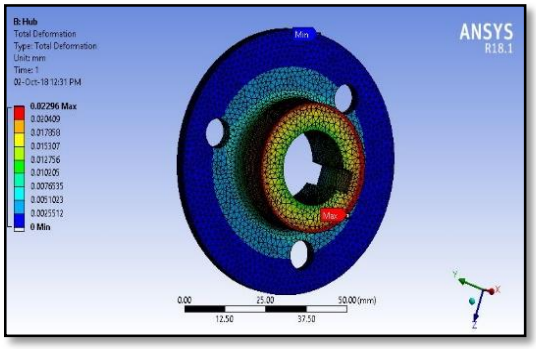
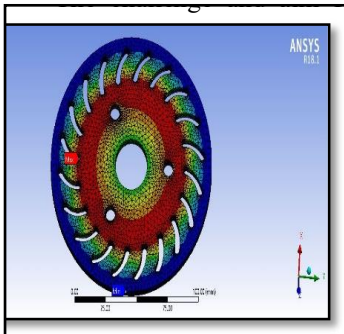


FIGURE 14. HUB DEFORMATION

CONCLUSIONS



chance of failures and to reduce stopping distance. Many aspects of the fabrication will require much more time and attention to them have already been anticipated. A project of this magnitude requires excessive man hours and continues to extend far beyond the requirements. The team has started well in advance in order to give more stress on practical testing, the team is confident with the work that has been completed so far and is sure that they will successfully complete & compete in the competition.

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Design and analysis of Braking and Rollcage sub-system for an all-terrain vehicle (May 2019)

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ABSTRACT Safety is the main aspect of automobile engineering. Effective braking system along with good suspension and a rigid chassis is very important to determine the performance of a vehicle. The objective of this work is to design and analyze two major sub-systems that is the braking system and rollcage system for an all-terrain vehicle. This analysis is further used to select the best material for rollcage and find critical stress areas with help of software like ANSYS. Good brakes can improve your overall abilities by allowing much better control of the vehicle at all the times. Finally, with the recent dramatic increase in the popularity of "racing" forms of wheeling competition, good brakes have become much more important.

INDEX TERMS Brake Caliper, Brake System, Rollcage

1. INTRODUCTION

A brake is a mechanical device which inhibits motion, slowing or stopping a moving object or preventing its motion. Most brakes commonly use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed. For example regenerative braking converts much of the energy to electrical energy, which may be stored for later use. Other methods convert kinetic energy into potential energy in such stored forms as pressurized air or pressurized oil. Main Function Of Braking System:

1. To stop the vehicle safely in shortest possible distance in case of emergency.
2. To Control the vehicle when it is descending along the hills.
3. To keep the vehicle in desire position after bringing it in complete rest when there is no driver.

We would be designing the braking system for an all-terrain vehicle. The vehicle would be participating in various events such as BAJA SAEINDIA, MEGA ATV. Hence the braking system would be designed keeping above events in mind.

Rollcage is the structural element of the vehicle. It provides safety to the driver while operating on the torturous terrain and is a place where all the other sub-system is installed and work simultaneously. The rollcage is designed so that it satisfies all the rules mentioned by the rulebook provided by the event. The weight of the rollcage should be as minimum as possible but must be sufficiently rigid to protect driver during any mishap. Low weigh improves vehicle performance like acceleration, handling, suspension traction etc.

1.1 OBJECTIVEs

1. To produce enough BRAKING TORQUE to bring the buggy to stop.
2. Lock all 4 wheels once the brakes are applied without any lag.
3. Reduces the stopping distance.
4. Increase the performance of vehicle without increasing the weight of the system.
5. Provide full safety to the driver, by obtaining required strength and torsional rigidity, while reducing weight through diligent tubing selection.
6. Design for manufacturability, as well as cost reduction, to ensure both material and manufacturing cost are competitive with SAE vehicles.
7. Improve driver comfort by providing more lateral space and leg room in the driver compartment.
8. Maintain ease of serviceability by ensuring that rollcage member do not interfere with other system.

2. DESIGN

2.1 DESIGN OF BRAKES

Each component in a properly functioning brake system must work in harmony with the other components for us to achieve maximum braking performance. We will cover each component; it's selection, modification, and integration into the 'system'. For now, the basic components of a 4-wheel disc-brake system are:

1. A pedal mechanism – for the driver to actuate the brakes. Also acts as a lever that serves to multiply the driver's input via the "pedal ratio".
2. A master cylinder (MC) & reservoir – contains hydraulic brake fluid to actuate the brake calipers and a piston to move and pressurize that fluid.
3. Hydraulic lines – to convey the brake fluid to the brake calipers, and contain the hydraulic fluid, allowing it to be pressurized.
4. Valves – To improve performance, a brake system may contain some of the following valves between the MC and the calipers: residual pressure valve, metering valve, combination valve, proportioning valve, or pressure limiting valve.
5. Brake Calipers – located at each wheel, the brake calipers are hydraulically actuated clamps that clamp the brake pads against the rotors.
6. Brake pads – located inside the calipers, the pads are the friction material that the calipers clamp against the rotors.
7. Rotors – Bolted to the axle hub, the rotors slow and stop the rotation of the wheels when clamped by the calipers. They also absorb the heat created from the friction of the pads against the rotor.

In summary, in order to stop a rig, the brakes must have three properties. They must:

1. be able to apply a force to the rotor to decelerate the wheel's rotation so that friction is increased between tires and road and the vehicle slows/stops; this ability is described as the brake system's BRAKE TORQUE.
2. be able to create enough friction between the pad and rotors to convert the vehicle's kinetic energy to heat; this is called CLAMPING FORCE; and
3. be large and heavy enough (the rotors) to absorb that heat without damage; this is called THERMAL CAPACITY.

A. Assumptions

a. Vehicle mass (M) = 200 kg
b. Wheelbase (L) = 54 inch
c. Weight distribution = 35:65
d. Height of CG from ground =20inches
e. Velocity = 40 Km/hr
f. Stopping distance = 8.5m
g. Pedal force = 300 N
h. Leverage ratio= 6:1
i. Master cylinder bore = 14mm
j. Circuit = Y – SPLIT
k. Front calliper = single piston floating, bore =32mm
l. Rear calliper = four piston fixed, bore =28mm
m. Wheel diameter = 23inches, Rim diameter = 10inches
n. Coefficient of friction
   i. tire and road = 0.7
   ii. Calliper and disc = 0.3

B. Calculations

- Total weight of vehicle = Mass of vehicle x 9.8
  200 x 9.81 = **1962 N**
- Static weight on front axle W_f =
  200 x 0.35 x 9.81 = **686.7 N**
- Static weight on rear axle W_r =
  200 x 0.65 x 9.81 =**1275.3**

$$W_t = \left(\frac{a_v}{g}\right) \times \left(\frac{h_{cg}}{WB}\right) \times V_t$$

- Weight transfer W_t = 188.30 N
- Dynamic weight on front axle (D_f) =
  W_f + W_t = **875 N**
- Dynamic weight on rear axle (D_r) =
  W_r - W_t = **1087 N**
- Torque required on front axle= D_f x coeff. Of friction x rolling radius
  875 x 0.7 x 0.2921 = **178.91 N**
- Master cylinder input force F_{mc} =
  Pedal force x leverage ratio
  300 x 6 =1800 N
- Master cylinder pressure =
  F_{mc} / A_{mc}=11.69302 MPa
- Calliper force: F_{cal} =P_{mc} x A_{cal} x no. of piston
  - Front calliper force = 9404.68 N
  - Rear calliper force = 28799.96 N
- Clamping force: C_f = 2 x F_{cal}
  - Front clamping force = 18808.136 N
  - Rear clamping force = 57599.92 N
- Braking force = C_f x Coeff of friction between brake pad and disc
  - Front braking force = 5642.44 N
  - Rear braking force = 17279.98 N

- Torque developed on front wheel = **340** N (for safety)
- Front effective radius =
  Torque on front disc / Front braking force
  340/5642.44 = **0.06 m**
- Front disc diameter = 0.155 m
- Torque produced by engine = 550N
- Torque developed on rear = **1045** Nm (for safety)
- Rear effective radius =
  Torque on rear disc / Rear braking force
  1045/550 = **0.06 m**
- Rear disc diameter = 0.16 m

2.2 DESIGN OF ROLLCAGE

A. Material Selection

Material selection is a process which is performed to select the suitable material with proper strength and adequate weight. The key categories for comparison were strength, weight and cost. AISI 4130 chromoly steel was selected after this comparison.

Table 1: Properties of material used

Properties	Metric
Density(kg/m3)	7.785*1000
Tensile strength, yield	460 MPa
Modulus of elasticity	190-210 GPa
Poisson's ratio	0.27-0.30
Elongation at break (in 50 mm)	21.50%
Reduction of area	59.6
Hardness, Brinell	217
Tensile strength, ultimate	560 MPa

B. Chemical Properties

AISI 4130 alloy steel is a medium carbon, low alloy steel in ASTM A29 standard. ASTM 4140 steel is also commonly referred to as a chromoly steel, or chrome moly steel, containing nominally 0.28-0.33% Carbon, 0.8-1.1% Chromium and 0.15-0.25% Molybdenum.

C. Pipe Selection

There was a constraint in selection of size for primary members that Circular steel tubing with an outside diameter of 25 mm (1.0 in) and a wall thickness of 3 mm(0.120 in.) and a carbon content of at least 0.18%.A steel shape with bending stiffness and bending strength exceeding that of circular steel tubing with an outside diameter of 25 mm (1.0 in.) and a wall thickness of 3 mm (0.120 in.). And for secondary member that the wall thickness must be at least 1.57 mm (0.062 in.) Secondary members must be steel tubes having a minimum wall thickness of 0.89 mm (0.035 in) and a minimum outside diameter of 25.4 mm (1.0 in).

Various members of roll-cage:

Table 2: Size of members used in roll-cage

Members	Outside diameter(mm)	Wall thickness(mm)
Primary	29.2	1.65
Secondary (1)	25.4	1.00
Secondary (2)	25.4	1.25
Secondary (3)	25.4	1.65

D. Calculations

FORMULAE:

$$I = \frac{\pi\,(d_o^4 - d_i^4)}{64}$$

$$S_b = \frac{S_y \times I}{C}$$

$$K_b = E \times I$$

CALCULATIONS

For material AISI 1018:

S_y = 370 MPa

Primary Member: -Diameter = 25.4mm

Thickness = 3mm

I =1.3478*10^{-8} m^4

K = 2763.12 Nm^2

S_b = 392.666 Nm

Secondary Member: - Diameter=25.4mm

Thickness=0.89mm

I= 5.1529*10^{-9} m^4

K = 1056.345 Nm^2

S_b = 150.123Nm

Using the similar process different values of moment of Inertia (I), Bending Stiffness (K) and Bending Strength (S_b) are calculated by changing the Diameter and thickness for material having different yield strength.

3.2.4.3 For material AISI 4130: -

Table 3 Strength Calculation for AISI 4130

Yield Strength (S_y)	Diameter (d) & Thickness (t)	Moment of Inertia (I)	Bending Stiffness (K)	Bending Strength (S_b)
435	d = 29.2mm t = 1.65mm	1.3597*10^{-8} m^4	2787.38 Nm^2	405.116 Nm
	d = 25.4 mm t = 1.25 mm	6.9323*10^{-9} m^4	1421.12 Nm^2	237.444 Nm
	d = 25.4 mm t = 1.65 mm	8.722*10^{-9} m^4	1788.03 Nm^2	298.749 Nm
	d = 25.4mm t =1mm	5.71423*10^{-9} m^4	1171.4185 Nm^2	195.7236 Nm
650	d = 29.2mm t = 1.65mm	1.3597*10^{-8} m^4	2787.38 Nm^2	605.3458 Nm
	d = 25.4mm t = 1.25mm	6.9323*10^{-9} m^4	1421.12 Nm^2	354.8027 Nm
	d = 25.4mm t = 1.65mm	8.722*10^{-9}m^4	1788.03 Nm^2	446.4066 Nm
	d = 25.4mm t = 1mm	5.71423*10^{-9}m^4	1171.4185 Nm^2	292.4605 Nm
700	d = 29.2 mm t = 1.65 mm	1.3597*10^{-8} m^4	2787.38 Nm^2	651.910 Nm
	d = 25.4mm t = 1.25mm	6.9323*10^{-9}m^4	1421.12 Nm^2	382.095Nm
	d = 25.4mm t = 1.65mm	8.722*10^{-9}m^4	1788.03 Nm^2	480.7456 Nm
	d = 25.4mm t = 1mm	5.71423*10^{-9}m^4	1171.4185 Nm^2	314.957Nm

E. Frame Designing

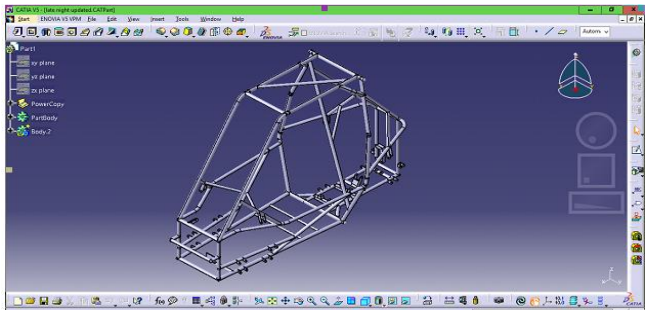

Figure 1: designing of Frame in CATIA V5 r21

The frame was designed in CATIA V5 r21 software. It took nearly 3-4 months for complete design of roll-cage. After designing various member were added for support as well as mounting of other systems. After number of iterations, final design was selected and analyzed for its safety.

3. ANALYSIS

3.1 Brakes

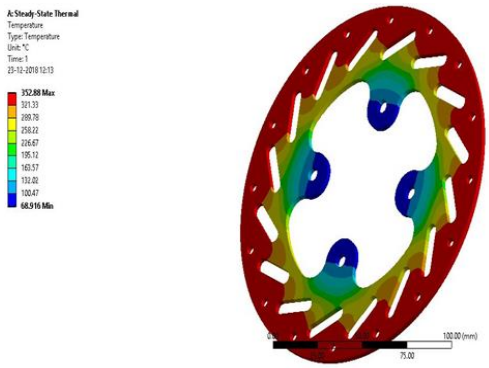

Figure 2: thermal Analysis of Disc Brake

3.2 Rollcage

After designing, we performed various simulations to check for its safety using software ANSYS. The forces for various impacts were calculated using '**Change in Kinetic Energy**' method. The simulations performed are listed below:

Front impact test: Forces are applied on front members while keeping the rear suspension members fixed. At event site, vehicle may impact the rocks and other vehicles. So, it is important to see whether the ATV is safe or not.

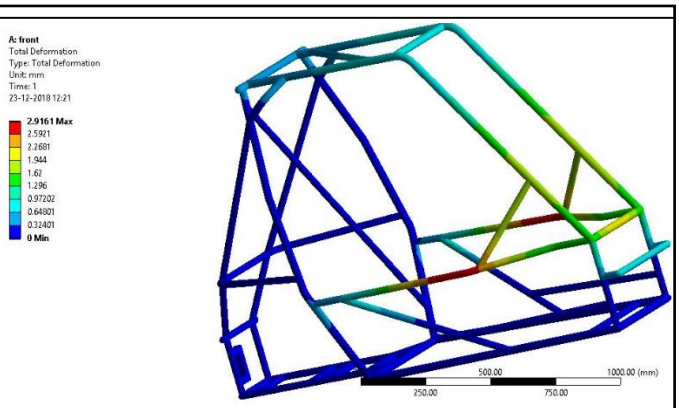

Figure 3: front Impact Total Deformation

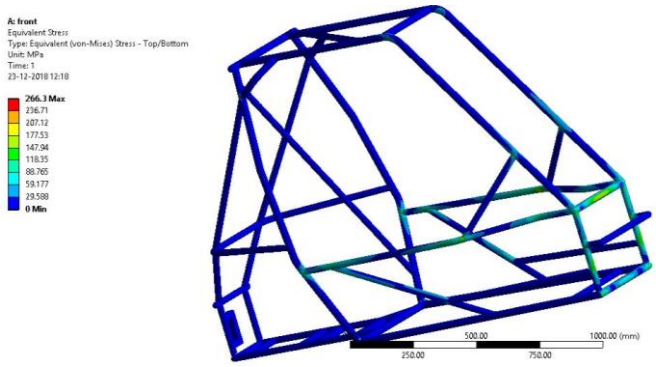

Figure 4: front impact stress

Rear impact test: Forces are applied on the rear members while the front suspension members are kept fixed. At event site, other vehicles can crash the buggy and to see whether it is safe this impact is done.

