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Design, Development Manufacturing of Mango Seed Cutting Machine

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ABSTRACT:

Mango seed cutting machine is used to obtain the kernel present inside the mango seed through mechanical means. The old method of obtaining the kernel was time consuming and also more energy was consumed, with the help of this machine both time and energy is saved.Mango is one of the most economical fruit which is also known as "KING OF FRUITS". Mango seed is an important part of fruit. Mango seeds are nutritionally dense by product of mangoes but commonly discarded as waste. By breaking the hard seed coat of mango seed, kernel is obtained. In today's world the mango seed kernel is obtained by manual cutting, due to which the production rate is less also it is time consuming. So, by research we are going to increase the production rate by using mechanically operated machine.

Keywords—Automation, Cutter, Impact Energy, Kernel, Work Deformation

1. INTRODUCTION

Mango seed kernel is approximately 20% of total fruit weight. The oil of mango seed kernel consists of about 44-48% saturated fatty acids and 52-56% unsaturated fatty acids. The purpose of study is proper utilization of mango seed kernels which are mainly used as a raw material for purpose like cattle feed, medicine, and antioxidant rich biscuit. Mango pit shell waste is valuable bioenergy feedstock and its recycling could be economically and environmentally beneficial for mango processing industry. In today's world the mango seed kernel is obtained by manual cutting, due to which the production rate is less also it is time consuming.. In Konkan region the production of mangoes is tremendously high. As the mango seed cutting machine is not available in Konkan region the mango seeds are transported to other regions for the further processing. So, by manufacturing the mango seed cutting machine in this region based on need.

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This project is designed on the basis of research papers & machines presently available on the cashew shelling. The cutters blades are for different for different mango seed. This can be used in the agriculture purpose and it is very useful for the small scale works. It can also be used for large scale work like mass production. This model is able to cut the mango seed in two parts and get the kernel which is used as raw material in medicine and cattle fields. Prime objective of our project is to cut mango seeds rapidly and minimize human efforts and labor cost. We can use this machine for other purposes like cashew shelling and almond shelling by changing blades only. Another objective is to provide this machine in Konkan Region in lowest cost, so small number of start-ups can be found for farmers and local businessman. Objectives to design and develop the set up for mango seed cutting machine, to reduce the mango seed cutting time, to reduce the labor cost & to increase the work efficiency.

2. LITERATURE REVIEW

The main purpose of Literature review is to know current developments in our area of research, existing problem solving techniques used by researchers in current research, the efficiency of their methods and to do comparison of various methods/solutions existing with our research work.

Design & manufacturing of cashew nut shelling machine(2017), in this paper , manually operated details mentioned so further improvement can be achieved by , automatic separation of kernel and shell of cashew nut, increase in production rate by means of multi cutters, the machine can be redesigned to reduce overall weight. The purpose is to study the working and design of cashew nut shelling cutter.

Automatic cashew nut cutting machine (2017), the cashew nut cutting machine works using the crank mechanism but it requires manual work to do processing. This research helps to design further operations automatically, like separation of nuts and waste part.

A review on cashew nut shelling technique (2016), this paper describes how the conventional cashew nut process and shelling is more time consuming , also having low rate of production. So it must be mechanized to save time and improve the quality. Shelling of roasted cashew nut is conventionally accomplished by cracking the nut manually to obtain the edible kernel. Also to study the conventional cashew nut process and how it effects on mass production and efficiency of entire process.

The analysis of an influence of rubber V-Belt physical properties on Cvt efficiency(2017), this paper describes how the high belt tensile stiffness and coefficient of friction entail slip reduction. The slip value indicates that this is significant part of the total power losses. Ultimately it improves the performance of machine.

Steady mechanics of belt-pulley system (2014), how the inclusion of bending stiffness leads to non-uniform speed and tension in the spans and reduces the belt wrap angles on pulleys, especially for small radii. Bending stiffness

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decreases wrap angles, causes earlier full slip of the belt on the pulley, increases the power efficiency and decreases the maximum transmissible moment. The effects of belt speed on the steady motion are reduced as the bending stiffness increases.

Utilization of mango seed(2012), mango seed having so many uses in food ingredients. The mango seeds should be further utilized rather than just discarded as waste. The mango seed could be used as a potential source for functional food ingredients natural antioxidants antimicrobial compounds, cosmetic, activated carbon and, in addition, it could be further processed into therapeutic functional food products processed into therapeutic functional food products.

Optimization and extraction of oil from mango seed kernel (2017), mango kernel is used in cosmetics. Mango seed kernel oil contained high unsaponifiable matter which could have good potential to be used in cosmetics.

Use of mango seed kernels for the development of antioxidant rich biscuits (2017) this paper describes, the mango seeds are nutritionally dense by-product of mangoes but commonly discarded as waste. Mango seed kernels were processed and flour was prepared for the development of antioxidant rich biscuits. The use of mango seed kernel flour can play an important role in improving nutritional value of diets.

Utilization of mango seed starch in manufacture of bio plastic reinforced with micro particle clay using glycerol as plasticizer (2020), paper describes how the bio plastics are plastics that can be used just like conventional plastics but will disintegrate by the activity of micro-organisms into water and carbon dioxide. Starch is a natural polymer material that can be used for bio plastic production. The addition of reinforcing particles has been shown to improve the mechanical properties of bio plastics.

Design and development of cashew nut shelling machine(2010), this paper investigate the physical and mechanical characteristics of the roasted cashew nut during fracture, by subjecting the nut to varying impact load tests at different orientations to ascertain the critical impact load that fractures the shell without damaging the kernel within.

A study of bearing and its types (2015), paper describes the different types of bearing to get better relative motion between the machine elements while carrying the loads. It helps to study certain amount of power is wasted in machine performance and selection of roller bearing.

Indian cashew processing industry-an overview (2017), paper describes how the cashew is an important cash crop and highly valued nut in the global market. The area under cashew cultivation is the highest in India so it is very much important to increase productivity, quality of cashew nut processing machine.

The design and testing of a low-cost cashew-nut cracker for peasant Farmers(1996), paper describes the cashew nut shelling machine was designed using impact method to improve shelling efficiency and whole kernel recovery for nuts roasted in hot oil. This was based on the principle of the optimum kinetic energy that could break the cashew nut shell.

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3. Basic theory

Basically there is no any proper machine for mango seed cutting operation. The manual process of cutting mango seed is done by hammering and then extracting the kernel. The manual process is time consuming. The automatic mango seed cutting machine works effectively. The release of kernel from the shell with no damage & breakage is possible with this. An automatic mango seed cutting machine is based on the principle of shear with respect to cutter mounted on sliding guide ways.

4. Construction & working

Currently there is no any machine available in the market for that specific operation of "mango seed cutting". For that specific operation we have designed a machine like a cashew shelling machine, cutters are slightly different according to Mango seed. For doing this operation we required electric power source, we have used single phase 1HP motor and power is transmitted through pulleys for up and down motion of Scrappers and feeding mechanism. Feeding mechanism and Scrappers are working simultaneously which are connected together to the moving plate.The steady part in the machine is cup and cutters. Feeding mechanism feeds mango seeds into the cups, and slides on the cutters with the help of scrappers. Guide bar are provided for moving plate for smooth sliding motion, self-made sliding bearing casing is used. Frame is provided for holding all the components like motor, cups, cutters, guide bars, bearings.

First washed mango seeds are poured in the hopper by working labor. When motor gets electric supply and operates, it moves moving plate up and down with the help of pulley-belt mechanism. Feeding mechanism is connected to moving plate which then feeds mango seeds one by one into the conical cups. Scrappers are also connected to moving plate which slides the seed into the conical cup and as well as slides on the cutters. Cutters has the spreading like structure which opens the mango seed after cutting and separates the inner usable seed. After that seeds are collected in the collector. Working labor only have to separate the usable inner seed from that seeds.

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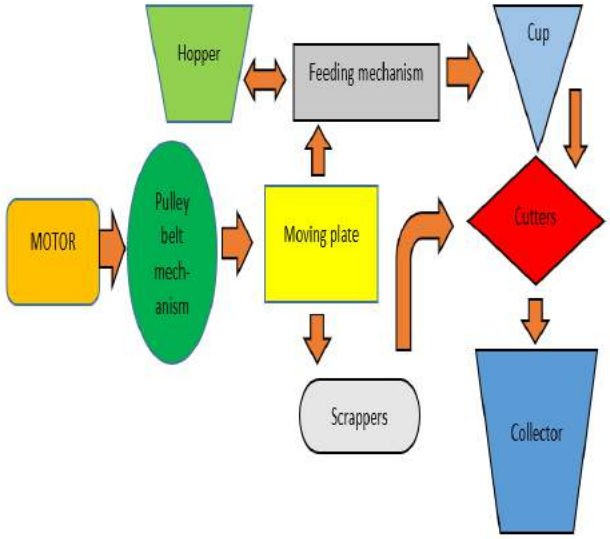

Fig.1 Flow chart of Mango seed cutting machine

5. MATERIAL SELECTION AND DESIGN OF VARIOUS COMPONENTS [9][10][11][12][13]

Table 1.List of components and Material used

Sr.No.	Components	Specification	Quantity	Material used
1	Frame	L-Channel 50mmx50mmx5mm	1	Mild Steel
2	Roller Bearing	Bearing No:-UC207 Diameter:- 30mm	4	Chrome Steel
3	Sliding Bearing	LM26UU-AJ Diameter:- 25mm	2	Chrome Steel
4	Cutter	OEM	2	Mild Steel
5	Shaft	Diameter:- 30mm Length:- 300mm	2	Mild Steel
6	Guide Shaft	Diameter:- 25mm Length:- 1000mm	2	Stainless Steel
7	Belt	V-Belt Length:-2025mm	2	Rubber
8	Motor	1HP(1440rpm)	1	Cast Iron (Body)

5.1 Frame:-

The frame material which we have used mild steel (L channel). While selecting frame material we had 3 choice circular pipe, square pipe and L channel, the reason for selecting L channel to make the frame lighter and also for the mounting purpose.

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5.2 Motor:-

We have used 2-stage reduction whose stroke length is 330mm so according to calculation we selected 1HP motor.

5.3 Pulley:-

As we have selected 2 stage reductions to get more efficiency and it produces less noise for that we have used 2 pulleys of 16 inch, 1 pulley of 5inch and 1 pulley of 2.5 inch of standard dimension.

5.4 Hopper

We have designed hopper in such a manner that once we pour the seed into it, the seeds will take place of the previous seed during the feeding mechanism.

5.5 Design of components [1][2][3][4]

The force required to crack the mango seed shells are provided by scrapper as an impact load. Therefore considering no conservation of kinetic energy, the velocity of impact is calculated, because seeds are cracked plastically.

5.5.1 Calculation of Cutting Force:-

Average weight of mango seed is 50g.

Impact energy =$\frac{mv^2}{2} J$ =$0.025v^2$

Considering highest impact load as 200N.

Work deformation=200 N $\times$ e m (J) = 200N $\times$ 0.01258 m (J) = 2.516 J

Equating,Impact energy =Work deformation

$0.025v^2 = 2.516$

Velocity of scrapper(v) = 10.03 m/sec

5.5.2 Design of spring:-

Material for spring hard drawn spring steel.

E=81370 N/mm^2

Max deflection of spring required is 10mm.

Force acting on spring is 14.56N.

Std spring available: - wire diameter (d) =2mm

Mean diameter(D)=21mm

Spring index =$\frac{D}{d} = 10.5$

Spring rate(K)=$\frac{Force\ acting\ on\ spring}{deflection\ of\ spring}$

=1.465 N/mm

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5.5.3Selection of Belt [5]

Type-v belt (B-cross section),Material- Rubber, usual load of drive 2-15kW, Min pulley pitch diameter 125mm, nominal top width 17mm, nominal thickness 11mm, weight per meter0.189kgf

5.5.4 Calculation of bottom width-

Bottom width=Top width-(2 × T × tan20°) =17-(2 ×11 ×tan20°) =8.9927mm

5.5.5 Calculation for belt velocity-

$v=\frac{\pi \times d \times N1}{60} = \frac{\pi \times 0.05 \times 1440}{60}$ =3.76m/sec

5.5.6 Calculation for diameter of driven pulley & speed

For 1st stage

$$\text{Diameter of driven pulley} = \text{Diameter of drive pulley} \times \frac{input\ speed}{output\ speed}$$

$$= 0.05 \times \frac{1440}{180} = 0.4\text{m}$$

For 2nd stage

Diameter of driven pulley $= 0.11 \times \frac{180}{50} = 0.4$m

5.5.7 Selection of centre distance and belt length

For 1st stage

As $i = \frac{D}{d} = \frac{0.4}{0.05} = 8$

Recommended C/D ratio is 0.85

C =0.4×0.85=0.34m˜340mm

Cmin= 0.55(D+d) +T = 0.55(400+50) +11 = 258.5mm

Cmax= 2(D+d)= 2(400+50) = 900mm

Cmin ≤ C ≤ Cmax

258.5mm ≤ 340mm ≤ 900mm

Hence design is safe.

Belt length

$L=2C + \frac{\pi}{2}(D+d) + \frac{(D+d)^2}{4C} = 2\times340 + \frac{\pi}{2}(400+50) + \frac{(400-50)^2}{4\times340}$

=1476.93mm

Actual centre distance

$C = A + \sqrt{(A^2 - B)}$

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Where, $A = \frac{L}{4} - \pi\frac{(D+d)}{8} = \frac{1476.93}{4} - \pi\frac{(400+50)}{8}$

= 192.51mm

$B = \frac{(D-d)^2}{8} = \frac{(400-50)^2}{8}$

=15312.5mm

Therefore, $C = 192.51 + \sqrt{(192.51^2 - 15312.5)}$

=339.38mm˜340mm

For 2nd stage

As $i = \frac{D}{d} = \frac{0.4}{0.114} = 3.55$

Recommended c/D ratio is 0.975

C =0.4×0.975=0.39m≈390mm

Cmin= 0.55(D+d) +T = 0.55(400+114) +11= 293.86mm

Cmax= 2(D+d) = 2(400+114) = 1028.6mm

Cmin ≤ C ≤ Cmax

293.86mm ≤ 390mm ≤1028.6mm

Hence design is safe.

Belt length

$L=2C + \frac{\pi}{2}(D+d) + \frac{(D+d)^2}{4C} = 2\times390 + \frac{\pi}{2}(400+114) + \frac{(400-114)^2}{4\times390}$

=1640.18mm

Actual centre distance

$C = A + \sqrt{(A^2 - B)}$

Where, $A = \frac{L}{4} - \pi\frac{(D+d)}{8} = \frac{1476.93}{4} - \pi\frac{(400+50)}{8}$ = 192.51mm

$B = \frac{(D-d)^2}{8} = \frac{(400-114)^2}{8}$ =10203.06mm

Therefore, $C = 208.07 + \sqrt{(208.07^2 - 10203.06)}$

=389.97mm≈390mm

5.5.8 Calculation for tension in belt

for 1st stage

$\alpha = sin^{-1}(\frac{D-d}{2C}) = sin^{-1}(\frac{400-50}{2\times340}) = 30.97°$ or 0.5406 rad

$\theta = \pi - 2\alpha = \pi - 2\times0.5406 = 2.06\,rad$

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$2\beta = 40°\ \beta = 20°$

Assume $\mu = 0.3$

Therefore, $\frac{T1}{T2} = e^{\frac{\mu\theta}{sin\beta}}$, $\therefore \frac{T1}{T2} = e^{\frac{0.3\times2.06}{sin20}}$

T1 –6.0916T2 =0----------1

Also,(T1-T2)V =P, ∴(T1-T2)3.76 = 745,

∴T1-T2 = 198.13----------2

By solving equations 1&2,we get

T1=237.04N, T2=38.91N

For 2nd stage

$\alpha = sin^{-1}(\frac{D-d}{2c}) = sin^{-1}(\frac{400-114}{2\times390})$ = 21.48° or 0.3750 rad

$\theta = \pi - 2\alpha = \pi - 2 \times 0.3750 = 2.39\ rad$, $2\beta = 40°\ \beta = 20°$ Assume, $\mu = 0.3$

Therefore,

$\frac{T1}{T2} = e^{\frac{\mu\theta}{sin\beta}}$, $\therefore \frac{T1}{T2} = e^{\frac{0.3\times2.39}{sin20}}$

T1 –8.1365T2 =0----------1

Also,(T1-T2)V =P, (T1-T2)1.036 = 745

T1-T2 = 719.11----------2

By solving equations 1&2,we get

T1=81987N, T2=100.76N

5.5.9 Arc of contact angle

For 1st stage,

Arc of contact angle=$2cos^{-1}\left(\frac{400-50}{2\times340}\right)$ =118.04°

For 2nd stage,

Arc of contact angle=$2cos^{-1}\left(\frac{400-114}{2\times390}\right)$ =137.02°

5.5.10Motor:-Single phase(DC Supply), -1hp(0.745kW), -1440 rpm

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6.CAD Model

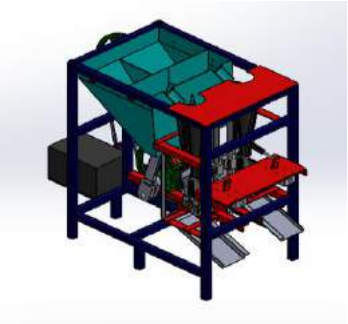

Fig.2.CAD Model of the mango seed cutting machine

7. Fabrication of Project set-up [5][6][7][8]

As all the design of the comments is completed then we started fabrication of project. First of all before starting fabrication, components of mango seed cutting machine and material required for that is to be identified. After identifying components, which components we have to make and which are readily available are short listed.

Components procured from the market: Motor, Pulleys, Bearings, Nut/ Bolts, SS Guide bars
Fabrications of the components are carried out in the following way:

1. **Frame:**
   Main frame is made up of Mild steel "L Section" pipes. All components are mounted on the frame. Some mounts are made from same L angle pipes, Mild steel bar of less thickness and mild steel sheet.

Fig 4 (a)Dummy Frame ,(b)L-Channel for Main Frame, (c) Arc Welding,(d)Main Frame

2. **Hopper:**Hopper is made up of mild steel sheet.
3. **Moving plate:**Moving plate is made up of mild steel plate.

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Fig 4 (e) Process of material removal of plate& moving plate

Fig.4(f) Milling Operation On Self Made Bearing Casing

Fig.4 (g) Mounting All The Necessary Part On Moving Plateand Guide Bar

Scrappers:

Scrappers are made up of mild steel sheet of appropriate thickness.

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Fig.4 (h) Scrappers

4. Link:

Moving plate attached to the link which is operate with the help of pulley belt mechanism. The material used for the link is Mild steel bar of appropriate thickness. Link is made in three parts as shown below.

Fig. 4(i)Three Parts Of A Link Fig..4(j) Link Mechanism

Fig.4 (k) Bending During Testing Fig.4 (l) Bending Overcome

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5. **Cups:**Cups are made up from mild steel sheet.
6. **Pulleys:**We have used standard OEM pulleys of mild steel.

Fig.4(m) Standard Pulleys Fig.4(n) Pulleys Mounted On Frame

Feeding Link: Feeding link is made up of mild steel L channels.

Fig.4(o) Feeding link Fig.4.Fabricated model of the mango cutting machine

Result and Discussion

For the manually cutting of mango seed cutting results are as follows:-Production rate -7 kg per hour, Efficiency - 40%, More Human Efforts. After development of machine, efficiency in the range 15-20 kg per hour. This depends also on the size of the mango seeds, improvedin the efficiency of the cutting operation found by means of automation in processing equipment.

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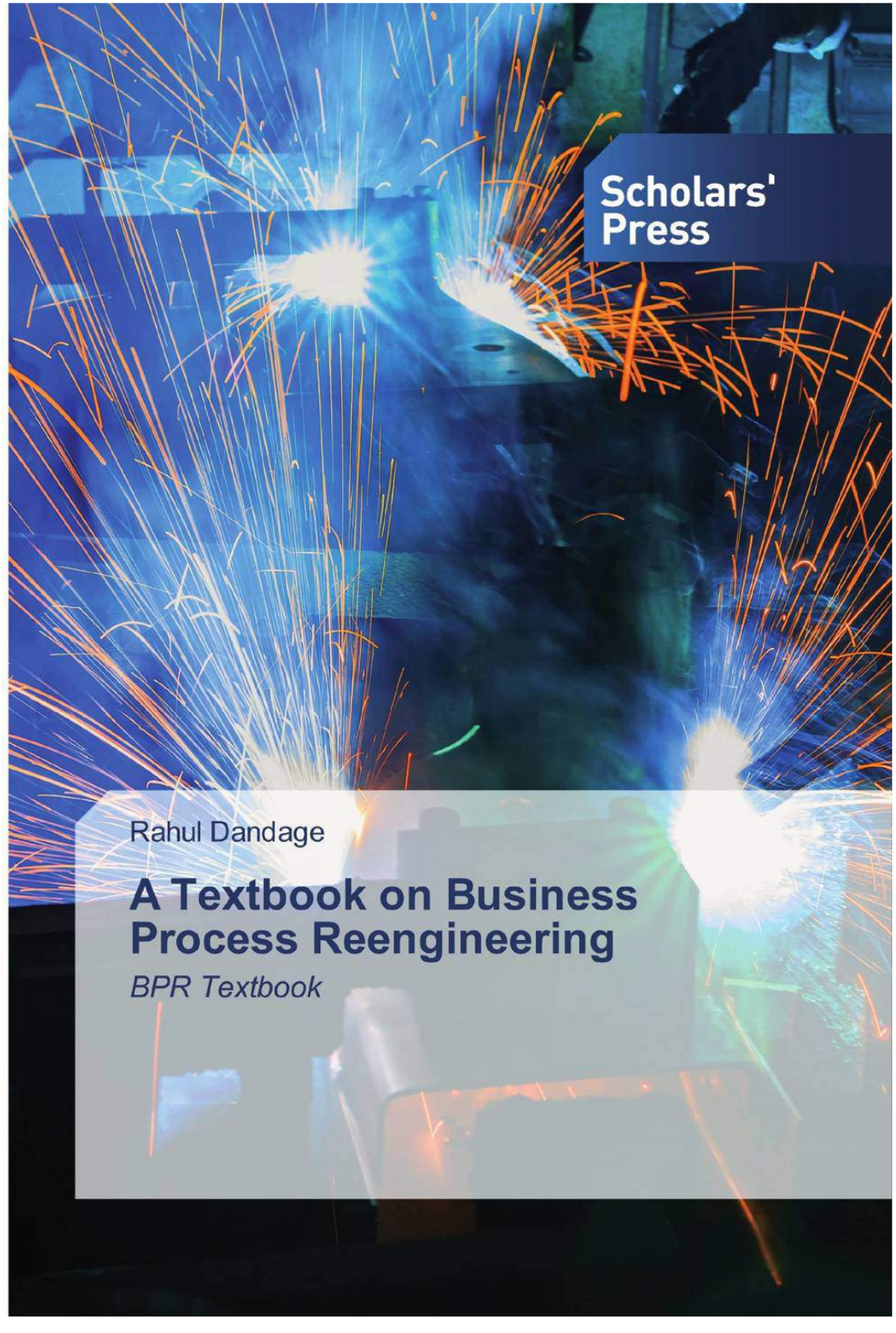

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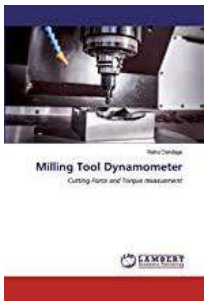

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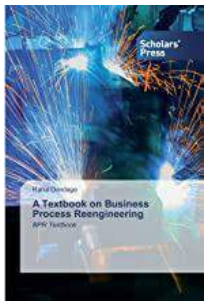

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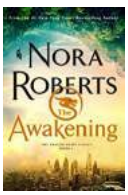

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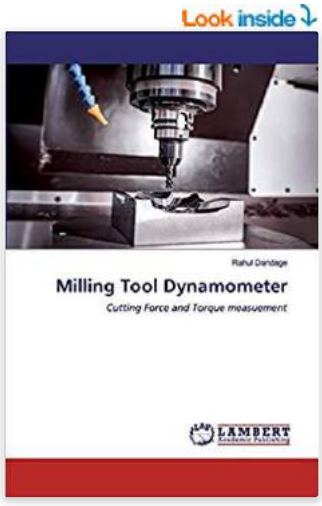

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RISK MANAGEMENT IN INTERNATIONAL PROJECTS: A CASE STUDY OF DABHOL POWER COMPANY

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Abstract

The industries are focusing to expand their business into new foreign markets as a result of the globalization of international markets. International projects involve a wider range of issues than domestic projects. It is very essential for the companies to understand the risks involved with the international projects and their effects for sustained competitiveness and growth in a global market. This paper aims to explore the different categories of risks involved in international projects and map them with the five process groups in project lifecycle. The paper represents the case study of Dabhol Power plant, the first International Power plant project in India based on the published literature and attempts to develop a risk management model.

Keywords-*Globalization, International projects, Risks, Dabhol Power Company (DPC)*

1. INTRODUCTION-

Generally projects are classified as domestic and international projects. The international projects are classified as overseas (executed in a foreign country for a native firm), foreign(executed in a foreign country for a foreign firm) or global (project team consisting of professionals from multiple countries) projects*(Grey et al., 2010)*.

The lower costs and increased capacity of global air & sea transportation, the developments in communication networks, use of internet, enhanced technological & business capabilities of countries like China & India, the international projects market has expanded tremendously. The international projects differ significantly from the domestic projects as moving outside the usual working jurisdiction may bring many unknown difficulties in executing the projects*(Nicholas & Steyn, 2009)*.For most international projects, the project life cycle is divided into various phases and different participants are responsible for and control of them. Division of project into various phases and responsibilities can increase the chances of risk

occurrence. Individually project participants become more concerned about risks related to their own phase and try to transfer the overarching project risks to other participants.

The survey conducted by Standish Group International Inc. shows that only 25% to 30 % projects succeed in successful completion. The success of an international project mainly depends upon understanding the risks associated with the specific project. To improve project performance the risks which occur across the entire project life cycle must be recognized and they must be given due consideration *(Han et al., 2008; Ahsan & Gunawan, 2010)*.

2. RISKS INVOLVED IN INTERNATIONAL PROJECTS-

According to *PMBOK (2017)*; Risk is often referred to as the presence of potential or actual threats or opportunities that has positive or negative influence on the objectives of the project during construction, commissioning or at the time of use. Hence, it is important to identify the risks before they become problems.

Earlier studies *(Dandage et al. 2017; Dandage et al. 2018a;Dandage et al. 2018b;Dandage et al. 2019)*have identified the various risks involved in international projects. The various risk categories and their mapping with five process groups is represented in table I

Table I Mapping of risks with Process Groups

Process Groups → / Risk Categories ↓	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring & Controlling Process Group	Closing Process Group
Financial & Economical	√	√	√	√	√
Contractual & Legal	√	√			√
Subcontractor related			√		
Operational			√	√	√
Safety & social			√	√	√
Design		√	√		
Physical			√	√	
Delay		√	√		
Political	√				

Internally generated		√	√	√	√
Managerial			√	√	√
Technical risks		√			
Level of competition related	√	√			
Fraudulent practices related	√	√			
Cultural	√	√			
Health related			√	√	
Force majeure	√	√	√	√	√

CASE STUDY OF DABHOL POWER PLANT-

In the early 1990s, India opened up its economy as a step towards its globalization and liberalization policy. With the growing population and industrialization, the demand for power was increasing at a rapid rate whereas the installed capacity was insufficient to cope up with that. The Indian government decided to welcome foreign investors to invest in the power sector as per the economic liberalization policy. Dabhol Power Plant was the first flagship project which opened India's domestic energy sector to foreign investors*(Parikh, 1997; Gupta & Sravat, 1998;Parry, 2001; Paul & Frederik, 2007)*.

In 1990, Enron Corporation, a U.S. based company set up a subsidiary named Enron International with the objective to run power generation projects in the developing countries. Enron along with General Electric Corporation (GE) & Bechtel Enterprises Inc. (Bechtel) Formed Dabhol Power Company (DPC) as an Indian private company entirely owned by foreign investors to start the gas based power plant near Anjanvel in Maharashtra state. The Enron had the major stake of 80 % while GE and Bechtel owned the stake of 10 % each.

Earlier studies *(Parikh, 1997; Gupta & Sravat, 1998;Parry, 2001; Paul & Frederik, 2007)* mentioned the major risks considerations for DPC as follows:

1) Environmental Risks-The risks like pollution of drinking water, protest by the resident villagers keeping in view the possible contamination of sea water affecting the local fishing business and possibility of exhaust gases harming the local alphonso mango business.

2) Human rights risks- The risks due to repeated ignorance to public complaints, lack of transparency, physical and mental harassment of protesting local people and social activists, arrogance of officers etc.

3)Political Risks- The political risks were mainly due to changes in the ruling political parties in the state government, bureaucratic administration, constant re-examination of the project and the conflicts over the selling price of the electricity produced to M.S.E.B. (Maharashtra State Electricity Board), the state board for Electricity generation and distribution.

4) Economic Risks- The economic risk related to fluctuations in the rate of currency was properly transferred to M.S.E.B. by the DPC as most of the payments were linked to U.S. Dollars. But this gave birth to increase in the selling price of electricity produced which was very heavy for M.S.E.B. to pay.

5) Technological Risks- The risks related to Technology were not prominent because of the presence of two partners in the joint venture. Bechtel had a vast experience of construction of power plants and GE had expertise in supplying Gas turbines.

6) Legal Risks- The legal risks aroused due to the conflicts between MoU signed by DPC and M.S.E.B. and the Indian laws related to Power generation. According to the Indian laws, the contract should be based on the actual power generation and not on the generation capacity.
As per the MoU, M.S.E.B. must pay the same amount equal to 90 % of the generation capacity irrespective of consumption of energy. Also as per the audit made by Central Electricity Authority, the capital cost of DPP was Rs.19.1 million per MW whereas the estimate by Enron was Rs. 44.9 million per MW which was against the least cost approach as per Indian Laws.