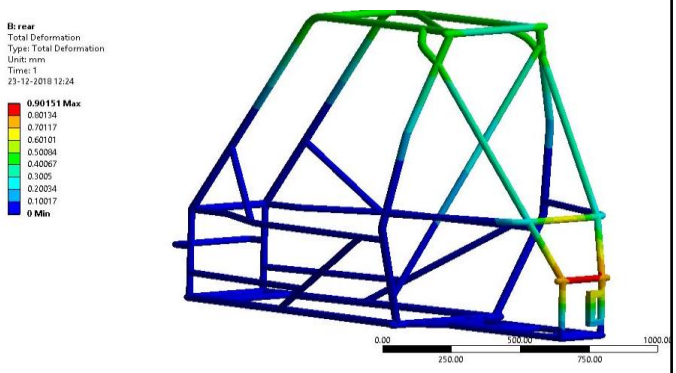

Figure 5: rear impact total deformation

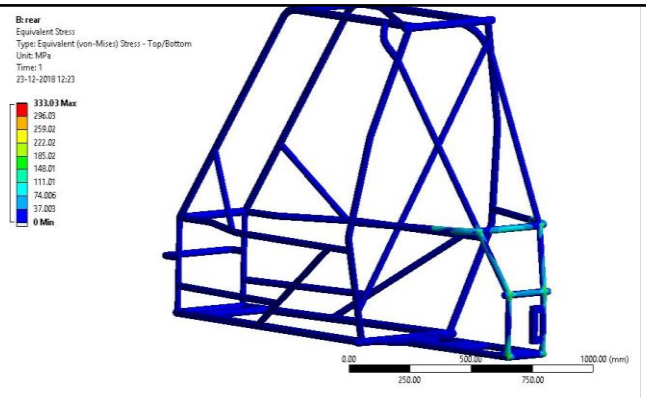

Figure 6: rear impact stress

Roll over impact test: Due to ups and downs on terrain, buggy might topple front ways, and this can be fatal to the driver. So, for safety of driver, this test must be done. Forces are applied on the bracing members while the lower suspension members are kept fixed.

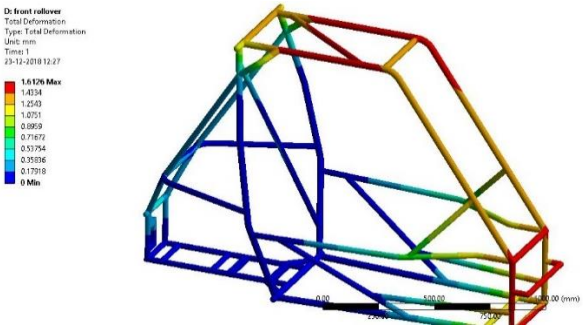

Figure 7: front roll over deformation

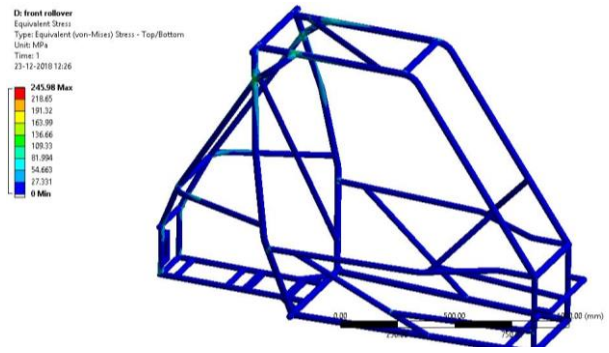

Figure 8: front roll over stress

Side impact test: The side members are very important while considering the ergonomics of driver. Forces are applied to side members keeping the suspension members of other side fixed.

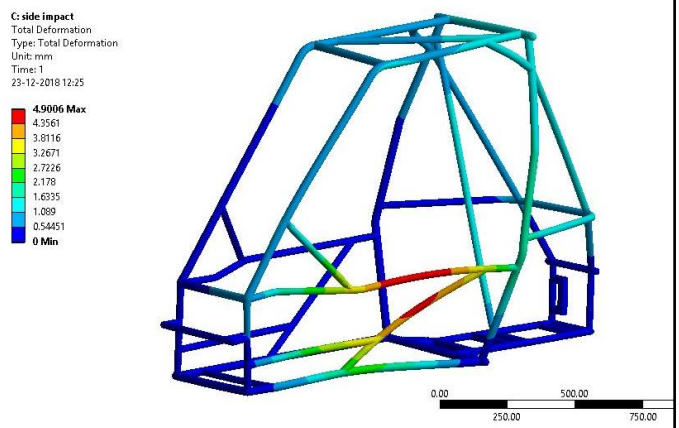

Figure 9: left side impact deformation

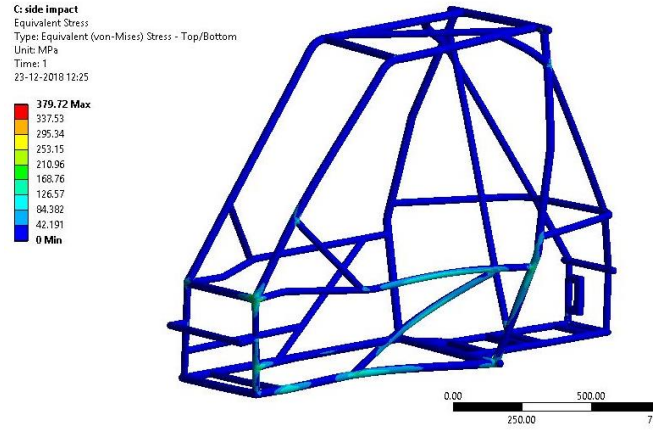

Figure 10: left side impact stress

Torsional: Every time the buggy won't land on all its 4 wheels when it gains some height. Sometimes, it lands on 2 wheels on one side at it needs to be checked whether it is safe at such times. Forces are applied on one side suspension members keeping the other side suspension members fixed.

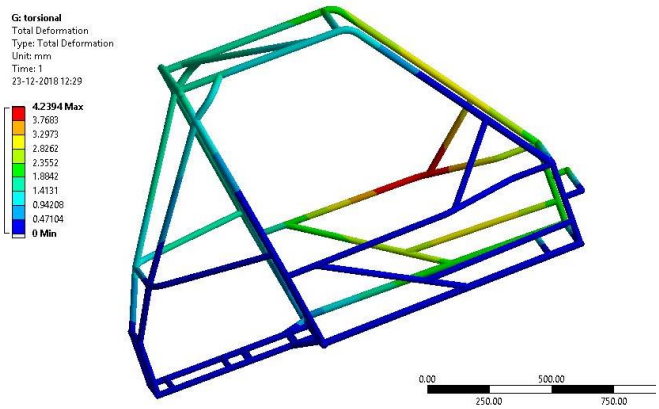

Figure 11: front torsional deformation

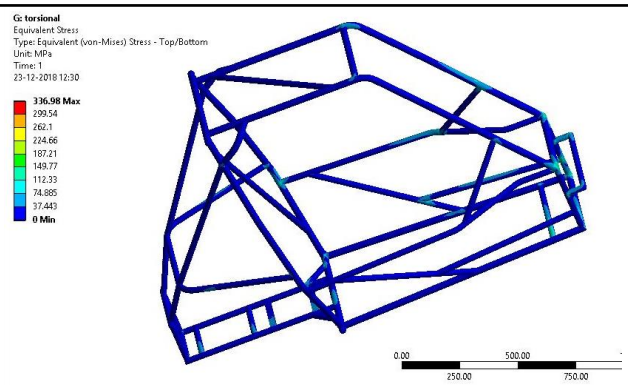

Figure 12: front torsional stress

BUMP: When the vehicle lands on all the four wheels, the the impact is very high on the suspension members. Forces are applied on all the lower mountings of suspension members keeping the upper mountings fixed.

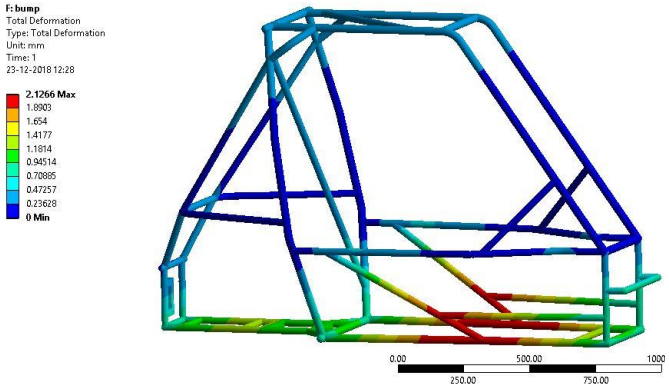

Figure 13: bump deformation

In all the cases, the maximum stress occurred was below the ultimate tensile strength of the material used which proves that the material used is safe.

4. CONCLUSION

- We have designed the roll cage using optimum design parameters and which satisfied the rules.
- We have selected **AISI 4130** for the roll cage for its better strength to weight ratio.
- We have designed the roll cage for better driver ergonomics.
- From the various types available, we have selected the best suitable braking system for the vehicle.
- We have theoretically designed the braking system for minimum stopping distance with better performance.
- We have successfully analyzed both the systems with enough factor of safety.

5. CONCLUSION

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Modelling and Simulation of Shock absorption System (May 2019)

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ABSTRACT This project presents comparative study of different designs of isolators for shock absorption system. The Shock Response Spectrum (SRS) has been formed from shock input, stiffness and mass of containerized object. To protect the containerized object, isolators are designed. The isolators are designed by using different hyperelastic material models. This material model includes Mooney-Rivlin, Neo-Hookean, Yeoh, Ogden, etc. The required stiffness which we got from SRS has been achieved by iterating different values of coefficients in potential energy equation of respective hyperelastic models for different shapes of isolators.

INDEX TERMS Implicit, Explicit, FE Analysis, Isolators, Hyperelastics, Stiffness, Dynamic Analysis

1. INTRODUCTION

It is a phenomenon in which oscillations occur about an equilibrium point. The word comes from Latin vibrationem. The oscillations may be periodic, as motion of a pendulum or random, such as the movement of a tire on a road.

Vibration can be important to; for example, the motion of a tuning fork, the reed in a woodwind instrument or harmonica, a mobile phone, or the cone of a loudspeaker.

In many cases, vibration is also undesirable, wasting energy and creating unwanted sound. For example the vibrations from engines, electric motors, or any mechanical device in operation are typically unwanted. Such vibrations could be caused by imbalances in the rotating parts, uneven friction, or the meshing of gear teeth. Careful designs usually minimize unwanted vibrations.

1.1.1 EQUATIONS OF MOTION:-

As force F (t) acts on a viscously damped spring-mass system. The equation of motion can be obtained using Newton s second law:

$$m\ddot{x}+C\dot{x}+Kx=F(t)$$

Since this equation is nonhomogeneous, its general solution x (t) is given by the sum of the homogeneous solution and the particular solution,

$$m\ddot{x}+C\dot{x}+Kx=0$$

The homogeneous solution, which is the solution of the homogeneous `equation, represents the free vibration of the system. This free vibration dies out with time under each of the three possible conditions of damping (underdamping, critical damping, and overdamping) and under all possible initial conditions.

1.1.2 TYPES OF VIBRATION:-

Free vibration occurs when a system is set in motion when an initial input given and allowed to vibrate freely. Examples of this can be said a child playing swings or hitting the tuning fork and letting it vibrate. The mechanical system vibrates at different natural frequencies and damps down to motionlessness.

- Damped and undamped:

If the energy is dissipated or reduced in friction or resistance offered during oscillation, the vibration is known as undamped vibration. If no energy is lost during oscillations, then it is called damped vibration.

There are two types of damping:-

- Viscous Damping
- Dry or Coulomb's Damping

1.1.3 DEGREE OF FREEDOM (DOF):-

DOF in mechanical system is the number of independent parameters that define its configuration. It is the number of parameters that determine the state of a physical system and is important to the analysis of systems of bodies in mechanical engineering, aeronautical engineering, robotics, and structural engineering. The position of a single railcar (engine) moving along a track has one degree of freedom because the position of the car is defined by the distance along the track. A train of rigid bogies which are connected by hinges to an engine consists of only 1dof due to the positions of the bogies held behind the engine are constrained due to the shape of the track.

1.1.4 FINITE ELEMENT ANALYSIS:-

The Finite Element Analysis (FEA) is a numerical method for solving problems of engineering and mathematical physics. It can be used for problems with

complicated geometries, loadings, and material properties wherever analytical solutions are difficult to achieve.

• Stress analysis for different types of beams, trusses, and various simple structures are accomplished using simplification and idealization: mass which is concentrated at the center of gravity beam simplified as a line segment

• Design is formed on the calculation results of the ideal structure with a large factor of safety (1.5 3).

1.1.5 RESONANCE:-

Elastic body subjected to free vibrations is called as natural vibrations and this is known as natural frequency. Natural vibrations are different from forced vibrations which occur at frequency of applied force. When the forced frequency is same as the natural frequency, the amplitude increases largely. This phenomenon is known as resonance.

Vibrations which happen at frequency of applied force (forced frequency). If forced frequency is equal to the natural frequency, the amplitude of vibration increases manifold. This phenomenon is known as resonance.

1.1.6 FREQUENCY RESPONSE:-

Frequency response is the quantitative measure of the output of a system or device in response to a stimulus; it is used to characterize system Dynamics. It is measure of magnitude and phase of the output as a function of frequency, as compared to input. Simply, if sine wave is given into a system at specific frequency, the system will respond with same frequency with certain magnitude and a certain phase angle related to the input.

When the system is time invariant, then the frequency response also will not vary with time. Thus for LTI systems, the frequency response can be seen as applying the system's transfer function to a purely imaginary number argument representing the frequency of the sinusoidal excitation

For an audio system, the objective is to reproduce the input signal without distortion. This requires a uniform magnitude of response up to the bandwidth limited in the system, with delaying the signal precisely by the same amount of time at all frequencies. That amount may be in seconds, or weeks or months.

In comparison, the feedback apparatus to control a dynamic system is to give the closed--loop system corrected response in contrast to the uncompensated system. Generally the feedback supposed to respond to system dynamics usually less than one full cycle, and with a specific phase angle relative to the commanded control input. For feedback of enough amplification, if we got the phase angle wrong then this can lead to uncertainty for open--loop stable system.

2. SHOCK RESPONSE SPECTRUM:-

A Shock Response Spectrum (SRS) is a graphical representation of a shock, or any other transient acceleration input, in terms of how a Single Degree Of Freedom (SDOF) system (like a mass on a spring) would respond to that input. The horizontal axis shows the natural frequency of a hypothetical SDOF, and the vertical axis shows the peak acceleration which this SDOF would undergo as a consequence of the shock input.

We have used the following tabular shock input which consists of displacement corresponding to their respective time. The nature of this shock input is a sine wave. Where in the maximum amplitude is 30mm & circular frequency is 62.83 Hz.