Risk Analysis of DPC Project-

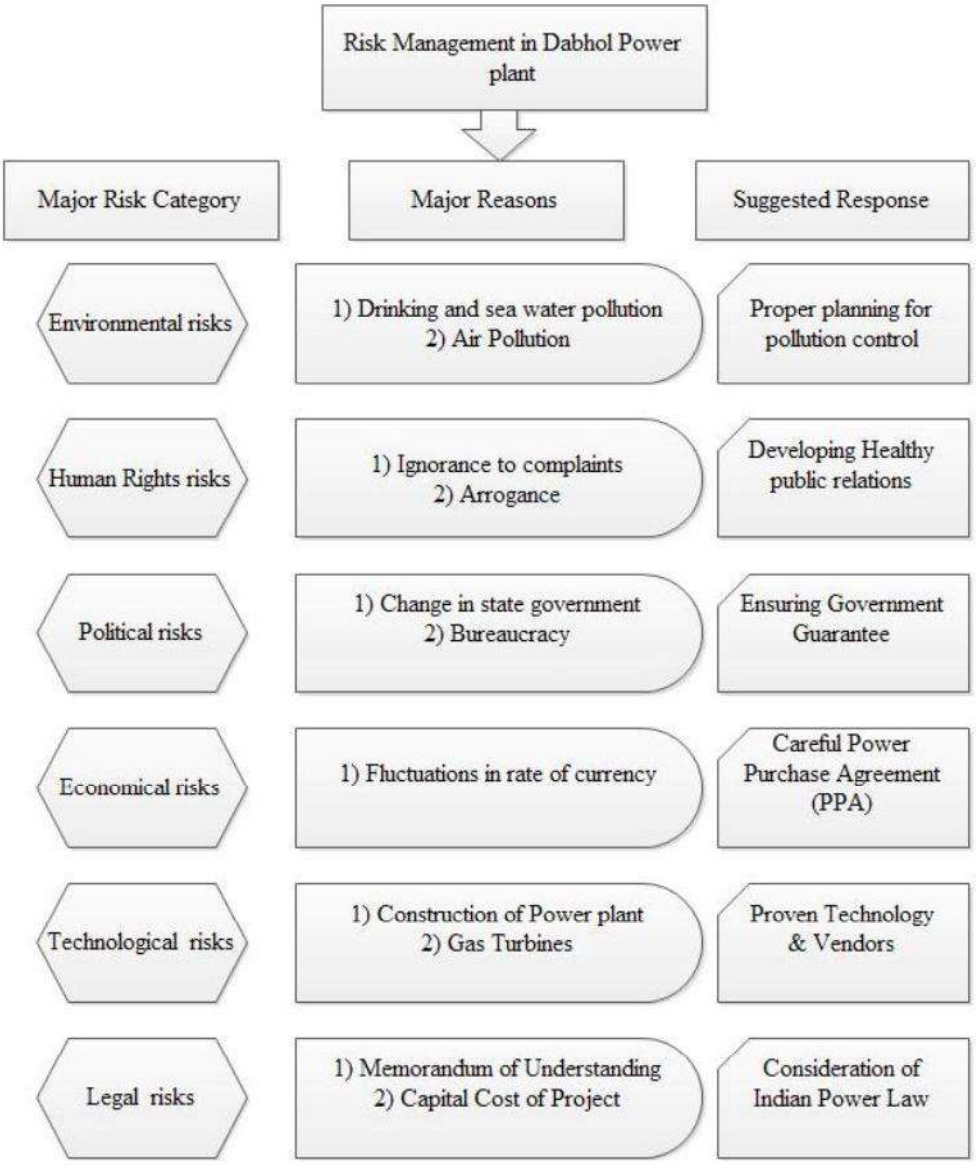

Fig.1 Risk Management Model for Dabhol Power Plant

The failure of Dabhol Power Plant project proved to be a major setback for Indian economy. Foreign investors like Electricity de France (French Company) and Cogentrix Energy (U.S. Company) changed their interest to invest in India*(Parikh, 1997; Gupta & Sravat, 1998;Parry, 2001; Paul & Frederik, 2007)*

CONCLUSION-

The paper gives an insight into the general scenario of the various risks an international project may have to face. It also maps the various risks with the project groups in Project management. The risks which are to be faced can be varying from country to country as the local conditions are different.

The Dabhol Power plant project failed because of poor understanding of the various risks associated with the Indian scenario. The political changeovers in the Maharashtra State adversely hampered the project success. The paper tries to study the various risks associated with the Dabhol power Plant project through the available literature and tries to suggest a risk management model for Dabhol Power plant.

The risks if identified initially can be of great help to the company to plan for its response strategy. For successful implementation of any international project; the company must thoroughly study the different country specific aspects of the project and proactively address the risks consistently throughout the project. The risks must be identified at the initial stage, assessed for its probability of occurrence and impact and then responded properly.

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Current Trends in TQM and ISO/TS 16949

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Abstract—

Global competition has increased during the past few decades. Nkechi Eugenia pointed out that customers are the only factor that can create competition between organizations, and quality of goods is determined by customers. Further, more customers identify the quality of products and make factories focus more on quality. Nowadays, gaining competitive advantage has become a matter of knowing your customers. As a matter of fact, customers have become the starting point rather than the ending point in any successful business. Nkechi Eugenia mentions that organizations for survival need to create new management based on total quality management. Demirbag agreed that quality management is one of the most influential factors in every organization. Successful enterprises comprehend the dominant influence customer-defined quality could have on trade. Hence, many rivalry companies constantly enhance their quality models. If the firm does not consider quality, customers will be dissatisfied. The outcomes of such an approach are lost clients and chances for rivals to catch benefit of the market require Therefore, paying serious attention to customers' needs make quality a priority.

As Reid and Sanders stated "It means gathering and surpassing customer anticipations by engaging each person in the firm inward a merged attempt". This integrated effort is named Total Quality Management (TQM). According to Demirbag , TQM is a factor that can improve quality and it is a holistic approach towards continuous improvement in all organizations. TQM is a management competitive environment. TQM is identified as an origin of innovation, competitive advantage, and organizational culture. Philosophy necessary for all organizations and this factor exists in a competitive environment. TQM is identified as an origin of innovation,

competitive advantage, and organizational culture.

Thanks to the constant globalisation process and the systematically encountered fierce competition on international markets, the change in the location of production processes has become a common practice for entrepreneurs representing the automotive sector all over the world. At the same time, the phenomenon of capital concentration can be observed in the automotive sector. This concentration can be seen in the form of numerous fusions and acquisitions continuously taking place on this market.

The occurring capital concentration and relocation of production entail further consequences. Entrepreneurs from the automotive sector acting in the environment of dispersed business entities have to unify operation standards, including quality standards. The aim of the paper is to present and analyze trends in implementation of quality certificates that conform to the ISO/TS 16949. Data preparation and analysis of inference was performed based on desk research methods. Data were collected on the basis of source materials including such as communications, trade studies, reports, companies and research institutions. ISO / TS 16949 standards are the modern challenge in front of the Industries producing, designing and selling automotive parts. Automobile industries has to follow those standards to sustain global pressures of competition. The extended standards are designed to make all auto industries global and competitive. So researcher tries to focus on the current scenario related to ISO / TS 16949 standards for automotive industries. This study will certainly benefit various industries related to auto components.

Introduction :-

Total Quality Management :- The way of managing organization to achieve excellence

- *Total – everything*
- *Quality – degree of excellence*
- *Management – art, act or way of organizing, controlling, planning, directing to achieve certain goals*

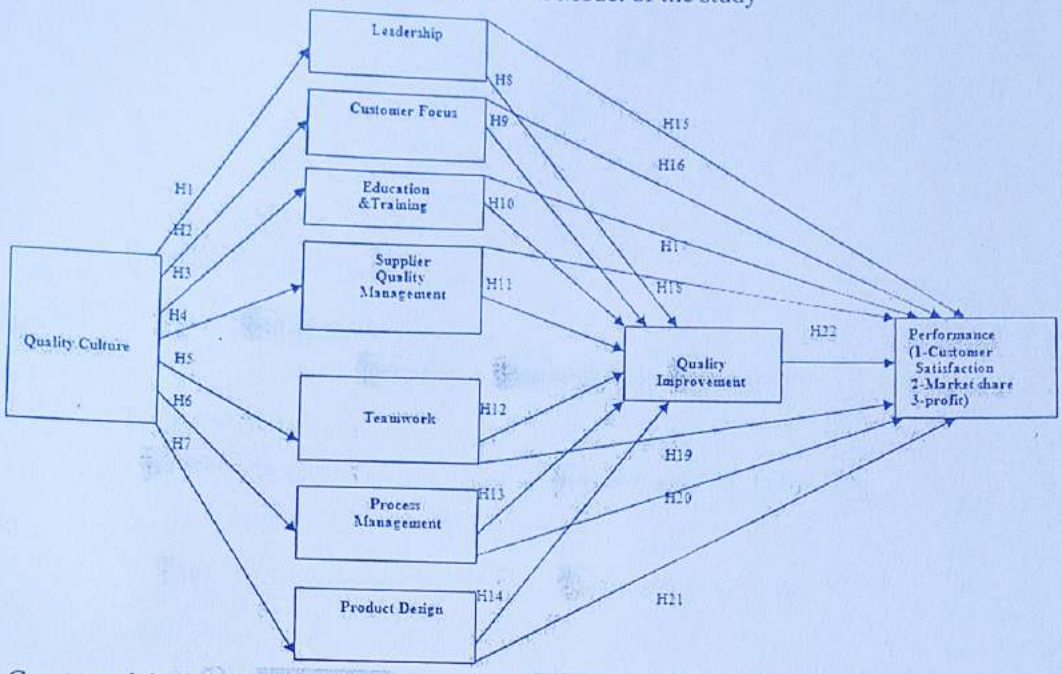
Definition of TQM (BS 4778:1991)

"A management philosophy embracing all activities through which the needs and expectations of the CUSTOMER and COMMUNITY, and the objectives of the organization are satisfied in the most efficient and cost effective manner by maximising the potential of ALL employees in a continuing drive for improvement."

TQM model, a process of cultural change within the organization has to be initiated. Three critical success factor of TQM namely, quality leadership, policy & strategic, planning, customer focus & satisfaction would need reinforcement during the implementation process.

As demonstrated below (the theoretical framework of the study, see Figure 1) there is a positive connection among quality culture, CSF of TQM, Quality Improvement and PM.

Figure 1. Theoretical Model of the study



Constant globalisation process and the systematically encountered fierce competition on international markets, the change in the location of production processes has become a common practice for entrepreneurs representing the automotive sector all over the world. At the same time, the phenomenon of capital concentration can be observed in the automotive sector. This concentration can be seen in the form of numerous fusions and acquisitions continuously taking place on this market.

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1. Methodology

The preparation of data, their analysis and drawing conclusions have been made on the basis of the desk research method. The data was gathered by means of an analysis of source materials such as, among others Zarz'dzanie i Finanse Journal of Management and Finance Vol. 13, No. 2/2015 * Ph.D., Faculty of Production Engineering and Logistics, The Opole University of Tech-nology, Luboszycka 5, 45-036 Opole, k.hys@po.opole.plannouncements, press releases, reports for industries, publicly available reports of companies and research institutions, information from the Internet.

2. Technical Specification Identification ISO/TS 16949

2.1. Idea of ISO/TS 16949

Time	Era			
	Early 1900's	1940's	1950's	1980's and beyond
Focus	Inspection	Statistical Sampling	Organizational Quality Focus	Customer driven Quality
	Old concept of quality : Inspect for quality after production			**New concept of Quality** Build quality into the process

Year-2018

Skin Lesion Semantic Segmentation using Convolutional Encoder Decoder Architecture

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***Abstract*— Computerized skin lesion analysis system often used segmentation technique which is always advantageous due skin lesion unequal size, shape and border. In this research paper deep convolutional encoder decoder neural network is proposed for pixel-wise semantic segmentation of dermascopic image of skin lesion. Proposed segmentation network consist sequence of encoder block and subsequent decoder block and final output is fed to pixel-wise classification layer.**

The proposed segmentation network is trained and tested on publicly available dermatology images obtained from challenge host by International Skin Imaging Collaboration (ISIC) in the beginning 2016 on "Skin Lesion Analysis towards Melanoma Detection". This challenge consists of 900 training sample of dermascopic skin images and 379 for evaluation. Experimental results of proposed segmentation network are very encouraging compare to state of the art result which achieves jaccard index value of 0.928.

Keywords — Computer Vision, Skin Cancer, Deep Learning, Image Segmentation, Convolutional Neural Network.

I. INTRODUCTION

Skin cancer is the commonly known health concern in world where 5% are malignant resulting around 75% of death [1]. There are 3 kinds of skin cancers: squamous cell, basal cell and melanomas. Out of these 3 types, melanomas are mostly difficult to diagnose. Dermatologists employ dermatoscope to enhance layers of skin resulting improved accuracy for skin cancer detection. Computer aided skin cancer diagnosis system include five major steps: a) image acquisition b) pre-processing c) lesion segmentation d) feature extraction e) classification [2].Skin lesion segmentation is important step in computerized diagnosis system due to uneven shape, border and size of skin lesion.

This paper presents deep convolutional encoder decoder neural network for automatically pixel-wise segmentation of skin lesion from dermascopic images. Segmentation network convert input resolution to low features resolution for semantic segmentation. It contains sequence of encoder block and subsequent decoder block followed by pixel-wise classification layer. Each encoder block consists of one convolutional layer followed by batch normalization, ReLu activation function and max-pooling. Each decoder block up-samples feature maps received from max pooling of subsequent encoder block and applies non linear activation function [10].

This research paper is organized as below: Section II gives literature reviews of previous methods for skin lesion segmentation. Section III in brief explains the proposed architecture. Section IV discusses result of proposed model and compares with state of the art result. Section V gives conclusion and future work.

II. LITERATURE REVIEW

In this section we present summary of existing methods in this field, as well as associated dataset and challenges.

A. Related work

Pixel-wise semantic segmentation means assigning class label to individual pixel of an image. Before deep neural network took over, TexonForest and Random Forest classifier were used for segmentation.

J. Shotton et al. [3] introduce semantic texon forests, which is new efficient low level features. This is ensemble of multiple decision tree that act on each pixel of image. These are very fast to train and test as compared to k-means clustering algorithm and nearest neighbor algorithm. J. Shotton et al. [4] proposed body part recognition as an in-between representation for human pose estimation. Deep decision forests are used to train highly diverse synthetic training set using simple depth invariant features which avoid overfitting.

Dan C. Ciresan et al. [5] present deep artificial neural network for pixel-wise classification to segment out biological neuron membranes from 3D brain structure. Jonathan Long et al [6] introduce fully deep convolutional neural networks for semantic segmentation which use ALexNet, VGG net and GoogLeNet for transfer learning. These learned representations are then fine-tune and passed to segmentation task.

Convolutional neural network primarily used for classification task which give class label to input image. However in biomedical image processing, localization is frequently required where network assign class label to each pixel.

B. Datasets and challenges

There are very less skin lesion dataset publicly available. It becomes challenging task for research community to perform reproducible research.

The international Symposium on Biomedical Imaging (ISBI) [8] released a challenge in the beginning of 2016 on Skin lesion analysis towards melanoma detection. Dataset for this challenge was collected from International Skin Imaging Collaboration [7].

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III. METHODOLOGY

In this section we describe proposed deep convolutional encoder decoder neural network and discuss design and implementation aspects.

A. Deep Convolutional Encoder and Decoder architecture

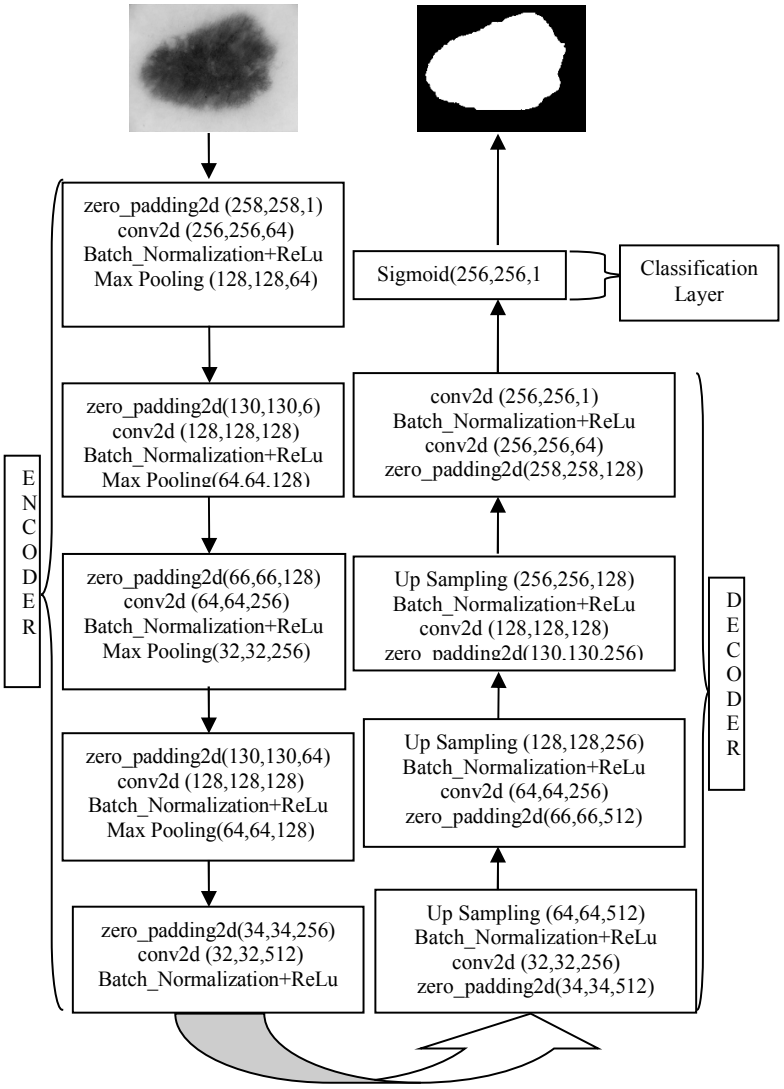

Fig. 1. Convolutional Encoder Decoder Network

Deep Convolutional Encoder Decoder Neural Network illustrated in fig.1 which consists of sequence of encoder block and subsequent decoder block followed by pixel wise classification layer. Each encoder block perform convolution with 3x3 filters and batch normalization followed by element wise ReLu activation function. To attain translation invariance 2 x 2 max-pooling with stride of 2 is applied. Each decoder block up-samples feature maps received from max pooling of subsequent encoder block. High dimensional feature generated at the output of final decoder block is fed to final pixel wise classifier.

Before image is send to network, image needs to resized and zero-padded so that network can perform image segmentation. Dice coefficient loss is used for image segmentation between predicted segmented image and ground truth. Adadelta optimizer is applied to train network.

B. Implementation details

Input images are normalized by converting each pixel value from [0, 255] range to [0, 1] range. Each image is then resized to 256x256 pixels.

Keras [9] deep learning python framework which provides top level abstraction over theano is used to implement deep convolutional encoder decoder neural network.

Network is trained on 900 and tested on 379 skin images categorized into benign or malignant. Our network is used to segment skin lesion from dermascopic image automatically and accurately.

IV. EXPERIMENTS AND RESULTS

This section discusses and compares the result of proposed method with state of the art result in the area of image segmentation of dermascopic skin images.

A. Dataset

Dataset contains 1279 images which divided into two parts, 900 images for training and 379 images for testing .All images have respective manually segmented ground truth images for training and testing purpose [7].

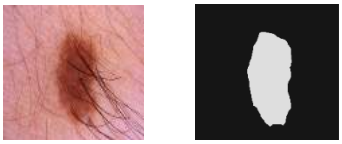

Fig. 2: Sample image and its ground truth

B. Results

Experimental result of our proposed architecture is evaluated on 379 testing images provided during challenge on Skin lesion analysis towards melanoma detection .During challenge participants were ranked and awarded based on Jaccard index.

The Metrics used are:

- Sensitivity: It is proportion of true positive which are identified accurately.
- Specificity: It is proportion of true negatives which are identified accurately.
- Accuracy: It is proportion of correct prediction over total number of prediction.
- Jaccard index: It is used to find similarity and difference between ground truth and model output. It is commonly known as Intersection over Union.
- Dice coefficient: It is used to compare ground truth and predicted segmentation pixel-wise.

Segmentation results computed over 379 test images by taking average of comparison between automatically segmented images with its ground truths. Participants from ISBI 2016 challenge were ranked based on jaccard index. Top three winners of the challenge were Urko Sanchez, Lequan Yu and Mahmudur Rahman.

TABLE I. COMPARISON BETWEEN RESULTS OF OUR MODEL WITH TOP 3 WINNERS

Model	Accuracy	Dice	Jaccard	Sensitivity	Specificity
Our Model	0.928	0.845	0.928	0.889	0.948
Urko Sanchez [10]	0.953	0.910	0.843	0.910	0.965
Lequan Yu [11]	0.949	0.897	0.829	0.911	0.957
Mahmud ur Rahman [12]	0.952	0.895	0.822	0.880	0.969

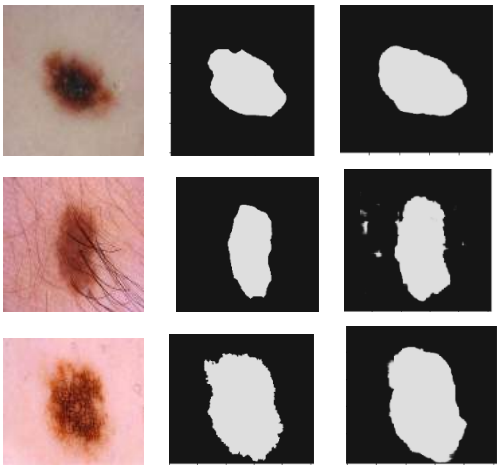

Fig. 3: Dermascopic Image (left) Ground Truth (Middle) Segmented Image (right)

From table I, it was observed that proposed Deep Convolutional Encoder Decoder Neural Network outperform the segmentation task on dermascopic image compare to top 3 winners of ISBI 2016 challenge. Our proposed model achieves jaccard index value of 0.928, which is considerably superior to current state of the art result. Fig. 3 contains visualization of output of our model and ground truth for various input image.

V. CONCLUSION AND FUTURE WORK

In order to attain superior performance in automated skin cancer classifier, skin lesion from dermascopy image should be accurately segmented. This paper proposed effective skin lesion segmentation network which outperform state of the art result most notably, a Jaccard index value of 0.928.

Avenue for future work include: i) using larger dataset to minimize risk of over-fitting ii) fine tuning of regularization parameter and hyper parameter to achieve better performance.

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Anti-theft System for Vehicle Using microcontroller

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ABSTRACT-Every vehicle owner wants maximum protection of his vehicle; otherwise thief can easily steal the vehicle. Modern vehicles are becoming smarter by the incorporation of higher computing power, connectivity solutions and advances in communication. This paper introduces design of theft prevention system. Three stages are proposed to protect the vehicle from theft. 1. when the user accesses the vehicle by the vehicle key and entered the wrong password, the power remain disable. 2. If engine is cracked by any other means like bypassing the key switch, the second level comes by sending "ALERT" message to the owner of the vehicle. 3. In case, owner identifies that vehicle is stolen by other way, he has to send "STOP" message to predefined number, so that ignition of vehicles engine will be turned off and brakes will be applied to the vehicle automatically, which is third security. Once that vehicle engine is turned OFF, after every five minutes microcontroller reads geographical location from GPS and sends one URL to owner through GSM module. Owner can open this URL and identify exact location of vehicle on Google Map.

Index Terms- GPS, GSM, matrix Keypad, microcontroller, SMS

I. INTRODUCTION

In these days, vehicle thefts are increasing at an alarming rate all over the world. So to get rid of this problem,ownercan install the theft prevention system described below. The main objective of this system is to protect the vehicle from any unauthorized access, through entering a protected password, disabling the power, applying brakes and intimate the position of the same vehicle to owner. Here, we make an attempt to develop microcontroller based system which is mainly uses GPS and GSM technologies. The system is low cost vehicle theft control embedded system.

The Global System for Mobile communications (GSM) is the most popular and accepted standard for mobile phones in the world established in 1982 and it operates in 900 MHz frequency. The Global Positioning System (GPS) is a space-based satellite route framework that gives area and time data in all climate conditions, anyplace on or close to the Earth where there is an unrestricted observable pathway to four or more GPS satellites. A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth.

Three stages are proposed to protect the vehicle from theft. Firstly user has to enter known password through keypad. If password is matched with stored password then power is turned ON and user can get further access. If the power shifted by others, the second level comes by sending "ALERT" message to the owner's cell phone. In this way owner get information that correct password is entered and now vehicle is being turned ON, which is second security. Suppose owner has came to know that vehicle is stolen by any other way, user has to send "STOP" message to predefined GSM number. Once Instrument receives and reads "STOP" message, it is going through three steps. 1.It cuts the current supply to the ignition system in case of petrol engine to turn OFF the engine of vehicle so that vehicle will get stop within 10 seconds. 2. It turns ON the motor to pull the brake paddle and apply the brakes. 3. It keeps triggering GPS module after regular interval. GPS modules provide timing and precise location information to microcontroller unit. Micro-controller read this information and creates a URL. This URL will be sent to the owner cell phone through GSM. Owner can open this URL and identify exact location of vehicle on Google Map.

II. LITERATURE SURVEY

Montaser, N.R.,& Mohammad, A.A. (2012) explain an efficient automotive security system has been implemented for anti-theft using an embedded system occupied with GPS and GSM. In this work, the client communicates through this system with vehicles and the vehicles current locations and status are determined using Google Earth. The position of targeted vehicles is tracked by the user on Google Earth. By using GPS locator, the target current location is determined and sent, alongside with various parameters received by vehicles data port, via SMS through GSM networks [1].

Sot, S. (2012) has proposed the use of MMS Based Vehicle Security System for solving issue. This system integrated monitoring and tracking system. SMS and MMS are sent to the owner to initiate fast response most especially when the vehicle is close. Whenever intrusion is detected, the SMS and the picture of the intruder are first sent to main user via local GSM/GPRS service provider to user (and/or) police mail ID. The time taken to receive the SMS and MMS by the owner and police are suitable to take action against intruder [2].

Kiruthiga, N., &Latha, L. (2014) studied the use of Biometric Approach for Vehicle Security System Using Finger print Recognition. In all the areas, an embedded computing technology is used. A competent automotive security system has been implemented using embedded system along with Global System for Mobile (GSM) and Fingerprint Recognition. The survey mainly raised emphasizes on major approaches for automatic person identification, such as fingerprint recognition and various existing vehicle security system. The security system can be implemented using Microcontroller [3].

Iman M. Almomani ;Nour Y. Alkhalil ; Enas M. Ahmad ; Rania M. Jodeh proposed "GPS vehicle tracking system". This system is useful for fleet operators in monitoring driving behavior of employees or parents monitoring their teen drivers. This system can be used in theft prevention as a retrieval device in addition of working as a security system combined with vehicle alarms. The system's tracking services includes acquiring the location and ground speed of a given vehicle in the current moment or on any previous date. It also monitors the vehicle by setting speed and geographical limits and therefore receiving SMS alerts when the vehicle exceeds these pre-defined limits. Tracking vehicles in system uses a wide range of new technologies and communication networks including General Packet Radio Service (GPRS), Global System for Mobile Communication (GSM), the Internet or the World Wide Web and Global Positioning System (GPS) [4].

III. SYSTEM STRUCTURE

System is mainly divided in two parts, i.e. electronic part and mechanical part. Electronic part includes microcontroller 8051, GPS, GSM, matrix keypad, EEPROM, 16x2 LCD, relay driver and relay. Block diagram of proposed system is given below.

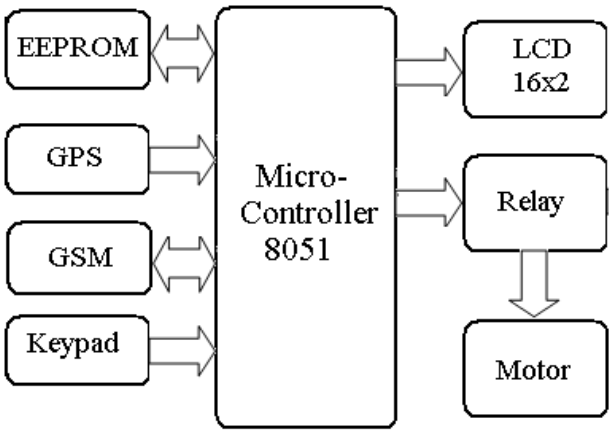

Figure 1: Block diagram of proposed system

Microcontroller is control unit which controlling all remaining units. In this project 8 bit, low power Philips microcontroller 89V51RD2 is used. 4x4 matrix keypad is provided to input password. The entered password is processed by the control circuit, which compares the entered data with those stored in EEPROM memory. Correct password enables ignition system through relay. EEPROM memory store information even power is turned off. Here EEPROM is used to stored password. In this project AT24C01A is used. The AT24C01A provides 1024 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 128 words of 8 bits each. Memory is accessed via a Two-wire serialinterface.

If vehicle is turned ON by other means like bypassing the ignition switch, ALERT message will be sent to owner cell phone. Owner would know that whether unauthorized person is using his vehicle. In case owner has identified that his vehicle is stolen then he has to send STOP message to GSM module. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. The working of GSM modem is based on commands, the commands always start with AT (which means Attentions) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD9730xxxxxx; here the dialing command ends with semicolon. The AT commands are given to the GSM modem with the help controller. The GSM modem is serially interfaced with the controller with the help of UART. In this project SIM300 GSM module is used. Some useful command of GSM are listed below

GSM module receives STOP message from owner and intimate to microcontroller unit.. Microcontroller activates a relay driver to trip the relay that disconnects the ignition of the automobile resulting in stopping the vehicle followed by applying brakes.

Sr. No.	Command	Description
1	AT+CMGF=1	Select text mode SMS Message Format
2	AT+CMGS="9730xxxxxx" >This is a test	Send a SMS to specified number
3	AT+CMGR=<Index>	Read SMS message

Table 1: GSM Command and their description

Figure 2: Electronic setup of proposed system

As soon as the ignition supply gets cut off, the application of brake after 5 seconds will occur. This will be possible through actuating programmable relay which supplies current to the motor after 5 seconds which will pull the brake pedal through pulley and cable in 3 seconds. The motor will be in running condition for 5 seconds after which it will also stop. This two stage procedure will ultimately stop the vehicle by disconnecting fuel supply at ignition system and vehicle will not be able to move due to application of brake.

Figure 3: Position of Electric Motor for application of brake

The theft prevention system is installed in Maruti Omni Vehicle of 2004 model. As Omni vehicle is more specious and reliable to work, it is preferred to use and hence gives proper output. The brake system in this model is Drum Brake system and the Fuel ignition system is MPFI. Force require to push the brake pedal in this vehicle is little more compared to disc brake system.

But the motor used to pull the brake pedal is more effective that it can easily make the brake pedal to its fully pressed condition. The installation of motor is behind the brake pedal and supply to fuel ignition is directly connect at its place.

Microcontroller trigger GPS module to get current geographical position. GPS receiver is used for this research work to detect the vehicle location and provide information to responsible person through GSM technology. The Global Positioning System (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit. The system provides essential information to military, civil and commercial users around the world and which is freely accessible to anyone with a GPS receiver. With four or more satellites in sight, the receiver can determine the user's 3D position (latitude, longitude and altitude). GPS receiver calculates location using Triangulation method. 66 Channel GPS receiver interfaced via NMEA protocol. Information of GPS is read by microcontroller. Microcontroller has to extract latitude, longitude and altitude from received data. In this project $GPRMC command is monitor to extract these information. We found 17.049922 as latitude and 73.5700050 as longitude for our location. Microcontroller creates a URL to show current location of vehicle on Google.map. URL has to be formed like http://maps.google.com/?q=<lat>,<lng>. This URL is sent to owner to identify current geographical position of his vehicle.

IV EXPERIMENTAL PROCESS

- Execution starts with keypad. Correct password is entered to initiate the process.
- Authorized person receives ALERT message on his phone.
- Authorized person sends "STOP" message to the GSM module.
- Electric supply to Ignition system is cut off at the first stage through the relay
- After 5 seconds, the second relay actuates with supply of current and allows the motor to start for 5 seconds. This will pull the brake pedal from normal position to fully pressed condition. With these two steps, cutting current supply to the ignition system and application of brake can stop the vehicle in safe condition without damage.

V CONCLUSION

The system developed can be used to protect the vehicle from the theft without any damage to the vehicle. The system is user friendly that can be controlled with help of mobile of the vehicle owner from remote location also. The above mentioned system is for the petrol vehicles. It can be used for diesel vehicles with few modifications.

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Design, Development and Manufacturing of Special Purpose Machine for Serration Operation

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ABSTRACT

In this paper we discuss on serration operation on a component for gripping purpose. Special purpose machine are widely used for special kind of operations, which are not economical on conventional machines. It is design for getting higher accuracy at desired condition. A Special Purpose Machine introduced here can be operated semi-automatically as per the condition or a mechatronic based system can be developed that will work with different speed currently the operation is performed on a manual machine which is time consuming due to time required for loading and unloading of job, requiring total human efforts, results in less accuracy and less productivity, operational accuracy required. The manpower is required is more & skilled. In order to successfully come up with these problems we are going to design a Special Purpose Machine which is semi-automatic results in reduction of human efforts, high accuracy and high productivity and less time consuming. It will save production time and increase the production rate.

Keywords : Productivity, Quick Return Mechanism, Rotary Table, Semi-Automatic, Serration, Special Purpose Machine, Stepper Motor

1. INTRODUCTION

Production quality and low production cost are essential for the success of manufacturers in today's competitive market. SPMs are very useful for producing large quantities of high quality products at low costs. These machines can also be altered to produce similar components when necessary. High accuracy, uniform quality, and large production quantities are important characteristics of Special Purpose Machines.

The component for which SPM designed and developed is just similar like 'Single adjustable clamp'. Serration is required to be carried out on work piece to manufacture clamp.

In earlier process of manufacturing the clamps were machined by using conventional horizontal milling machine on which three jaw chuck is mounted on rotary table. By using conventional process all job setting and machining activities carried out manually. To rectify these drawbacks new Special Purpose Machine is designed and developed by following automation and process improvement. New concept of automation is developed

with focus on specialization of operation, simultaneous operation and increased flexibility strategies of automation. It will help to improve Productivity.

Quick-return mechanism design .The links displacement, velocity and acceleration were found. Computer-Aided Design and Analysis of the Quick Return Mechanism was studied. In the quick return mechanism, the velocity of cutting stroke and return stroke both change with the change in length of slotted link but the total velocity ratio remains constant. The velocity ratio and force output changes with the change in height of slider. The velocity ratio and force are found to be with their maximum value during the stroke.

2. WORKING PRINCIPLE

This Special Purpose Machine is constructed with a vertical column and a horizontal base. Column consists of tool arm which moves vertically along 'Y' axis. The tool holder is mounted at the free end of arm.

Rotary table carries a three-jaw chuck which holds the component. It is rotated by means of Stepper motor which are mounted on Work table having reciprocating movement along 'X' axis. Stepper motor fixes position of Rotary table at required angle. When position is locked, Work table moves horizontally against Single point cutting tool and a serration is obtained. Reciprocating motion of work table is performed by 'Quick Return Mechanism' which is fixed on the base.

Component is held manually in three-jaw chuck and then whole serration operation is done automatically. Finally, we get serrated component.

3. LITERATURE REVIEW

Mr. S. V. Shekhar (et al.), IJAERS, Vol. I, Issue IV, July-Sept., 2012/13-17, "Design and Development of SPM-A Case Study in Gang Milling Machine for Manufacturing of Conveyor Chain Bushes". It is concluded that new developed special purpose machine is technically and economically justified and proven its effectiveness over conventional manufacturing process. New concept of automation is developed with focus on specialization of operation, simultaneous operation and increased flexibility strategies of automation.

S. Ravindran M.E., Middle-East J. Sci. Res., 12 (12): 1710-1714, 2012, "Productivity Improvement and Energy Conservation With Modified Tool Heads of Shaper and Planer". The Quick Return mechanism of shaper and planer machines reduces the ineffective time and wastage of energy and improves productivity. Alternate tool changing time will be reduced in the case of mass production.

P. Parthiban (et al.), IJETER, Volume 4, Issue 6, June (2016), "Gear Shaping Attachment in a Shaper Machine". Use of shaping machine for high production of automatic gear cutting with auto indexing work piece. By this arrangement of the forward/reverse stroke is adjustable as compared with the conventional machines.

Mr. R.H. Aadekar (et al.), IJIERT, VOLUME 3, ISSUE 5, MAY-2016, "Evaluation of Tool Life in Face Serration Operation". The reliability of cutting tools influences the whole manufacturing effectiveness and stability of equipment. Tool wear monitoring is important in machining industries for controlling the quality of machined parts that helps to improve the productivity. It attempted to correlate the tool life and process parameter with productivity.

Haiyan Hu (et al.), ICAEES 2015, "The Design of DSP Controller Based DC Servo Motor Control System". Control system with DSP as its core controller for its great function of input and output (I/O) and capability of high speed digital signal processing.

4. PROBLEM STATEMENT

As per requirement of Adler Mediequip Pvt.Ltd, Sadavali, India, we developed the Special Purpose Machine for serration operation by using automation instead of manual operation to reduce cycle time and increase productivity.

5. OBJECTIVES OF THE PROJECT

1. To reduce cycle time.
2. To provide accuracy.
3. To make easy & vibration free for the purpose of serration operation, to increase productivity.

6. PROPOSED METHODOLOGY

1. Designing a SPM for required component considering following aspects :
    - Material of tool and components
    - Indexing of work piece
    - Reciprocating moment of work table
    - Rigidity of base
2. Providing suitable mechanism.

    Quick Return Mechanism

7. DESIGN CALCULATIONS:

7.1 Cutting Force

Cutting force depends upon workpiece material, machining parameters (speed, feed, and depth), wear of cutting tool, etc.

Normal force = F = kb (0.4a+c) kgf

P_z = k (a+0.4c) b kgf

Where Pz = force component in the direction of the cutting speed vector

k = Unit cutting force, kgf/mm^2, for steel k = 120 – 180 kgf/mm^2

b = width of undeformed clip, mm

a = thickness of undeformed clip, mm

c = mean width of flank wear land which is equal to half of the permissible flank wear

$c = \frac{0.5}{\tan(60)} = 0.28867$

b = 2c = 2 * 0.28867 = 0.5774 mm

a = 0.5 mm

F = kb (0.4a+c) kgf

= 150 * 0.5774 (0.4 * 0.5 +0.2887)

= 42.33 kgf

F = 423.3 N

P_z = k (a+0.4c) b kgf

= 150 * 0.5774 (0.5 + 0.4 * 0.2887)

= 53.31 kgf = 533.1 N

7.2 Quick Return Mechanism

1) Length of AC = r / $\cos(90 - \alpha/2)$
2) Length of slotted liver AP = P_1Q / $\sin(90 - \alpha/2)$
3) Length of AR = AQ +QR

= AP $\cos(90 - \alpha/2)$ + PR $\sin(90 - \alpha/2)$

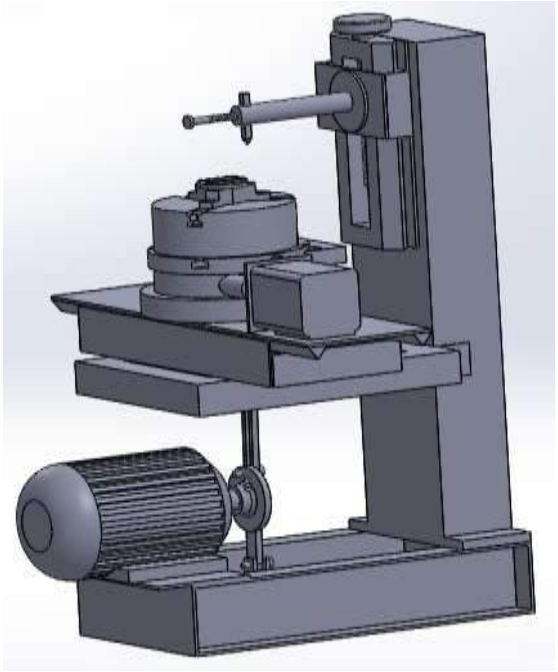

Fig. 1 CAD model

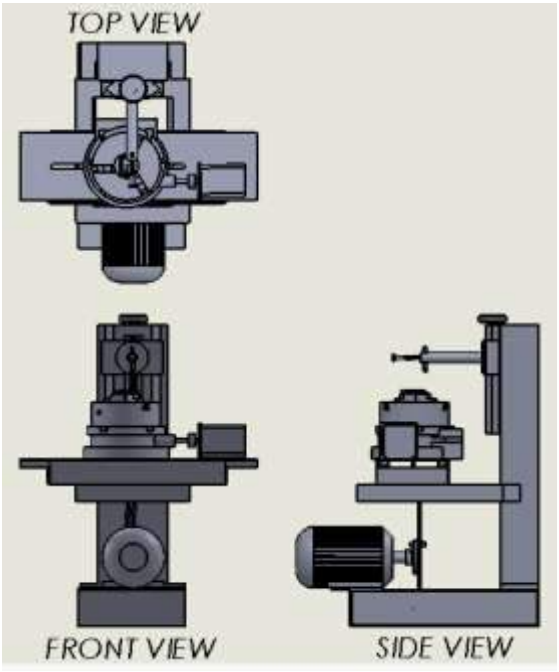

Fig. 2 orthographic view

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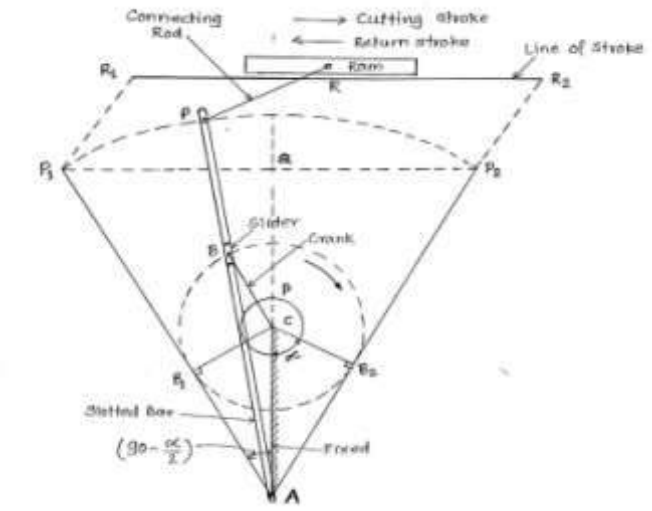

Fig. 3 line diagram of connecting rod

Fig. 4 CAD model of connecting rod

Fig. 5 Actual working model of SPM designed and manufactured.

8. RESULTS

In manufactured machine we use a 20RPM Three Phase Motor.

JOB SPECIFICATIONS

- Material:- SS 304
- Total number of Serrations:- 120
- Indexing Angle:- 3 degree
- Flange Angle:- 60 degree
- Depth of Serrations:- 0.5 mm

Fig. 6 CAD model of serrated component

So for completing a job with 120 serrations our machine take up to 8 – 9 minutes that means in one shift of 8 hours we can complete up to 50 components.

9. CONCLUSION

From the overall procedure we followed in designing a Special Purpose Machine, we conclude that design is safe , accordingly the design could be brought into practice while designing we have successive in keeping the cost factor to minimum total net savings. In quick return mechanism, velocity of cutting stroke and return stroke both change with the change in length of slotted link and crank length. Due to its lower rpm reciprocating motion of work table requires more for cutting and return stroke.

Productivity has improved in both ways that is qualitative and quantitative. Special purpose machine is necessary for improving the production. It has improved the repeatability, accuracy and less rejection, due to accurate automation. Special Purpose Machine causes less human interaction, drastic reduction in work load through Special Purpose Machine which directly helps in less operator fatigue. This reduces the labour cost. Hence Special Purpose Machine increases the production rate, reduced production cost, and reduced labour cost which minimizes the production cost.

If we use 40RPM motor instead of 20RPM the productivity will increases up to 30% - 35% that means we can complete up to 80 components so productivity more increase.

10. ACKNOWLEDGEMENTS

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Proposed Model of Feeding and Collecting Mechanism for Scoring Machine

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Abstract- Automation is one of the basic tool for improving the productivity. Automation is of different types of, inevitable and its demand increasing steadily in files industry. "Automatic file feeder machine" which is based on the mechatronics principle and it include hopper, feed roller and piston based hydraulic system. The feeder machine in automation industry used for dispense different types of items at high rate, reduces the time, increases the production rate and reduces the human effort.

Keywords —Automatic file feeding machine, Efficiency,flexibility, Performance, Material, Operation etc.

I. INTRODUCTION

In industries, production quality and low production cost are essential for the success of manufacturers in today's competitive market. Automation will no longer be seen only as automatic production, but as a complex of technologies that guarantee reliability, flexibility, safety, for humans as well as for the environment. Automation is defined as a technology concerns with the application of mechanical, electronics and computer-based system to operate and control the production. The automation in mechanical systems leads to increase in productivity.

In most of industries, basically it has been seen that the feeding of raw material is done manually. Now- a–days some industries also use automation in feeding; still it has limitation that they are not fully automated. Some worker participation is always required. Thus, we used the mechanism that feed the different types of files at speed of 120 files in 1 minute at equal space without any damage to file.

II. HADRAULIC TRANSMISSION PROCESS

In conventional hydraulic transmissions, the fluid performs a unidirectional motion between the energy converters in the power transmitting process. In hydraulic transmissions driven by alternating flow, the fluid executes an alternating periodical motion between the energy converters. In the case of a hydraulic system in which every working volume of an alternating motor is connected independently, by a phase pipe, with the corresponding working volume of a generator, any modification to the volume of the generator will produce an alternating flow and pressure transmitted along the phase line to the motor. Generally, a hydraulic transmission driven by a rotary alternating flow consists of a generator of alternating flows and pressures and a motor (The connection between them is realized by a number of pipes equal to the number of phases), the pipes being filled with fluid at a certain (pre-established) pressure, Figure 1. When the system is functioning, the pressure and the flow within each pipe varies in a sinusoidal way, around an average value

III.SIMULATION METHOD

The model is composed of a feed roller (φ20mm), a reverse roller (φ20mm), and a inserting file (t=10mm). The feed roller rotates at a constant velocity and the reverse roller is subjected to a reverse torque T and pushed to the feed roller by a spring. A rubber layer with 1mm thickness is wrapped around each steel roller surface. These components are divided by plane strain quadrilateral elements. The modified Coulomb friction F is not only a function of a

normal force P and coefficient of friction μ but a slip velocity rv . Typical C is a normalized slip velocity to be determined by experiment.
A file feed process of a reverse roller type feed mechanism is simulated by a FEM software MARC. The feed system is composed of a feed roller rotating at a constant velocity and a reverse roller with reverse torque. In the simulation, a modified Coulomb friction model is used, where the friction force is a function of slipping velocity as well as vertical load and coefficient of friction. The results show that the feed process is successfully simulated. The file feed velocity decreases as the reverse torque becomes larger. The friction forces acting between the paper and rollers are almost the same in magnitude and equal the value obtained by dividing the reverse torque by the separation roller radius. Based on the simulation results, a method for evaluating the paper feed velocity is proposed.

Key Words: Coulomb Friction, file Feed, Friction Coefficient

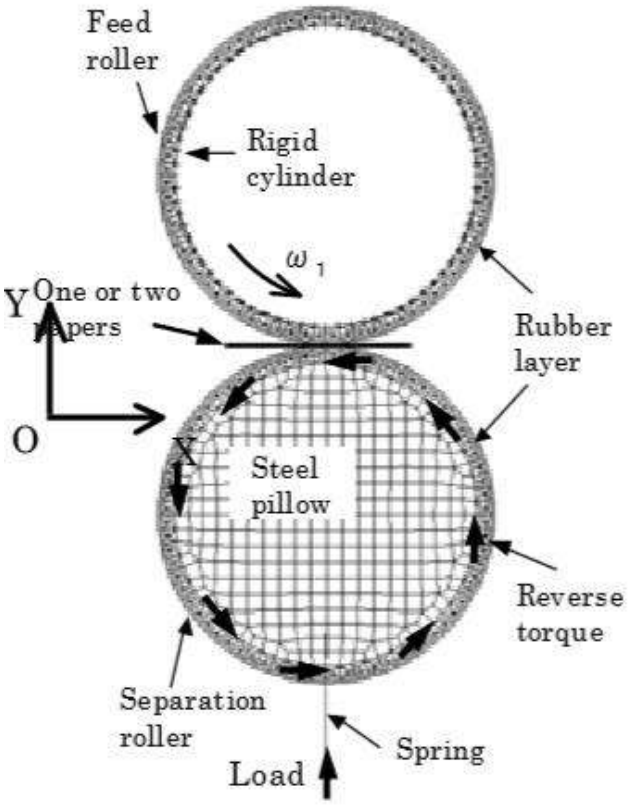


Fig.1 Simulation model

IV. WORKING

Operation performed by feeding mechanism is explained below:

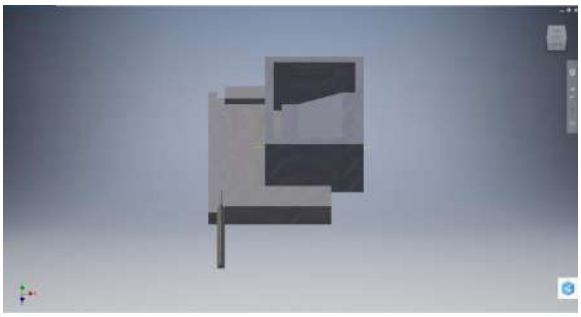
1) First stock of files is to be collected in hopper. Hopper having piston based arrangement which is mounted on movable cross-slide which is moved by hydraulic based system.

2) Then there is a guideway provide for movement of another piston .the piston having a hole inside it upto certain distance which again operated by hydraulic system.

3)Then during the operation, as the hopper moves there is slot provided insided it so that when it moves forward and came into position of guideway the file will release from hopper and it place on guideway.

4)Then the piston which provide on guideway push the file into roller so that feeding operation done.

5)The operation is done till the end of production.



Concept design

V. LITERATURE REVIEW

1)M.AntonyMariaThomasBenny1, U.S. Chavan2,
Hydraulic cylinders are one such actuators that generates linear translatory motion. Hydraulic cylinder force required for actuation depends on implement requirements and in heavier applications were output forces needed are higher. There are instances during implement operation, when the cylinder reciprocates and reaches its extreme fully open position. When there is no more stroke available, the cylinder bottoms-up completely putting high tensile load on the rod and piston-rod joint which may even lead to failure of these joint and cylinder.

2)Prof. S.D. Bhalekar 1, Vikas S. Vishwakarma2, Arvind Umbarkar3 ,Bhaskar M. Tale4, 2018, "Automatic Stack Feeding Machine"
Automation is one of the basic tool for improving the productivity. Automation in packaging of different types of pouches, papers etc. inevitable and its demand increasing steadily in packaging industry. Automatic Stack feeder machine" which is based on the mechatronics principle and it include hopper, feed roller and conveyor. The feeder machine in automation industry used for dispense different types of items at high rate, reduces the time, increases the production rate and reduces the human effort.

3) 1 Manavalan .S, 2 Anmolpurty 1Asst.Professor, 2UG Student, This project deals with the fabrication of Hydraulic floor crane. The aim of this project work is to acquire practical knowledge in the field of material handling equipment with the help of hydraulic principle. This machine is very useful for lifting and transporting heavy jobs up to 3 kg for all types of jobs such as automobile repairs and service shops of central workshops, production industries, material handling units etc. In material handling, the cranes play a vital role in modern manufacturing industries. In our project we aim to fabricate a hydraulic operated floor crane for handling various kinds of materials. The hydraulic floor crane consists of truck, hydraulic cylinder, hydraulic tank, hydraulic hoses, DCV, beam and hooks.

4) Prof G.S.Jagushte, Mayur Lanjekar

In today's industries, several types of machines are present that can cut single bar at a time. Though single bar cutting machine also differs to

its size and shape. Today automation and increase in production rate is main step companies are undertaking for faster and cheaper production. Recently during project work we have seen a machine that can cut a bar (100mm diameter) with automatic feeding and cutting, but machine we have designed can cut three bars at a time and design of this is unique. This Project gives the information regarding the design of the machine and its working. For automatic bar cutting, Holding and feeding operation Hydraulic cylinders are used. Basic view of this Project is to in increase Production rate.

5) Ioan-Lucian Marcu1, Daniel-Vasile Banyai1, Acta Polytechnica

"Fundamental Research on Hydraulic Systems Driven by Alternating Flow"

This paper presents a new approach to rotary hydraulic systems, and the functional principles of rotary hydraulic systems that can work using alternating flows. Hydraulic transmissions using alternating flows are based on bidirectional displacement of a predefined volume of fluid through the connection pipes between the alternating flow, the pressure energy generator and the motor. The paper also presents some considerations regarding the basic calculation formulas, the design and testing principles for a hydraulic motor driven by alternating flow, and also a three-phase rotary hydraulic motor.

VII. PROBLEM STATEMENT

"In most of industries, it has been seen that the feeding of raw material is done manually. Now- a–days some industries also use automation in feeding; still it has limitation that they are not fully automated. Some worker participation is always required. Because of this 'degree of mechanization' is not maintained. The technology of 'degree of mechanization' is decided upon the principles of minimization of cost , improved productivity ,both qualitative and quantitative, improved accuracy, better safety, etc. which again is paused with higher initial investments, higher maintenance costs etc.

Following problems have been identified in manual operations:

1. Maximum time taken for component handling (loading and unloading) at workstations.
2. Feeding the job at workstation is of monotonous nature which does require any skill and causes fatigue to the worker.
3. Decrease in productivity (quantitative and qualitative wise).
4. Sometime the working conditions near the workstation are not favorable.
5. Decrease in repeatability and accuracy.
6. Higher rejection of products.
7. Maximization of production cost.

At the same time it is difficult and strenuous for an operator to work with a machine that has a natural set of directions of operation, to work on a project that has a set of natural movements that are misaligned with the operator's machine. Such work requires a continuous adjustment of several controls at the same time and is both tiring and confusing".

VI. MATERIALS AND METHODS [9]

1. Double acting double ends hydraulic cylinders:

Double acting cylinders are normally designed such that pressure can be applied in either inlet or outlet port, providing linear power in both directions [11]. Furthermore, since the exposed areas in the cylinder are unequal during extract and retract operations (forward and return stroke) there is a difference in operation speed and force.The double acting double ends hydraulic cylinder which is the subject of this research is not in any sense different in principle of operation from every normal hydraulic cylinder but it produces both fluid flow and pressure in both directions, and both ends of the piston can be connected to the point of application where work is needed to be done.

2. Parts design consideration :

The following assumptions were taken into the consideration of the design of the cylinder, piston, piston rod and seals in the hydraulic cylinder.

- Working fluid is mineral oil
- Available pressured Pa =200bar= 200* 105pa
- Atmospheric pressure = 1.0135 * 105pa
- Stroke length= 60mm+80mm =140mm = 0.14m
- Cylinder output force =11KN = 11000N
- Cutting stroke=1.5m/s
- Material for cylinder calculation low carbon steel BS970 070M20
- Tensile stress of material is = 430mPa
- Yield stress of material is = 215mPa
- Factor of safety = 3
- Young modulus of the material used is = 210GPa, for BS 970 070M20 (low carbon steel)
- End fixing factor = K = 0.7 is chosen because of maintenance purpose, in a case of adjustment i.e. in the case of increasing stroke length.

➢ Design of piston rod :

The piston rod of a hydraulic cylinder is highly stressed, and therefore it should be able to resist the bending, tensile and compressive forces that it may encounter during the operation without buckling. In practice, the rod is more likely to fail by buckling under the compressive load than by bending. In this case, the rod behaves like a column and is subjected to buckling. The rod diameter can be related to critical load. Therefore Euler's formula in the equation below for long column can be used to obtain the piston rod diameter.

$$P = \frac{\pi^2 . E . I}{L^2 . K^2} (1)$$

Where:

P = Buckling load (N)
L = the column length (m)
I = Moment of inertia (m4)
E = Young's Modulus of Elasticity for the column material (Pa)
K = the end fixing factor

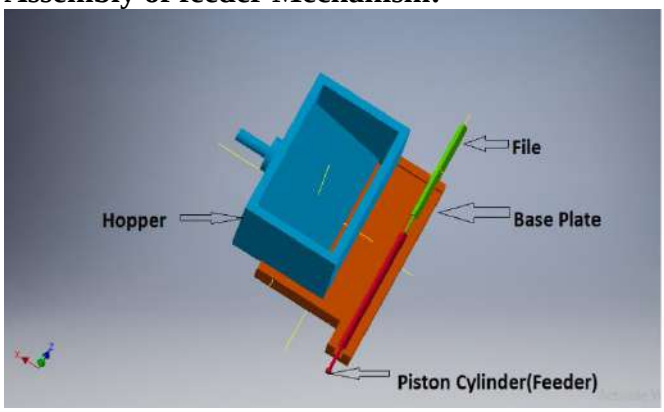
E = Young's modulus of the material used in this design calculation is 210 (Gpa) for BS 970 070M20 (Low carbon steel).

P = cylinder force * factor of safety = 11000 * 3 = 33 * 103N

L = total stroke length =140mm = 0.14m

K = 0.7, Reason for choosing k = 0.7 is for maintenance purposes in case of adjustment i.e. in case of increase in the stroke length of the rod.

Assembly of feeder Mechanism:



VIII. OBJECTIVE

The objective is to study the various mechanisms used for automating the mechanical system by categorizing it as per the conversion of motions from one form to other and to compile them in the form of database; which will help the user for easy access of mechanisms according to their requirements for designing the automated mechanical system using combination of mechanisms

Following are the objective that are made to increase production:

- To increase productivity:
- To reduce the labor cost
- To mitigate the effort of labor shortages
- To reduce or eliminate routine manual and clerical task
- To improve the workers safety
- To accomplish process that cannot be done manually

IX. CONCLUSION

We have to decide to design the feeding machine which will make use of hydraulic system with feeder based piston arrangement as a power source because the various problem faced during conventional operation like poor thread finish, more time consumption, etc.

It is efficient and economical since the number of operation and can be performed in a simple unit.

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Design of Automatic Mango Cutting Machine

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Abstract: Nowadays, there are many Mango juice canning industries present in the konkan region. They need to cut the mangoes in very specific manner in shape as well as in size. This paper is based on the proposed automatic mango cutting machine which is designed as per the requirements of a mango canning industry in Ratnagiri District. For extracting the juice from mangoes; the first process is to cut the mangoes. At present this work is done manually by labors. Presently they are using one cutter and this cutting process is done as one mango at a time. This manual operation is more time consuming and it requires more hard-work from labors. The proposed automatic mango cutting machine will overcome limitations of the above-mentioned operation and hence will prove to be more beneficial for industries. In recent years automatic visions based technology has become more potential and more important to many areas including food industry. This automation is done with the help of pneumatic cylinder and actuation of this cylinder is done by Arduino circuit. This device gives automatically actuation of piston at regular interval of time. Hence the repeated strokes of piston will be executed till the work get finished. This paper gives overview of the existing mango cutting machines and represents the design of proposed automatic mango cutting machine.

Keywords — Mango juice, Automatic mango cutting machine, Pneumatic cylinder, Arduino.

1. INTRODUCTION

India is a leading mango growing country and produces about 65 % of the world's total mango produced. Handling of mango is done manually and in unhygienic ways. Most of the raw mango industries in India perform basic operations like peeling, cutting, slicing, grating, and dicing. All these operations are tedious and labor intensive, as it involves manual work. So it is essential to mechanize these operations by developing efficient machines which can reduce the processing time as well as cost of operation and make the process more hygienic. Mechanical operation of slicing and cutting of mango is advantageous as it involves more precise slicing and cutting than the manual cutting. It reduces fruit damage and improves the efficiency and accuracy. However, only limited work has been done and published on the development of slicing and cutting machines. Therefore, the present study was undertaken with specific objectives to develop an appropriate, efficient mango cutter for mechanizing the processing industry. [1]

Stainless steel sections have been increasingly used in architectural and structural applications because of their superior corrosion resistance, ease of maintenance and pleasing appearance and good for food preservation. [8]

2.LITERATURE SURVEY

2.1 IMPLEMENTATION OF RAW DESIGN OF MANGO CUTTING MACHINE.

Slicing and cube cutting is one of the most important steps in processing of raw mango fruits. Mechanical slicing and cube cutting is capable of more precise than manual mango cutting operation. It reduces the operation time and improves the efficiency and accuracy of raw mango slicing and cube cutting. However, only limited work have been done and published, on the development of slicing and cube cutting machines. Therefore, the present study was undertaken to develop an appropriate, efficient slicer and cube cutter for mechanizing the pickle processing industry.

2.2 FORCE CONTROL FOR A PNEUMATIC CYLINDER USING GENERALIZED PREDICTIVE CONTROLLER APPROACH

Pneumatic cylinder is a well-known device because of its high power to weight ratio, easy use , and environmental safety. Pneumatic cylinder uses air as its power source and convert sit to a possible movement such as linear and rotary movement. In order to control the pneumatic cylinder ,controller algorithm is needed to control the on-off solenoid valve with encoder and pressure sensor as the feedback inputs.

2.3 STAINLESS STEEL AS A STRUCTURAL MATERIAL: STATE OF REVIEW

Stainless steels have not traditionally been widely used as structural materials in building and civil engineering. Where the steels have been used for this purpose there has been some other imperative driving the design, usually corrosion resistance or architectural requirements rather than the inherent structural properties of the steel. The primary reason for this low use in structural applications is usually the perceived and actual cost of stainless steel as a material. Developments over the last 10 years, both in available materials and attitudes to durability, are now offering a new opportunity for stainless steels to be considered as primary structural materials. This paper introduces stainless steel alloys and briefly discusses the important properties and commercial aspects of these alloys relevant to structural designers. The paper also considers recent developments, particularly with respect to available alloys and considers obstacles to the wider use of stainless steels in structural engineering that are related to both supply chain costs and efficiency of design.