2.1 INPUT TO FIND STIFFNESS:-

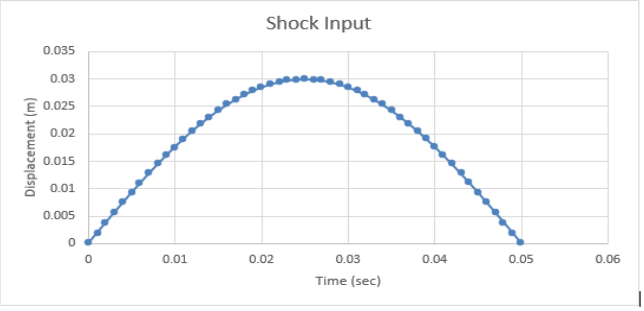


Fig 2.1 Shock Input

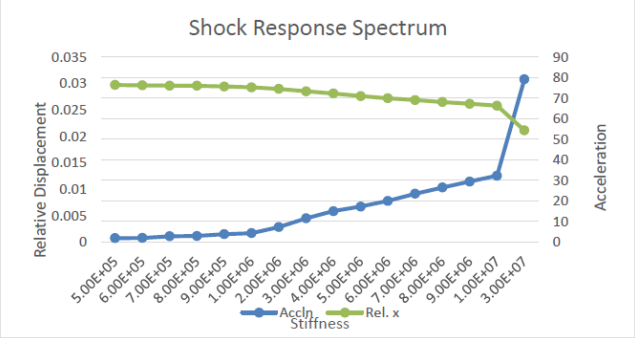


Fig. 2.2 Shock Response Spectrum

To find the optimum stiffness we should consider following parameters:-

- In order to achieve stability of the electronic components which tends to fail if its shock impact limit exceeds magnitude of 3*g hence selection of optimum stiffness from the SRS the acceleration should be considered less than 3*g.
- The relative displacement (difference between the displacements of two ends of the spring) should be minimum, to ensure its stability.

3. HYPER ELASTIC MODELS IN ABAQUS:-

In ABAQUS, two types of hyper elastic material models are available and each model defines the strain energy function in a different ways. One is the phenomenological models which treat the problem from the viewpoint of continuum mechanics and stress-strain behavior is

characterized without reference to the microscopic structure. Other one is physically motivated models which consider the material response from the viewpoint of microstructure. A brief review about the hyper elastic models available in ABAQUS exploited during this study is given below.

3.1 Mooney-Rivlin model:-

Two parameters phenomenological model that works well for moderately large stains in uniaxial elongation and shear deformation10,11. But, it cannot capture the upturn (S-curvature) of the force-extension relation in uniaxial test and the force-shear displacement relation in shear test. For a compressible rubber, model has a form.

3.2 Yeoh model:-

In 1993, Yeoh13 proposed a phenomenological model in the form of third-order polynomial based only on first invariant I1. It can be used for the characterization of carbon-black filled rubber and can capture upturn of stress-strain curve.

3.3 Ogden model:-

Proposed in 1972 by Ogden15,16, this is also a phenomenological model and is based on principal stretches instead of invariants. The model is able to capture upturn (stiffening) of stress-strain curve and models rubber accurately for large ranges of deformation.

	C10	C20	C30	D1	D2	D3
1	4000000	200	150	0.0021839	8.68E-005	-1.794E-005

Table 4.1 Coefficients for Yeoh Model

Yeoh

```
HYPERELASTICITY - POLYNOMIAL STRAIN ENERGY FUNCTION WITH N =   3

                D1              C10             C01
                D2              C20             C11             C02
                D3              C30             C21             C12             C03

          2.183900000E-03   4000000.00      0.00000000
          8.680000000E-05   200.000000      0.00000000      0.00000000
         -1.794000000E-05   150.000000      0.00000000      0.00000000      0.00000000


                STABILITY LIMIT INFORMATION


WARNING: UNSTABLE HYPERELASTIC MATERIAL


   UNIAXIAL TENSION:       STABLE FOR ALL STRAINS
   UNIAXIAL COMPRESSION:   STABLE FOR ALL STRAINS
   BIAXIAL TENSION:        STABLE FOR ALL STRAINS
   BIAXIAL COMPRESSION:    STABLE FOR ALL STRAINS
   PLANAR TENSION:         STABLE FOR ALL STRAINS
   PLANAR COMPRESSION:     STABLE FOR ALL STRAINS
   VOLUMETRIC TENSION:     UNSTABLE AT A VOLUME RATIO LARGER THAN          1.3310
   VOLUMETRIC COMPRESSION: UNSTABLE AT A VOLUME RATIO LESS THAN            0.6815
```

Fig. 4.2 Stability check for YEOH Model

4. AXIS SYMMETRY:-

Axis symmetry is nothing but symmetry about an axis around which the objects revolves; an object is axially symmetric if its appearance is unchanged if it is oriented around an axis. For example, a baseball bat , football, looks the same if it is rotated by any angle about the line passing lengthwise through its center, so it is axially symmetric.

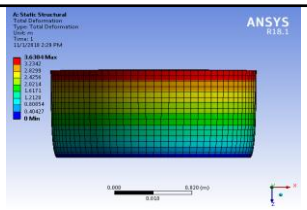


Fig 4.1 Axis symmetric rubber Model deformation

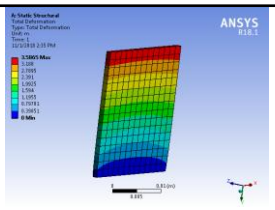


Fig.4.2. Axis symmetric rubber plate deformation

5. GEOMETRY FOR RUBBER ISOLATOR:-

Initially we started with the hollow cylinder model,
1. Hollow Cylinder:-

- Dimensions:-
  - Outer Diameter = 150 mm
  - Thickness = 30 mm

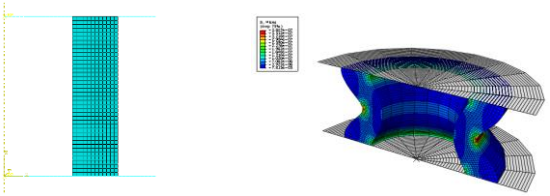


Fig. 5.1 2D and 3D hollow cylindrical Model

- Same model was checked for static analysis to find the maximum stiffness it can achieve.

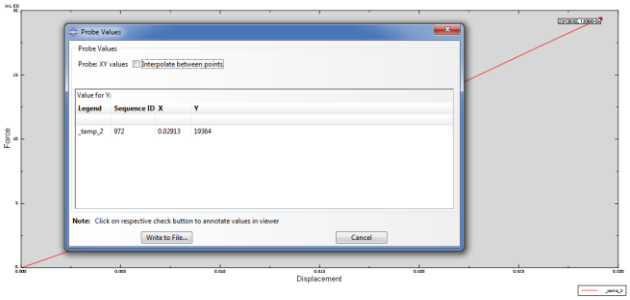


Fig. 5.2 Force vs Displacement curve

Stiffness achieve in static analysis = 0.664e+6 N/m

The above model is given the properties of yeoh material model then tested for dynamic analysis in which the models base was given the shock input and recording were made.

In this we determined the acceleration at the top most point and relative displacement between two ends of the isolator.

- Maximum Acceleration achieved in hollow cylindrical model:-

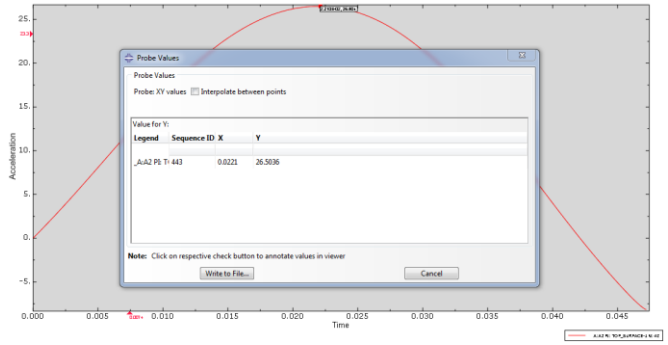


Fig. 5.3 Acceleration vs time curve

Value of acceleration = 26.5036 m/s2

- Relative Displacement:-

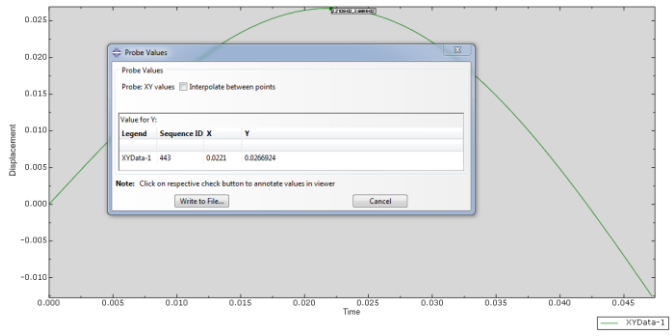


Fig. 5.4 displacement vs time curve

Relative Displacement = 0.02669 m

6. RESULTS:-

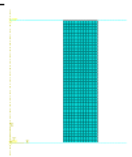
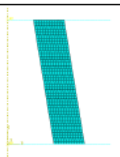
Specification	Hollow cylindrical OD=150 mm Thickness=30mm	Cone 1 OD =150 mm Thickness=30mm Apex angle=24 degree	Cone 2 OD=150mm Thickness=30mm Apex angle=16 degree	Shape 1
Geometry				
Stiffness achieved in static	0.664e+6 N/m	0.41854e^6 N/m	0.56539e6 N/m	0.004e6 N/m
Maximum Acceleration	26.5036 m/s^2	17.6044 N/m^2	22.7547 m/s2	1 m/s^2
Maximum Relative Displacement	0.02669 m	0.0277 m	0.0271609 m	0.007 m

Table 6.1 Result Table

7. CONCLUSION:-

- After simulating various shapes as given above along with controlling parameters such as rubber constants & dimensions. We found out that the cone shape gives the optimum results.
- Again in cone shape we took the controlling parameters as cone angle and dimensions among those cone with OD=150mm, thickness=30mm,apex angle=24 degree proved to be best fitting our requirement also it gives the optimum result for our given shock input.
- Hence we concluded that the Yeoh material model of cone with OD=150mm, Thickness =30mm, angle =24 degree is the best fit.

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DETERMINATION OF FATIGUE STRENGTH OF A SINGLE THROW 6 CYLINDER INLINE DIESEL ENGINE BY FINITE ELEMENT ANALYSIS AND CO-RELATING IT WITH EXPERIMENTAL VALUES

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ABSTRACT

The main objective of the project is to co-relate the data obtained from the actual experimental tests done on the crankshafts of a four-cylinder diesel engine to that obtained from the finite element analysis. The correlation would thus validate the results obtained from the simulation, which could then be directly referred to, without the need for actual testing on the crankshaft, for crankshafts of other engines as well. The project would thus, help standardizing a process using FEA for assessing supplied quality of crankshafts.

The data from the experiments is obtained in the form of strain values (or frequencies in case of modal analysis) through the strain gauges (or accelerometers in case of modal experiment) located at specific locations on the crankshaft. For static testing done at ARAI, the applied load is obtained by crank-train dynamic analysis and boundary conditions are chosen to replicate the stress state in an actual operating engine. These results are then further used for estimation of factor of safety in endurance test. The modal experiment is carried out at KOEL, resulting in the various natural frequencies of vibration for the test structure and the corresponding mode shapes. The resonance testing is accomplished by applying fully reversed sinusoidal acceleration at a frequency corresponding to the natural frequency of the first torsional mode of the 'crankshaft assembly' with the help of an electrodynamic shaker machine in the NVH lab at KOEL. Report of endurance test is presented finally.

INDEX TERMS Crankshaft analytics, 6-cylinder Engine,Experimental Results.

1. INTRODUCTION

Crankshafts convert the forces generated within the cylinder during combustion into torque. During this process, crankshafts are exposed to severe cyclic fatigue loads and the design must be optimized to deliver the required service life. Fatigue testing is therefore essential to validate the design and manufacturing process for these key components. A new method is being evaluated through this project for torsional fatigue testing of the crankshafts of IC engines.The sponsoring company, Kirloskar Oil Engines Ltd. manufactures a wide range of diesel engines and majority of them are used for electric power generation (Diesel Generator Sets). Various components go in the making of an internal combustion engine and crankshaft is one of the principal components amongst them. The crankshafts are manufactured by external suppliers for the company. In order to assess the quality of production of the supplied crankshaft it is necessary to subject it to testing and analysis. Moreover, the hardening process for the particular crankshaft has been changed recently. Therefore, a detailed fatigue analysis of this crankshaft is carried out.

2. BACKGROUND OF THE STUDY

IC engines have made great impact on transportation. It is also used in many other applications like power generation, pumping, marine, etc. There is a continuous development in IC engine worldwide to improve fuel efficiency, NVH(Noise, Vibration and Harshness),fuel injection parameters, advance transmission, weight optimization etc. to increase the engine performance. Engine performance is mainly governed by many parameters like mean effective pressure, mean speed of piston, specific fuel consumption, air fuel ratio, vibration, noise etc.

Many studies have been conducted to reduce vibration and noise, the primary method is to minimize their generation. This can be accomplished by;

- Balancing rotating components.
- Reducing the mass of reciprocating members.
- Loading the driven device as uniformly as possible.
- Incorporating a soft-start device to minimize start-up shock.

In present study, modeling and FEM analysis of individual component in IC engine will be conducted using FEA software to observe the natural frequencies of different components. In addition to this at different dynamic condition modal analysis of complete engine will be performed using FEM, for finding out the most critical components having high vibration amplitude and its influence on overall engine vibration.

By comparing both the results i.e. modal analysis of initial and modal analysis results of engine after the necessary modifications suggested for reducing vibration

and noise.

3. BACKGROUND OF CRANKSHAFT

The main objective of the project is to co-relate the data obtained from the actual experimental tests done on the crankshafts of a four-cylinder diesel engine to that obtained from the finite element analysis. The correlation would thus validate the results obtained from the simulation, which could then be directly referred to, without the need for actual testing on the crankshaft, for crankshafts of other engines as well.

The project would thus, help standardizing a process using FEA for assessing supplied quality of crankshafts. It mainly focuses on three types of structural analyses, viz., static, modal and harmonic (free & forced vibration). In each case, experiments are carried out on the crankshaft and the test conditions are simulated in FEA software, ANSYS to compare the results.

A crankshaft consists of main journals, webs, and connecting rod journals, commonly known as “crank-pins”. The crankshaft rotates on bearings inside the engine. The bearings supporting the crankshaft are the main bearings of an engine and the part of the crankshaft that rides on the bearings are called the main bearing journals. The number of main bearings and main journals in an engine depend on its size. Small single cylinder engines have only two main bearings, one at each end of the crankshaft. Larger multi-cylinder engines usually have more than two main bearings at the ends and include some in the central part of the crankshaft for more support as shown in Figure 1.2. The piston connects to the crankshaft on a bearing journal, referred to as a crank pin.

4. FUNCTION OF CRANKSHAFTS IN IC ENGINES

The crankshaft, connecting rod, and piston constitute a four bar slider-crank mechanism, which converts the sliding motion of the piston (slider in the mechanism) to a rotary motion. Since the rotation output is more practical and applicable for input to other devices, the concept design of an engine is that the output would be rotation. In addition, the linear displacement of an engine is not smooth, as the displacement is caused by the combustion of gas in the combustion chamber.

. Figure 1.4 shows the mounting of a crankshaft in an engine and Figure 1.5 shows the P-V diagram during an engine cycle for a four stroke cycle engine, where Vd is the volume swept by the piston and Vbdc is the volume of the cylinder when the piston is at the bottom dead centre (BDC).

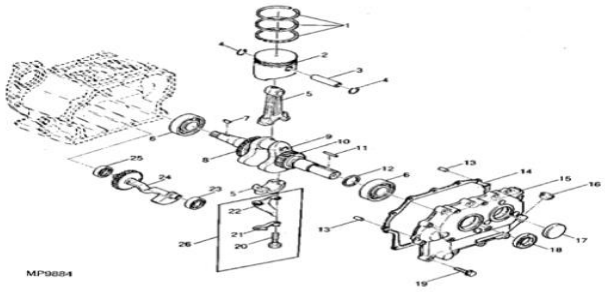


FIGURE 1. **Exploded view of single cylinder engine**

5. SERVICE LOADS AND FAILURES EXPERIENCED BY CRANKSHAFTS

Crankshaft experiences large forces from gas combustion. This force is applied to the top of the piston and since the connecting rod connects the piston to the crankshaft, the force will be transmitted to the crankshaft. The magnitude of the force depends on many factors which consists of crank radius, connecting rod dimensions, weight of the connecting rod, piston, piston rings, and pin. Combustion and inertia forces acting on the crankshaft cause two types of loading on the crankshaft structure; torsional load and bending load.