2.4 WORKING PRINCIPLE OF ARDUINO AND USING IT AS A TOOL FOR STUDY AND RESEARCH

This paper explores the working principle and applications of an Arduino board. This also explores on how it can be used as a tool for study and research works. Arduino board can provide a quick tool in development of VLSI test bench especially of sensors. Main advantages are fast processing and easy interface. Today, with increasing number of people using open source software and hardware devices day after day, technology is forming a new dimension by making complicated things look easier and interesting. These open sources provide free or virtually low costs, highly reliable and affordable technology. This paper provides a glimpse of type of Arduino boards, working principles, software implementation and their applications.

3. PROPOSED SYSTEM

3.1 MATERIAL REQUIRED FOR PUNCH AND CUTTER

A. Stainless steel

As Stainless steel having a superior corrosion resistance, ease of maintenance pleasing appearance and good food preservation properties it is widely used in food industry and also in architectural and structural applications. The mechanical properties of stainless steel are quite different from those of carbon steel. For carbon and low-alloy steels, the proportional limit is assumed to be at least 70 % of the yield point, but for stainless steel the proportional limit ranges from approximately 36 % - 60 % of the yield strength, Therefore the lower proportional limits would affect the buckling behavior of stainless steel structural members. Stainless steel structural members are more expensive than carbon steel. Therefore, more economic design and the use of high strength stainless steel could offset some of the costs. Several applications already exist worldwide for structural and non-structural components made of SSs, all these steels are alloys of iron, chromium, nickel and to varying degrees molybdenum. The characteristic corrosion resistance of stainless steel is dependent on the chromium content and is enhanced by additions of molybdenum and nitrogen. Nickel is added, primarily, to ensure the mechanical properties and the correct microstructure of the steel. Other alloying elements may be added to improve particular aspects of the stainless steel such as high temperature properties, enhanced strength or to facilitate particular processing routes. [8]

B. Mechanical Properties of Stainless Steels

The stress-strain behaviour of duplex and austenitic steels in a tensile test differs from that of carbon steels. Stainless steels are also characterized by:

[1] A high degree of plasticity between the proof stress and the ultimate tensile stress.
[2] Very good low temperature toughness.
[3] A degree of anisotropy.[8]

3.2 DESIGN

Design of Cutter

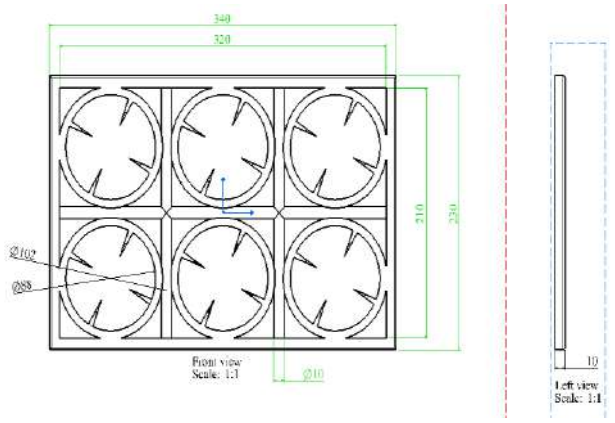

Fig.1: Design of Cutter with Dimensions

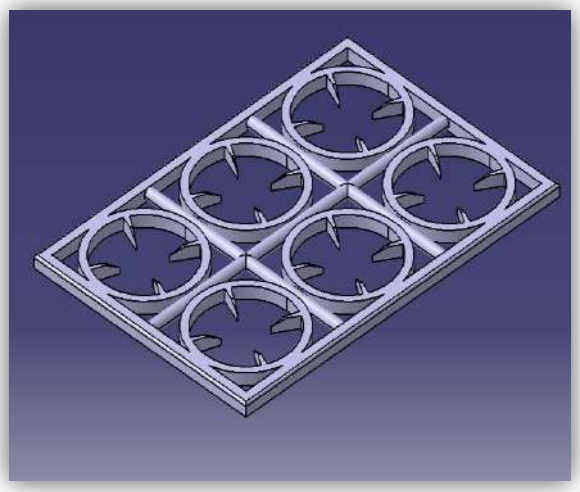

Fig.2: 3D Model of Cutter

Design of Punch

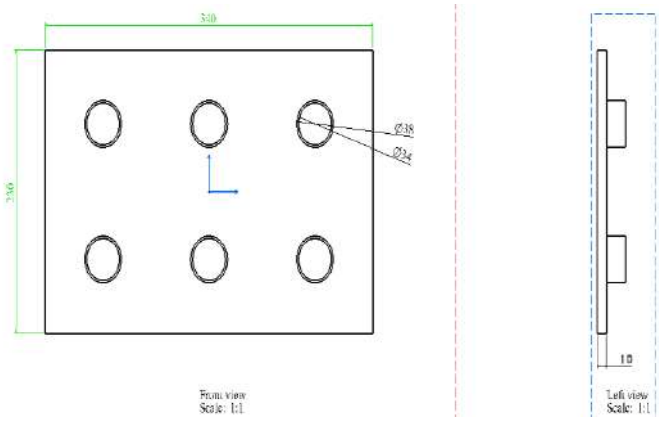

Fig.3: Design of Punch with Dimensions

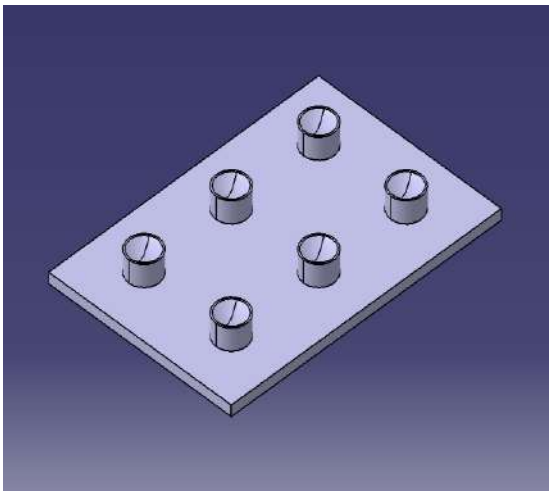

Fig.4: 3D Model of Punch

Design Considerations:

Parameter	Dimensions
Size of die	230 X 340mm
Thickness of die	10mm
Cutting edge length	24mm
Cutter radius	44mm
Size of punch	230 X 340mm
Punch diameter	38mm
No of cutters	6

3.3 ADVANTAGES & LIMITATIONS

Advantages:

8. Reduce the mango cutting time.
9. Reduce the labour cost.
10. Increase the work efficiency.
11. Increase accuracy and precision of cutting mangoes.

Limitations :

3. It requires the compressor for operation.
4. Initial cost is more for whole machine system.

3.4 ELEMENTS OF ARDUINO BOARDS

Elements of an Arduino Board can be done into two categories:

- **Hardware**
- **Software**

Hardware

The Arduino Development Board consists of many components that together makes it work. Here are some of those main component blocks that help in its functioning:

• **Microcontroller:** This is the heart of the development board, which works as a mini computer and can receive as well as send information or command to the peripheral devices connected to it. The microcontroller used differs from board to board; it also has its own various specifications.

• **External Power Supply:** This power supply is used to power the Arduino development board with a regulated voltage ranging from 9 – 12 volts.

• **USB plug:** This plug is a very important port in this board. It is used to upload (burn) a program to the microcontroller using a USB cable. It also has a regulated power of 5V which also powers the Arduino board in cases when the External Power Supply is absent.

• **Internal Programmer**: The developed software code can be uploaded to the microcontroller via USB port, without an external programmer.

• **Reset button**: This button is present on the board and can be used to resets the Arduino microcontroller.

• **Analog Pins**: There are some analog input pins ranging from A0 – A7 (typical). These pins are used for the analog input / output. The no. of analog pins also varies from board to board.

• **Digital I/O Pins:** There are some digital input pins also ranging fro : m 2 to 16 (typical). These pins are used for the digital input / output. The no. of these digital pins also varies from board to board.

• **Power and GND Pins**: There are pins on the development board that provide 3.3, 5 volts and ground through them

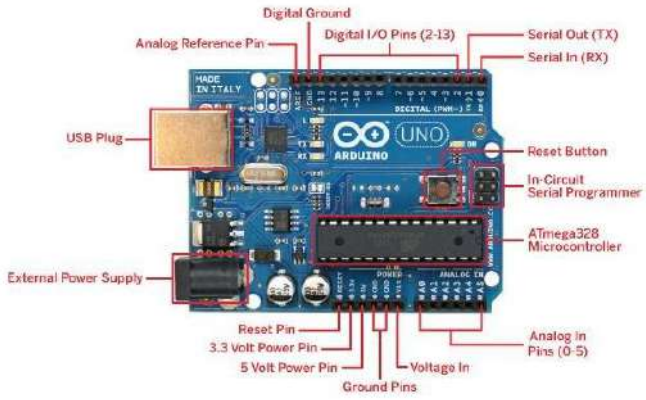

Fig.5: Structure of Arduino (Source [9])

Software

The program code written for Arduino is known as a sketch. The software used for developing such sketches for an Arduino is commonly known as the Arduino IDE. This IDE contains the following parts in it:

• **Text editor**: This is where the simplified code can be written using a simplified version of C++ programming language.

• **Message area**: It displays error and also gives a feedback on saving and exporting the code.

• **Text:** The console displays text output by the Arduino environment including complete error messages and other information

• **Console Toolbar**: This toolbar contains various buttons like Verify, Upload, New, Open, Save and Serial Monitor. On the bottom right hand corner of the window there displays the Development Board and the Serial Port in use. [7]

3.5 DOUBLE ACTING CYLINDER

Double Acting Cylinder With this actuator, thrust is developed in both extending and retracting directions as air pressure is applied alternately to opposite sides of a piston. The thrust available on the retracting stroke is reduced due to the smaller effective piston area,but is only a consideration if the cylinder is to pull the same load in both the directions.

Piston Force- The piston force exerted by a working element is dependent on the air pressure, the cylinder diameter and the frictional resistance of the sealing components [4].

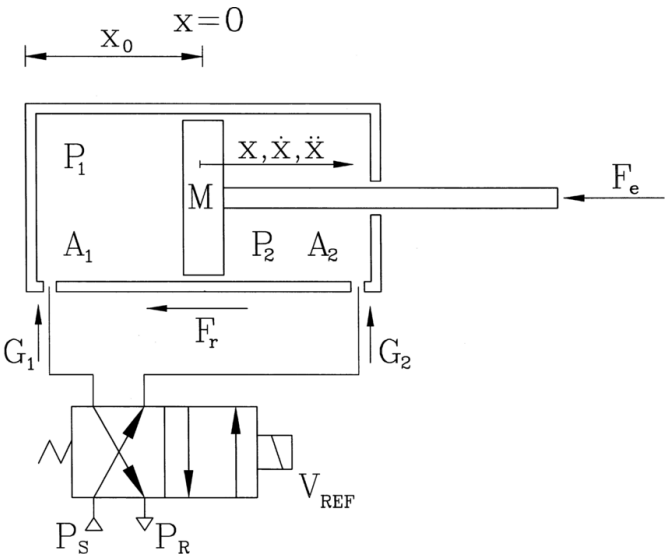

Fig 6: Schematic diagram of Double Acting Cylinder

The theoretical piston force is calculated using the following formulae:

In practice, the effective piston force is significant in calculating the effective piston force, the frictional resistance must be taken into account. Under normal operating conditions (pressure range 400-800kli 4-8bar), the frictional forces may be assumed to be between 3-20% of the calculated force[4].

Single acting cylinders

Fn = A. p - (FR+FF)

Double acting cylinders (forward stroke) Double acting cylinders (return stroke)

Fn = A. p- FR Fn = A'. p- FR

Where,

F~ = Effective piston force in Newton (N)

A = useful piston area in cm= = D2 x n/4

A' = useful piston ring area in cm2 = (D2 - d2) x rc/4

p= operation pressure (kPa, 105 N/m', bar)
FR = frictional force (3-20%) in Newton (N)
FF = force of return spring in Newton (N)
D= cylinder diameter in cm

4. CONCLUSION

In this project there is a application of machine vision based technique for automatic mango cutting machine. Cutting is one of the most important steps in processing of raw mango fruits. This Mechanical cutting is capable of more precise than manual mango cutting operation. It reduces the operation time and improves the efficiency and accuracy of mango cutting and also it will reduce labour cost. However, only limited work has been done and published, on the development of cutting machines. Therefore, the present study was undertaken to develop an appropriate, efficient cutter for automation in the canning industry.

5.ACKNOWLEDGEMENT

We would like to express our deep gratitude to Mr. Sourabh Kelkar owner of Kelkar Canning Pvt. Ltd. Dist-Ratnagiri for giving us opportunity to do this project work for their canning industry and guiding us in each and every aspects.

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Design, Manufacturing and Testing of a Solar Dryer

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Abstract: Variety of Fruits and vegetables are available in the market. To enhance life cycle of fruits and vegetables; drying is the most preferable method. There are different techniques like microwave vacuum drying, open sunlight drying, household ovens, etc. Drying/dehydration are a simple, low cost way to preserve food as compared with other techniques. Open sun drying is the most common method practiced by people to dry food for past several years. But this process causes problem to the quantity of food item in terms of its taste and color. Also, these items are easily contaminated by dust, fungus, insects, rodents and other animals. Different types of solar dryers have been designed, developed and tested in different region of tropics and subtropics. This paper represents the design, manufacturing and testing of a portable natural convection solar dryer which can be used for drying of fruits and vegetables and convenient to use at any place due to its portability.

Keywords —Solar Energy, Solar Dryer, Natural Convection, Portable, Fruits, Vegetables

I. INTRODUCTION

Drying/dehydration are a simple, low cost way to preserve food as compared with other techniques. Drying removes water and thus prevents fermentation or growth of molds. It also slows the chemical changes that take place naturally in food, as when a fruit ripens. Open sun drying is the most common method practiced by people to dry food for past several years. But this process causes problem to the quantity of food item in terms of its taste, color also these items are easily contaminated by dust, fungus, insects, rodents and other animals.

To overcome these drawbacks, different types of solar dryers have been designed, developed and tested in different region of tropics and subtropics. The major two categories of dryers are natural convection solar dryers and forced convection solar dryers. In natural convection solar dryer, air flow is established by buoyancy induced airflow, while in forced convection solar dryers, air flow is provided by using fan operated either by electricity or solar module. The objective of this study is to develop a portable natural convection solar dryer in which food items can be heated by hot air through radiation collected from roof and walls of cabinets as well as from solar collector. In the dryer, the heated air from separate solar collector is passed through a food bed and at same time, drying cabinet absorb solar energy directly through walls and roof. The result obtain during test period revealed that temperature inside dryer and solar collector where much higher than ambient temperature during most hours of day light.

II. LITERATURE REVIEW

There are various types of solar dryers such as active solar cabinet dryer, cabinet dryers with back-up heating, greenhouse dryer, solar drying system using the V-groove solar collector, double pass solar collector with fins, Indirect active hybrid solar–electrical dryer system, Solar

drying system with chemical heat pump, Solar dryer with dehumidification system for different agricultural products for best processing and good quality food. [1]

Drying is a main process of conservation used for cocoa beans and it is so essential to control its drying parameters. The parameters like shrinkage, density, porosity, and heat and mass transfer coefficients of cocoa beans during indirect solar drying were investigated. The results showed that shrinkage and porosity increased with decrease in reduced moisture content. The real density varied during drying process. Its value decreased from 825.10 kg/m3 at the beginning of the drying to about 696.25 kg/m3 at the end of the drying process. The cocoa beans had a final porosity approaching 25% and most of its removed water during drying was replaced by gas. [2]

An indirect natural convection updraft solar dryer was designed and fabricated with objectives to; suit mid-latitude applications, determine its performance efficiency, analyze air properties by use of psychrometric chart and assess the quality of dried product. The dryer was fabricated using low cost and locally available materials. For mid-latitude regions, zenith angle is dependent on latitude, solar declination angle, time of the year and of the day. Based on these changing parameters, the solar dryer was designed to suit the conditions. In the current study, fresh apples of 886.64 grams with moisture content of 86% were dried to moisture content of 8.12 % (wet basis) within 9 hours 20 minutes at an average irradiance of 534.45W/m2. [3]

The collector-greenhouse type hybrid solar dryer has more advantages in the development direction of low temperature drying category. The collector tube which is the key element of the dryer has been the core technology of solar dryer. [4]

A solar fish dryer was design and constructed using a locally source materials. It was designed to determine the effect which is obvious during a beautiful sunset and solar rays with small angle of incidence are spread over a large surface with less energy per unit area. The efficiency of this fish dryer has been tested and was found to be effective in the sense that the temperature of the ice fish within the system raise to about 82°C. [5]

Solar is one of the renewable and sustainable sources of power that attracted a large community of researchers from all over the world. This is largely due to its abundance in both direct and indirect form. As such the development of efficient and inexpensive equipment for the drying of agricultural and marine products using solar power evolved thereby improving the quality of the products as well as improving the quality of life. [6]

The solar drying system utilizes solar energy to heat up air and to dry any food substance loaded, which is beneficial in reducing wastage of agricultural product and helps in preservation of agricultural product. [7]

III. DESIGN OF SOLAR DRYER

Material Selection:

1. Wood – Wood is selected for entire casing, because it is light in weight, easily available and cheaper in cost then other material.
2. Glass – Glass is selected for upper covering of the air heater chamber because it easily allows the rays to go inside and heat the sheet and it resist the heat to go outside.
3. Aluminum sheet and Galvanized iron sheet of 0.9 mm thickness each are used to increase the temperature of air passing through the air chamber painted black with tar for absorption of solar radiation.
4. Stainless steel wire mesh is used for constructing the trays for placing the product in the drying chamber.
5. Caster Wheels are used for easy movement of dryer from one place to another place.

Design Considerations:

1. Temperature - The minimum temperature for drying food is 35°C and the maximum temperature is 65°C, therefore. 50°C and above is considered average and normal for drying fruits, vegetables, roots and tuber crop chips, crop seeds etc.
2. Air gap - It is suggested that for hot climate passive solar dryers, a gap of 10 cm should be created as air vent (inlet) and air passage.
3. Glass and flat plate solar collector – It suggested that the glass covering should be 4-5mm thickness. In this work, 4mm thick transparent glass was used. It also suggested that the metal sheet thickness should be of 0.8 – 1.0mm thickness; here the aluminum and galvanized iron sheets of 0.9 mm thickness was used.
4. Cabinet Dimensions – It is recommended that a constant exchange of air and a roomy drying chamber should be attained in solar food dryer design, thus the design of the drying chamber was made as spacious as possible of average dimension of 60cm × 60cm × 35cm with air passage (air vent) out of the cabinet of (20 × 5) cm^2.
5. Dryer Trays – Stainless steel wire mesh was selected as the dryer screen or trays to aid air circulation within the drying chamber. Three trays were made of metal net. The tray dimension is 24cm × 24cm.
6. Efficiency - This is defined as the ratio of the useful output of a product to the input of the product.
7. Latitude of collector location- The latitude of Konkan region where the dryer is designed is latitude 17N. Hence the angle of Solar collector is 32°.
8. Average air speed Va = 0.200 m/s.

The constructional details of the solar dryer are as represented in the Fig. 1

Constructional Details:

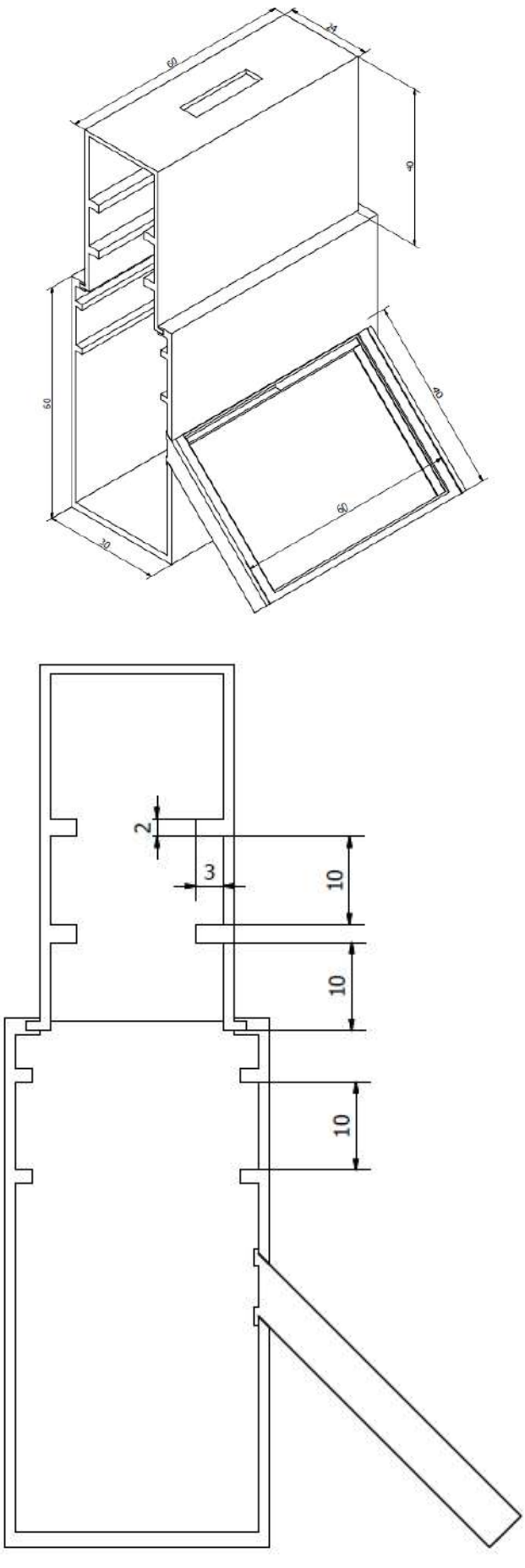

Fig. 1 Constructional details of the solar dryer (All dimensions are in cm)

IV. TESTING OF SOLAR DRYER

The solar dryer has been tested by considering Onion as the sample for drying. Two materials viz. Aluminum sheet and Galvanized Iron sheet were used for flat plate collector. The various parameters measured using a hygrometer were Wet Bulb Temperature (WBT °C), Dry Bulb Temperature (DBT °C), Enthalpy (KJ/Kg of dry Air) and Mass (Kg/Kg of dry air). The measurement was taken at inlet, outlet and at individual trays at different timings during the summer season.

Following Table 1 shows the results obtained after the testing of solar dryer.

Table 1. Testing of Solar Dryer

Parameter	Galvanized Iron Sheet	Aluminum Sheet
Initial Weight (gms) of Onions	1450	1450
Final weight (gms) of Onions	242	170
Effective Time Required for Drying (hrs.)	24	12

V. CONCLUSIONS

Following conclusions are derived from successful testing of solar dryer by using both flat plate collector materials; i.e. G.I. sheet and Aluminum sheet.

1. Final weight of onion and time required for drying process by using aluminum sheet is much lesser than G. I. sheet.
2. Telescopic arrangement of cabinets and use of caster wheels makes portability of solar dryer easy.
3. Provision of hygrometer device enables real time monitoring of temperature and other properties at specified location.

VI. FUTURE SCOPE

As we know solar dryer's moisture removal rate is more dependent on collector area, one can improve the effectiveness by increasing solar collector area.

Also, solar dryer can be made useful in night time too by using PCM (phase changing material) which stores the thermal energy in day time and by changing its phase in night time one can utilize the stored energy.

Provision of parabolic trough solar collector instead of black coated aluminum/ G.I. absorber plate to increase heating of air.

APPENDIX

The physical set up is represented in following Fig. 2 and Fig. 3

Fig. 2 Front View of the Solar Dryer

Fig. 3 Side View showing the flat plate collector

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Effect of Helix Angle on Beam Strength of Helical Gear Tooth - Theoratical Analysis

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Abstract: The aim of this paper is to investigate the helix angle effect on the beam strength of helical gear. Gears are one of the most critical components in mechanical power transmission systems. Helical gears are used increasingly because of its properties like relatively smooth and silent operation, large load carrying capacity and higher operating speed. For designing helical gears for power transmission systems that are good in strength and low level in noise, it is necessary to analysis methods that can easily be put into practice and also give useful information on bending stresses. The bending strength of the gear tooth is considered to be one of the main contributors for the failure of the gear. Thus, analysis of stresses has become popular area of research on gears to minimize or to reduce the failures and for optimal design of gears. This paper investigates the characteristics of helical gear system mainly focused on maximum bending stress to variation of helix angle using analytical method. The analytical investigation is based on Lewis stress formula. Bending stress can also be found out by modified Lewis formula, AGMA standards etc.

Keywords *— Helical gear design, Lewis equation, Optimum design parameters, Beam strength, Helix angle.*

1. INTRODUCTION

Gears have been manufactured for a number of years with extensive ongoing research related to their efficiency, operational quality and durability. They are relatively complex and there is a number of design parameters involved in gear design. The design of gears requires an iterative approach to optimize design parameters, which govern both the kinematics as well as the strength performance. The constant pressure to build less expensive, quieter running, light weight, low cost and more powerful machinery has resulted in a steady change in gear design. The extensive ongoing research deals with the analysis of gear stresses, transmission errors, dynamic loads, noise, and failure of gear tooth, which are very useful for optimal design of gear set [1].

The aim of the gears is to couple two shafts together; the rotation of the drive-shaft is a function of the rotation of the

drive-shaft in the gear mechanism. Therefore, determining the geometric design parameters of gears is crucial. The contact ratio is an important parameter for successful gear design. The helix angle is considered to be an effective parameter to increase the contact ratio of a helical gear. Thus, it is possible to increase the helical gear load carrying capacity, including the tooth bending stress and tooth contact stress [2].

Thus, this paper investigate the effect of helix angle on beam strength of gear tooth. In this part of the work, apart from the constant number of teeth, module and pressure angle, the face width is also kept constant and the helix angle is varied from15° to 35° in steps of 5°.The maximum bending stresses obtained and it is observed that maximum bending stress value decreases with the increase of helix angle.

2. LITERATURE SURVEY

2.1. Effect of change of helix angle on helical gear

The helical gear offers high contact and more friction which avoids slippage when compared to spur gear. To estimate the bending stress, three dimensional solid models for different number of teeth are generated by CATIA that is powerful and modern modeling software and the numerical solution is done by ANSYS, which is a finite element analysis package. The analytical investigation is based on Lewis stress formula. There is a variation in the maximum bending stresses with the change in helix angle. The maximum bending stress value decreases with the increase of helix angle which is in close agreement with values obtained from AGMA formula.

2.2 Analysis of bending strength of gear using FEM

Lewis equation is used for finding out the bending strength of a helical gear. This equation is based on certain assumptions. Various FEM are also based on this equation. In this paper a comparison between Lewis equation and Ansys workbench is done. In helical gear the engagement between driver gear and driven gear teeth begins with point contact and gradually extends along the tooth surface. Due to initial point contact in helical gear the bending stresses produced at critical section (root of tooth) are maximum as compared to spur gear, which has kinematic line contact. The calculation of maximum stresses in a helical gear at tooth root is three dimensional problems. The accurate evaluation of stress state and distribution of stress is complex task. The stresses produced at any discontinuity are different in magnitude from those calculated by elementary formulae. In theory of helical gear we are considering that load is acting at one point and the stress is calculated. But, in case of FEM a continuous load is considered. So a pressure will act along the teeth of helical gear.

3.THEORATICAL ANALYSIS USING LEWIS EQUATION

The analysis of bending stress in gear tooth was done by Mr. Wilfred Lewis known as Lewis equation. In the Lewis analysis, the gear tooth is treated as a cantilever beam as shown in fig. 3.1. The tangential component (Pt) causes the bending moment about the base of tooth.

The Lewis analysis is based on the following assumptions:
The effect of radial component (Pr) is neglected.
The effect of stress concentration is neglected.
At any time only one pair of teeth is in contact and takes the total load.

It is observed that the cross- section of tooth varies from free end to fixed end. Therefore, a parabola is constructed with in the tooth profile. The advantage of parabolic outlines is that it is a beam of uniform strength.
In fig.3.2 at section XX,

$$M_b = P_t \times h \quad \text{....(Eq. 2.1)}$$

$$I = \left(\frac{1}{12}\right) bt^3 \quad \text{....(Eq.2.2)}$$

$$y = \frac{t}{2} \quad \text{....(Eq.2.3)}$$

Here,
M_b = Bending Moment,
h= Height from root of tooth (dedendum circle to intersection of parabolas)
I = M.I of tooth about neutral axis
t = thickness of tooth at root
y = Distance of neutral axis from edge.

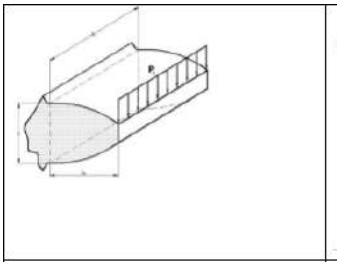


Fig.3.1 Gear tooth as cantilever beam

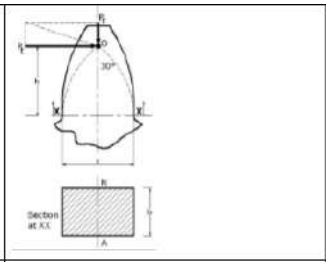


fig.3.2 Gear tooth as parabolic beam

The bending stress (σ_b) is given by,

$$\sigma_b = \frac{M_b}{I} \times y \quad \text{.....}(Eq2.4)$$

Putting values of Mb, I, y and solving,

We get,

$$\sigma_b = \frac{P_t}{m \times b \times Y} \quad \text{.....(Eq. 2.5)}$$

Here, Y is Lewis form factor

$$Y = \frac{t^2}{6 \times m \times h} \quad \text{.... (Eq. 2.6)}$$

m= Module of gear,
Pt = tangential component of load
According to Lewis equation, the Beam Strength of helical gear tooth is given by

$$F_b = [\sigma_b] \times m_n \times b \times Y_v$$

Where,
$[\sigma_b]$ =Allowable contact stress in kgf/cm2
b = Face width of gear blank =10 mm
m_n= Normal module which must be standardized.
Y_v = Lewis form factor which depends on the virtual number of teeth.
$z_v = [\frac{z}{\cos\beta^3}]$

4. CALCULATION

Geometrical parameters of helical gear-

Speed of gear[rpm]	760
Power transmitted[KW]	2.2
Number of teeth	30
Diametrical pitch (p) [mm]	60
Pressure angle	20°
Face width [mm]	24
Addendum [mm]	1/p
Dedendum [mm]	1.25/p
Helix angle	15°

Torque transmitted by helical pinion =M_t

$M_t = \frac{60\times10^6\times P}{2\times\pi\times n}$ N-mm

$M_t = \frac{60\times10^6\times2.2}{2\times\pi\times760}$ = 27656.72 N-mm

Tangential component acts at pitch is,

$$M_t = p_t \times \frac{d}{2}$$

Where, d = Pitch circle diameter

Pt = 921.89 N

In order to determine bending stress, the helical gear is considered to be equivalent to a formative spur gear. The formative gear is an imaginary spur gear in a plane perpendicular to the tooth element.
Therefore for helical gear,

b'= $\frac{b}{\cos\beta}$

b'= $\frac{24}{cos15}$= 24.84 mm

z' = $\frac{Z}{\cos\beta^3}$

z' = $\frac{30}{\cos 15^3}$ = 33

Y for Z' = 0.367

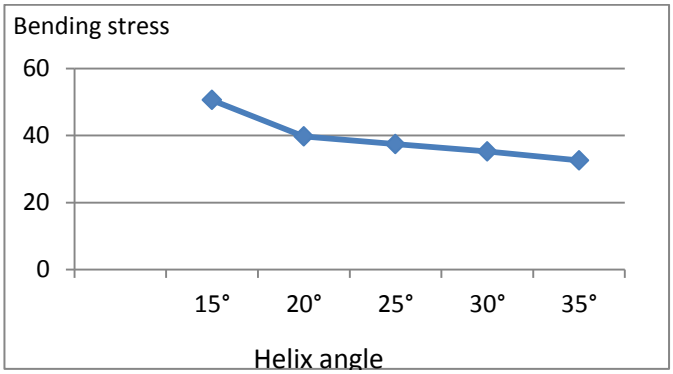
$\sigma_b = \frac{P_t}{m\times b\prime\times Y}$ ...from Eq 2.5

$$\sigma_b = \frac{921.89}{2 \times 24.84 \times 0.367} = 50.56\ N/mm\text{^}2$$

5. RESULTS

Helix angle	Bending stress $\frac{N}{(mm^2})$
15°	50.56
20°	39.72
25°	37.41
30°	35.22
35°	32.56

6.GRAPH



7. CONCLUSION

The maximum tooth bending stress was decreased and improved with increasing the helix angle for each types of gear, the standard gear (symmetric) and asymmetric tooth of gear.

Optimum helix angle of has the highest enhancement percentage of maximum tooth bending stress for both cases when the force applied at the tip point of tooth and near the middle of tooth with enhancement percentage (1.727 %) and (16.874 %) respectively.

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Design of Spur Gear for Dynamic Analysis

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Abstract: Gear is a widely used mechanical component whose primary use is to transmit power from one shaft to other. Gears are machine elements that transmit angular motion and power by the successive engagement of teeth on their periphery. These gears are of many types namely spur gear, helical gears, worm gears etc. Gear drives are used to various kinds of machines like automobiles, metal cutting tools, material handling equipment, rolling mills, marine power plants etc. The friction and other losses in this type of power transmission equipment is comparatively very low. Spur gears are the most common variety and the most economical to manufacture. The main purpose of modern spur gear design it increases the power transmitting capacity and also improves the efficiency of power transmission. Spur gear made of cast iron is considered as the conventional model in this project.

Keywords — ***Spur Gear, Power Transmission, Machine Tool Application, Efficiency, Cast Iron.***

1. INTRODUCTION

A Gear can be defined as the mechanical element used for transmitting power and rotary motion from one shaft to another by means of progressive engagement of projections called teeth. Geared devices can change the speed, torque, and direction of a power source. The most common situation is for a gear to mesh with another gear; however, a gear can also mesh with a non-rotating toothed part, called a rack, thereby producing translation instead of rotation. Spur gears are used in many devices but not in cars as they produce large noises. The main reason for the popularity of spur gear is their simplicity in design and manufacturing. The two parameters i.e. tip radius and in tooth widths which play a key role gear design are studied. The torque ratio can be determined by considering the force that a tooth of one gear exerts on a tooth of the other gear. Consider two teeth in contact at a point on the line joining the shaft axes of the two gears. The force will have both a radial and a circumferential component. Gears are a very useful simple machine. Thus, the load application is gradual which results in low impact stresses and reduction in noise. Therefore, the spur gears are used in transmitting power with very less friction losses.

2. LITERATURE SURVEY

The paper presents an original method to determine the efficiency of the gear, the forces of the gearing, the velocities and the powers. The originality of this method relies on the eliminated friction modulus. The paper is analyzing the influence of a few parameters concerning gear efficiency. These parameters are: z1 the number of teeth for the primary wheel of gear; z2 the number of teeth of the secondary wheel of gear. Studied the reduction of gear fillet stressed by using one-sided involutes teeth, for increasing the load carrying capacity of geared power transmissions several tooth designs alternative to the standard involute have been proposed. The use of non-involutes teeth has a number of disadvantages and for this reason a symmetric involute-type teeth have been studied as a promising alternative. The increase in load carrying capacity can reach up to 28% compared to the standard 20°involutes teeth.

3. GEAR NOMENCLATURE

Fig.1.Gear Nomenclature

4. PROPOSED SYSTEM

4.1 MATERIAL SELECTION FOR SPUR GEAR

A. Desirable Properties

[1] High fatigue strength
[2] High tensile strength
[3] Low coefficient of friction
[4] Good manufacturability
[5] Material should have good surface finish
[6] No stress concentration

4.2 Cast Iron

The cast iron is obtained by re-melting pig iron with coke and limestone in a furnace known as cupola. It is primarily an alloy of iron and carbon. The carbon content in cast iron varies from 1.7 per cent to 4.5 per cent. It also contains small amounts of silicon, manganese, phosphorous and sulphur. Cast iron is a brittle material; therefore, it cannot be used in those parts of machines which are subjected to shocks. The properties of cast iron which make it a valuable material for engineering purposes are its low cost, good casting characteristics, high compressive strength, wear resistance and excellent machinability. The compressive strength of cast iron is much greater than the tensile strength.

Types of Cast Iron:

1. Grey cast iron
2. White cast iron
3. Malleable cast iron
4. Alloy cast iron
5. Wrought iron

5. Design Procedure of Spur Gear

1. From the statement of problem, note down them power to be transmitted, pinion, speed, gear ratio, life of gear drive and other working conditions.
2. Based on the transmitting power and gear ratio, select a suitable material. Usually the pinion is subjected to more loading cycles then gear and hence the material selected for pinion should be strong than gear material.
3. Note the design surface compressive stress and bending stress for the selected material from design data book (or) find them by using the formula.

$$[\sigma_c] = C_B HBK_{cl} \; OR \; [\sigma_c] = C_R HRK_{cl}$$

AND $\sigma_B = \frac{1.4\, K_{bl}\sigma_e}{n\, K_\sigma}$ For rotation in one direction only

$= \frac{K_{bl}\sigma_e}{n\, K_\sigma}$ For rotation in both direction

4. Based on surface compressive stress, determine the minimum center distance required for the gear drive as

$$a \geq (i + 1)\sqrt[3]{\{\frac{0.74}{[\sigma_c]}\}^2 \frac{E\,[M_t]}{i\varphi}} \; For\ 20^0\ pressure\ angle$$

$$a \geq (i + 1)\sqrt[3]{\{\frac{0.85}{[\sigma_c]}\}^2 \frac{E\,[M_t]}{i\varphi}} \; For\ 14.5^0\ pressure\ angle$$

In the above expression

a = Center distance

$i = gear\ ratio = \frac{Z_2}{Z_1}$

(i+1) for external gearing and (i-1) for internal gearing

$[M_t]$ = Design torque

$= M_t.K.K_d$ where M_t is the normal twisting moment and is obtained from the power as,

$$P = \frac{2\pi n_1 M_t}{60}$$

P = power in watts.

n_1= speed in rpm of pinion

M_t= Normal twisting moment in N-m

Initially $K.K_d$ may be assumed as 1.3,

And $\varphi = \frac{b}{a} = 0.3$

E = Equivalent young's modulus

$= \frac{2E_1E_2}{E_1+E_2}$

The design stress $[\sigma_c]$, to be substituted in the above expression should be the minimum value, and usually formul based on 20 degree pressure angle is preferred.

5. Based on beam strength or bending stress, determine the minimum module as

$$m \geq 1.26\sqrt[3]{\frac{[M_t]}{y[\sigma_b]\varphi Z_1}}$$

Where $[\sigma_b]$ = Design bending stress which should be the minimum value.

$\varphi_m = \frac{b}{m} = 10$ (Initially assumed)

Z_1 = Number of teeth on pinion

(Usually selected from 14 to 20 initially)

Y =Form factor corresponding to $Z_1(PSG)$

6. After calculating the minimum module, select the next standard module from the table (PSG).
7. Then correct the number of teeth on pinion using the standard module and minimum center distance as

Z_1=$\frac{2a}{m(i+1)}$

8.Similarly finalize the center distance using standard module and corrected number of pinion teeth as

$$a = \frac{mZ_1(i+1)}{2}$$

9. Find out the pitch circle diameters for pinion and gear as $d_1 = mZ_1\ and\ d_2 = mZ_2\ Where\ Z_2$=$iZ_1$. Also the center distance "a" is equal to $\frac{d_1+d_2}{2}$

10.Find the face width "b" as $b = \varphi.a$ (or) $b = \varphi_m.m$ and adopt the higher value.

11.Calculate the pitch line velocity using $v = \frac{\pi d_1 n_1}{60\ X\ 1000}$ m/s and also notes the values of load concentration factor (k) and the dynamic load factor (K_d) from PSG based on (b/d_1) ratio and pitch line velocity and evaluate the actual transmitted torque as $[M_t] = M_t.K.K_d$

12.Then determine the induced surface compressive stress and bending stress as

$\sigma_c = 0.74(\frac{i+1}{a})\sqrt{\frac{(i+1)}{ib}\,E[M_t]}$ For 20^0 pressure angle

And $\sigma_b = \frac{(i+1)\,[M_t]}{a.m.b.y}$ here y = form factor for corrected Z_1

13. Evaluate the other parameters of gear such as addendum, dedendum, tip circle diameter, root circle diameter, circular pitch etc. as follows.

Addendum = $f_0.m$

Dedendum = $(f_0 + c)m$

Where f_0 =Height Factor

=1 for full depth teeth

=0.8 for stub teeth

C = clearance factor

=0.25 for full depth

=0.3 for stub teeth

Tip circle diameter= Pitch circle diameter + (2*Addendum) Root circle diameter=Pitch circle diameter - (2*Dedendum) Tooth height= Addendum + Dedendum

Working depth= 2*Addendum

Clearance = Dedendum – Addendum

Circular pitch=$\frac{\pi.d}{Z}$

6. CONCLUSION

Using this design procedure, spur gear can be easily designed and can be easily used dynamics analysis.

As gear is one of the important element of power transmission, its design can be easily implemented using this procedure.

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Solar Powered Water Harvester

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Abstract-Water scarcity is a particularly severe challenge in today's world.Although there are trillions of liters of water floating around in the air, it's not easily accessible for those who need it. There is a process of plucking out quantities of water from atmosphere using a device only powered by the Sun which is discussed in the following paper.

Keywords —Absorption, Hygroscopy, Hygroscopic Materials, Metal Organic Framework, Solar Powered harvester, Thermal Conductivity.

I. INTRODUCTION

The Primary source of drinking water available right now is ground water. India is the largest user of groundwater in the world. It uses an estimated 230 cubic kilometers of groundwater per year - over a quarter of the global total. 85% of drinking water supplies are dependent on groundwater. Urban residents increasingly rely on groundwater due to unreliable and inadequate municipal water supplies. Two-thirds of the world's population is experiencing water shortages. The water vapor and droplets in the atmosphere, estimated to be around 13,000 trillion liters, is a natural resource that could address the global water problem.

Although there has been interest in dewing (*3–6*) from moist air and fog capture (*7–9*), these processes require either frequent presence of 100% relative humidity (RH) or a large amount of energy, and are not viable solutions to the capture of water from air. Ideally, a water-harvesting system should operate with a material that can take up and release water with minimum energy requirements and powered by low-grade energy sources, such as sunlight. Such materials available to us at low cost are Silica Gel, Aluminum Silica, zeolites which works on principle on Hygroscopy.

Hygroscopy is the phenomenon of attracting and holding water molecules from the surrounding, which is usually at normal or room temperature. This is achieved throughabsorption with the adsorbing substance becoming physically changed somewhat. This could be an increase in volume, boiling point, viscosity, or other physical characteristic or property of the substance, as water molecules can become suspended between the substance's molecules in the process.

II. HYGROSCOPIC MATERIALS USED

1. Activated Alumina

Activated alumina is a white beaded desiccant with a diameter of 2 to 4 mm. Compared with silica gel, it has a

Lower surface-area-to-weight ratio and exhibits a higher

fluctuation of the quantity adsorbed in relation to changes in relative humidity. Due to its adsorption characteristics, activated alumina is mainly used for heatless regenerative dehumidifying equipment.

2. SK-400 silica alumina

SK-400 silica alumina is a white beaded desiccant with a diameter of 2.36 to 4.75 mm. Since it has a higher surface-area-to-weight ratio as well as higher heat and water resistance than activated alumina, it is mainly used for heated dehumidifying equipment. Silica-alumina particles do not fracture when exposed to water mist and can be used alone.

3. SK-600 silica gel

SK-600 silica gel is a clear beaded desiccant with a diameter of 2.36 to 4.75 mm. It has a high surface-area-to-weight ratio and adsorbs more moisture than any other type of desiccant. Silica gel fractures when exposed to mist, and its adsorption performance degrades when regenerated at high temperatures. Due to these drawbacks, silica gel has more application limitations than other types of desiccants. Silica gel is used in combination with silica alumina in our heated air and gas dehumidifying equipment products.

4. Synthetic zeolite

Synthetic zeolite is a pale yellow beaded desiccant with a diameter of 2.36 to 4.75 mm. Unlike active alumina and silica gel, synthetic zeolite exhibits better adsorption performance in high temperatures or low relative humidity regions. While synthetic zeolite is not commonly used for normal compressed air drying processes, it is used for drying special gases and as a molecular sieve to separate certain types of molecules from mixed gases.

III. OPERATION PRINCIPLE

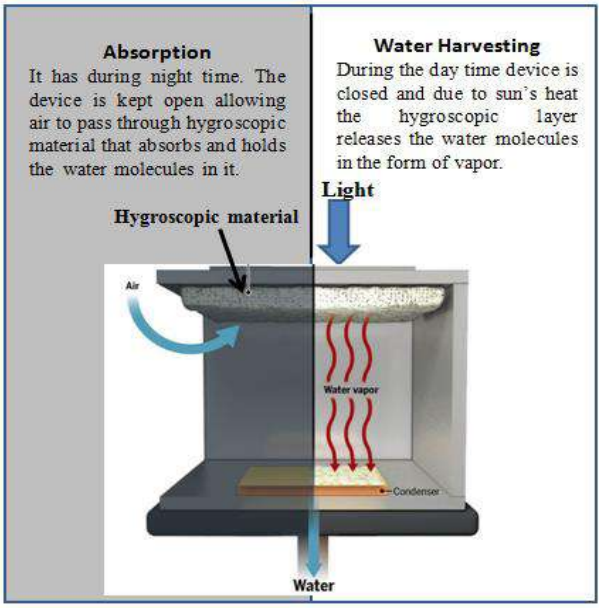


Fig. Concept Idea

Our operational principle involves

A single daily cycle where adsorption occurs during night-time ata higher humidity (50-80% RH) and solar-assisted desorption/water production occurs during day-time at a humidity(40-70% RH).The deviceconsists of two key components, an adsorbent layer (Hygroscopic Material) andan air-cooled condenser in an enclosure. Duringnight-time adsorption, the enclosure side walls are opened andthe hygroscopicmaterial is saturated with vapour from the natural flow ofambient air and passively cooled with radiation to the sky.

During day-time water production, the enclosure is closed andthe sides of the walls are covered with a thermal insulator. The Hygroscopic layer is heatedby exposure to solar irradiance, causing water release (desorption).

The desorbed water vapour diffuses from the hygroscopic layer to the side of the walls due to a concentration gradient. Accumulation of vapour in the enclosure leads to saturation conditions andconsequently, the condensation process occurs at ambienttemperature. The heat of condensation is dissipated to theambient by a heat sink. The adsorbents need to be selected basedon the typically available ambient RH for water adsorption.

IV. CONSTRUCTIONAL DETAILS OF SET-UP.

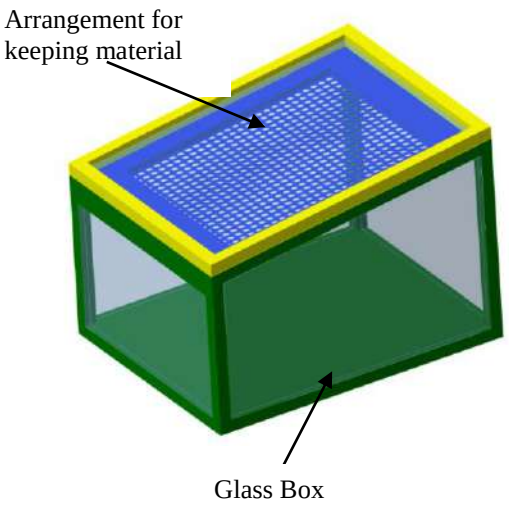
It consists of a Box with walls made of Glass. Glass is selected because it has high heat storing capacity and it has low thermal conductivity around 1W/m.k. The upper surface of the setup is tilted to a certain angle so that layer of hygroscopic material is more exposed to flowing air which will increase the absorption capacity of material and another reason is during daytime there will be more exposure to setup of sunlight which will increase heat supplied to material and more water molecules will be released in the form of vapours.

Sr.No	Material Used	Expected results (per kg per day)
1	Silica Gel	250 ml
2	Activated Alumina	200 ml
3	Zeolites	180 ml

Insulation is provided around side walls of setup to prevent vapours from escaping the box. To increase efficiency of set up i.e. to generate more water from device there are some factors which can be controlled

1) Type of Material used
2) Surface area exposed to sunlight
3) Heat absorbed by the material

To increase the heat supplied to material some arrangements can be made such as concave lens can be used to increase the concentration of sunlight on the material.



Fig, Assembly of Solar Powered Water Harvester

V. PREDICTED RESULTS

Different Hygroscopic materials like Silica Gel, Activated Alumina and Zeolites are used.Depending upon the surface area of material and absorption capacity of the material, they harvest water accordingly.

Above table shows the expected results predicted on the basis of test carried on the small testing setup which was prepared for checking that the phenomenon was working or not. From that setup we got the conclusion that the idea we suggested is practically possible.

VI. CONCLUSION

With the tremendous use of groundwater as drinking water, groundwater levels are depleting day by day. It is necessary to find out alternate sources for drinking water. So solar powered water harvester can be next level of drinking water. At areas where there is scarcity of water and no other sources of energy available, solar powered water harvester can be boon for them.

To increase the efficiency of water harvester different types of material can be used. One of them is Metal Organic Framework (MOF) which has largest surface area which is equivalent to surface area of 7 football field. However due to its very high cost its usage is restricted .Research is going on to develop lower cost MOF. If it is developed then Solar Powered water harvester can surely be next level of drinking water.
Using hygroscopic materials also fulfills the purpose but has comparatively less efficiency. Various Designs are being made to use maximum use of material and produce water.

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Modified Design of Rice Planting Machine

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Abstract: Need of rice planter machine is growing nowadays because it's unique features, seeding in well sequence and in well manner. Seeding by rice planter saves too much efforts of human being. A rice planter is a specialized machine fitted with a planting mechanism (usually having some form of reciprocating motion) driven by the power from the live axle, in order to the plant rice seedings onto paddy field. The rice translation process is generally manual which involves number of labour. The process of manual rice plantation is not so efficient as compared to the mechanical rice plantation. Machine planting using rice planter requires considerably less time and labour than manual planting. We can save the production cost as well as cultivation time and labour cost. The orientation of the labour at the time of planting is hazardous for their health. With manual plantation the cost of production of rice also increases. In this project we have designed the rice planting machine and its 3D model is prepared. After constructing it considering resulting specifications from design procedure followed by us, analyzing and making necessary changes if required; it can be used in paddy field in highly efficient and effective way in term of cultivation of rice.

Keywords: Planter, Mechanism, CAD Model, Fabrication, Planting Field, Production.

I. INTRODUCTION

Agriculture is most important sector of the Indian economy. It is most important source of employment for the majority of the work force in the country. Rice is primary and major crop cultivated in India.

Rice being the important food crop covers about one fourth of the total cropped area and cater food to half of the Indian population. In India, average rice production per hectare is 2.2 tonne.

North Eastern India covers 7.8 percent of the total area of rice cultivated in India and in terms of rice production, accounts to only 5.9 percent of the total national rice production. However, this region is lagging in terms of rice production because of labour intensive work.

The Government of India has also started taking steps in the form many initiatives in which the farmers are made aware about the technologies they can use in farming. There are basically five steps that a farmer needs to do properly to get increased productivity.

These five steps namely are:

[1] Ploughing
[2] Seed Sowing
[3] Ploughing
[4] Irrigation Process
[5] Harvesting
[6] Threshing.

Manual seeding method:

Fig.01 Agriculture field

Manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. Farmers can do much to increase food production especially grains, if drudgery can be reduced or totally removed from their planting operations. To achieve the best performance from a seed planter, the above limits are to be optimized by proper design and selection of the components required on the machine to suit the needs of crops.

Traditional method is costly, time consuming and labour intensive work.

Fig.02 manual seeding method

Existing rice planting machines:

Types of planters

Planters are classified based on the,

(a) Type of nursery and

(b) The source of power to drive it.

There are two types of nursery

I) Washed root seedlings

ii) Mat type or soil-bearing nursery

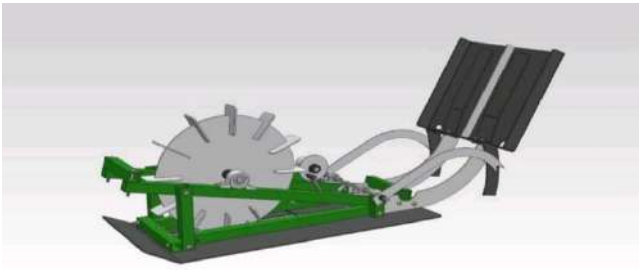
Based on the power source:

i) Manually operated planter

ii) Self-propelled planter.

Due to the high price of an automated paddy planter, it becomes impossible for a small scale farmer to buy a non-subsidized automated paddy planter.

Fig.03 existing rice planting machine



Our project work:

Use of rice planting reduce labour requirement by 75-80%. The manual and self-propelled planter reduces cost of planting. The mechanical planting of the rice has been considered the most promising option, as it saves labour costs, ensure timely transplanting and attains optimum plant density that contribute to high productivity.

II. LITERATURE REVIEW

Pankaj Kumar Singh, Hardstand srivastav and their team gives information about Manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. Therefore it is better to have nylon bushes and iron or aluminium rods to reduce the friction. It's better to use iron sprocket with same diameter and number of teeth to reduce the damage when tension is high. The sprocket and chain used for the machine was foot cycle chains and sprockets. [1]

Satish Kumbhar, Sangram Khot, Suraj Mohite, S.V.Pandit focused on design analysis and fabrication of a manually operated rice planter for small scale Indian rice cultivators. By achieving the goals like simplifying the mechanism, reduce cost and reduced weight of present rice transplanter. Trial run of planter is conducted and from this it is seen the time taken for planting per square meter of is less. [2]

Dhanesh D. Patil & Dr. Mangesh R. Phate Designed and developed of planter machine. In this paper design and selection of main shaft and bearing is done. This gives the idea about design of frame and other component. [3]

Prof. S. K. Pawar, Mishra Akash Arvind, Modi Akshay Anil gives need of designing and developing a cheap, simple and effective indigenous planter suited to perform well under Indian conditions.[4]

Ms. Kavitkar Chhaya Ragho gives information about various components of the machine, its specifictions and materials of the component. [5]

Uttam Patel, Purva Patel, Parth Rana, Alay Shah, Parthiv Mehta gives information about the designing of the chain and sprocket along with information of planting arm.[6]

Anirban Manna, Ayush Poddar, Harshit Lathi and team studied design procedure for planting arm, plant catching mechanism is given. [7]

Isha Singh1, Chinmaye Kulkarni1, Shahnawaz Khan1, Akash Tangade1 Assit.prof. Suryavanshi A.R2 concluded that the Mechanical planter should be used in an area of 28 hectares per year give us information about mainly two types of rice planter i.e. riding type and walking type, riding type is power driven and can usually transplant six to eight rows in one pass, on other hand walking type is manually driven and can usually transplant three lines in one pass. [8]

III. OBJECTIVES

1) To minimize cost of work.

2) To reduce human efforts.

3) To generate alternate source of income for rural farmers.

4) To minimize time of plantation.

5) Pulling force is greatly reduced by decreasing the weight of the model.

IV. CONSTRUCTION AND WORKING

1) Base frame- It is base structure of machine which gives support to the other components mounted on it.

2) Sprockets: - The main function of sprockets is to transmit torque through chain. There are two sprocket-one drivers and other driven mounted on respective shafts.

3) Chain: - The function of chain is to transmit torque from driver to driven sprockets. The chain is simplex type.

4) Four Bar Linkage: - In this four bar linkage one link is fixed and other three linkages are in motion. The links are Connecting's rod, lever, crank and planting finger or fork. It is mounted on the driven shaft.

5) Tray: - This is used to store the rice plant from where the planting finger pick the plant and saw in the ground. This tray has two vertical guide slots.

6) Planting Finger: - The planting finger is the main element which is responsible for the plantation of the nursery seed. It has the specific shape which picks the nursery seed and plant in mud. It oscillates at certain angle and it is called as fixed fork mechanism.

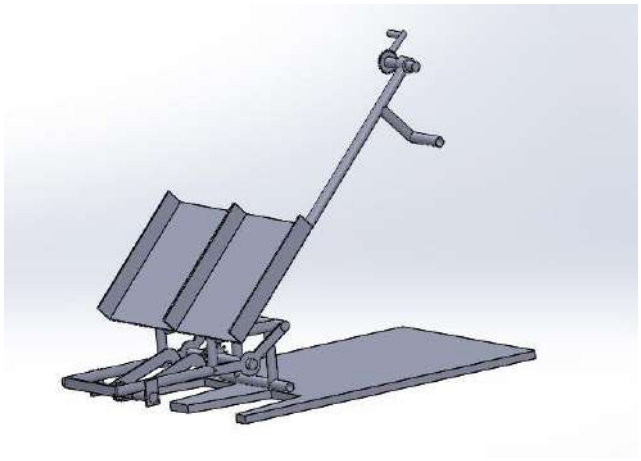


Fig.04 Cad model

V. DESIGN OF COMPONENTS

[1] Four bar linkage

The four bar link are as follows:
Crank-can rotate a full 360 degree
Lever-can rotate through a limited range of angles
Connecting rod-connects the crank and lever
Fixed frame-fixed part in linkage

Dimensions of four bar linkage

Length of crank=3.5cm
Length of lever =6cm
Length of connecting rod=0.7m
Length of fixed frame=0.8 m
Grashof condition
S+L≤P+Q
3.5+10 ≤6+8
13.5 ≤14
Hence Grashof condition is satisfied

[2] Chain

Fig.05 chain

Length of chain
L = Lp x Pd
Where,
Lp is the Length of continuous chain in multiples of pitches (i.e. approximate no. of links)
Pd = Pitch diameter
Now to find Pitch diameter Pd,
a = (30-50) Pd
Where a is the center distance and assumed it as 110cm
110 = 50Pd
Pd = 2.2 cm

Now to find length Lp,

Lp = 2ap + (Z1+Z2)/2 + (((Z1-Z2)/ (2X3.14)) 2/ap)
Where ap is the approx. center distance in multiples of pitches
ap = a/P = 110/2.2 = 50cm
Lp = 2(50) + (58/2) + ((22/ (2x3.14)) 2/50)
= 100 + 29 + 0.25
Lp = 129.25 cm
Length of chain,
L = Lp x Pd = 129.25 x 2.2 L = 284cm
Length of first chain = 284cm
Length of second chain = 85 cm

[3] Sprocket

Fig.06 sprocket

We use Sprockets for hand driving wheel and in the shaft for rotating the fork and four bar mechanism.
Calculation of Speed of Rotation
Z1=No. of teeth on sprocket pinion
Z2=No. of teeth on sprocket wheel
N1=Speed of rotation of pinion
N2=Speed of rotation of wheel
Speed of wheel driven by hand N2=25 rpm (optimum value)
No. of teeth in sprocket wheel Z2=40
No. of teeth in sprocket pinion Z1=18
Transmission Ratio 'i'N1/N2= Z2/Z1
Z2/Z1= 40/18 = 2.2
Therefore, N1 = 2.2 x 25
Speed of rotation of pinion = 55rpm.

[4] Tray

Fig.07 Tray

Tray is used to keep the seedlings on the trans planter. Sheet metal is metal formed by an industrial process into thin, flat pieces.

Dimensions of tray

Length of sheet metal = 53.5cm
Breadth of sheet metal = 26 cm
Thickness of sheet metal = 0.1cm

[5] Shaft

Fig.08 Shaft

Shaft is a revolving rod that transmits motion or power Here, the one shaft contains forks and another shaft contains four bar linkage and power is taken from the hand driven wheel by chains and sprockets.

Shaft dimensions:

Length of the shaft = 30 cm (it is space required between the paddy seedlings)
Diameter of shaft = 2 cm (it is the optimum diameter for 30cm shaft)

Planting arm

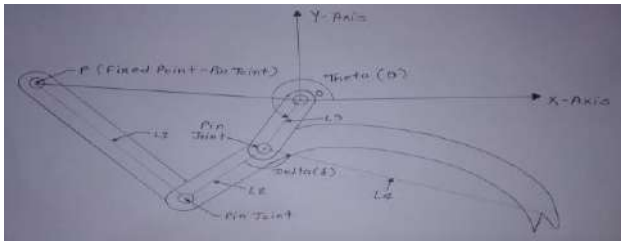


Fig.09 planting arm

The trajectory of the planting depends upon …

[1] Point (P)
[2] Length(L1, L2,L3,L4)
[3] Delta

Assumed that following dimensions.
P = (-160, 10)
L1 =160 mm
L2 = 70 mm
L3 = 60 mm
L4 = 170 mm
Delta = 101^0

VI. CONCLUSION

The design specifications of rice planter which we found are seen to be satisfactory. The cost is less than motor powered and hand cranked mechanical rice planter. The four bar mechanism will give the good operation and will require less maintenance due to reduced number of parts which will reduce the overall weight. It will be highly efficient and effective in terms of cultivation of rice in paddy field. In this view this design of Rice planter would have a bright future ahead in existing models of rice planters.