Due to the crankshaft geometry and engine mechanism, the crankshaft fillet experiences a large stress range during its service life. Figure 1.5 shows a crankshaft in the engine block from side view. In this figure it can be seen that at the moment of combustion the load from the piston is transmitted to the crankpin, causing a large bending as well as torsional moment on the entire geometry of the crankshaft. At the root of the fillet areas stress concentrations exist and these high stress range locations are the points where cyclic loads could cause fatigue crack initiation, leading to fracture.

6. ENDURANCE TESTING

Fatigue is the progressive, localized and permanent structural change that occurs in a material subjected to repeated, or fluctuating, strains at nominal stresses with maximum values less than the static yield strength of the material. Fatigue may culminate into cracks and cause fracture after a sufficient number of cycles. Fatigue damage is caused by the simultaneous action of cyclic stress, tensile stress and plastic strain. Plastic strain resulting from cyclic stress initiates the crack and tensile stress promotes crack growth (propagation). Although compressive stresses will not cause fatigue, compressive loads can result in local tensile stresses, and a fatigue crack may form even in a flow-free metal having a highly polished surface and no stress and no stress concentrators.

Micro-cracks may be initially present due to heat treatment. They can be generated during induction hardening if quenching is not controlled properly, and their

presence will adversely affect the fatigue life of the specimen.

8. COMPUTER AIDED DESIGN (CAD)

CAD which is computer aided design is the modern way of engineering communication. Every design or concept is a gift from an individual imagination. To convey these ideas we need to draw them and explain it to them.Earlier these were done through hand drawn sheets and pictures. With development of computers we have another platform to share these ideas through software's. CAD has integrated tools than can draw the same with higher accuracy and speed and in moments those drawings can be converted into actual 2D sheets. CAD is also used to create software animation for graphic effects in TV and entertainment industries, mercantile, and technological documents, often referred to as DCC (digital content creation). The omnipresence of modernity and the power of computers mean that even perfume bottles and shampoo dispensers are designed according to techniques unknown to engineers in the 1960s. Due to its tremendous monetary standing, CAD has been a moving concept in computer advances, computer graphics and distinct fluctuating geometry.

8. MODELING AND ANALYSIS

- The components were modeled and assembled in CREO PARAMETRIC 5.0.1.0 and the analysis was performed in ANSYS 19.2

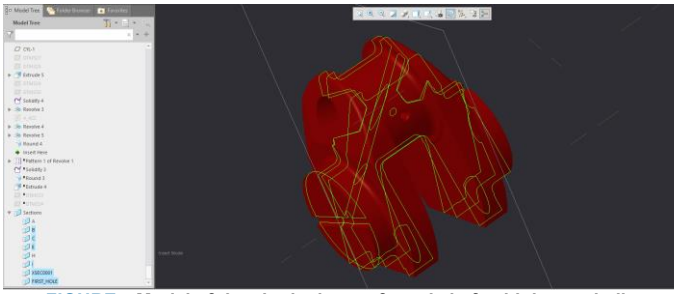


FIGURE . Model of the single throw of crankshaft with internal oil passages highlighted in green.

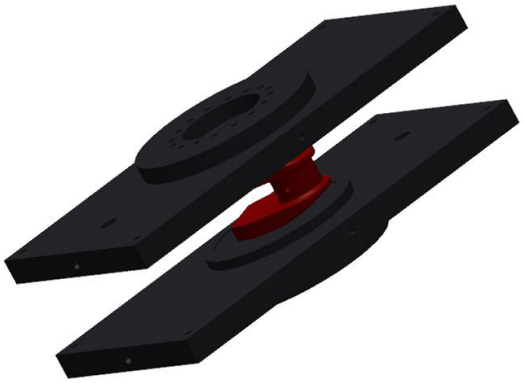
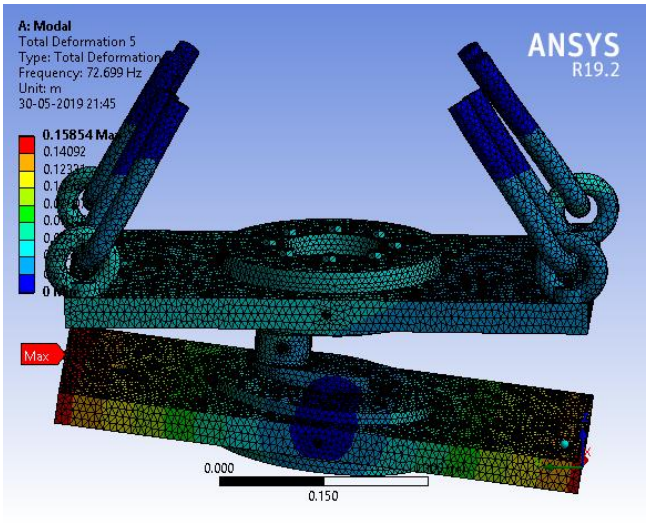


FIGURE . Complete assembly of the tuning fork arrangement.

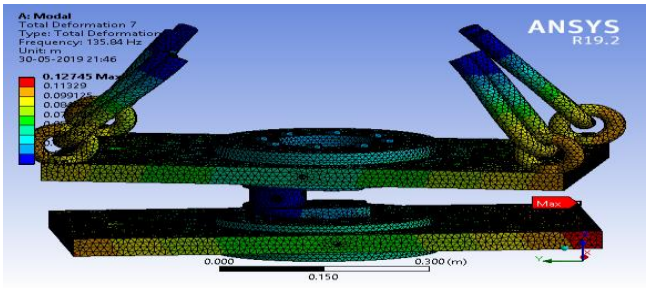
9. ANSYS RESULTS

- **MODAL ANALYSIS**

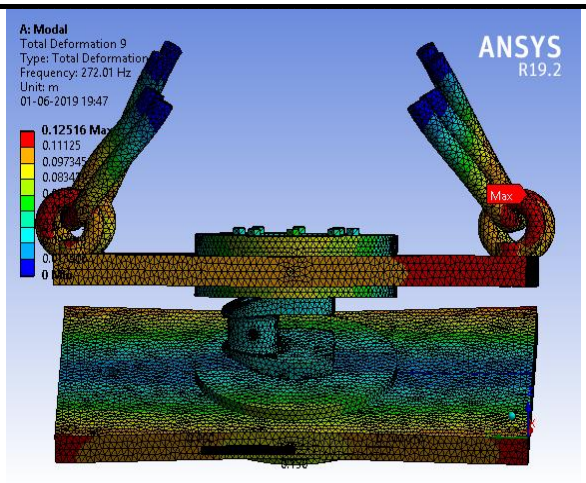
BENDING MODE:-



TORSION MODE:-

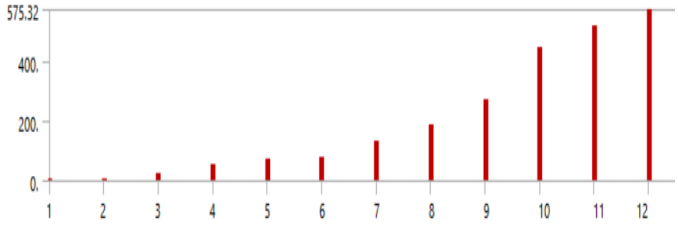


TWISTING MODE:-



- **RESULT GRAPH**

❖ **TORSIONAL STRESS VS FREQUENCY**



- **RESULT TABLE**

MODE SHAPE	FREQUENCY (HZ)	MAXIMUM STRESS (PA)
TORSION	135.84	1.085e+011
BENDING	72.699	6.797e+010
TWISTING	272.01	1.9298e+011

10. TEST RIG SETUP

- The experiments on the crankshaft specimen were performed at ARAI as well as the NVH lab in KOEL Khadki.
- The test rig basically consists of an assembly of crankshaft shrink fitted between two mounting plates(also called as tines).
- Thus the entire assembly ressembles a tuning fork like arrangement with the plates similar to the tines of the tuning fork and the crankshaft mounted in between them.
- This entire assembly is then supported using four nylon ropes the loop through respective I-bolts present at the four corners of the upper mounting plate thus making the upper plate rigid in a sense during the further stage of the experiment.
- The bottom mounting plate is then given excitation at a point on one of its vertical faces using an electrodynamic shaker table.
- The component is then tested under various cyclic loads and fatigue loads using number of strain gauges strategically placed at various critical locations of the assembly to determine its strength, critical junctions, stresses developed and failure modes.

FIGURE . Electrodynamic Shaker table.

- All the obtained results are then feed into the database of the computer which is also the control unit of the entire experiment.

FIGURE . NVH lab control modules and computer system

TORSION TESTING

- The entire assembly is held horizontal and cyclic load is applied at a one point on the narrow vertical face of the plate thus it vibrates back and forth in the vertical plain.
- As a result tork acts at the crankpin of the crankshaft.

BENDING TESTING

- The entire assembly is held vertically and cyclic load is applied at the center point on the vertical face of the plate thus it vibrates inwards and outwards in the vertical plain.

- As a result bending stresses develop at the crankpin of the crankshaft.
- Though this has been performed at NVH lab, KOEL, Khadki but is not the part of this project.

FIGURE . Setup for bending testing.

. RESULTS OF FATIGUE TESTING OBTAINED ON ACTUAL SETUP

- Average torsional fatigue strength of existing crankshaft (inclined hole with cavity) : approx 70-75 Gpa
- Average torsional fatigue strength of straight hole crankshaft (inclined hole with cavity) : approx 107.5 Gpa
- No abnormal behavior observed during 60 Hrs endurance test of genset at resonance.
- Torsional amplitudes are well within limit after completion of endurance test.
- Maximum damper temperature observed is 70.2 deg C at ambient of 29.7 deg C.
- The Straight Hole Crankshaft is better as compare to existing inclined hole crankshaft as the torsional fatigue strength is increased from 70-75 Gpa to 107.5 Gpa. approx. (Exact values will be available after completion of test).

COMPARISON RESULT OF TORSIONAL ANALYSIS

	EXPERIMENTAL RESULTS	ANSYS RESULTS
FREQUENCY(Hz)	145	135.84
MAX. STRESS(Pa)	1.10e+011	1.08e+011

CONCLUSION

Thus we modeled the physical components in Engineering CAD software CREO and performed the analysis using Ansys Workbench. The results were then compared with the results obtained at the ARAI lab as well as the NVH lab at

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CARTRIDGE PRODUCT (May 2019)

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ABSTRACT The design of a fixture is a highly complex and intuitive process, which require knowledge. Fixture design plays an important role at the setup planning phase. Proper fixture design is crucial for developing product quality in different terms of accuracy, surface finish and precision of the machined parts .In existing design the fixture set up is done manually, so the aim of this project is to replace with fixture to save time for loading and unloading of component. Fixture provides the manufacturer for flexibility. In holding forces and to optimize design for machine operation as well as process function ability. Widely used in manufacturing, fixtures have a direct impact upon product manufacturing quality, productivity and cost, so much attention has already been paid to the research fixture design and many achievements in this field have been reported. In this paper, a literature survey of fixture design and automation over the past decade is proposed. First, an introduction is given on the fixture applications in industry. Then, significant works done in the design field, including their approaches, requirements and working principles are discussed. Finally, some prospective research trends are also discussed.

Key Words: Fixture design, manufacturing considerations, need of automation of fixture.

1. INTRODUCTION

A fixture is a device used in manufacturing to hold a work piece, place it properly with respect to a machine tool, and sustenance it during machining. Fixture is a mechanism for localizing, holding and supportive a work piece during a industrialized process. Fixtures are important elements of manufacture processes as they are required in most of the automatic manufacturing, examination, and assembly operations. Fixtures must correctly locate a work piece in a specified direction with respect to a cutting tool or gauging device. They are generally designed for a specific operation to process a definite work piece and are planned and manufactured individually. Widely used in manufacturing, fixtures have a direct effect upon product quality, productivity and cost. Normally, the costs associated with fixture design and manufacture can account for 10%– 20% of the total cost of a manufacturing system. Nearly 40% of rejected parts are due to dimensioning errors that are attributed to poor fixture design. Fixture design work is also tedious and time-consuming. Traditionally, the design and manufacture of a fixture can take several days or even longer to complete when human experience in fixture design is utilized. And a good fixture design is often based on the designer's experience, his understanding of the products, and a try- and-error process. Therefore, with the increasingly intense global competition which pushes every manufacturer in industry to make the best effort to sharpen its competitiveness by enhancing the product's quality, squeezing the production costs and reducing the lead time. There is a strong desire for the upgrading of fixture design with the hope of making sound fixture design more efficiently and at a lower cost.

Fundamentals of the Fixtures Usually, fixtures consist of the following elements:

1. Locating system A locator is generally a stationary element of a fixture. It is used to produce and remain the position of a part in the fixture by compelling the movement of the part. For work pieces of greater changeability in shapes and surface settings, a locator can also be variable.

2. Holds A clamp is a force-stimulating mechanism of a fixture. The forces exerted by the clamps hold a part steadily in the fixture against all other outward forces acting on to the element.

3. Supports A support is a fixed or regulating element of a fixture. Supports in additional of what is necessary for the determination of the position of the part should be companionable with the locators and clamps.[1]

1.1 FIXTURE :–

Fixture is a device for holding a work piece to produce repetitive work during machining operation. The name 'fixture' is derived from the fact that it is always fastened to machine or bench in a fix position. Various standard devices are available to hold the work piece, but when number of parts is enough to justify its cost. Fixture is generally used for holding and locating the work.

Employment of fixture is an important aspect of workshop engineering and its application is worthy of some consideration on all except the simplest type of production, small orders and tool room work. The primary objective of fixture is to facilitate holding and supporting of awkward or frail articles for some machining operation, so that: -

1) Every component will be uniform.

2) Accommodate several components in one setting.[3]

I.

II. **1.2 LOCATION PRINCIPLE: -**

An important aspect of design is concerned with the location of the component. Correct location influences the accuracy of finished result and particularly its positional relationship with other surfaces on the component. Unless location arrangement is reliable and consistent, the fixture will not produce uniform components and all the reasons for using the fixture will be nullified. Along with location clamping is also essential for example, a perfectly satisfactory method of location might be spoiled by faulty method of clamping, and causing the component to lift away from the locating face or due to poor design of locating face or the component may be clogged by swarf and be rendered useless.

In order to fix definitely, the position of a body in space, it is necessary to account for six degrees of freedom. These may be referred to three perpendicular axes, which are shown in figure and known as OX, OY and OZ. In addition to this, it may rotate about any axis, so there are in all six possibilities. So while designing location facilities one must consider above factors so that arrangement will provide positive restraint as well as ensuring the surface relationships necessitated on the job in hand. a perfectly satisfactory method of location might be spoiled by faulty method of clamping, and causing the component to lift away from the locating face or due to poor design of locating face or the component may be clogged by swarf and be rendered useless.

2. WORKING PRINCIPLE

The following is a detailed analysis of each step.

Step 1: Define Requirements

To initiate the fixture-design process, clearly state the problem to be solved or needs to be met. State these requirements as broadly as possible, but specifically enough to define the scope of the design project. The designer should ask some basic questions: Is the new tooling required for first-time production or to improve existing production? If improving an existing job, is the goal greater accuracy, faster cycle times, or both? Is the tooling intended for one part or an entire family of parts?

The tooling designer must determine how much freedom and input there is on each project. If many choices regarding machine tools, operations, and cutting tools have already been made, the designer's role will have a relatively narrow focus.

Step 2: Gather/Analyze Information

Collect all relevant data and assemble it for evaluation. The main sources of information are the part print, process sheets, and machine specifications. Make sure that part documents and records are current. For example, verify that the shop print is the current revision, and the processing information is up-to-date. Check with the design department for pending part revisions. An important part of the evaluation process is note taking. All ideas, thoughts, observations, and any other data about the part or fixture are then available for later reference. It is always better to have too many ideas about a particular design than too few.

Four categories of design considerations need to be taken into account at this time: workpiece specifications, operation variables, availability of equipment, and personnel. These categories, while separately covered here, are actually interdependent. Each is an integral part of the evaluation phase and must be thoroughly thought out before beginning the fixture design.