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Design & Fabrication of Electromagnetic Gear Shifter for FSAE Racecar

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Abstract: *Gear shifting mechanism plays an important role in conservation of fuel and energy. A well as It helps to achieve the proper speed control of vehicle. The gear shifting mechanism is the most important part of the FASE vehicle. Most of formula SAE teams uses mechanical linkage system for their formula racecar, but this system also lacs the performance and expected results. So, the main objective of this paper is to study & identify the problems occurs with mechanical linkage and accounts a proposed solution for it. The solution should be more reliable than mechanical system in design and performance to achieve the purposed outcomes. This can be done by bringing automation in gear shifting by electromagnetic button operated gear shifting mechanism. There are different methods of button operated gear shifting mechanism but electro-magnetic button operated gear shifting which works on the principle of electro-magnet, will be ease in operation. This will help us to change the gear as per desired speed with minimum efforts and reduces time delays. The advance technique in gear shifting mechanism leads to flexibility and easiness for driver. Button operated gear shifting mechanism is more significant for physically handicapped users. This system gives more benefits and reduces time delay in gear shifting.*

Keywords – Gear Shifter, FSAE Vehicle, Electromagnetic Shifter, Mechanical Linkages

1. INTRODUCTION

FSAE Formula Student is an engineering design competition organized by the Society of Automotive Engineers where college students design, manufacture and compete with a formula style car. As in concerned with design gear shifting mechanism plays an important role in conservation of fuel and energy. A well as It helps to achieve the proper speed control of vehicle. The gear shifting mechanism is the most important part of the FASE vehicle. Better the gear shifting system better the dynamics results will be obtained. The car built by Team MH-08 Racing, Formula SAE team uses a 2015-2016 KTM Duke 390cc engine that has a 6-speed sequential gearbox. The gears can only shift sequentially in order, and shifts are actuated by the rotation of a lever at the gearbox. Currently the team using mechanical arrangement for the Gear shifting system which is not able to give the performance required for better results. The current system lacks in Precise movement and control. As it is mechanical linkages there is always the chances of failure in extreme conditions. For the hand lever operation, the drivers need to remove his or her hands off the steering wheel and have to shift the gear with one hand and control the steering by another one. This will be difficult for driver to shift and maneuver the vehicle by steering with one hand.

This will rather lead to inefficient driver performance in dynamics, as in concerned with FSAE racecar the driver performance is the key to dynamics so the better performance of every system of racecar including gear shifting. So, a more reliable, efficient gear shifting mechanism is need to be used. There are different methods that can be used for gear shifting along with automation with button operation gear change. An Electromagnetic gear shifting mechanism can be a solution for the occurred problem. The system will work on Electromagnetic principle to change the gear. This change will help to change the gear as per desired speed with minimum efforts and reduces time delays as well as this will reduces the driver's effort the driver's effort to minimum and increases the performance for better results.

2. BASIC REQUIREMENTS OF A GEAR SHIFTING MECHANISM FOR FSAE VEHICLE

The gear shifter system should be design as per drivers' comfort and it should provide the adequate assistance to driver for an easy use. As concerned with FSAE racecar performance any gear shifting mechanism should accomplishes the following requirements for the better performance of the system:

- Gear shifting system should have proper accessibility to driver and ease in use
- It should be reliable and highly durable
- It should be maintainable
- It should give prior and complete control on gear shifting process
- It should acquire the precise and smooth movement for gear shifting
- It should be safe and sturdy in design
- The gear shifting time should reduce to as minimum as possible along with time delay elimination
- The system should be transferable to next FSAE Vehicle
- It must be more efficient in all manner as reliability and control, safety

3. CURRENT MECHANICAL ARRENGEMENT DESIGN

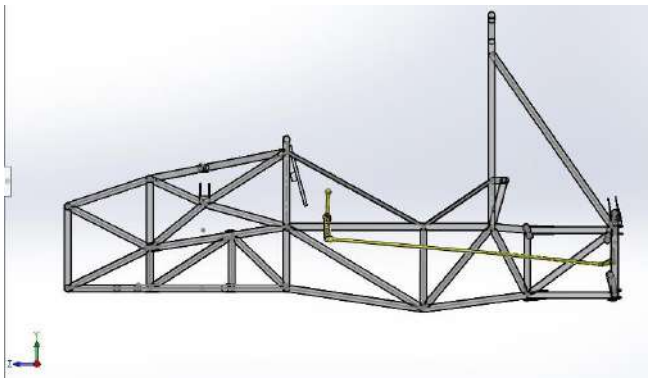

Fig.1: Side View of Mechanical Hand lever shifter position

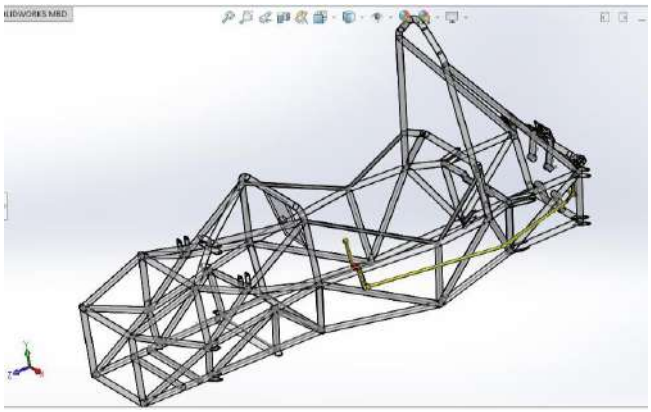

Fig.2: Iso- View of Mechanical Hand lever shifter position

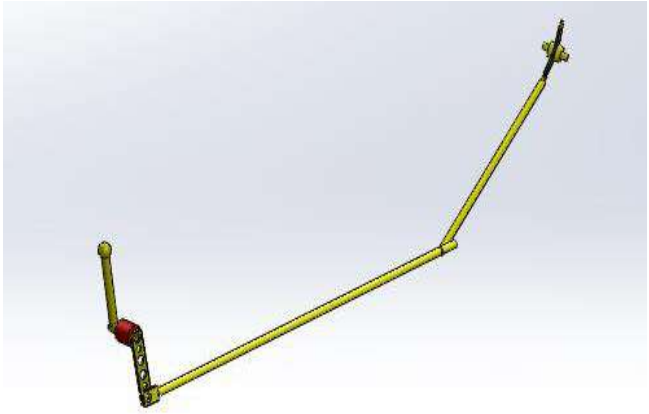

Fig.3: Mechanical Hand lever shifter CAD Model

- Our race car consists of a mechanical hand lever operated gear shifter
- It consists of parts like hand lever, connecting rod, bearings, etc
- The system is completely mechanical for 6 gear change

The car built by Team MH-08 Racing, Formula SAE team uses a 2015-2016, KTM Duke 390cc engine that has a 6-speed sequential gearbox. The gears can only shift sequentially in order, and shifts are actuated by the rotation of a lever at the gearbox. The current gear shifting system is completely mechanical and is actuated by a lever mounted to the driver's left side. This lever is attached to a push-pull mechanical linkage which runs the length of the car to the gearbox. When a shift is needed the driver is required to remove his or her hand from the wheel, grab the lever, and push or pull it while driving at high speeds on a tight course. The current shifter is a simple mechanical device with a direct linkage to the transmission at the rear of car.

This system is problematic in a few specific ways. The time taken between when the shift is needed to when it is actuated is somewhat slow due to the driver's need to remove his or her hand from the wheel. The lever also proved to be difficult to actuate at certain critical times. On a Formula SAE competition course with many turns for dynamics, frequent shifting is required to maximize performance. If a shift is needed during a turn the driver would have to make the turn with one hand on the steering wheel or simply wait until after the turn and lose time while the engine was in a bad RPM range. Both situations lead to a decrease in overall performance.

3.1. PROBLEMS OCCOURED WITH MECHANICAL GEAR SHIFTING SYSTEM:

Although the mechanical hand lever system is the simplest system also the easy one in operation, still this system is problematic and its lacs other important aspects as discussed below:

- Unwanted efforts required
- There is time delay in gear sifting
- Friction occurs in mechanical linkages
- Less precise and smooth movement
- Chance of linkage failure in exceeding force and extreme situations
- It is less reliable and safe as well as gives lesser control
- Wearing of mechanical parts & joints creates loosening motion
- It affects the race car as well as driver's performance

3.2. DESIGN SPECIFICATION:

Even using mechanical gear shifting system the goal is to made the system as easy in operation and simple in design along with its strength considerations, the normal conditions for gear shifter are as follows:

1. In normal condition the while running a vehicle a 10-20 N force is applied by the driver on gear shifting lever
2. In Running or extreme condition this force can be exceeded up to 30-35 N

- **Design considerations of Mechanical Gear shifter**:
  1. It should pass all FSAE Rules
  2. It must withstand the high load conditions
  3. It should have good strength and durability
  4. It should be smooth in operation
  5. Easy and simple mounting on chassis

- **Design Specifications:**

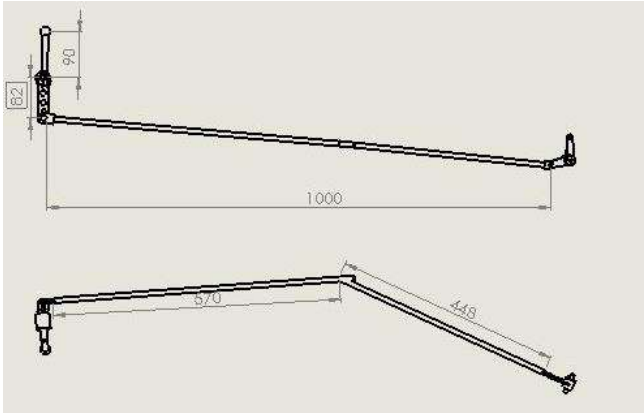

Fig.4: Drafted view of mechanical linkages

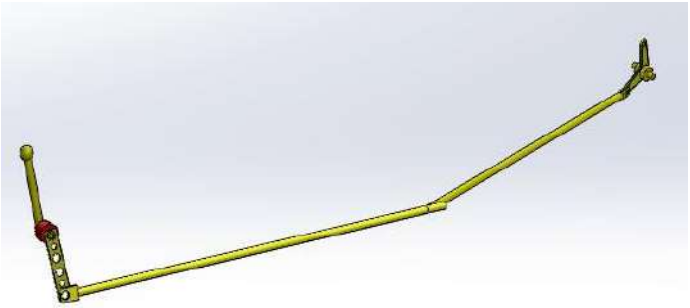

Fig.5: CAD model view

- **Selection of material:**

- Material: Mild Steel
- Properties: The selection of Mild steel for Mechanical linkages was based on the consideration of the strength and durability factor of mild steel. Also, welding can be done easily on the mild steel.

Parameter	Dimensions
Diameter of pipes	OD: 22 mm ID: 12 mm
Length of linkage pipes	800 mm
Bearing	SKF ID: 10
Hand lever length	100 mm
Bend plate	90 mm 50 mm
Shifter clamp hole	14 mm

3.3 Mechanical Gear Shifter Sub-Parts:

Fig. 6: Hand Lever

1. **Hand lever**: The hand lever is made of stainless steel with a circular ball grip for easy handling of driver. Its length is 150 mm from Circular ball top to the end of horizontal bar support.

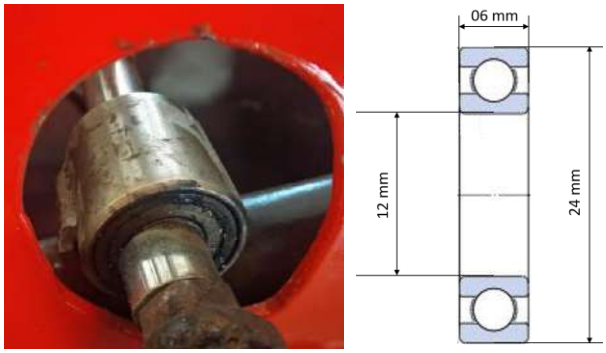

Fig. 7: Bearing with dimension

2. **Bearings: SKF 61901**
   ID: 12 mm, OD: 24 mm, Width: 06 mm
   Bearings are used in order to attained the sooth movement of hand lever for precise TO and FRO motion. Two bearings are used which would also act as supporting parts for horizontal bar.


Fig. 8: Bend Plate

3. **Bend plate:** Bend plate is also made of mild steel. Its main function is to connect and support the linkage pipe and shifting clamp. It is attached to the chassis from its bend point


Fig. 9: MS Pipes

4. **Pipes**: The pipes used are of mild steel for taking consideration of strength and durability Total length of used pipe with bent joint is 800 mm and the straight length from start point to end point is 1000 mm.


Fig. 10: Shifter clamp

5. **Shifter clamp**: It is also like bend plate connected to bend plate and the attached to the gear change shaft to the engine which change the gears as per the mechanism movement of up and down. It is also made of mild steel with 14 mm hole for gear change shaft

4. PROPOSED SOLUTION

As an alternative proposed solution for the push-pull mechanical hand lever system, an electromagnetic gear shifter will be feasible to overcome the mechanical gear shifting system and improve the driver performance resulting better overall performance in a race. As the system will design by taking consideration of FSAE racecar, as with button operated electromagnetic gear shifting mechanism, the driver would be able to actuate a shift with the help of button operation as Up-Down without removing his or her hand from the steering wheel, increasing control at every point in the race. As well, the amount of energy required by the driver to actuate the shift is minimized to reduce the fatigue of the driver during a race as compared to the current push-pull mechanical lever system being used.

This would ideally lead to faster shift times, a decrease in weight, and better performance overall. The system should be designed with increased performance, light weight, and reliability as the driving parameters. When finalized, it will allow the driver to actuate a shift almost instantaneously without losing any control of the car. The team has come across with some supportive features to be added that would make the project more proficient and would make both the vehicle and driver perform better such as adding gear control unit and gear display on dash for the driver's ease.

This leads to faster shift times, better performance overall and better driver control increasing the safety of the vehicle. The system will be designed with long term performance and easy transferability in mind so that it can be easily transferred to the next year's Formula SAE vehicle. The display system being used is to easily be read by the driver and it will inform them of which gear they are in. One of the fundament challenges for the SAE team is system reliability so it is a must need to ensure that new system is more efficient than current system the system will also be logging the location of the vehicle, the rpms, gear and time so that the driver can review this information later and improve upon their performance.

Fig.11: Electromagnetic Gear Shifter CAD Model

Fig.12: Electromagnetic Gear Shifter exploded view

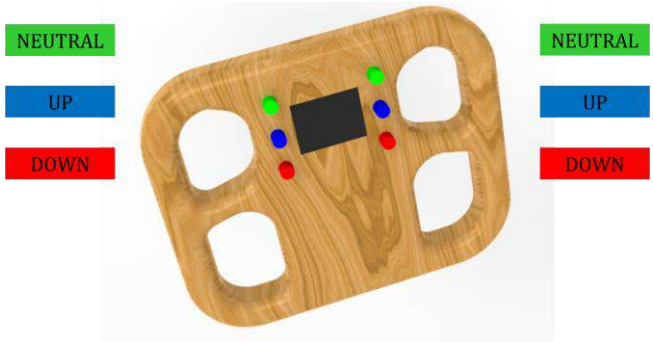

Fig.13: Buttons Position on steering wheel

5. EXPECTED OUTCOMES

The new gear shifting system should be more reliable and efficient in every aspect compare to the mechanical lever system.

- It will reduce time delay in Gear Shifting
- Less than - Up 0.64 millisecond, Down 0.64 millisecond
- The application of electro-magnetic coil produces smooth operation.
- It reduces the efforts of drivers as it is button operated which also make it easier to shift the gears
- It eliminates the long mechanical linkages and hand lever
- This allows the driver to keep both hands on the steering wheel and may reduce the amount of time required for shifting by an order of magnitude. This will be a safer, quicker vehicle.

6. LITERATURE SURVEY

6.1. Study of Button Operated Gear Shifting System

Gear shifting mechanism plays an vital role in vehicle performance and it can be improved by using button operated gear sifting system. The advance technique in gear shifting mechanism leads to flexibility and easiness for human. Button operated gear shifting mechanism is more significant for physically handicapped users. This system gives more benefits and reduces time delay in gear shifting

6.2. Button Operated Gear Shifter in Two-Wheeler using Stepper Motor

The main objective of this paper is used to bring automation in gear shifter of two wheelers using stepper motor. This is the new innovative model mainly used for the vehicles to control the vehicle. Here we are concentrating to design the automatic gear changing mechanism in two-wheeler vehicles by using the components like gear box, stepper motor, battery, electronic switch etc. This is very useful and unique method for the gear changing mechanism in two-wheeler vehicles. By using this we can easily control the bike through button which will give instruction to stepper motor through programming we going to achieve to control motion i.e. Clockwise or anticlockwise by some specific angle.

6.3 Design and fabrication of button operated electromagnetic gear changer for four stroke petrol engines two-wheeler vehicle

A rotational output of an internal combustion engine is connected to drive wheels of the automobile and a load device. when a gear shifting up of an automobile transmission is to affected. the load applied by the load device is increased, or the load connected to an output rotation shaft of the engine via selectivity device.

6.4 FSAE Electronic Shifter

The Formula SAE Team's current vehicle uses mechanical linkage to allow the driver to change gears. This configuration requires that the driver remove one hand from the steering wheel to move the shift lever, which has the following drawbacks: If shifting in the middle of a corner, the driver will only have one hand on the steering wheel, reducing the amount of control they have of the vehicle. The time required to change gears is currently on the order of second

6.5 Formula-SAE Shift System and Controls

This Paper consist with the prizes and availability as well as the parts used in Gear shifting mechanism. These parts are used to make ease of application of shifter. This Button operated gear shifting mechanism is very flexible due to its reaction time. This system having quick response due to its simple mechanism and it is comfortable for physically handicapped people and also from women's point of view. Due to its simple mechanism and quick response it has very good performance in gear shifting. It is very easier to operate over feet operated gear shifting

6.6 Paddle Shifter

The goal of this project was to install a paddle shifting system to address these issues and eliminate the detriment of the push-pull system to overall performance in a race. With paddle shifting, the driver would be able to actuate a shift without removing his or her hand from the wheel, increasing control at every point in the race. As well, the amount of force required by the driver to actuate the shift is minimized to reduce the strain of a race. This would ideally lead to faster shift times, a decrease in weight, and reduction in part numbers by removing the long cable. The system is designed with increased performance, lighter weight, and simplicity as the driving parameters. When finalized, it would allow the driver to actuate a shift almost instantaneously without losing any control of the car

6.7 Design of Electrical Gear Shifter for Formula Student Racing Car

The purpose of this project was to devise an improved solenoid gear shifter as a part of University of Glasgow Racing (UGR) team for its entry into Formula Student competition. Formula Student is currently being run by The Institute of Mechanical Engineers and every year Formula Student Competition is held in UK where students from various universities across the globe participate and compete with other in teams to build a single seat student racing car which they race at Silverstone Racing Track. Team UGR presently employs the engine of KTM 450 SX-F 2007 in its student formula car for this year

6.8 Formula SAE Paddle Shift System

The goal of this project is to design and implement an electronic paddle shift system to address these issues and eliminate the detriment of the push-pull system to overall performance in a race. With paddle shifting, the driver would be able to actuate a shift without removing his or her hand from the steering wheel, increasing control at every point in the race. As well, the amount of energy required by the driver to actuate the shift is minimized to reduce the fatigue of the driver during a race. This would ideally lead to faster shift times, a decrease in weight, and better performance overall. The system will be designed with increased performance, light weight, and reliability as the driving parameters. When finalized, it will allow the driver to actuate a shift almost instantaneously without losing any control of the car

6.9 Formula SAE Paddle Shift System

The formula SAE paddle shift system is a system design to be implemented on the UCF SAE formula race car that consists of other subsystems such as the GPS, gear position sensor, and data logger. The purpose of this system to assist the driver of the vehicle in performing better on the track by getting rid of the older stick shift system and replacing it with the paddle shifters for faster shifting. This project uses principles of control systems, electric circuitry, and computer programming in order to achieve the project goals.

7. CONCLUSION

The current mechanical gear shifting system does not gives the appropriate results, needed for better dynamic performance, although the beginner FSAE teams prefer the mechanical Hand lever gear shifting system, as it is simple in design and operation as well. But still the system does not fill the performative incapability of it which affect the driver

performance. To overcome the problems like time delays, linkage failure, driver performance, an alternate system will be proposed for gear shifting.

An electromagnetic Gear shifter will be suitable for performing the gear shifting along with button operated system on steering wheel. As it works on electromagnetic principle the application of electro-magnetic coil produces smooth operation. This Button operated gear shifting mechanism will be very flexible due to its reaction time. This system having quick response due to its simple mechanism and it is comfortable for physically handicapped people and also from women's point of view. Due to its simple mechanism and quick response it has very good performance in gear shifting. This button operated electro-magnetic gear shifting design can be modified and developed according to the applications.

However, the project still in development stage so, only limited work has been done and published on electromagnetic gear shifter, with the previous design, problem identification and the feasible solution over it. Therefore, the present study was undertaken to develop an appropriate gear shifting system using electromagnetic actuator.

8. ACKNOWLEDGEMENT

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A Survey of Smart Lawn Shaper

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Abstract: This review paper on smart lawn shaper summarizes and reviews technological development of grass cutter. Various developments in the grass cutter machines and their performance is reviewed in this paper. In survey we found various types of grass cutters based on different technologies like internal combustion engine, electric and solar etc. So we discuss in detail about the lawn shaper which uses the renewable source of energy for its operation like solar energy. This lawn shaper can overcome the problems like pollutions, power cut etc. This smart lawn shaper is mainly used to cut the grass in a lawn.

Keywords — lawn mower, Lawn Shaper, solar power, ultrasonic sensors

I. INTRODUCTION

In the past and even today also grass cutting is done by humans. This method of manual cutting is time consuming; also inaccuracy in cutting level was observed in this method and lots of labour charges needed for simple grass cutting work. Fuel based cutters are used to overcome these problems but it increases noise & air pollution. Now a day's most of the activities which included human efforts are either replaced or automated using machines or other kinds of equipment. Skilled persons are required for conventional grass cutter. Now we have a need to depend on the technology. With this kind of cutter skilled persons are not required as well as we can reduce the noise & air pollution at our level.

Smart Lawn Shaper is a device which is cutting the grass on its own. This device reduces both environment and noise pollution. It can be made with the help of Motors, robotic body, ultrasonic sensors and high quality solar panels. This are interfaced to an Atmega328P microcontroller. It is a Smart grass cutting vehicle powered by solar energy. It is designed such that it can sense the obstacles automatically. The system uses 12V batteries to power the device. A Solar Panel is used to charge batteries. With the help of solar power 12V DC motor runs, we are using a BLDC motor for Blades. Sharp edged Stainless Steel Blades are used for cutting purpose.

An Atmega328P controller is used as the brain of the system. The grass cutter motors and the wheel motors are interfaced to the Atmega328P microcontroller that controls the working of all the motors. Detection of objects or obstacles is a very important factor for safety of the machine as well as human safety. On detection of object or obstacle a pre-programmed action is taken by the controller as per the conditions sensed by the sensor.

The objective of this work includes,

- To reduce labour input & labour charges
- To reduce cost, time of cutting and also to beautify the environment.
- To reduce noise & pollution

. There are primarily two types of mowers, namely (i) the reel mowers, and (ii) the rotary mowers Today, the recent innovation is the rotary mower. Research have showed that the rotary lawn mowers are more effective than the reel mowers because of its clean mowing and provision for collecting grass.

II. LITERATURE REVIEW

The first lawn mower was invented by Edwin Budding in 1830. Bedding's mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830[1].

1869 with a mower called the Climax was introduced by Bates. This machine was a major innovation - the land roller was removed and replaced by two land wheels. Placed on the outside of the side-frames. A gear inside the land wheel drove the cutting cylinder and the machine had fewer parts and was much lighter and cheap in costs. It was shown at the International Exhibition of 1862 along with Shanks, Ferrabee and Green. (Hall and Duck Trust et al., 2011).

Motorized mowers appeared in late 1890. Gasoline powered lawn mowers were first, manufactured in 1914 by Ideal Power [1].

1920's and 1930's Electric powered mowers and rotary cutting machines were introduced.

In electrical grass cutter used a single phase induction motor so it is required AC power. This cutter has supply through long wires so it is difficult to operate. Also the weight of the device is more due single phase induction motor so it is more difficult to operate.

This can be solved by designing a solar power based fully automated solar grass cutter which is capable of mowing a lawn by itself [2] [3][4].

In order to improve its efficiency and automate the process of grass cutting various new technologies such as remote operated lawnmowers arrived. In remote operated lawnmowers the range of grass cutting equipment is limited as the signal strength is very weak and also the equipment required for these lawnmowers is sophisticated and expensive. To overcome these limitations remote controlled lawn mower is incorporated with a mobile phone which acts as a link between user and grass cutter [5].
Cutting grass by machine reduces human efforts. Also great portion of farmland can easily cut or brushed with lawn mower in one day. From literature survey we came to know about different models of grass cutting machine.

Types of Lawn Movers-

1. The Original Push Reel Mower

This is a traditional push lawn mower that was invented in 1830. Push reel mowers are simple machine. Push reel mower is easy and safe to use. You can see their blades and it stops cutting when you stop pushing. Moreover, it is quite to use as it does not use engine to operate. Push reel mowers, however, have limited cutting ability and is not suitable to large and uneven lawns.

2. Cylinder Lawn Mowers

Cylinder lawn mowers are often called Reel Lawn mowers. It carries a fixed, horizontal cutting blade at the desired height of cut. The cylinder lawnmower operates with a spinning reel of six to twelve blades which are welded into a single reel configuration, the spinning reel spins across the top of the grass trapping the leaves between it and the stationary bottom blade - which is also called a sheer blade. The effect is exactly like that of a pair of scissors whose blades swish past each other to perform the clean cutting action, like that seen on a bowling green. Both reel blades and bottom blades need to be kept sharp to ensure the maximum quality of cut.

3. Rotary lawn mowers

A rotary mower rotates about a vertical axis having one very high speed rotating blade underneath. The blade 'chops' the grass on impact due to its very high speed. This tends to result in a rougher cut and bruises and shreds the grass leaf resulting in discolouration of the leaf ends as the shredded portion dies.

Most rotary mowers have the grass box behind with a few having an integral grass box. These mowers work best on a medium to high cut.

4. Gasoline lawn movers

Most rotary push mowers are powered by internal combustion engines. Such engines are usually four-stroke engines, used for their greater torque and cleaner combustion, running on gasoline (petrol) or other liquid fuels. Gasoline mowers have the advantages over electric mowers of greater power and distance range. They do create a significant amount of pollution due to the combustion in the engine, and their engines require periodic maintenance such as cleaning or replacement of the spark plug and air filter, and changing the engine oil

5. Electricity Lawn Movers

Electric mowers are further subdivided into corded and cordless electric models. Both are relatively quiet, typically producing less than 75 decibels, while a gasoline lawn mower can be 95 decibels or more.

5.1 Corded electric mowers are limited in range by their trailing power cord, which may limit their use with lawns extending outward more than 100–150 feet (30–45 m) from the nearest available power outlet. There is the additional hazard with these machines of accidentally mowing over the power cable, which stops the mower and may put users at risk of receiving a dangerous electric shock.

5.2 Cordless electric mowers are powered by a variable number (typically 1–4) of 12-volt, 56-volt, and 80-volt rechargeable batteries.

6. Robot Lawn Movers

Robotic mowers can mow the lawn unsupervised. Simply turn it on and let it wander around the lawn cutting the grasses. It is contained by a border wire around the lawn that defines the area to be mowed. The robot uses this wire to locate the boundary of the area to be trimmed and in some cases to locate a recharging dock.

III. PROPOSED MODEL

Considering the Literature survey we discuss "Solar powered automatic lawn shaper" model. Following block diagram gives the idea about it

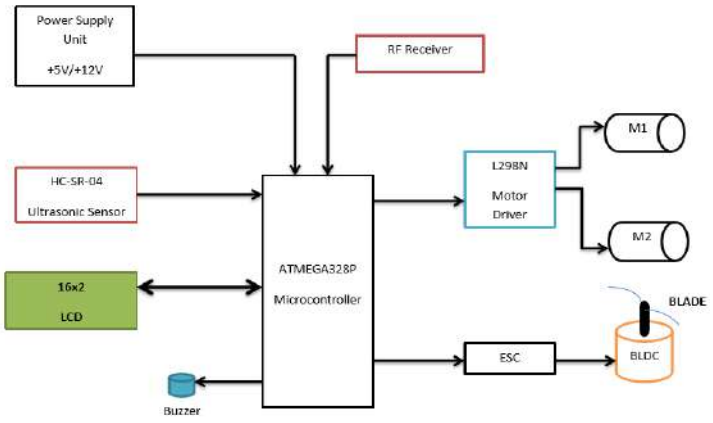

Figure1: Block Diagram

The solar panels of smart lawn shaper are mounted in such a way that it can receive solar radiation with high intensity from the sun. This electrical energy is stored in batteries by using a solar charger.
The main function of the solar charger is to increase the current from the panels while batteries are charging. It also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging of batteries is low.
The motor is connected through the motor driver IC. The power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass at an even height. The cutter and vehicle motor are controlled by Atmega328P microcontroller.
To avoid and protect the device from any human interaction or any large and/or small obstacles the ultrasonic sensor is used. The sensor is sensed in some maximum distance for

example 1m, 2m, etc it depends on which type sensors are used.

IV. CONCLUSION

While taking an review on Grass cutter we found that from cutting the grass manually to the cutting grass using automatic cutter's, Technology has changed. The way of cutting has been changed. Also from using manual power we have come forward to use the power generated by the motor's and the solar panel's. The solar powered lawn mower is better than that powered by internal combustion engines, because it eliminates environmental pollution. Also Solar lawn mower can be used in rural areas where there is no electricity.

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Vaishnavi Bachat Gat

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Abstract: In day-to-day life, we will need to buy lots of goods or products from a shop. It may be food items, electronic items , household items etc. Now a days it is really hard to get some time to go out and get them by ourselves due to busy lifestyle and lots of works .In order to solve this e-commerce websites has been started. Using these websites and web applications, we can buy goods and products online just by visiting website and ordering the item online by making payments online. Some women's saving funds make garments, food items . In order to sale their product and publish their products an web application is needed. In this project" Vaishnavi Bachat Gat " the web application is to be built in order to publish their products and sale them online through this ecommerce website. Products can be made available on website and online shopping of these products to be done. This web application will find different products made by them that will depict online shopping of that product and purchasing using online payment. It will maintain easy maintaining and purchasing products on website for administrator. It will improve efficiency of their services.

Keywords — products, registration, placing orders, cart, payment gateway

I. INTRODUCTION

This Project is aimed at developing a web application that depicts online shopping of products made by women's saving funds team and purchasing using online payment .Using this website, the "Vaishnavi Bachat Gat" can improve the efficiency of their services. Online shopping is one of the applications to improve the marketing of bachat gat's products. This web application will involve all the features of online shopping.

This software will help customer to find different products, their features, and new updates easily. The customers will register first. Products will be shop through this website by adding it to cart, placing orders , keeping records of orders, online payment of products can be done. Admin will have to manage products stock, price of products discounts, etc. through registered account. The software will help in easy maintaining and updating products in the website for the administrator. Also ,quick and easy of comparison of different products in the website for the customers through different filters.

This will reduce manual operations requires to maintain all records of booking information and also generate various reports and analysis. Main concept is to maintain customer records and enter transaction reports. Hence, software can be used in any bachat gat to maintain their record easily and efficient selling of their products.