Work piece specifications usually are the most important factors and have the largest influence on the fixture's final design. Typically, these considerations include the size and shape of the part, the accuracy required , the properties of the part material, the locating and clamping surfaces, and the size of the run.[3]

Operation variables include the type of operations required to make the part, number of operations performed, and

sequence of operations, inspection requirements, and time restrictions.

Availability of equipment required to machine, assemble, and inspect a part often determines whether the fixture is designed for a single part or multiple parts. A process engineer sometimes selects the equipment to machine parts before the tooling designer begins the design. The tooling designer should verify what equipment will be used for each operation.

Step 3: Develop Several Options

This phase of the fixture-design process requires the most creativity. A typical work piece can be located and clamped several different ways. The natural tendency is to think of one solution, then develop and refine it while blocking out other, perhaps better solutions. A designer should brainstorm for several good tooling alternatives, not just choose one path right away. During this phase, the designer's goal should be adding options, not discarding them.

III. Step 4: Choose the Best Option

The fourth phase of the tool-design process is a cost/benefit analysis of different tooling options. Some benefits, such as greater operator comfort and safety, are difficult to express in dollars but are still important. In analyzing fixture costs, the emphasis is on comparing one method to another, rather than finding exact costs. Estimates are acceptable. Sometimes these methods compare both proposed and existing fixtures, so that, where possible, actual production data can be used instead of estimates. To evaluate the cost of any work holding alternative, first estimate the initial cost of the fixture. To make this estimate, draw an accurate sketch of the fixture. Number and list each part and component of the fixture individually. Here it is important to have an orderly method for outlining this information. For modular fixtures, total component cost should be amortized over the system's typical lifetime. Although somewhat arbitrary, dividing total component cost by 100 (10 uses per year, for 10 years) gives a fair estimate. The next step is calculating the cost of material and labor for each tooling element. Once again it is important to have an orderly system for listing the data. First list the cost of each component, then itemize the operations needed to mount, machine, and assemble that component. Once those steps are listed, estimate the time required for each operation for each component, then multiply by the labor rate. This amount should then be added to the cost of the components and of the design to find the estimated cost of the fixture.

The total cost to manufacture a part is the sum of per-piece run cost, setup cost, and tooling cost. Expressed as a formula:

$$\text{Cost per Part} = \text{Run Cost} + \frac{\text{Setup Cost}}{\text{Lot Size}} + \frac{\text{Tooling Cost}}{\text{Total Quanity Over Tooling Lifetime}}$$

These variables are described below with sample values from three tooling options: a modular fixture, a permanent fixture, and a hydraulically powered permanent fixture.

Run Cost- This is the variable cost per piece to produce a part, at shop labor rate (material cost does not need to be included as long as it is the same for all fixturing options).

Lot Size- This is the average quantity manufactured each time the fixture is set up. In this example, lot size is 100 for all three options.

Tooling Cost- This is the total cost of labor plus material to design and build a fixture. The modular fixture is least expensive because components can be re-used.

IV. Step 5: Implement the Design

The final phase of the fixture-design process consists of turning the chosen design approach into reality. Final details are decided, final drawings are made, and the tooling is built and tested. The following guidelines should be considered during the final-design process to make the fixture less costly while improving its efficiency. These rules are a mix of practical considerations, sound design practices, and common sense.

Use standard components- The economies of standardized parts apply to tooling components as well as to manufactured products. Standard, readily available components include clamps, locators, supports, studs, nuts, pins, and a host of other elements. Most designers would never think of having the shop make cap screws, bolts, or nuts for a fixture. Likewise, no standard tooling components should be made in-house. The first rule of economic design is: Never build any component you can buy. Commercially available tooling components are manufactured in large quantities for much greater economy. In most cases, the cost of buying a component is less than 20% of the cost of making it. Labor is usually the greatest cost element in the building of any fixture. Standard tooling components are one way to cut labor costs. application ideas to make designs simpler and less expensive.[4]

Use prefinished materials- Prefinished and preformed materials should be used where possible to lower costs and simplify construction. These materials include precision-

ground flat stock, drill rod, structural sections, cast tooling sections, precast tooling bodies, tooling plates, and other standard preformed materials. Including these materials in a design both reduces the design time and lowers the labor cost.

Eliminate finishing operations- Finishing operations should never be performed for cosmetic purposes. Making a fixture look better often can double its cost. For example, do not machine the edges of a baseplate. Just remove the burrs. Harden only those areas of the fixture subject to wear.

Keep tolerances as liberal as possible- The most cost-effective tooling tolerance for a locator is approximately 30% to 50% of the workpiece's tolerance. Tighter tolerances normally add extra cost to the tooling with little benefit to the process. Where necessary, tighter tolerances can be used, but tighter tolerances do not necessarily result in a better fixture, only a more expensive one.

Simplify tooling details- Elaborate designs often add little or nothing to the function of the fixture. More often, a power clamp can do the same job at a fraction of the cost. Keep the function and operation of a fixture as simple as possible. The likelihood of breakdowns and other problems increases with complex designs. These problems multiply when moving parts are added to the design. Misalignment, inaccuracy, wear, and malfunctions caused by chips and debris can cause many problems in the best fixture designs.[5]

3. CARTRIDGE

Fig.(a) Actual Photo Before operation on Cartridge

Fig.(b) Actual Photo After operation on Cartridge

V. Cartridge is the most important tool used for metal cutting operation. Metal cutting is vital process of all the other processes. In TCC around 1200 types of cartridges are produced. As TCC is export oriented unit all the products m are exported. Government does not levy any tax on raw materials & finished products at TCC. Finished products are dispatched from Sandvik group distribution centers one for Asia Pacific & other for Europe.

By offering good quality tools giving better performance with services & technology TCC helps the customer to become more productive. Cartridges are produced with the help of various departments like design, store, tool crib etc on highly sophisticated CNC machine

3.1 Composition

Element	Weight %
C	0.45-0.55
Mn	0.50-0.80
P	0.06(max)
S	0.06(max)
Si	0.50
Cr	0.80-1.20
V	0.15(min)

VI.

VII.

VIII.

IX.

X.

XI.

XII.

XIII.

XIV.

XV.

XVI. Table no.3 Chemical Composition of EN47 [8]

XVII. 4. PROPOSED FIXTURE DESIGN STAGE

4.1 Current Fixture

The Current fixture has only pockets, and main issue is length which create error because larger in size and to increase the production rate and reducing the length which is main cause of error to reduce. we made some changes length is now reduced to half from previous length of fixture and added 4pockets instead of 2 at an angle of 90 degree so the space is utilized and even production rate increase and also reduce in the time which required for every cartridge for its machining and mounting is reduced (to one third) of its original time and the error which made by length is also resolved and even it become simple to use and handle and also weight is reduced.

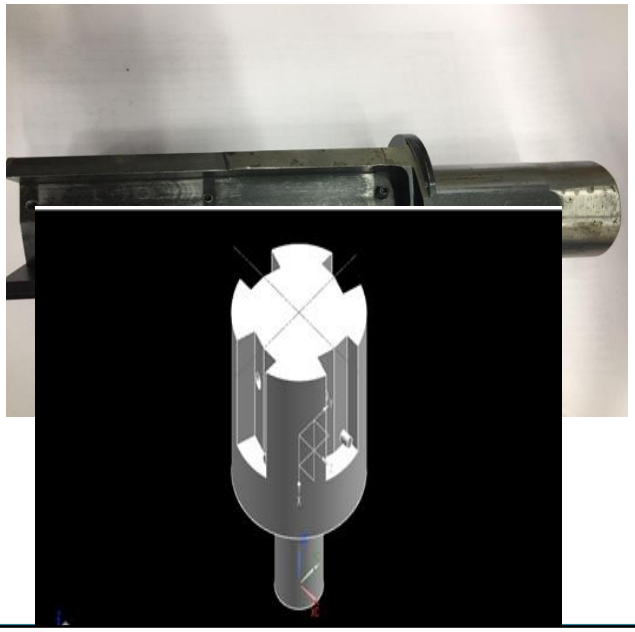

Figure no.4.1 Actual Photo of Current Fixture

Figure no.4.2 Proposed Fixture Design Stage (Final)

XVIII. COMPARISON:

Sr. No.	Parameter	Old Fixture	New Fixture
1.	Number of jobs mounted on fixture	2	4
2.	Time required for job mounting on fixture manually	1min	2 min
3.	Time required for fixture clamping manually	1 min 20 sec	1 min 20 sec
4.	Machine running time for bottom angle process	1min 10 sec	2 min 20 sec
5.	Time required for remove the fixture	50 sec	50 sec
6.	Time required for remove the job	40 sec	1 min 20 sec
7.	Total Time	5 min	7 min 50 sec
8.	Allowance per day	3 hours	3 hours
9.	Number of jobs produce per day	504 job	672 job

ACKNOWLEDGMENT

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CONCLUSION

The efficiency and reliability of the fixture design has enhanced by the system and the result of the fixture design has made more reasonable. To reduce cycle time required for loading and unloading of part, this approach is useful.

If modern CAE, CAD are used in designing the systems then significant improvement can be assured. To fulfill the multi- functional and high performance fixturing requirements optimum design approach can be used to provide comprehensive analyses and determine an overall optimal design. The proposed fixture will fulfilled researcher production target and enhanced the efficiency, reduces operation time and increases productivity, high quality of operation, reduce accidents.

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Soilless Agriculture Using Hydroponic System With Evaporative Cooling

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ABSTRACT Soil cultivation is practiced since centuries. However, soil tend to compact naturally over time, which is not good for proper plant growth, as plants may have difficulty in growing and accessing nutrients. To achieve year-round production of plants, plant production factories use series of plant growth facilities through artificial regulation of indoor environment, such as lighting, temperature, CO_2, nutrient solution, etc. To enhance the productivity as compared to conventional soil cultivation, protected cultivation was introduced during 1980 onwards. It also incorporated with various technologies like drip irrigation system, automatic temperature control using evaporative cooling, light controlling systems etc Recently, in western countries, a new technique called soil-less culture commonly referred to as "hydroponics" has been developed to further improve the crop productivity in lesser space and time by controlling the supply of water and nutrient. The term hydroponic was derived from the Greek words „hydro" means water and „ponos" means labor. Hydroponic is being used in developed countries in a view to see advancement in technology. Researchers discovered that plants absorb essential mineral nutrients as inorganic ions in water. In natural conditions, soil acts as a mineral nutrient reservoir but the soil itself is not essential to plant growth. When the mineral nutrients in soil dissolve in water, plant roots are able to absorb them. When the required mineral nutrients are introduced into a plants through water supply artificially, soil is no longer required for the plants to grow.

INDEX TERMS Soilless agriculture, temperature controlled systems, hydroponics, nutrient, reservoir.

1. INTRODUCTION

There are number of hydroponic techniques which are being used such as Ebb and Flow System, Drip System, Wick System, Deep Water Culture System and Nutrient Film Technique (NFT). Nutrient Film Technique is a hydroponic technique wherein a very shallow stream of water containing all the dissolved nutrients required for plant growth is re-circulated past the bare roots of plants in a watertight gully known as channels. In an ideal system, the depth of the re-circulating stream should be very shallow, little more than a film of water hence the name nutrient film.

Hydroponic and NFT culture involves no use of soil. Both the culture require sufficient supply of nutrients and suitable conditions like high oxygen levels for root uptake and optimum pH levels for increased nutrient and water uptake and also high grade nutrient solutions. In this system, it is possible to control the pH and electrical conductivity (EC) of the nutrient solution.

A. EBB and flow system

The ebb and flow system consists of water-tight growing bed and tank of nutrient solution. The growing bed consists of either gravel or gravel and sand both. The nutrient solution present in the tank is pumped for fixed interval of

time into the growing bed for a short duration (5 -10 min). The tank of nutrient solution is placed below the growing bed so that nutrient solution can easily re-circulate in the system. This system was widely used by U.S. Army during the World War 2nd to produce vegetables specially tomato and lettuce. The nutrient solution used in this system need to be replace within fixed interval of time otherwise the repeated use of this nutrient solution lead to disease and nutrient element imbalances (Anon 2016).

B Nutrient Film Technique

Nutrient Film Technique is a hydroponic technique wherein a very shallow stream of water containing all the dissolved nutrients required for plant growth is re-circulated past the bare roots of plants in a watertight gully known as channels. In an ideal system, the depth of the re-circulating stream should be very shallow, little more than a film of water hence the name „nutrient film"(Anon 2016).

C Nutrient Film Technique

Tomatoes, lettuce, capsicum, endive, Chinese cabbage, cucumbers, zucchini and curettes', beans, sweet peppers, sweet potato, egg plants, chilies, parsley and other herbs, silver beet, strawberries. The hydroponics is growing of plants without soil in any organic media or in direct contact with water i.e. Nutrient Film Technique. Soil-less culture means growing of plants in proper media mixture strictly without soil. This method utilizes a limited supply of water efficiently. Soilless culture offers earlier growth and higher yield as in this culture attack of insect-pest decreases. The pot along with the media mixture should be light in weight as to hold it easily. The author conducted certain additional investigations and prepared a manuscript for a popular circular on the general subject of growing plants in nutrient solutions.

Growing **strawberries** hydroponically in an NFT system requires the plants to be placed in net pots. The bare rooted strawberry runners can be placed directly in the net pots and expanded clay medium can be filled to close the gaps and also provide anchorage to the plant.

Alternatively if the strawberry plants arrived in preformed plugs, the plugs can be directly inserted into net pots firmly. The net pots are then placed in the NFT gully/channel. They are placed such that the bottom of the netpot touches the top of the nutrient solution. This is essential for the first few weeks when the root system of the strawberry plants are still developing. This also keeps the plug moist all the time. The nutrient flow in the channel should be 1-2 liters per minute and the circulation pump should be running 24×7. It is recommended to aerate the nutrient solution with an aquarium bubbler to increase the oxygen content. If there is a fall of the nutrient solution from the return pipe to the reservoir, the fall also causes some aeration.

D Temperature required for plants

The ideal temperature for strawberries is 18-25 degrees. If the environment is too cold, the plants won't grow, and even flowers that have already formed buds can become dormant if not kept adequately warm. Conversely, if the temperature in system is too high, flowering will be inhibited. Strawberry plants are susceptible to mould and mildew in high humidity. This can be prevented by using a dehumidifier, or by placing a bowl of bicarbonate of soda near hydroponic garden. Bicarbonate of soda releases carbon dioxide when damp, so it further enhances the growth of strawberry plants. Chilling strawberry plants at certain points in the growth cycle encourages vigorous leafing and flowering.

A Evaporative Cooler For Cooling Of the Setup

Evaporative coolers lower the temperature of air using the principle of evaporative cooling, unlike typical air conditioning systems which use vapor-compression refrigeration or absorption refrigerator.

Evaporative cooling is the addition of water vapor into air, which causes a lowering of the temperature of the air. The energy needed to evaporate the water is taken from the air in the form of sensible heat, which affect the temperature of the air, and converted into latent heat, the energy present in the water vapor component of the air, whilst the air remains at a constant enthalpy value. This conversion of sensible heat to latent heat is known as an isenthalpic process because it occurs at a constant enthalpy value. Evaporative cooling therefore causes a drop in the temperature of air proportional to the sensible heat drop and an increase in humidity proportional to the latent heat gain.

FIGURE 1. Strawberries grown hydroponically in the first harvest.

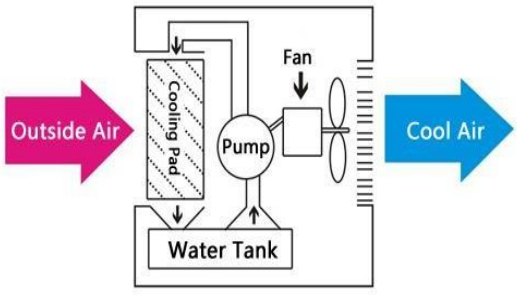

FIGURE1. Strawberries grown hydroponically in the first harvest.

Direct evaporative cooling (open circuit) is used to lower the temperature and increase the humidity of air by using latent heat of evaporation, changing liquid water to water vapor. In this process, the energy in the air does not change. Warm dry air is changed to cool moist air. The heat of the outside air is used to evaporate water. The RH increases to 70 to 90% which reduces the cooling effect of human perspiration. The moist air has to be continually released to outside or else the air becomes saturated and evaporation stops.