II. LITERATURE REVIEW

1] E-commerce means electronic commerce. It means dealing in goods and services through the electronic media and internet. E-commerce involves carrying on a business with the help of the internet and by using the information technology like Electronic Data Interchange (EDI). E-Commerce relates to a website of the vendor on the Internet, who trades products or services directly to the customer from the portal. The portal uses a digital shopping cart or digital shopping basket system and allows payment through credit card, debit card or EFT (Electronic fund transfer) payments.

2] The customers who are going for online shopping are very much concerned about the important things for online shoping.31.28% people gives importance to security for online shopping,27.37% people gives importance to privacy for online shopping,12.29% people gives importance to trust for online shopping and 29.05% people gives importance to all of the above for online shopping.
3] The main benefit from the customers' point of view is significant increase and saves of time and eases access from anywhere in the globe. Customer can place a purchase order at any time. The main benefits of ecommerce for customers are as follows: Reduced transaction costs for participating exchange in a market.Increased comfort - transactions can be made 24 hours a day, without requiring the physical interaction with the business organization. Time saving-Customer can buy or sell any product at any time with the help of internet.Quick and continuous access to information-Customer will have easier to access information
4] Some internet portals provide almost all categories of goods and services in a single site; they are targeting customers of every possible product or service. Indian E-Commerce portals provide goods and services in a variety of categories like apparel and accessories for men and women, health and beauty products, books and magazines, computers and peripherals, vehicles, collectibles, software, consumer electronics, household appliances, jewelry, audio/video entertainment goods, gift articles, real estate and services, business and opportunities, employment, travel tickets, matrimony etc. Examples: www.indiayplaza.com, www.thebestofindia.com, www.khoj.com, www.sify.com, www.rediff.com, www.indiatimes.com etc.
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III. PROBLEM DEFINITION

In the existing technology, Bachat gats do not have a chance to publish their products at different places due economic reasons. Manual record keeping is used for keeping customer data but proposed system is more secure and unique form of filters to be added for users to get different products of bachat gat available for them. To develop Web application to publish and introduce online shopping for products made by "Vaishnavi Bachat Gat" and improve the efficiency of their services.

IV. PROPOSED WORK

1. System Architecture:

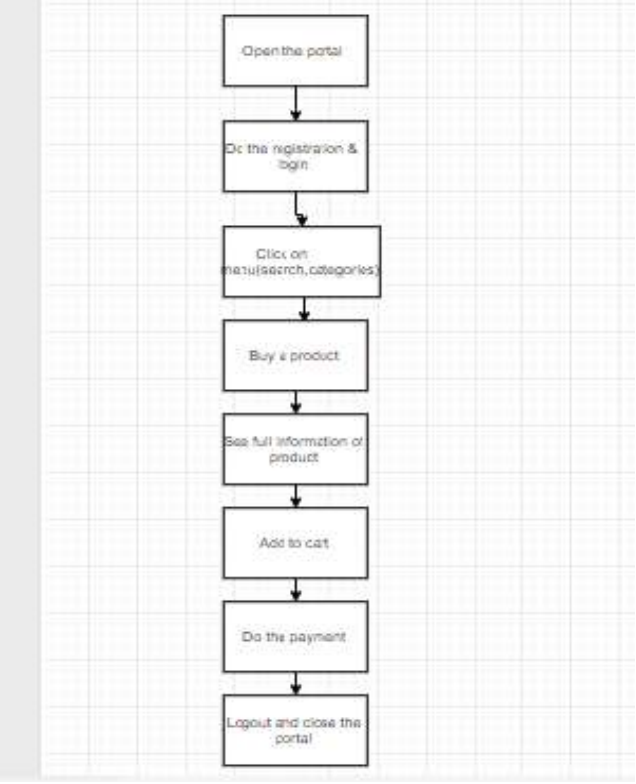
In this system we are implementing sign up page for customers where they will be registered and then they will have a login id and password available for them. They will shop products through this website by adding it to cart, placing orders , keeping records of orders, online payment of products can be done. Admin will have to manage products stock, price of products discounts, etc. through registered account. The website will help in easy maintaining and updating products in the website for the administrator. Thus, quick and easy of comparison of different products in the website for the customers.

1.1 Advantage and Disadvantages:

Advantages:

- User can search for required different categories of products.
- User can give his/her review about product shipping or about product.
- Admin can give reply to those reviews easily.
- Unauthorized user cannot order product first it need to be registered and then can create account for shopping.
- This System gives an automated output from resulting algorithm.
- Simple to use.
- Updates products and their prices.

1.2 Block Diagram:



V. PROPOSED METHODOLOGY

Login Module:

Customer will first go to sign up page and will do the registeration and then login id and password will be provided by data taken from customer while signup.

Orders Module:

When a customer goes through checkout, the information on their order is automatically transferred to the Orders section for keeping track of. In administration we can view all the orders made on site. The orders ever made are stored in detail with order information.

Customer Module:

Bachat gat owners should know who their customers are and how to manage their information. Customer information should be stored efficiently to remember any transactions made with their account.

Categories Module:

Parent Categories are listed on top menu of homepage. This navigational feature is to guide customers to find similar products within the same category let the customer compare similarities and differences among products. When adding product to store the category of product will be asked to admin.

Profiles Module:

Profiles are new features where they provides to set up recurring payments for customer. Profiles are useful to plan to sell products by subscription, if we are promoting discount and offers etc. This gives admin the more control over customers how they are to be charged for products.

Flow Charts:

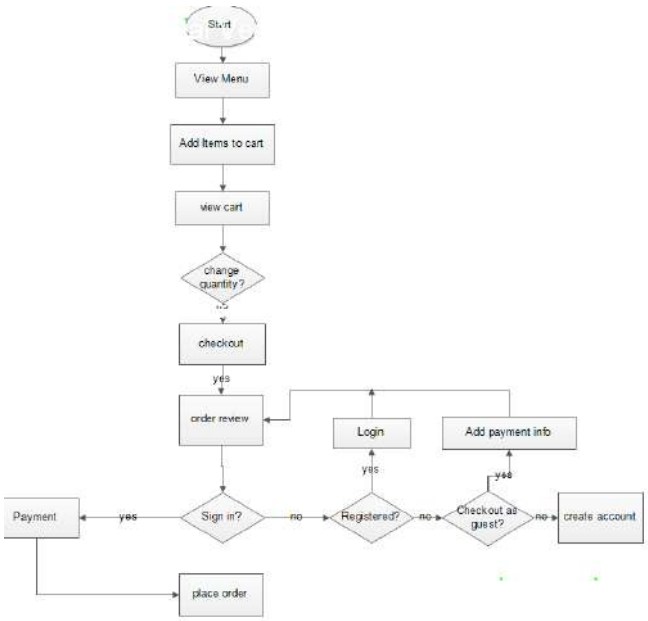


Fig. flowchart for checkout process

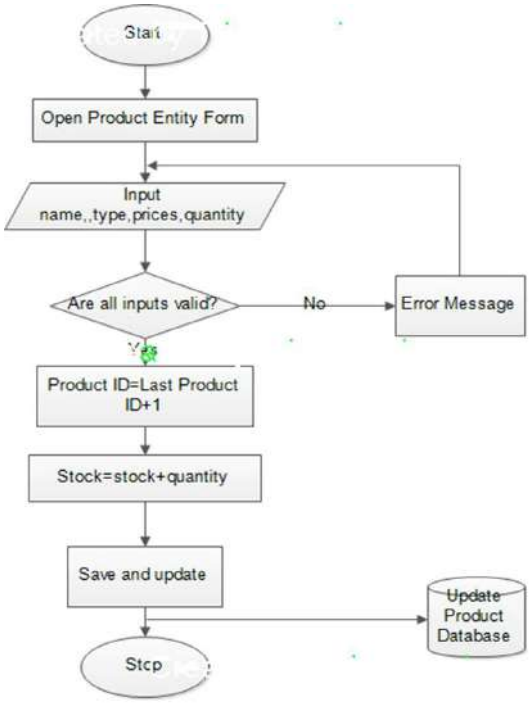


Fig. Flow chart for adding new products

VI. SCOPE IN THE FUTURE

To develop software that can be used to store more no. of data about customers and to easily contact them so it can reduce the manual work and also provide the platform for publishing bachat gat products.

VII. CONCLUSION

In existing system, the "Vaishnavi Bachat Gat " were having their own traditional way of publishing their products but through this project we are introducing online shopping website for them. So, that they can publish their different types of products through this site and increase their clients .This project would be very useful to them for selling their product of different categories using filters and also publishing their Bachat gat products wherever they want.

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Virtual College Campus Walkthrough

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Abstract: Virtual Campus walkthrough is 3-D view of the college campus that provides information which allows students to access the college campus online. The Campus can be explored interactively on a personal computer, usually by manipulating keys or the mouse so that the content of the image moves in some direction or zooms in or out. More sophisticated efforts involve such approaches as wrap-around display screens, actual rooms augmented with wearable computers, and haptic devices that let you feel the display images. This system is used to explore the College and it reduces the time, money etc. This system is just like game but in game we can play and win. In this system we know more things of each place in college by rendering in this system. The structure of the college in reality and in our system is approximately same so people can easily recognize it. People who are handicapped or cannot reach and see College can easily explore all the places in it on their personal computer by rendering through mouse and keyboard. They also can explore it by using VR device. They can feel that they are present at the college. It is so interesting that everyone can use it and enjoy it.

***Keywords- virtual reality, walk-through, computer, graphics, rendering, interfaces*.**

I. INTRODUCTION

Virtual environments are becoming more and more popular and can be used for various purposes. Their best-known use may be computer games but there are many more applications for them such as for training, learning and planning. A virtual campus Walk-through is an artificial environment that is created with the unity 3D software and present to the user in such a way that the user suspends belief and accepts it as a real College and explore it. On, a computer, the campus walk-through is primarily experienced through two of the five senses: sight and sound.

The virtual reality is a 3-D image that can be explored interactively at a personal computer, usually by manipulating keys or the mouse so that the content of the image moves in some direction or zooms in or out. More sophisticated efforts involve such approaches as wrap-around display screens, actual rooms augmented with wearable computers, and haptic devices that let you feel the display images.

II. LITERATURE REVIEW

There have been studies proved that world is digitally updating and virtual reality is contributing in it.
In [1] Author has shown operation of Unity 3D to blend fundamental object models and create a three-dimensional view for the object constructed during modelling.
In [2] Author has shown interaction technique for walkthrough in virtual 3D spaces to create 3D paths.
In [3] Author has shown Building a 3D Interactive Walkthrough in a Digital Storytelling Classroom Experience and the idea of storytelling in a virtual classroom emerged with surround sound with an audio.

III. SYSTEM DESIGN

The objective of the project is to design a 3D model of College where people can explore the college without investing their money, time or effort easily can visit this place. To develop a virtual campus walkthrough of college which can be made available on official website of college that can reduce physical efforts of user.

Virtual Reality (VR) technology is an advanced human computer interface. Virtual college campus walkthrough is a relatively large-scale three-dimensional scene. It shows view of the college through the desktop system. Virtual walkthrough gives professional feel and look. Improves college popularity for example if anyone wants to take an admission in a college and if he/she wants to know about the college campus and all the related stuff then it can be done by going to the college website and having a virtual view of the college using virtual kit, which will give an amazing experience to the user and by sitting at one place the user can view the college premises.

Virtual walkthrough provides a unique way to introduce a college campus. Based on the information collected about the campus, modeling will be done of the gathered parameters so that the user could feel the environment while walking through the campus. Texture mapping is a method for defining high frequency detail, surface texture, or color information on a computer-generated graphic or 3D. model. So, whatever modeling we will have done so far will go through texture mapping in order to provide a realistic view of the environment to the user. All individual modeling will be combined together to build the system as a whole. Optimizing means increasing the efficiency and making the best and effective use. Optimization implies manage intentional change and continuous improvement. By using

the keyboard, the user can walk through the campus or the user can also have virtual reality view of the campus.

Fig 1. Shows the block diagram of the System Architecture of the above described design whose use-case is shown in Fig. 2.

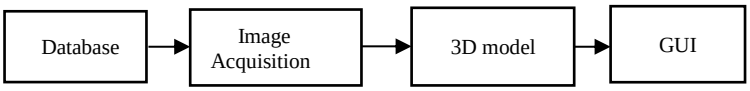

Fig 1. System Architecture block diagram

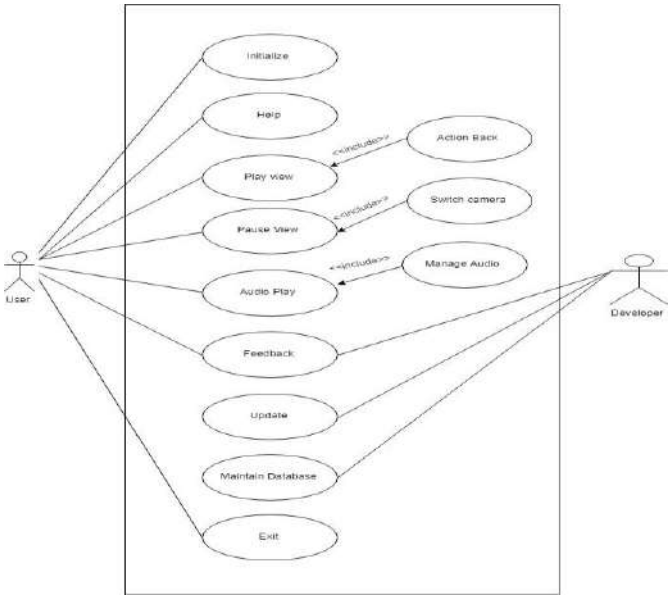

Fig 2. Use case diagram

IV. DEVELOPMENT

A. Image stitching

[4] Image stitching is combining of multiple images with overlapping fields of view so that, they become an image of a single scenario [5] Quality of stitching is determined on the basis of how similar it seems to be with the input images and how continuous or seamless it is. Various techniques have been created by the researchers to create continuous images. If pictures are taken in arbitrary order, automatic stitching methods are available to create them for you.

B. Raytracing Algorithm

[6] POV-Ray is a freeware which takes input as a text file with the scene described in a script language known as POV-Ray scene description language (SDL) and creates three-dimensional images. POV-Ray makes it hard to use them for computational purposes as it does not describe the surfaces of the objects they generate very well. Rather than trying to solve the problem of data translation, we propose to apply the fictitious domain method in the numerical solution. We explain what the difficulties are and give some solutions with an illustration of a finite element computation for a three-dimensional acoustic scattering problem. Bishop3D is an interactive modeler and animation tool designed and built to work with POV-Ray.

The basic idea of raytracing is to "shoot" rays from the camera towards the scene and see what does the ray hit. If the ray hits the surface of an object, then lighting calculations are performed in order to get the color of the surface at that place.

The following figure shows this graphically:

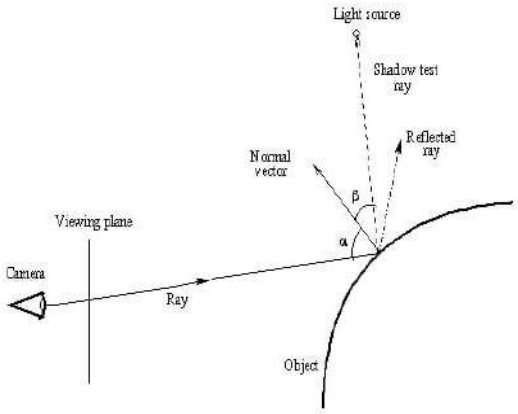

Fig 3. The basic raytracing algorithm [7]

First a ray is "shot" in a specified direction to see if there is something there. As this is solved mathematically, we need to know the mathematical representation of the ray and the objects in the scene so that we can calculate where does the ray intersect the objects. Once we get all the intersection points, we choose the closest one.

After this we have to calculate the lighting (illumination) of the object at the intersection point. In the most basic lighting model (as the one used in the script) there are three main things that affect the lighting of the surface:

1. The shadow test ray, which determines whether a light source illuminates the intersection point or not.
2. The normal vector, which is a vector perpendicular (i.e. at 90 degrees) to the object surface at the intersection point. It determines the diffuse component of the lighting as well as the direction of the reflected ray (in conjunction with the incoming ray; that is, the angle alpha determines the direction of the reflected ray).
3. The reflected ray, which determines the specular component of the lighting and of course the color of the reflection (if the object is reflective).

V. CONCLUSION

Virtual college campus Walk-through provides a user-friendly environment for those people who want to explore or cannot afford to travel to the college from outside the state. This System enables the users to provide all the information and experience about College without visiting there. Virtual college campus Walk-through guarantees to save users time, money and giving the real experience without being at the college. Through the creation of a virtual campus the user can walk through the campus by sitting at one place in reality. Virtual college campus Walk-through easily run in the personal computer and by using mouse and keyboard user can render here and there easily.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude towards our staff at RMCET, Ambav, for the help, guidance and encouragement, they provided during the Project. This work would have not been possible without their valuable time, patience and motivation. We take the privilege to express our sincere thanks to Dr. Bhagwat M.M., our Principal for providing the encouragement and much support throughout our work.

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Survey paper on: Smart Car Parking System using IoT & Cloud Technology

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Abstract: In today's world, number of vehicles are constantly facing problem of car parking in urban and semi urban cities. This leads to traffic congestion and also pollution. So there is need to propose a smart parking system which will reduce problem of parking vehicle and manual work as well. This system will assign exact slot to the car driver to park a car. This survey paper proposes the concept of Internet of Things (IoT) to sense the presence & movement of vehicle in parking area. A mobile application is also provided that allows car driver to check the availability of parking space and to book a parking slot accordingly. This mobile application is connected to the cloud, as cloud provides high storage capacity and computation power. This will offer car drivers a hassle-free and quick car parking experience.

Keywords - Internet of Things (IoT), Cloud, Smart Parking.

I. INTRODUCTION

One of the key issues that smart cities are facing is car parking facilities and traffic management systems. In present day, it is difficult for drivers to find an appropriate parking space, and it tends to even harder for increasing number of private car users. This situation pushes to develop one efficient system to tackle with the vehicle parking problem. Smart parking system will enhance the efficiency of using parking resources which leads to reduction in searching times and traffic congestion. Problems concerning to parking and traffic congestion can be solved if the drivers informed in advance about the availability of parking spaces at and around their intended destination. The proposed system takes advantage of popular concepts i.e. Internet of Things (IoT) and Cloud computing.

The concept of Internet of Things (IoT) deals with Internet, physical object and sensors. It starts with identifying communication devices. The devices could be tracked, controlled or monitored by using remote computers which are connected through Internet. The two major words in IoT are "internet" and "things". Internet means a wide global network which provides communication between end users via connected servers, computers, tablets and mobiles with the use of various communication protocols. Generally, 'Thing' is a term used for physical object, an action or idea, situation or activity. IoT provides a vision where things (wearable, watch, alarm clock, home devices, surrounding objects, etc.) become smart and behave lively through sensing, computing and communicating by embedded small devices. These devices interact with remote objects or persons through internet connectivity.

The proposed smart parking system is implemented using a mobile application which is connected to the cloud. System helps a user to know the availability of parking spaces on a real time basis. It requires cloud and IoT integration.

Cloud computing and IoT have large evolution. Both the technologies have their own advantages as well as mutual advantages from their integration. As we know IoT deals with its technological constraints such as storage, processing where as Cloud deals with real world entities in a more distributed and dynamic way by the use of IoT.

Following are some factors which force us to integrate cloud & IoT [1]:

1. Computation power:

The devices being used under IoT contains limited processing capabilities. Data collected from various sensors are getting transmitted to more powerful nodes where its processing can be done. With the help of cloud computing, IoT systems can perform real-time processing of data which in terns facilitate highly responsive applications.

2. Storage capacity:

IoT produces large amounts of non-structured or semi-structured data which requires to be collected, accessed, processed, visualized and shared. Cloud has unlimited, low-cost, and on-demand storage capacity, which provides most cost effective solution to deal with data generated by IoT.

Through APIs, the stored data on the Cloud can be accessed and visualized from anywhere, anytime.

3. Communication resources:

IP-enabled devices communication through dedicated set of hardware is the basic functionality of IoT, where as cloud recommend cheap and effective ways of connecting, tracking, and managing devices from anywhere over the internet.

4. Interoperability:

IoT promotes the use of heterogeneous devices which results in compatibility issues. Cloud helps in addressing this problem as it provides a common platform where various devices can connect, interact and share information with each other.

II. LITERATURE REVIEW

With the increasing numbers of vehicles, traffic and pollution, it is required to have smart and efficient system for parking vehicles. This can be achieved with the integration of IoT and cloud computing technology. As

these technologies promotes high computation power, efficient storage, scalability, and uninterrupted communication for the heterogeneous devices [1][2]. The rapid technological development of Wireless Sensor Networks (WSNs) is a key for IoT across a range of applications, including parking management [2][7]. This system can detect and transmit parking spot statuses (occupied or idle) to a database. This information can be accessed by users through website or mobile app (application) to receive real-time updates [2][7]. Raspberry pi based parking sensor contains pi-camera to detect the empty parking spaces and it sends the data to server, and this stored data is accessed by users[3]. Participatory sensing paradigm is another way to find, monitor and regulate parking where volunteers collect and share information from their local environment using smart-devices [4]. RFID is most popular technology to avoid the human intervention which minimizes the cost[5]. RFID reader is a sensor that reads the RFID tag and authenticates the user information. The user has to register first to get the service from the smart parking system which in terns provide RFID tag to the user which contains a unique number[6]. Then mobile application helps the user to book the appropriate car slot. Another replacement for mobile application is to send SMS (Short Message Service)[8].

Through all this survey, better solution is found for efficient car parking system is to use IoT & Cloud technology with android based mobile application.

III. Problem Statement

To build smart car parking system in terms of mobile application which will provide hassle-free and quick car parking experience to user. This can be achieved with the help of emerging technologies like Internet of Things (IoT) and Cloud computing.

IV. Proposed System

A. *System Architecture:*

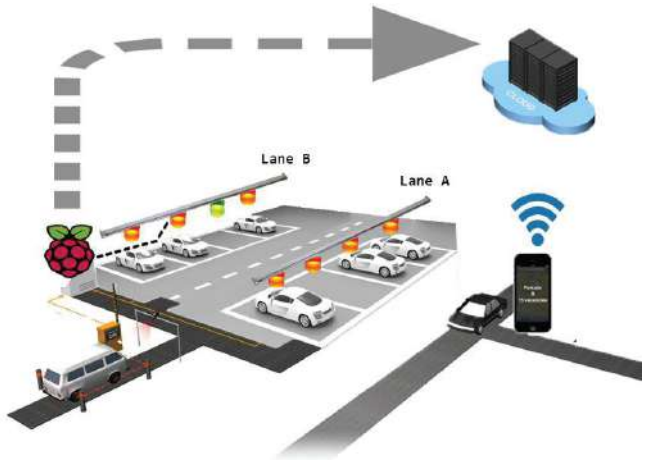

Figure 1. System Architecture of Smart Car Parking System

The above figure indicates working of smart parking system. This system mainly consists of following heads:

1. Cloud:

Cloud works as a database to store all the records related to parking areas and end users that have access to the system. It keeps a track of every user information such as time at which the car was parked, duration of car parking, amount paid by the user and mode of payment. As the cloud has capacity to store large amount data, it permits the system to store many records efficiently. Another feature that cloud offers is, continuous backup, which will helps to take easy and quick recovery of data in case of system failure.

2. Sensors:

The role of sensors is to sense the parking area and determine whether a parking slot is vacant or not. In proposed system Passive Infrared (PIR) and Ultrasonic Sensors are recommended as it detects the presence of a car and provide access to the WiFi network.

3. Mobile application:

The mobile application works as an interface between an end user and system. The application is connected with the server through a secure channel and authorization mechanism. The purpose of this mobile application is to provide information of availability of parking spaces and to book a slot accordingly. End user can check for the vacant slot, put the duration of car parking and pays through this mobile application.

B. *Work Flow:*

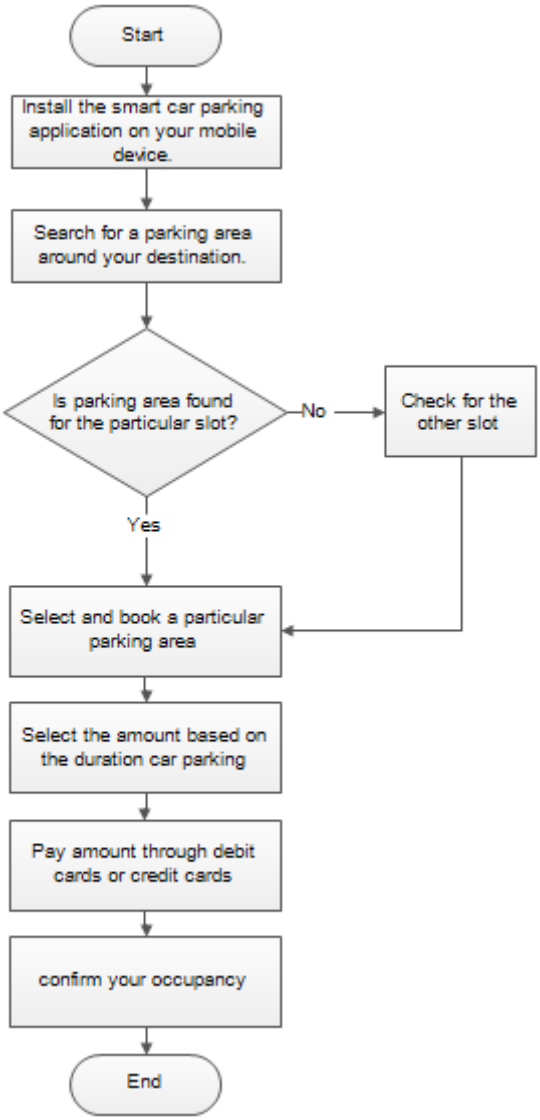

Figure 2. Flowchart of system

The above figure depicts work flow of system.

Step 1: User (car owner/ driver) has to install the smart car parking application on their mobile device.
Step 2: User can search for a parking area around their destination through the mobile application
Step 3: They can check for the various parking slots available in that parking area. If one slot is full, then they can check for another slot where they can park their car.
Step 4: Select and book a particular parking area.
Step 5: Select the amount based on the duration for which they would like to park their car.
Step 6: Pay amount through debit cards or credit cards.
Step 7: Once the car successfully parked in selected parking slot, user has to confirm the occupancy.

V. CONCLUSION

With increasing number of vehicles, every car owner/ driver faces the problem of parking cars in usual areas. This survey paper addresses the issue of car parking by providing a mobile application to the user. This application uses Internet of Things (IoT) and Cloud technologies for car parking and traffic management. This system will provide real time information regarding availability of parking slots in a parking area. Users from any remote locations can book a parking slot for them through this application. This will reduces time and manual efforts.

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"REVIEW PAPER ON - WEB CONTROLLED ARM ROBOT"

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Abstract When we talk about robots, people tend to think that robots are only suitable to use in the industry However, the main function of robots are to help humans in doing work either in the industries or just helping out doing normal household chores. This research paper aims to develop a web controlled arm robot and purpose of it to show that robots not only restricted to industrial usage only but also suitable for household usage. The movement of the arm robot can be controlled by a computer or mobile via the web. Robot is controlled by arduino Uno that interfaced with the internet using arduino Wi-Fi Shield. This user friendly robot is expected to bridge the gap between robot and household chores also robot is expected to perform operation such as picking and placing hazardous objects, chemicals and triggering of weapons for military operation.

Keyword: Robot, Arduino UNO, Internet, WIFI shield.

I. INTRODUCTION

Robots are increasingly being integrated into working tasks to replace humans specially to perform the repetitive task. In general, robotics can be divided into two areas, industrial and service robotics. On the other hand, internet nowadays is becoming the center for everything. People tend to get online rather than doing household chores. Internet is now everywhere, compare to the last decades where internet is only wired, and people needs to be in front of the computer to access the internet but nowadays, internet is just at the tip of your finger. This is an advantage to introduce robot to household chores. The robot body is to prepare mechanically and choosing electrical components suitable to be used as a robotic arm. The robot body can be controlled using Arduino as the brain of the arm robot, connect to the internet via Arduino wifi Shield as the interface for Arduino to the internet. Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. The movement of the robot is control with the help block diagram of robot on web page and then the robotic arm will move to the desired movement. In this research work, web server developed using HTML and PHP is used to make the user interfaced that will be displayed when the operator accesses the robotic arm via the web to control it.

II. LITERATURE REVIEW

The following research papers were referred before starting with the research work. The excerpt from our study is documented in the literature review. It consists of research work carried out by the research scholars used internet to control their robot.

Wan Muhamad Hanif Wan Kadira, Reza Ezuan Saminb, Babul Salam Kader Ibrahim [1] worked on Design and development Internet Controlled Robotic arm. The robot is controlled by Arduino Uno that interfaced with the internet using Arduino Ethernet Shield. The moment of robot is controlled with help of giving angles of servo motor for each position.

G.Ramakrishnaprabu, E.Elangovan [2], worked on design and implementation of a gesture controlled anthropomorphic robotic arm. The robotic arm is designed in such a way that it consists of four movable fingers, each three linkages, an opposing thumb, a rotating wrist and an elbow. The robotic arm is made to mimic the human hand movements using a hand glove. The hand glove contains 5 linear slide potentiometers for controlling the finger movements and an accelerometer for the wrist and elbow movements. The actuators used for the robotic arm are servo motors. The finger movements are controlled using cables that act like the tendons of human arm. The robotic arm is controlled from a distant location using a wireless module.

Prof. Dr. Nabeel Kadim Abid Al-Sahib Mohammed Zuhair Azeez [3] design and build a real time mobile robot system based on using internet communication. This research work shows how to implement mobile robot system by interface the microcontroller (Arduino) with microcomputer (Raspberry Pi) by using serial port. The microcontroller is programmed in arduino C language and the microcomputer is programmed in python language, the mobile robot system contain camera moving in two axes and 5-DOF arm robot to hold objects. The mobile robot can be controlled by web page programmed in java Script language. Necessary programs are installed to run server and camera correctly, and then the system is connected wirelessly via internet and time delay is calculated in different cases (LAN and WAN) network.

Kaustubh Gawli, Parinay Karand, Pravin Belose, Tushar Bhadirke4, Akansha Bhargava [4] worked on Internet of

Things (IOT) Based Robotic Arm which can pick and place things from one place to another. Movement robotic arm is controlled by giving specific commands. The robotic arm is equipped with servo motors which are help to move the arm in desired direction. The motors are controlled with the help of a micro controller (FRDM KL25Z). The user interface which is used to control the robotic arm is made on a web page or an app. The control is given via the internet to the wifi module (ESP8266). This acts as the receiver and gives the received signal to the microcontroller.

III. System Design:

The block diagram of proposed system is shown consisting of Arm robot, arduino, wifi shield, and input devices like PC, Smartphone or tablet.