A mechanical direct evaporative cooler unit uses a fan to draw air through a wetted membrane, or pad, which provides a large surface area for the evaporation of water into the air. Water is sprayed at the top of the pad so it can drip down into the membrane and continually keep the membrane saturated. Any excess water that drips out from the bottom of the membrane is collected in a pan and recirculated to the top. Single stage direct evaporative coolers are typically small in size as it only consists of the membrane, water pump, and centrifugal fan. The mineral content of the municipal water supply will cause scaling on the membrane, which will lead to clogging over the life of the membrane. Depending on this mineral content and the evaporation rate, regular cleaning and maintenance is required to ensure optimal performance. Generally, supply air from the single-stage evaporative cooler will need to be exhausted directly (one-through flow) because the high humidity of the supply air. Few design solutions have been conceived to utilize the energy in the air like directing the exhaust air through two sheets of double-glazed windows, thus reducing the solar energy absorbed through the glazing. Compared to energy required to achieve the equivalent cooling load with a compressor, single stage evaporative coolers consume less energy. Passive direct evaporative cooling can occur anywhere that the evaporative

cooled water can cool a space without the assist of a fan. This can be achieved through use of fountains or more architectural designs such as the evaporative downdraft cooling tower, also called a "passive cooling tower". The passive cooling tower design allows outside air to flow in through the top of a tower that is constructed within or next to the building. The outside air comes in contact with water inside the tower either through a wetted membrane or a mister. As water evaporates in the outside air, the air becomes cooler and less buoyant and creates a downward flow in the tower. At the bottom of the tower, an outlet allows the cooler air into the interior. Similar to mechanical evaporative coolers, towers can be an attractive low-energy solution for hot and dry climate as they only require a water pump to raise water to the top of the tower. Energy savings from using a passive direct evaporating cooling strategy depends on the climate and heat load. For arid climates with a great wet-bulb depression, cooling towers can provide enough cooling during summer design conditions to be net zero.

2. CONCLUSION

Hydroponic farming is the future of conventional farming. Various new methods of soilless farming have been implemented successfully and there is a huge scope for development of soilless agriculture. Plant can be grown in less space with more efficiency, meeting the exponentially growing food requirements. Experimenting on various crops can open new unexplored areas in soilless farming. Growth of plants and the diseases affecting plant life can be controlled.

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Solar Powered fertilizer Sprayer (May 2019)

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ABSTRACT **Science is basically "passive" observation of the universe, as it exists to generate knowledge. Engineering is making use of that knowledge to meet human needs by creating machine, systems, process and technologies that have not previously existed. In Indian farms generally two types of spray pumps are used for spraying; hand operated spray pump and fuel operated spray pump. Of which hand operated spray pump is most popular. The main drawback of hand operated spray pump is that the user can't use it for more than 5-6 hours continuously as he gets tired after some hours where as fuel operated spray pump requires fuel which is expensive and availability of fuel is not easy at rural places. At the same time it exhausts carbon dioxide as pollutant which is harmful to our environment. In an effort to solve this situation we should think to move towards some non-conventional energy. Considering it, solar energy would be one of the solutions. The project emphasizes its aim from initial study to actually making of solar powered sprayers considering all the design parameters and building an efficient and potential prototype which would signify its aim in being environment friendly and cost effective at the same time giving the poor sections of the society a reason to go forward with it.**

INDEX TERMS Battery, fertilizer, frame, fuel, photovoltaic, sprayer

INTRODUCTION

Now-a-days employing Non- conventional energy has become very popular for all kinds of development activities. The project topic emphasizes on extending the concept of Solar PV-Technology on "Solar Sprayers" as "Energy Alternate Devices" and also to convert the previously used "Fuel Operating System" as "Free Energy Operating System" for agriculture implementation. A combination of solar energy with technology can be used in sink for spraying chemicals (ie.pesticides) on the plants using Solar Sprayers which may act as a boon for farmers, indirectly contributing to the nation's welfare.

RENEWABLE Energy resources are the most preferable resources for generation of electrical energy because of environmentally friendly. Of all the renewable energy resources, solar power is the most resource mainly because it is free, unlimited and free from pollution . The solar energy is usually harvested through solar panels that are made up of photovoltaic cells. Approximately 80% of all photovoltaic systems are mended into a standalone system .

SPRAYERS: Sprayers are mechanical devices that are specifically designed to spray liquids quickly and easily over a particular field area. They come in a number of different varieties. In this project we'll take a look at solar operated mechanical sprayers which deals with affordability and convenience of usage.

TYPES OF SPRAYERS:

A. Hand Driven Sprayer

Hand driven pumps consist of a flexible diaphragm made of synthetic rubber connected to the pump handle by a crankshaft mechanism, a rigid diaphragm chamber and either flat or ball-type inlet and outlet valves. The outlet valve is connected to a pressure chamber, which in many hand driven pump sprayers has a variable pressure setting valve. These pumps typically operate between pressures of 1 and 3 bar (15-44 psi) and it is suitable for herbicide application where large droplets are required to minimize spray-drift.

B. Fuel Operated Sprayer

The power sprayer consists of an integrated or external spray tank; a high pressure piston pump usually powered by a petrol engine a pressure regulating valve and a hose of up to 50 m of length. Spray tanks are too big to be carried as a knapsack. The power sprayer is produced in a number of versions.

Most simple and common is an engine driven pump mounted on a frame without wheels, a 200 l drum and hose and lance. Flow regulation is to be done via a pressure regulating valve and/or by restrictors (basic power sprayer) and the size of the nozzle. At the other end of sprayers mounted on wheels, equipped with pressure regulators. Technically, the power sprayer has a lot in common with the motorized knapsack-sprayer. The unit is generally set for high volume spraying, transporting the droplets with high pressure. Hallow cone nozzles are the preferred type of nozzles.

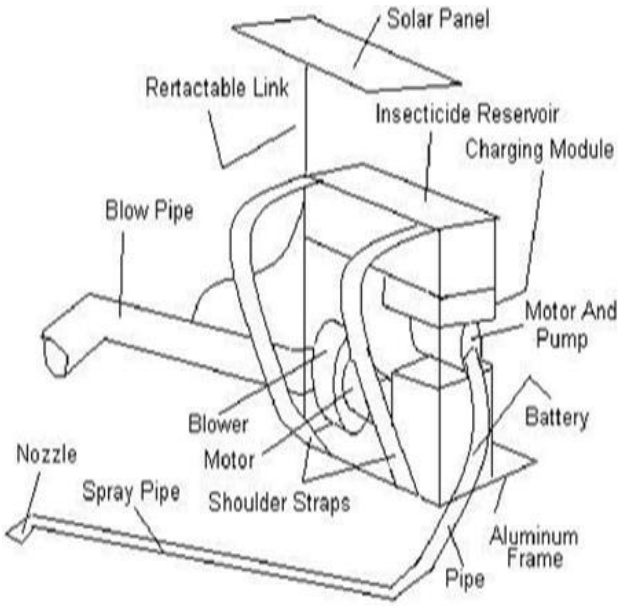

Fig 1. Solar sprayer setup[2]

SOLAR POWERED SPRAYER

In this project, an aluminum frame is constructed using aluminum bars to keep the weight of the frame as low as possible. In this frame, to the top end a solar photovoltaic panel is fixed that converts solar power into electricity.

This electricity is then provided to battery via a charging circuit and is used for charging the battery. Electric power from this battery is given to an electric motor to whose shaft a pump is connected. This pump sucks the chemical solution and provides high pressure output through the nozzle[2]

By using a convergent type of nozzle, the chemical solution can be sprayed on the plant under high pressure. The flow of mixed (water and chemical) liquid is controlled by a valve.

Solar radiation can be converted directly into electricity using semiconductor devices, known as Photo Voltaic (PV) cells. When Sun light falls upon the Solar cell a part of the light is absorbed and it is converted into electrical energy by means of Electron Movements.

This Solar Panel is connected to 12V lead acid battery for storing the electrical energy. A 12V DC motor is connected to these lead acid battery to convert the electrical energy into mechanical energy.Charging can be done using a solar Panel. Battery can be charged continuously during discharge itself, by attaching the Panel on the sprayers.

Without Panel on the sprayers, discharge can be done for a minimum period of 4 to 5 hours. By changing the battery, discharge can be continued for further more hours. Charging can be done by separate Solar Panel attachment. [4]

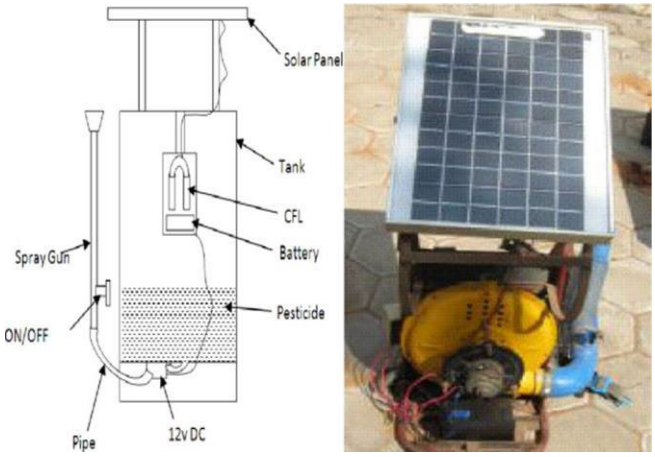

Fig 2.Solar panel setup [4]

CALCULATIONS

- **NOZZLE**

1. Nozzle angle = 90 degrees
2. Nozzle outlet diameter(D) = 1.4mm = 0.0014 metre
3. Area of outlet = $\frac{\pi \times D^2}{4} = 1.539 \times 10^{-6} m^2$
4. Discharge Q = 2 lit/min = 3.33×10^{-5} m^3/sec
5. Velocity v = $\frac{Q}{A}$ = 21.65 m/s

- **SELECTION OF SPRAY PUMP**

According to the discharge, the spray pump is selected:

1. Type: Centrifugal Pump
2. Liquid Discharge = 2 lit/min
3. Operating Parameters= 12V, 1.8A
4. Power=V $\times$ I= 12 $\times 1.8 = 21.6W$
5. Minimum Running Time= 3 hrs(Assumed)
6. Total Pump Power Required= $21.6 \times 3 = 64.8Wh$

- **LIQUID STORAGE TANK**

1. Tank capacity =12 litres.
2. Material =Poly Vinyl Chloride (PVC)

- **BATTERY**

1. Battery type : Gel type battery.
2. Weight= 2.0 kg
3. Nominal Voltage=12V
4. Efficiency factor = 0.85
5. Depth of discharge= 0.8
6. Battery-Capacity= -

$$\frac{Total Pump Poer Required}{Efficiency Factor \times DOD \times Nominal Voltage}$$

$$= \frac{64.8}{0.85 \times 0.8 \times 12} = 8Ah$$

ADVANTAGES

1. The prepared solar operated sprayer is environment friendly and cost efficient. More economical
2. Easy to clean and maintain.
3. The prepared solar operated sprayer can be used largely in agriculture field effectively.

DISADVANTAGES

1. Initial cost of Solar sprayer is quite high
2. The system is weather dependent
3. It requires energy storing device.

OBJECTIVES

- To extend the concept of solar PV technology on solar sprayers as energy alternate device.
- To convert the fuel operating system as free energy operating system for agricultural system.
- To design a prototype of the arrangement considering the cost effectiveness criteria for the society.
- To design a prototype which shall not produce air pollution by any combustion means, and also safe for wildlife and mankind.

CONCLUSION

From the proposed project it was tested that by taking a battery of capacity of 8Ah, 12V takes approximately 5 hours to get fully charged. Aim of this project is to fulfill the tasks of spraying chemicals on the plants using non- conventional energy sources in a different way so as to serve mankind.

As we know 70% of population of our country lives in villages & their main occupation is agriculture, solar operated spray will help the farmers of those remote areas of country where fuel is not readily and economic option.

Implimenting such a thought of this concept on the coming generations would act as a bonus for initiating nature protecting agendas.

ACKNOWLEDGMENT

I have great pleasure in submitting the Report for Project Stage-I on the topic, “Solar Powered Sprayer”. It gives me immense pleasure to record my debt of gratitude and my warmest regards to my Guide Prof.Vijay.P.Desai and HOD Prof.Dr.S.H.Mankar for extensive guidance and direction I have received from him throughout the progress of the work. The various values that tried to learn from him shall remain a source of inspiration for me forever.

I would like to say thank you to our Project Coordinators, all teaching and non-teaching staff of Mechanical Engineering Department for their support and help.

I am thankful to my family for their whole hearted blessings, support and encouragement towards the fulfilment of my work. I wish to record the help extended by my friends in all possible ways and active support and constant encouragement.

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Lean Layout Implementation In The Supply Unit Of Alfa Laval(May 2019)

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ABSTRACT Lean manufacturing is based on the same concepts as the Toyota Production System (TPS) and focuses a lot on eliminating non-value adding activities, so called waste. Waste could come in many different shapes but could for example be transportation, overproduction and inventory. Companies that have not previously been exposed to TPS or lean manufacturing tend to have a lot of waste in their manufacturing processes.
The Swedish metal processing company Alfa Laval has relatively recently acquired a factory . This factory has previously not been applying lean manufacturing on their operations and is currently struggling with a lot of waste, resulting in long lead times and high inventories.

INDEX TERMS. Toyota Production System, Lean manufacturing, Value stream mapping, Product family matrix, Lean layout design and Material flow.

1. INTRODUCTION

Background behind using Lean

The competition in the manufacturing industry is growing and Alfa Laval have been pressured to take measures and change their manufacturing processes in order to stay competitive on a global market.
Such initiatives have, in many cases, been aimed towards implementing lean manufacturing.

What is Lean & Six Sigma ?

- Lean refers to reducing waste .Waste is anything that doesn't benefit your bottom line or add value to your organization. If lean is about streamlining processes.
- Six Sigma is about improving the quality of what your business delivers. Six sigma refers to a method of statistical quality control and is a data driven problem solving methodology."

3.3 What is Lean Manufacturing?

Lean Manufacturing is a systematic approach to reducing waste in the production process. In this sense, waste is anything (activities, processes, tools, materials, personnel) that does not add value to the product or service as viewed by the customer

3.4 Principles of Lean manufacturing

Process for guiding the implementation of lean techniques is easy to remember.
a. Specify value from the standpoint of the end customer by product family.
b. Identify all the steps in the value stream for each product family, eliminating whenever `
c. Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.
d. As flow is introduced, let customers pull value from the next upstream activity.
e. As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced, begin the process again and continue it until a state of perfection is reached in which perfect value is created with no waste.

6 Benefits of Lean Manufacturing

- Reduced scrap and waste
- Reduced inventory costs
- Reduced cycle time
- Lower space required in shop floor
- High quality & reliability of machine
- Lower overall costs
- Lead time reduction

A. ABBREVIATIONS

VSM- Value Stream Mapping

SU- Supply Unit

JIT- Just In Time

CTQ- Critical to Quality

CU-Component Unit

MO- Manufacturing Order

WIP-Work In Progress

B.Methodology and Experimentation

Spagethi Existing Material Flow and observation

Distance Travel (Store to Testing Area) for product-1 unit - 247.9 metres
Distance travel for product 2 unit-249.3

2) Excess Material Handling - Kitting Trolley storage not at point of use
3) Multiple Storage & Excess inventory - Fasteners
4) Components Searching Time is more due to multiple Storage Location
5) Excess Space due to multi location storage
6)Different table used for Sub Assy - Excess Material transportation
7) Spindle sub Assy - Common work station - Distance travel is more for Main Assy Line
8) Pneumatic gun connection far away from work station
9) No visual indication for Shortages /Line stoppages

Spagathi Diagram improvements

1) Andon Lights to signal for Raw material ,Paper work, Quality problems
2) Tooling shadow board placed at the Point -of-use
3) Heavy parts storage near Main Assy station
4) Work station design
5)Layout reorganized to minimize operator travel
6) Tool prepared prior to being used
7) Scrap bin placed at near Assy location
8) Air Gun near work station
9) Visual work instructions -near Assy station
10) Red bin Area near Assy location

Takt Time Calculation

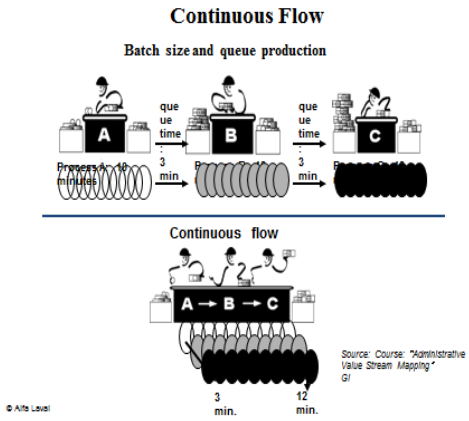
- **Takt Time = The rate or time that a completed product is finished.**
- A Takt Time of two minutes means that every two minutes a complete product, assembly or machine is produced.
- The customers' buying rate establishes Takt Time. It's the rate at which the customer buys your product.
- Takt Time is the desired time between units of production output, synchronized to customer demand.

$$\text{Takt Time} = \frac{\text{Effective Working Time per Shift}}{\text{Customer Requirement per Shift}}$$

$$\frac{27{,}000 \text{ sec}}{460 \text{ pieces}} = 59 \text{ sec}$$

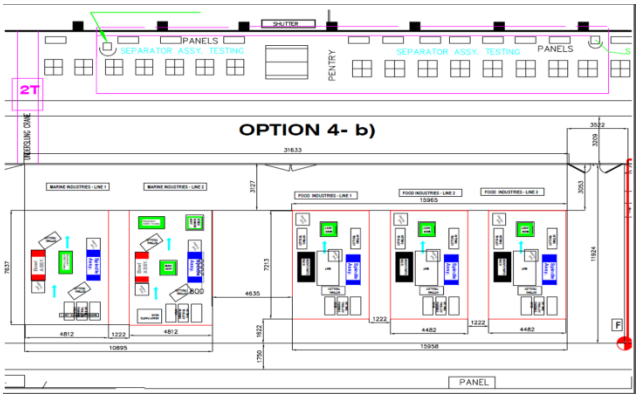
Single Piece Flow

- After takt time calculation the flow should be divided into based on the requirement of the machines to be done.
- A continuous process with a one-piece flow is the core which many of the lean tools will be implemented around since it reveals hidden problems in a manufacturing environment.



Sr. No.	Benefits Parameters	Layout Options			
		Option1	Option2	Option3	Option4
1	Space Utilization	Better	Better	Poor	Poor
2	Distance Travelled Compared with Existing	Better	Better	Better	Better
3	Material Handling	Better	Better	Good	Better
4	Walking Area Within Workstation	Better	Better	Better	Better
5	Better Visual Impact	Good	Good	Better	Better
6	Scope For Future Expansion	Better	Better	Poor	Good
7	Fit Within Alloted Area	Poor	Poor	Better	Better

Based on the above parameter option 4 is better



Work Station Concept Proposal :

So two workstations are made.

Marine Industries :

For each Line 2 Work Stations

1) Separator Assy

a) Main Station – Fixed station with Lifting & Tilting Arrangement

b) Sub Assy Station – Fixed Station – Table

2) For Bowl Assy

a) Main Assy - Fixed station with Lifting Arrangement

b) Balancing Stage - Fixed station – Table

Food Industries :

1) Seperator + Bowl Assy

For Line 1 - 2 Work Stations

a) Main Station – Movable Trolley As is (Common)

b) Sub Assy Station – 1Fixed Station – Table (Spindle Assy)

c) Sub Assy Station - 1 Fixed Station – Table (Bowl Assy)

For Line 3- 5 Work Stations

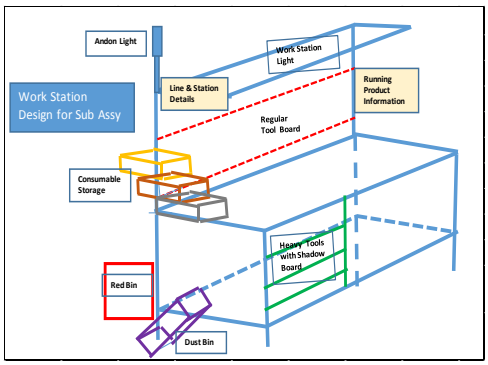
a) Main Station – Fixed station with Lifting Arrangement

b) Sub Assy Station - 1Fixed Station – Table (Spindle Assy)

c) Sub Assy Station - 1 Fixed Station – Table (Bowl Assy)

d) Sub Assy Station - 1 Fixted Station – Std Frame (Speed Sensor)

Work Station Layout



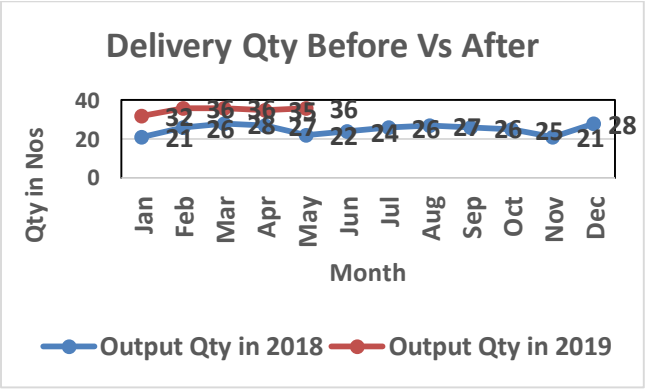
Material Handling Equipment's

Objectives Of Material Handling Equipment

- Minimize cost of material handling.
- Minimize delays and interruptions by making available the materials at the point of use at right quantity and at right time
- Increase the productive capacity of the production facilities by effective utilization of capacity and enhancing productivity.
- Safety in material handling through improvement in working condition.

Chain Hoists

Results



2. CONCLUSION.

From this project we conclude that,by using various lean tools , the layout has been designed to minimize waste, inventories and unnecessary transport. The future state in the factory strives towards a one-piece flow with Just-In-Time deliveries, which is consistent with a lean manufacturing philosophy.Comprison was made before and after applying lean .Lead time was reduced.

ACKNOWLEDGMENT

I have great pleasure in submitting the Report for ProjectStage-I on the topic, “Lean Layout Implementation in the Supply Unit Of Alfa Laval”. It gives me immense pleasure to record my debt of
gratitude and my warmest regards to my Guide Prof.Rahul. K. Bawane for extensive guidance and direction I have received from him throughout the progress of the work. The various values that we tried to learn from him shall remain a source of inspiration for me forever.
I would like to say thank you to our Project Coordinators, all teaching and non-teaching staff of Mechanical Engineering Department for their support and help.I am thankful to my family for their whole hearted blessings, support and encouragement towards the fulfilment of my work. I wish to record the help extended by my friends in all possible ways and active support and
constant encouragement.

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POWER GENERATION BY GRAVITY (May 2019)

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ABSTRACT Flywheels have consideration to be used for energy storage purposes. Developing countries like India, with growth in the economy, the demand for electricity is increasing. With the demand for reliable, cost-effective, and environmentally friendly storage, Flywheel Energy Storage System (FESS) is coming into its own. Study presents an analysis shows that using an FESS is a promising alternative in mitigating energy storage problems in decentralized electricity generation where an uninterrupted power supply is required. An electrical machine is used as a motor to store KE when the solar energy is available, and then the stored energy is converted back to electrical energy by running the machine when the solar energy is no longer available. Flywheel Energy Storage systems using advanced technology have come up as a promising alternative to the traditional battery. Energy storage depends on the mass, flywheel shape, and rotational speed. Energy fed into the rotational of a flywheel, store it as KE, and release when it is in demand.

INDEX TERMS Enter key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords

1. INTRODUCTION

Flywheel energy storage (FES) Works by accelerating a rotor to at high speed and maintaining the energy in the system as rotational source energy. Energy is extracted from the system, the flywheel's speed is reduced as the principle of conservation of energy; adding energy to the system results in increase in the speed of the flywheel. Most FES systems use electricity to accelerate and decelerate, but devices that directly use energy are being developed.

Description of Flywheel Energy Storage System

Flywheel energy storage has existed for thousands of years as one of the earliest energy storage systems Flywheel were performed by rotary objects, such as lathe, mils, and other rotary objects operated by people. Spinning wheels the middle ages do not differ from those used in 19th or even 20th centuries. In the 18th century, the use of flywheels in steam engines. The time, flywheels were used in steam engine trains and as energy accumulators in factories. In the middle. A mechanical storage device which emulates the storage of electrical converting it to mechanical. Energy in a flywheel is stored in the form of rotational KE. Flywheel speeds up as it stores energy and slows down when it is discharging, to deliver the accumulated energy. The flywheel and MG are coaxially connected, indicating that controlling the MG enables control of the flywheel. Flywheel Energy concept that is being used to overcome the limitations energy supply. A system is described as a battery, it does not create electricity it converts and stores the KE. Fly wheels are relatively simple technology as compared to counterpart such as rechargeable batteries in initial cost, ongoing Maintenance, environmental friendly and are very quick to get up to the speed. A flywheel is a shaft-mounted rotating disc that speeds up when electrical energy is applied to it. In a matter of second the electricity can be created from spinning flywheel making it the ideal solution to help regulate supply in the electrical grid. It is based on a old concept. the potter works, it removes energy from the system, to keep wheel spinning; he needs to keep moving. Energy flywheel contains is a function of speed it is spinning by the moment of inertia. The moment of inertia states that the effective mass of a spinning object is not dependent on how much actual mass the spinning object contains. Instead, it is dependent on where the mass is located in relation to the central point that it is rotating around. The flywheel rotates has a effect on the energy stored within it compared to the moment of inertia. Flywheel with a rim weighing 1kg and replace it with a 2kg rim, it has the potential to store double the energy.

2. OBJECTIVE

To design a flywheel whose mass concentration is far out towards the rim. To maximize the power generation by Flywheel system. To increase the efficiency of power generation by using flywheel no matters the angular displacement of input. To generate an amount of electrical energy without the complete rotations of gear.

3. PROBLEM DEFINITION

Most of the power generated through mechanical systems which includes incomplete rotation of gears, from which dynamo gets its rotational energy, is negligible because of

the incomplete rotations of gear. Power generation through piezoelectric system is not considered as a reliable source of energy as it produces negligible amount of power. Thermo-electric system is also not a reliable source of power generation as huge amount of temperature is not always available.

4. SCOPE

1.The objective of this work is to develop a New Automatic operated Machine of flywheel power generation.

2.This concept allows us to achieve our goal as well as better space management.

3.The new model takes into account all the real time conveying system and provide solution over their shortcoming.

4.The New model will get good efficiency compare to old method.

5. LITERATURE REVIEW

[1] Energy Characteristics of a Fixed-Speed Flywheel Energy Storage System with Direct Grid-Connection

Flywheel energy storage systems (FESSs) store kinetic energy in the form of J ω 2/2, where J i s the moment of inertia and ω i s the angular frequency. Although conventional FESSs vary ω to charge and discharge the stored energy, in this study a fixed-speed FESS, in which J is changed actively while maintaining ω , was demonstrated. A fixed-speed FESS has the advantage of being capable of direct grid-connection without requiring a power electronic interface. A prototype with an output power of several hundred watts and a charge/discharge period of several seconds has been developed and discharge/charge operations have been conducted while mechanically measuring the output energy Em from the flywheel and mechanical work E c , to vary J . Theoretical analysis suggests a ratio of 2.2 for E, and experimental values of show high reproducibility, m Ec Em E c approximately 1.8 and 2.7 in discharge and charge operations, respectively. The reason for the errors can be explained by the loss incurred in varying J . A prototype fixed-speed flywheel energy storage system with an output power of several hundred watts and a charge/discharge period of several seconds was manufactured and tested under direct grid-connection. To obtain operational data, sensors to measure both electrical and mechanical power were embedded in the prototype assembly to eliminate the influence of losses in the motor/generator and the inertia controller from the analysis results. The following conclusions were drawn The fixed-speed FESS is required to change the moment of inertia mechanically to discharge and charge stored energy instead of having a PEI. The efficiency of the mechanical change in the flywheel is reasonable. To obtain a feasible fixed-speed FESS, it is essential to improve the efficiency of the inertia controller used to vary the moment of inertia of the flywheel. The experimental analysis of energy balance in the fixed-speed FESS was similar to the theoretical analysis, and the errors between them can be explained.

[2] Optimization of the operation of a flywheel to support stability and reduce Generation costs using a Multi-Contingency TSCOPF with nonlinear loads

Multi-Contingency Transient Stability Constrained Optimal Power Flow (MC-TSCOPF) models optimize the economic dispatch of power systems while ensuring their stability after a series of reference incidents. This paper proposes a MC-TSCOPF model that represents the power balance at each node of the system and at each sample time. The proposed model includes non-linear loads, synchronous generators, a wind farm, and a Flywheel Energy Storage system (FESS).The model is written on GAMS and solved using a standard Interior Point algorithm. This study focuses on the Fuerteventura-Lanzarote insular grid in Spain, where stability problems and load shedding cause high additional costs due to the low inertia of the system. A FESS has been recently installed in the system to improve its stability, taking advantage of its high-power capacity and rapid response. The proposed TSCOPF model has been applied to optimize the operation of the FESS to support stability in the event of a contingency. The results of the study show that a proper model of non-linear loads is essential in TSCOPF Studies the proposed MC-TSCOPF provides a tool for minimizing the generation costs while ensuring transient and frequency stability it is possible to further reduce the generation costs by using the proposed model to calculate an optimal dynamic response of the FESS. A direct discretization MC-TSCOPF model that facilitates the inclusion of renewable generation, an energy storage system,and nonlinear loads is formulated. The application of the proposed MC-TSCOPF model to the Fuerteventura-Lanzarote island system provides the opportunity to calculate an optimal dispatch that ensures the system remains stable and no loads are shed after any one of a set of predefined reference incidents. The integration of an FESS model in the MC-TSCOPF problem can be used to optimize the dynamic response of the flywheel to support transient and frequency stability. Ensuring the stability in electric power systems presents additional costs because in some cases it entails to shift generation to power plants that are more expensive. The inclusion of the FESS dynamic response in the MC-TSCOPF model allows the generation costs to be reduced while ensuring stability after any of the reference incidents. It is found that the optimal response of the flywheel after a short-circuit may be contrary to the response of conventional FESS controls.

[3] Review of Flywheel Energy Storage Systems structures and applications in power systems and micro grids.

Flywheel Energy Storage System (FESS) is an electromechanical energy storage system which can exchange electrical power with the electric network. It consists of an electrical machine, back-to-back converter, DC link capacitor and a massive disk. Unlike other storage systems such as the Battery Energy Storage System (BESS), FESS is an environmentally-friendly short- or medium-term energy storage system, which has the capability of numerous charge and discharge cycles. These

characteristics make the FESS a suitable choice for different applications in the power system such as power quality improvement, power smoothing, renewable energies integration support, stability improvement, etc. This paper presents an overview on the structures and applications of FESS in power system and Micro grid (MG) and also challenges, problems and future works discussed. It can be a driver for development of FESS applications and also recommends suggestions to use its advantages in other areas. Investigation of different studies shows that FESS, as a developing technology, can play an effective role in the operation of the present and future power system and MG. n this study, the FESS structures and its applications in power systems and MGs have been investigated and an overview of previous studies has been presented. The following conclusions can be drawn based on this study Two types of FESS exist: low-speed and high-speed FESSs. These two types are different from each other in their physical structure and application. The usage of magnetic bearings, vacuum enclose, and composite disk are some characteristics of high-speed FESS and in a low-speed structure, mechanical bearings and steel flywheel are used and vacuum enclose is not required. The FESS has some characteristics that make it a desirable storage system among other storage systems. FESS is completely environmentally-friendly and has no pollution. It is able to charge/discharge for numerous cycles without any depreciation, consequently having a highlife-time and low maintenance requirement. The above characteristics make it suitable for applications that need a short- or medium-term energy storage system. Its presence in aerospace and military projects, FACTS devices, UPSs, renewable energy resources are some of these applications which have been reviewed. Although the FESS has many advantages, but some drawbacks such as low energy density and high initial cost limit its usage for some high technological applications such as space projects, military services, and so on. Nowadays, the BESS has wide areas of applications in power systems. It is expected by progress in different areas of FESS structure, the BESS can be replaced with FESS. In the future, the application of composite rotor for the FESS will be developed extensively, and its speed will be increased which leads to increase in the power density of FESS.

[4] A dynamic power management strategy of a grid connected hybrid generation system using wind, photovoltaic and Flywheel Energy Storage System in residential applications.

A global supervisory strategy for a micro-grid power generation system that comprises wind and photovoltaic generation subsystems, a flywheel storage system, and domestic loads connected both to the hybrid power generators and to the grid, is developed in this paper. The objectives of the supervisor control are, firstly, to satisfy in most cases the load power demand and, secondly, to check storage and grid constraints to prevent blackout, to reduce energy costs and greenhouse gas emissions, and to extend the life of the flywheel. For these purposes, the supervisor determines online the operation mode of the different generation subsystems, switching from maximum power conversion to power regulation. Decision criteria for the supervisor based on actual variables are presented. Finally, the performance of the supervisor is extensively assessed through computer simulation using a comprehensive nonlinear model of the studied system. A dynamic decision strategy for the energy management of a household application has been proposed. The PMS is able to define the optimal energy flows management in a house characterized by a mix of renewable energy resources (solar, wind) to satisfy different demands (electric, heating and water) while considering an effective storage system. The simulation results show the validity of the proposed PMS strategy. This management strategy is based on peak limiting and load shedding. These two objectives are fully drawn up. In fact, as simulation results show in Section all previously developed modes are correctly activated or deactivated according to the PMS main input factors. In this direction, the supervisor switches from maximum power conversion to power regulation. The proposed approach gives a possibility to select the optimum control scheme, to generate cost effective hybrid systems for power supply of grid connected residential application.

[5] Modeling of Human Power Flywheel Motor through Artificial Neural Network- A Novel Approach

Some of the authors of this paper had already established a pedal operated human powered flywheel motor (HPFM) which justifies the energy requirements for process units. The different types of process units designed and tested so far intestinally suits to rural areas such as brick making machine, Low head water lifting, Wood turning, Wood strips cutting, electricity generation etc. This machine system includes three sub systems namely (i) HPFM (ii) Torsionally Flexible Clutch (TFC) (iii) A Process Unit. ANN modeling has been used to model the experimental findings for human powered flywheel motor. It has been observed that neuron size, transfer function, training function plays important role in performance of the network. The optimal selection of parametric values of each ANN parameter is carried through observation of performance, regression plots. This paper illustrates a unique method of selecting optimal ANN network configuration for fitting function approximation problem. We also found that reliability of the derived ANN model is 97%. The conclusion may be drawn from the results shown in previous chapter that ANN can be employed very effectively for function approximation problem. Lower the ANN model for rectangular brick making process are found to be 96.68 and 0.95 respectively which is much appreciable.size of neurons in the hidden layer gives poor performance of the network while higher size of neurons requires more iterations and training and simulation time. Also it may result to over fitting thereby dominating the prediction of network. Hence optimum value of neuron size in hidden layer must be selected. For Human Powered Flywheel Motor with three independent variables the neuron size of 50 is found to be optimum. Transfer function defines the performance of any network. Hence its optimum value must be selected for optimal prediction of ANN model. It also defines the time and iteration requirements for training and simulation. For rectangular brick making process the transfer functions ‘logsig’ and ‘tansig’ at input and output

layer of single hidden layer MLP have given best results. The training function 'trainlm' was found most suitable training function. For rectangular brick making process 'sse' was best suited performance function for rectangular brick making process 'learnk' was the best suited learning algorithm. The values of reliability and R2 of

[6] Energy management of flywheel-based energy storage device for wind power smoothing

Power fluctuations of wind generators may affect power quality especially in weak or isolated grids. This paper proposes an energy management strategy for a flywheel-based energy storage device. The aim of the flywheel is to smooth the net power flow injected to the grid by a variable speed wind turbine. The design of the energy management strategy is conducted through several phases. First, a definition and determination of the optimal operation of the storage device is carried out through the formulation and deterministic solution of an optimization problem in GAMS. Based on this solution, an online energy management algorithm is proposed to achieve a close to optimal operation of the flywheel. This algorithm determines the set points of the torque control of the flywheel electrical machine. The proposed methodology is illustrated by simulations. This article proposes an energy management strategy of a FESS. The aim of the flywheel is to smooth the net power flow injected to the grid by a variable speed wind turbine. An optimal energy management of the storage device is defined as that which minimizes the difference between the energy to be injected or absorbed by the storage device and the energy that is finally exchanged by it during a given time interval. The formulation and solution of an optimization problem in GAMS for a set of sufficient representative wind profiles provides the optimal mean SoC of the flywheel. From the solution of this optimization problem a function is produced to compute offline a close to optimal flywheel angular speed reference. This simplifies the implementation of the algorithm online. The optimization results also show that the higher mean wind power, the higher mean rotating speed of the flywheel. In all cases, the optimal operation of the storage device is in the range of 89–93% of its mean SoC. Simulation results for an illustrative example show that the flywheel with the proposed energy management algorithm is able to achieve a 91.9% of turbulent energy component reduction in the high frequency components of the wind power. This is close to the 97.1% obtained by the optimal operation of the flywheel.

[7] Wind farms-fed HVDC system power profile enhancement using solid state transformer based flywheel energy storage system

As the power of wind farms (WFs) considerably proliferates in many areas worldwide, energy storage systems will be required to dynamically compensate the wind energy intermittency and increase power system stability. In this paper, a backup power conditioning strategy for wind energy-fed voltage source converter HVDC transmission systems is presented. An induction machine (IM) based flywheel energy storage systems (FESS) is integrated to the HVDC system via a solid state transformer (SST). The FESS is connected in parallel with the dc-link of the grid side converter; therefore, during the healthy conditions, the excess wind energy can be stored in the flywheel and then restored during the energy-shortage periods. However, in faulty conditions, typically ac faults, the FESS will provide an alternating path for the wind energy instead of feeding the fault. Hence, excessive overvoltage across the DC-link capacitor due to trapped energy is avoided. The proposed system including FESS with an interfacing SST is modeled, simulated, and analyzed in MATLAB/SIMULINK environment. The results verify the effectiveness of the proposed system. In this paper, an improving and recovery strategy of improving the integration of large scale wind farms into HVDC transmission system using SST based FESS has been proposed to compensate for the wind power oscillations and to enhance the power profile at grid side during healthy condition. And it also enhances the ability of a DC transmission system to ride-through different AC faults, without increasing the risk of device failures due to increased voltage or current stresses. This technique allows the HVDC system to remain operational longer in the case of permanent AC faults and in the same time the active power find another path to be stored. In the proposed technique a low speed induction machine based flywheel energy storage system is connected in parallel with the DC link of the gridside converter. Therefore, the excess wind power is stored in FESS and restored in case of wind power shortage and/or power demand increase preserving the grid power profile at its required value. The simulation results have demonstrated that the FESS compensates for power fluctuations caused by wind nature during different load conditions and exhibits good system performance with a relatively fast response and high dynamics. It also compensates and eliminates the DC link trapped energy during different AC faults, thus decreasing the current and voltage stress on the switching devices.

[8] Electric power control of a power generator using dissociation expansion of a gas hydrate

This study proposed a generator that could operate using a small temperature difference, by leveraging the change of state of a gas hydrate. The dynamic characteristics of an alternating current power supply from a gas-hydrate power-generation system (GHGS) have not previously been reported. The following conclusions were reached. When the load factor was increased rapidly from 0.2 to 0.93, the target voltage variation of within±0.6 V and frequency change of less than±0.2 Hz were achieved. These results suggest that the GHGS can operate as a commercial power system. Applying power factors of 1.0 (resistance load), 0.8 (phase lag by inductive load), and 0.8 (lead phase angle by capacitive load) to the power load had little influence on the quality of the electricity produced by the GHGS, although the voltage deviation slightly increased in response to the inductive load. The quality of the electricity supply could be maintained by controlling the P-I of the pressure regulating valve. However, when the time constant of the pressure regulating valve increased, the lag in the gas input to the actuator also increased, and the frequency fluctuation exceeded the stipulated range. Because the GHGS was of the batch type, a hybrid system, including conventional gas-powered generator, was investigated. This allowed the frequency fluctuations caused by changes in the supply

and-demand balance to be controlled by adjusting the inertial force of the flywheel of the gas engine. When applied to individual houses in a cold region of Japan, a flywheel with an inertia constant of 6.86 kg/m2 allowed the target frequency range to be achieved. This demonstrated that the installation of an appropriately designed flywheel would allow this hybrid system to provide a stable supply of electric power to an individual house. However, safety and cost of the high-pressure reactor contained in the proposal system are future subjects. It is expected that application method of the proposal system approaches a present power generation system using compressed air.

6. LITERATURE GAP

Conventional way of producing electrical energy is not so efficient. Power generation through piezoelectric system is not efficient method as it produces negligible amount of electricity which is insufficient as per the demand. Power generation through thermos-electric system is not considered as an optimum method of power generation as huge amount of temperature is not available always. Power generation through flywheel is one of the optimum method to generate electrical energy as it does not waste the other half of the rotational energy of gear. Power generated through the angular displacement get multiplied by using flywheel.

7. HOW IT WORKS

The theory of operation of a pulley system is that the pulleys and lines are weightless, and there is no energy loss due to friction. The forces on the moving block must sum to zero. the tension in the rope must be the same for each of its parts. This means that the two parts of the rope supporting the moving block must each support half the load. These are different types of pulley systems: A fixed pulley has an axle mounted in bearings attached to a supporting structure. A fixed pulley changes the direction of the force on a rope or belt that moves along its circumference. Mechanical advantage is gained by combining a fixed pulley with a movable pulley or another fixed pulley of a different diameter. A movable pulley has an axle in a movable block. A single movable pulley is supported by two parts of the same rope and has a mechanical advantage of two. A combination of fixed and a movable pulleys forms a block and tackle. A block and tackle can have several pulleys mounted on the fixed and moving axles, further increasing the mechanical advantage.

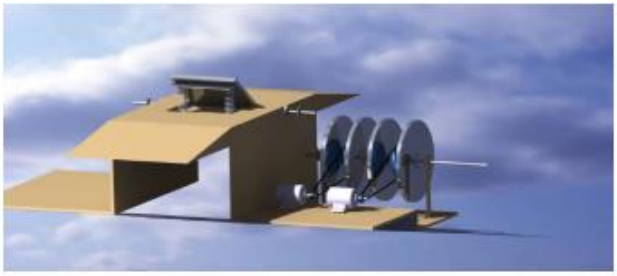

Fig. no .A: Construction of the System

8. STATIC STRUCTURAL ANALYSIS

We have done the static structural analysis of our design to find the total deformation and the maximum stress generated due to the applied load. We assumed the following boundary conditions: -

1) Ramp is considered as fixed entity.

2) Load acting on the ramp is considered to be 1000N.

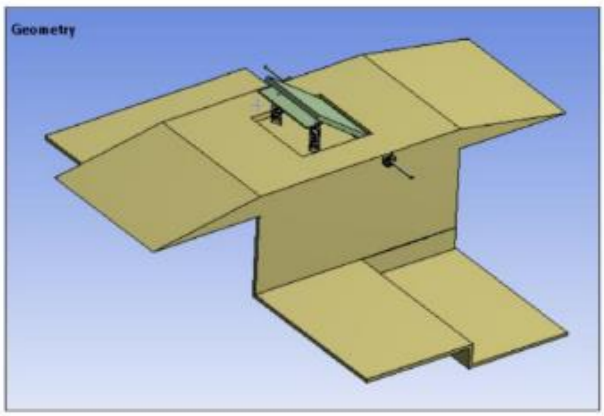

Fig. no.1: Geometry of system.

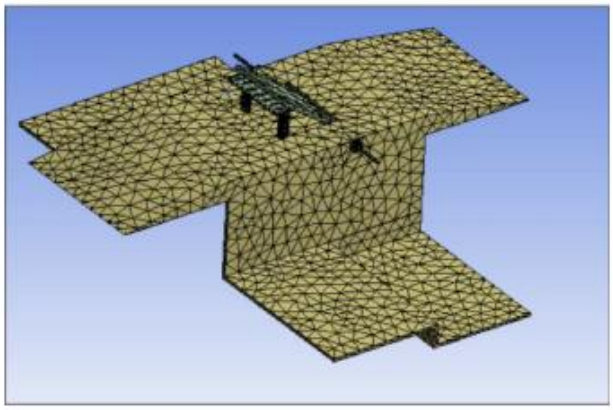

Fig. no.2: Meshing

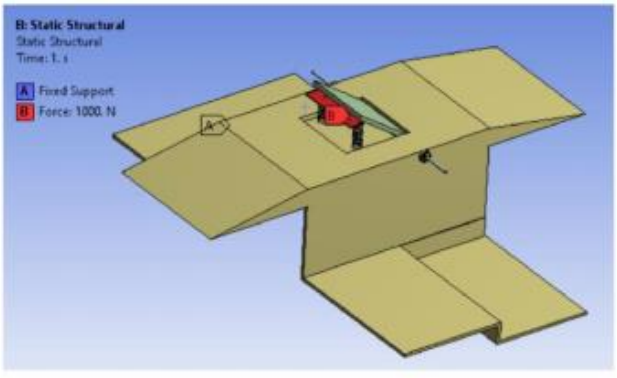

Fig. no.3: Boundary Conditions & Application of load

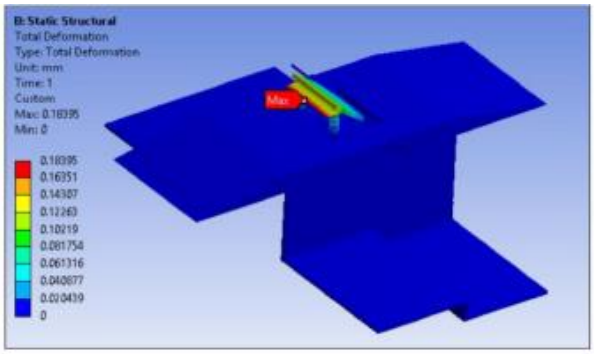

Fig. no.4: Deformation

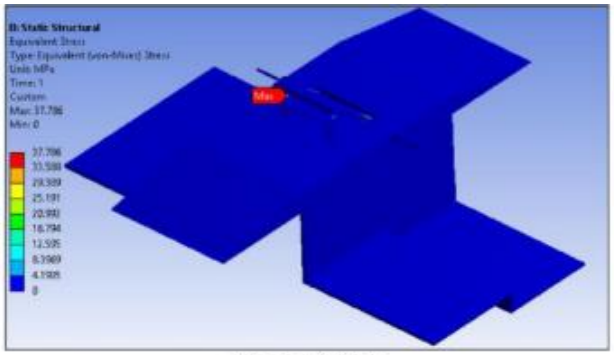

Fig. no.5: Stress

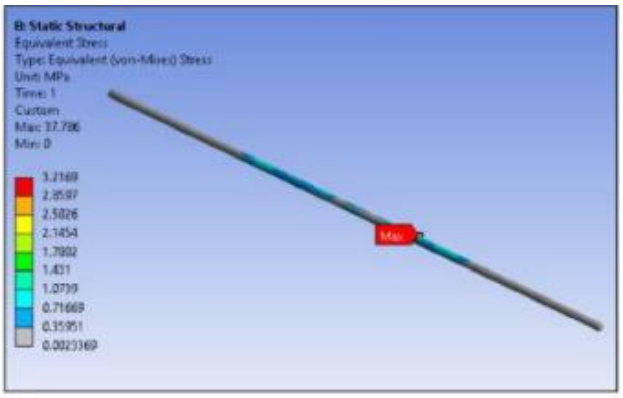

Fig. no.6: Stress

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