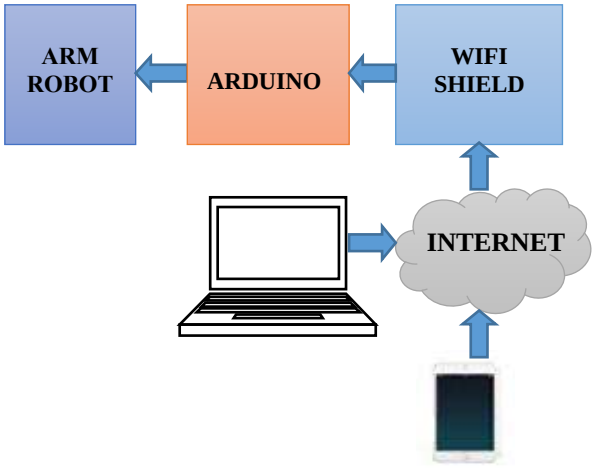

Fig1: Block Diagram

IV. Proposed Methodology:

In this research work, combination of hardware and software function is taken into account for system reliability. Arduino Uno is the brain of this research work and Arduino wifi Shield interfaced Arduino Uno with the internet. The robot degree-of-freedom mechanism is directly powered by servo motors. The base will be consisting of acrylic because it is easy to be formed, cheap, strong and can bear the motor weight and movement. The robotic arm will be constructed using servo brackets that are made of aluminums because it is lightweight but stiff to mimic the bone structure of a human arm. Basically, this robot has 6 outputs which consist of the robot base, the robot shoulder, the robot elbow, the robot wrist, the robot neck and the robot gripper. The robot will be a working on 12V DC supply. Servo motor is one of the DC type motors with feedback that used in many applications that required controlling the system in up-down direction. Servos are extremely useful in robotics. Servo motor provides low RPM with high torque. Since the high torque is essential for this research work. Therefore, servo motor 180 is preferred in this research work. This system comprises into two main parts which are the robotic arm and computer system. In this research work, the Arduino Uno is the controller of the entire system. Arduino Uno will interface to the internet via an Arduino wifi shield, Arduino wifi shield will enable the Arduino Uno to interconnect to the internet. Then, any computer that has internet connection can access and control the robotic arm. The main feature of this total system is the movement of robot can be controlled with the help of pictorial representation of robot on web page that going to make more convenient for user.

V. Advantages:

1. Lifting and moving hazardous objects.
2. Achieving more accuracy than human beings.
3. Easy to monitor and control things.
4. Internet Based Control.

VI. Applications:

1. Third hand – The arm holds the object while operators work on it.
2. In manufacturing processes.
3. Military to handle hazardous weapons.
4. In chemical industries.

VII. Conclusion:

In this proposed system the hardware operations include the automation process of controlling servo motors and also develop the robotic arm link and joint. Software development consists of developing the web server and also programming the Arduino Uno. The purpose of this system is to show that robots not only offers to industrial usage only but also suitable for household usage and other applications. Taking advantage of the internet connectivity nowadays, robots can be controlled via internet instead of a dedicated controller just for the robots.

VIII. Acknowledgement:

Our first and foremost thanks to Rajendra Mane college of Engineering and Technology for giving us the opportunity and to our professors from whom we have learnt a lot. We are deeply indebted to our principal, Dr.M.M.Bhagwat, our HOD, Prof. A.A.Tatugade our project co-ordinator and guide, Prof. P.D.Waiker. Their valuable feedback helped us tremendously to improve our project in many ways.

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[3] Prof. Dr. Nabeel Kadim Abid Al-Sahib1 Mohammed Zuhair Azeez2* **"Build and Interface Internet Mobile Robot using Raspberry Pi and Arduino"** 1. Al-Nahrain University, Al-Jadriya, Baghdad, Iraq 2. Al-Khawarizmi College of Engineering, Baghdad University, Baghdad, Iraq.

[4] Kaustubh Gawli1 , Parinay Karande2 , Pravin Belose3, Tushar Bhadirke4, Akansha Bhargava **"INTERNET OF THINGS (IOT) BASED ROBOTIC ARM"**, Atharva College, Dept. Electronics and Telecommunication, Atharva of Engg., Malad, Mumbai-95,India 2Parinay Karande College of Engg., Malad, Mumbai-95,India.

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Preparation of Papers for RASPBERRY PI BASED PAPER CUTTER

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Abstract : This paper illustrates "RASBERRY PI based mostly PAPER CUTTER". Increase in the rapid growth of Technology significantly increased the usage and utilization of CNC systems in industries but at considerable expense. The idea on the fabrication of low-cost CNC Router came forward to reduce the cost and complexity in CNC systems.
This paper discusses the event of a low-priced CNC router that is capable of 3-axis concurrent interpolated operation.
The lower cost is achieved by incorporating the features of a standard PC interface with micro-controller based CNC system in a Raspberry Pi based System. The system also features an o line G-Code parser and then interpreted on the micro-controller from a USB. Improved procedures area unit used within the system to cut back the procedure overheads in dominant a 3-axis CNC machine, while avoiding any loss in overall system performance.

Keyword: Raspberry pie, G code.

I. INTRODUCTION

In modern CNC systems, the end-to-end component design is highly automated using computer-aided design (CAD) and computer-aided manufacturing (CAM) programs. The programs manufacture a laptop file that's understood to extract the commands required to control a specific machine via a post processor, and then loaded into the CNC machines for production. Since any explicit element may need the utilization of variety of diff erent tools – drills, saws, etc., modern machines often combine multiple tools into a single "cell".
In different installations, a number of diff erent machines are used with an external controller and human or robotic operators that move the component from machine to machine.
In either case, the series of steps needed to produce any part is highly automated and produces a part that closely matches the original CAD design.
With the on-going development of technology and economy, new industrial requirements such as high precision, good quality, high production rates and low production costs are increasingly demanded.
Most of such necessities, as well as dimensional accuracy, conformance to tolerances of finished products and production rate can be met with better machine tools.
With the help of CNC technology, machine tools today are not limited to human capabilities and are able to make ultra-precision products down to nano scales in a much faster manner.
The traditional style philosophy of machine tools is multifunctionality and highest exactitude doable.
However, with the dramatic increase of business varieties and also the growing demand of miniature product, these general purpose machine tools don't seem to be efficient, either in terms of machine time
or cost, in producing product with special sizes and exactitude necessities.
There area unit many benefits of victimisation little machines to provide small-sized objects.
With a smaller machine size, space is saved.
The energy needed to control the machine is reduced yet.

It currently needs less material and elements to form the machine, hence bringing down the cost greatly.
The weight of moving element additionally comes down in order that throughout operation, the vibration and noise, as well as pollution to the environment, are markedly reduced.
As the machine becomes denser and lighter, it becomes more portable.
The layout of the industrial plant is often a lot of flexible.
The productivity and producing speed additionally will increase because of doable quicker operation.

II. LITERATURE REVIEW

The following research papers were referred before starting with the research work. The excerpt from our study is documented in the literature review. It consists of research work carried out by the research scholars on CNC Engraving Technique.
The Yang Lin, Hu Tianliang, Zhang Chengrui are worked on the Design and Implementation of Engraving Machine Controller. The Engraving Machine is controlled by EtherMC Interface Card and from that card, every signal is given to the Axis Motors along with Spindle motor. But in this,The Yong Chen, Hui Li, Yongkui Sun, Zhihe Gu are worked on The Control System of Three-Axes High Speed Engraving Machine Based on Embedded System. In this, they are used ARM(Advanced RISK Machine) Processor. But in this system, there are many instructions to perform the operations. As well as the complexity of the instructions is more.
The Saif Aldeen Saad Obayes, Ibtesam R. K. Al-Saedi, Farag Mahel Mohammed are worked on the Prototype Wireless Controller System based on Raspberry Pi and Arduino for Engraving Machine. In this, they are uses both Arduino as well as Raspberry Pi. Also in this system, they are uess Full Wave Bridge Rectifier And Power Transformer to control motors and gives Power Supply to the motors.
The Rohit Choudhary, Sambhav, Sunny David Titus, Akshaya P, Dr. Jose Alex Mathew and Balaji are also worked on the CNC PCB Milling and Wood Engraving Machine. In this system, they did engraving on PCB. In this, the RPM of a spindle motor is very high as compare to our system. This is the Future Scope OR Advance Versioon of our system. This system gives the good utility possess.

III. ADVANTAGES

The very important Advantage of our system is Cost Efficiency. But along with that, we gives the benefit of friendly handling of controls. This system can be operated by Literate OR Illiterate User also. For an operation of this system, there is no need of any Professional Course. As well as, installation of a system is easy. The maintenance of the system is LOW. The requirement of man power is LESS.

IV. HARDWARE AWARENESS

1. Raspberry PI

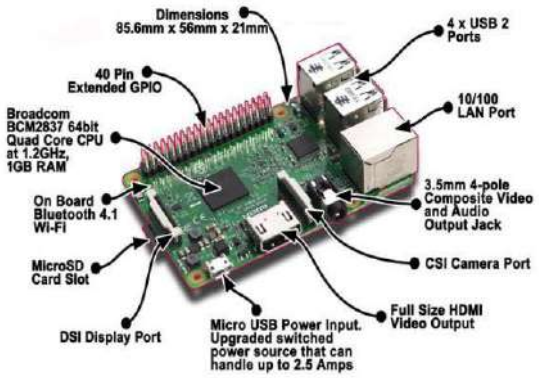

Fig. A : Raspberry Pi(Front View)

2. Shield

Shields are boards that can be plugged on top of the Raspberry PI extending its capabilities. The different shields follow the same philosophy as the original toolkit: they are easy to mount, and cheap to produce.

Fig. B : Shield For Motors

V. CONCLUSION

Soon, CNC technology will evolve just as the internet has done, and continue to do.
It has distended into the hands of several individuals and provides them the flexibility to try and do things that we would have solely seen in fantasy movies.

It also will give rise to a world of convenience, efficiency, and precision for the automated processes of projects previously done by hand. If a CNC can be controlling using a credit card sized computer like Raspberry Pi then it is surely an added advantage.

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"REVIEW PAPER ON - WIRELESS HARVESTING COCOBOT"

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Abstract: When we talk about robots, people tend to think that robots are only suitable to use in the industry or just for the scientist to test about new technologies. However, the main function of robots is to help humans in doing work either in the industries or just helping out doing normal household chores. To bridge the gap of the normal perception of "robots are for the industries only", Bluetooth control robots will be use. This paper presents the development of **WIRELESS HARVESTING COCOBOT**. The movement of the arm robot can be controlled by a mobile via the Android Application. This robot can be used to demonstrate that a robot can be used COCONUT HARVESTING. The robot is controlled by Arduino Uno that interfaced with the android mobile application and Bluetooth. Two type of analysis were done for this project that is DC motor analysis and ARM test. This user friendly robot is expected to bridge the gap between robot and household chores.

Keywords — Arduino UNO, Bluetooth module, Android Phone,Android application.

"WIRELESS HARVESTING COCOBOT"

I. INTRODUCTION

Robots are increasingly being integrated into working tasks to replace humans specially to perform the repetitive task. In general, robotics can be divided into two areas, industrial and service robotics. In beauty and utility no other tree can surpass the coconut tree. It is the most extensively grown nut in the world. It provides people their basic needs such as food, drink, shelter, fuel, furniture, medicine, decorative materials and much more. They are a necessity and a luxury. It is the "heavenly tree", "tree of life", "tree of abundance" and "nature's supermarket." The interest to coconut tree plantation seems to be decaying in prominent coconut cultivating countries because of two reasons. The first major reason for the declining coconut production is the unavailability of sufficient coconut tree climbers. The traditional coconut harvesting communities gradually gives up this job due to their improvement in standard of living and is done without proper safety measures which can lead to serious injuries. The second reason is the rise in wages of existing coconut tree climbers.

Coconut Tree climbers are a rarity these days in Goa and other coconut growing states of Kerala ,Karnataka, Tamil Nadu, Andhra Pradesh and Maharastra, with very few taking on the traditional profession.In many areas, farmers are forced to seek help from migrant laborers, who charge exorbitant amounts, despite not being familiar with the art of coconut climbing. 'The scarcity of labour disrupts harvesting cycles thus causing loss of income to the growers. As against the general norm of harvesting cycles of 45-60 days, farmers are currently able to harvest only once in three to four months. In the recent past there has been an

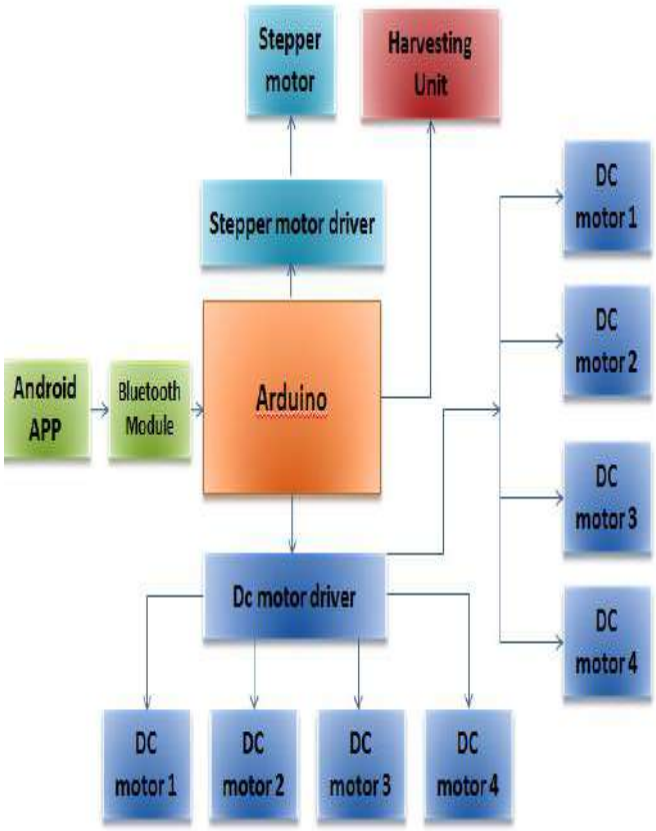
array of coconut palm climbing devices developed by individuals, Research Institutions, Universities and NGO"s , which are claimed to be safe and easy to operate. But in spite of all the efforts taken in the recent past, there is still an acute shortage of trained coconut palm climbers for harvesting and plant protection activities. With a serious view to tackle this problem**.**

II. BACKGROUND OF WIRELESS HARVESTING COCOBOT

Before we could start the design of our robot we decided that it would be beneficial to research existing tree climbing robots. In our research we looked at many different designs to see what was the most common and effective ways people used to develop tree climbing robots. In our research we found that there were many modes of locomotion that various people had implemented in there own designs. We also researched the different ways in which these designs were able to grip
their surroundings. These ideas would la out the basic design that we would eventually follow in
our own project.
In our project we used mainly two types of mechanism for development of project. Mechanisms are namely climbing mechanism and harvesting mechanism.
For climbing purpose we use two robocars which is havig dc motor and for harvesting purpose we use robotic arm
with circular saw (3).

III. WORKING OF WIRELESS HARVESTING COCOBOT

Figure 1: Block diagram

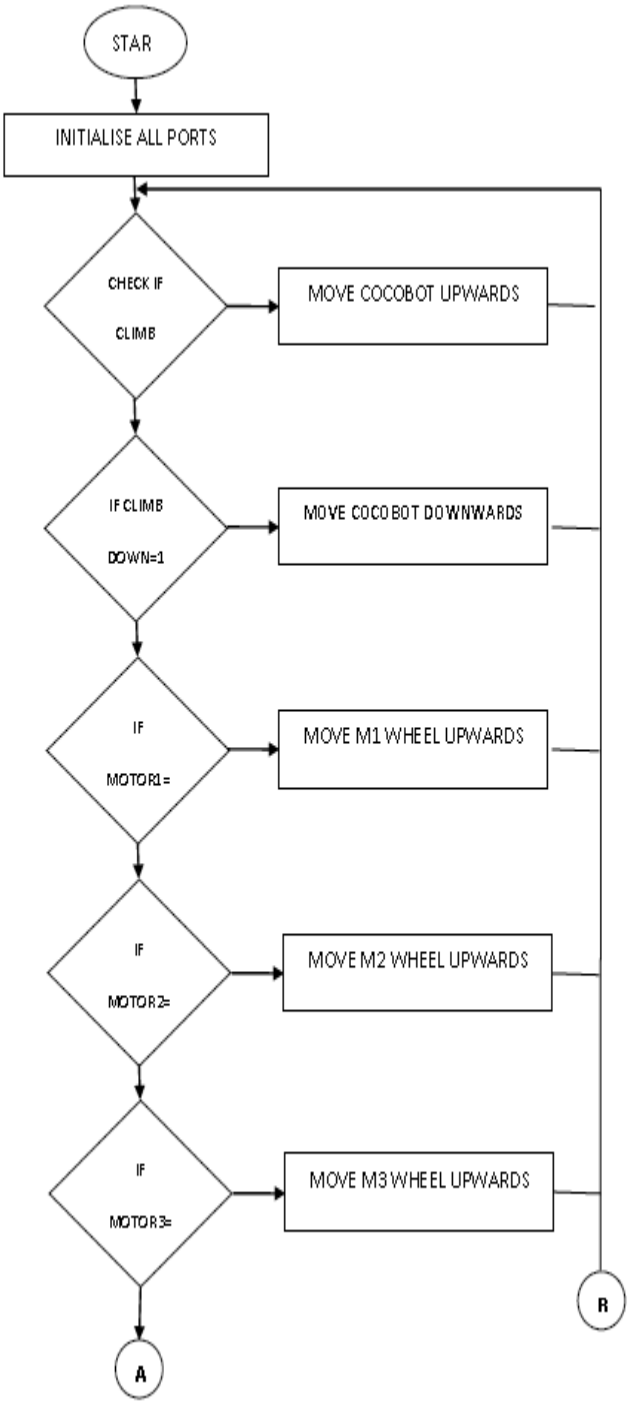


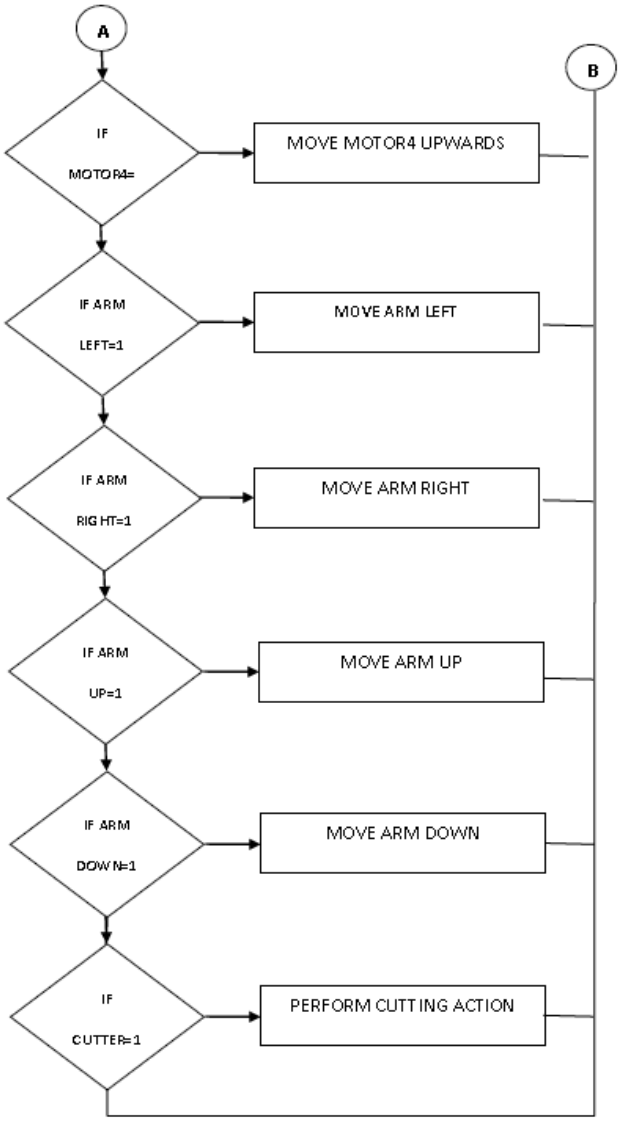
Connect the motors to the battery and start the motors. Feed in the required commands and check the working. Due to the rotary movement of the wheel in the device, the device climbs upward(1). Circular alignment of the device holds the tree firmly. The robotic arm attached in the device is controlled using RF module controller. By using vision system, a camera is placed in the device and controlled. By the use of camera and the remote controller, the robotic arm is functioned. The end-efector attached with the robotic-arm is used to cut the coconut palm (3). This end-efector is also controlled by the remote controller. Finally, the device climbs down using the reverse mechanism.

IV. APPLICATIONS

- It is used to climb in the electrical post for carrying tools.
- It also can be used to carry camera which is held at the top of the tree for research activities.

V. FLOW CHART





VI. WHY THIS SYSTEM (ADVANTAGES)

- It requires simple maintenance cares.
- Construction of this project is very simple and easy.
- This project adds to the system leads safety in harvesting of coconut tree.
- Also this project reduces the human efforts.
- Similarly this projects makes the harvesting of coconut simple.
- Its easy to handle.

VII. CONCLUSION

Overall, this project can be divided into two major sections that are hardware development and software development. The hardware operations include the automation process of controlling DC motors and also develop the robotic arm link and joint. Software development consists of developing the android application and also programming the Arduino Uno. From the analysis that have been made, it's clearly shows that controlling a DC motor is quiet easy and the output is accurate. Thus, it is the right choice to choose DC motor for the actuator of the robot arm. The purpose of this project is to show that robots not only restricted to industrial usage only but also suitable for household usage. Taking advantage of the widespread usage of internet connectivity nowadays, robots can be controlled via Bluetooth through android application instead of a dedicated controller just for the robots. This project was successful and proved that robots can be controlled via Bluetooth controlled android application and it is suitable for harvesting purpose.

ACKNOWLEDGMENT

We have great pleasure in presenting the report on "Wireless Harvesting COCOBOT" It gives me immense pleasure to acknowledge and thank many people who contributed in various ways for the successful completion of this research work. Words are inadequate to express my feelings while recording my deep sense of gratitude and respect to my guide Prof.G. V. Burshe. The work presented here could not have been accomplished without his inspiring guidance, constructive criticism and sustained encouragement during the course of my research work. We express my sincere thanks to Principal. Dr.M. M. Bhagwat without his guidance and support it would not have been possible. This research work has been carried out under the direct supervision and leadership of Prof. A. A. Tatugade Head of the department, without whose supervision and support it was merely impossible to accomplish the task.

We are grateful to Chairman of Probodhan Shikshan Prasarak mandal, Shree Ravindraji mane for his conditional support we are also grateful to Dr. M. M. Bhagwat Sir, Principal, Rajendra Mane College of Engineering and Technology Ambav (Devrukh) for his all possible cooperation. We express our sincere thanks to Prof. A. A. Tatugade HOD of EXTC Dept. And all teaching and non-teaching staff members from Electronics and Telecommunication Department of Rajendra Mane College of Engineering and Technology Ambav (Devrukh) for their help and constant motivation.

We are grateful to my parents without their blessings it was not possible for me to see even a single sparkle of light in this beautiful world.

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(5) "INDIAN COUNCIL OF AGRICULTURAL RESEARCH" by Prof. GOURISH M. NAIK on May 2015.

Web Based Salon Management System with Mobile Application

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Abstract: The purpose of this research is to develop the online web application for salon industry for owner/ beauty professionals. In recent times, most organization will opt to use management system in their daily business task. Subscribing to this software the salon owner / beauty professionals can have their own online store in a new way to do their business. The web application will provide convenience to the end customer to book online appointments using website or mobile application through user friendly calendar. The web application will contain mainly three types of users such as: Salon Owner, Salon employee, Customers. Salon Management System is to act an alternative to the non-computerized system. Computerized system makes it easier for users with functions such as searching, automatic calculation, and display of related information with minimal queries. Rapid application development methodology is used in the development of system. This paper will give the idea about how the system should perform.

Keywords — Appointment booking, Rapid application development, Salon Management system, Software development life cycle,

I. INTRODUCTION

This is a beauty focused era, where people constantly strive to enhance their appearance and to attain a standard of beauty that is comparable to perfection. In this process of beauty enhancement, people try out various beauty products available in the market and take advantage of services offered at salon. In the present trends, there is a large inflow of people in the salon every day. Every individual concerned with their appearances makes a visit to the salon expecting to get an amazing, fabulous makeover. And the aim of every salon should to be to meet the expectation of the customers. It is very necessary for the salon to manage clients, employee, invent of new beauty products effectively for the success of salon.

By keeping these points in mind we will develop this all-in-one software for managing the salon. It will keep the track of customer data along with billing and appointment information. It will also help in maintaining the stock of the product.

For easy convenience of customer we will build mobile application. Using this application, customer able to take appointment for particular service and will able to see services provided by the salon.

II. LITERATURE REVIEW

The traditional system of salon& beauty parlor was manual and insecure because there was no any counting system of customers coming in the salon which creates sometimes major issues. The customer as well as the owner faces the problems. Computerized systems are fast, reduces data anomalies, reduces data redundancy, low paper usage and generates information needed automatically. Manual system takes time in data retrieval, has higher chances of anomalies and redundancy, high paper usage and needs to gather analysis data step by step.

a. Saloon & Service Appointment Management System (case study)

This case study is about the developed salon management software. In this case study, they defined the integration of management system and appointment system.

b. CIS 499 SENIOR PROJECT FINAL REPORT(SalonBook.com)

SalonBook is web based salon management application with appointment functionality. This is the project report of developed web based application.

Hence, proposed system is the best solution of avoiding all possible problems. Salon manager are often responsible scheduling staff members, training new front

desk workers. Since salon is a service sector, so the success of hair salon depends on the satisfaction of customer. The business of salon is totally dependent on customer satisfaction.

III. METHODOLOGY

The development of Salon Management System is based on RAD model which is part of software life cycle. Rapid application development is a software development methodology that uses minimal planning in favor of rapid prototyping. A prototype is a working model that is functionally equivalent to a component of the product. In the RAD model, the functional modules are developed in parallel as prototypes and are integrated to make the complete product for faster product delivery. Since there is no detailed preplanning, it makes it easier to incorporate the changes within the development process. Mainly RAD model based on the waterfall model. Difference is only, that RAD model Separate small teams can be assigned to individual modules and in sdlc a larger team is required for different stages with strictly defined roles. Software life cycle is known as waterfall model. The phases in waterfall model cascades from one to another. In principle, planning and schedules of activities must be made before starting on them. There are five phases in waterfall model. The first phase is requirement definition followed by system and software design. The third phase is implementation and unit testing. The fourth phase is integration and system testing. The last phase is operation and maintenance

A. Requirement Definition

The system's services, constraints, and goals are established by consulting the owner of Salon. The owner specified that the system should be able to record customer information, employee information, product information, appointment information and payment information. The system should also be able to generate performance report of each of the employees.

B. System and Software Design

The system design process allocated the requirements to either hardware or software systems. It is done by establishing overall system architecture. Data flow diagram, flow chart and entity relationship diagram are designed to act as the foundation to the development of Salon Management System.

C. Implementation and Software Testing

In this phase, the front-end and back-end system are developed which includes all designed modules and the design database based on requirement of the customers. For its development, php language is used. The database was created using MySQL.

D. Integration and System Testing

During this phase, the interfaces are linked together to ensure the navigation and flow is smooth. All functions are integrated into the system along with the database. System testing is conducted to ensure that the modules are functional and to check for errors.

IV. SYSTEM ANALYSIS

System analysis and design illustrates the architecture of the system. There are two main users for admin system. The users are an admin and employees. And the mobile application is specifically for only client users. For admin, correct username and password are required in order to access to the system. Once the username and password are verified and status of admin is authenticated, admin will be given access to the homepage of the system. However, if the login fails, admin will have to enter the information again. After gaining access to the homepage, admin can choose from customer record, appointment calendar, employee record, product record, service record, appointment planner, payment, and performance report. Noted that, only admin can manipulate the data of employee, service and employee performance reports for security purposes.

When admin chooses to access customer record, a list of customer details will be displayed. Then, admin can choose to update the customer records if he or she wishes to insert, edit, and delete customer information. Once the update is successful, an updated record will then be displayed. If the admin does not want to update, the process will then be redirected to the "view customer record" decision. Admin then can choose to proceed with the same process or go to a different process. The flows are identical for all other processes in the system except for performance report process.

For employee, correct username and password are required for using this system. The status of the employees is authenticated using their own username and password. The employee can view customer record, appointment calendar, product records, payment, and planner.

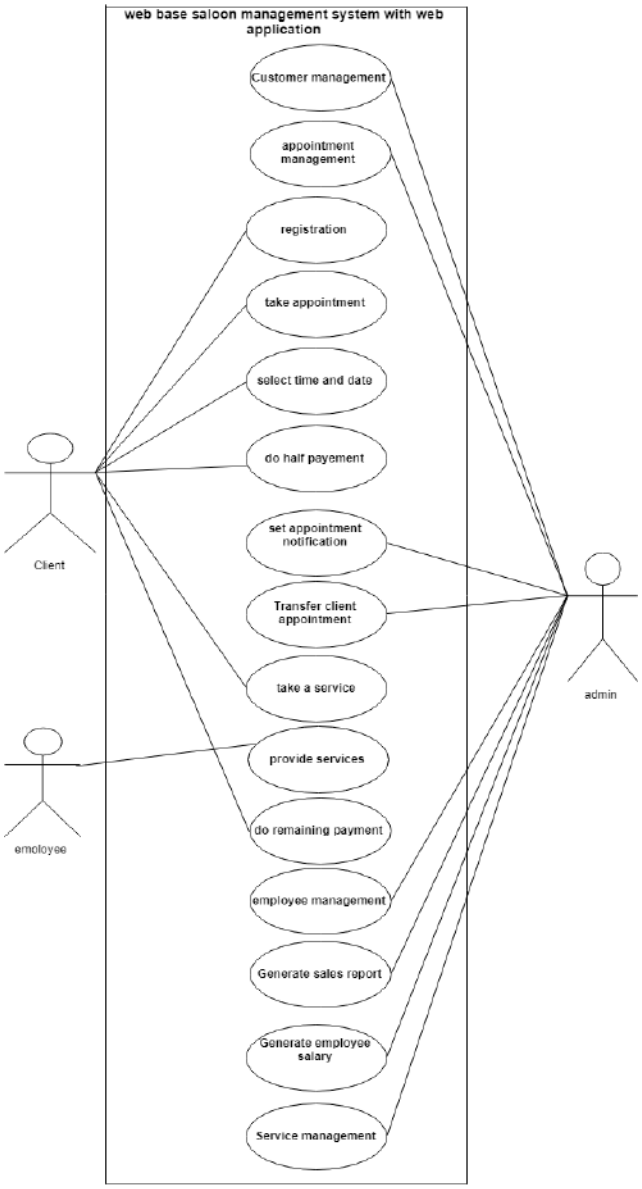
For customer, also username and password are required to set particular appointment and view the services.

V. SYSTEM DESIGN

- **Use case diagram**

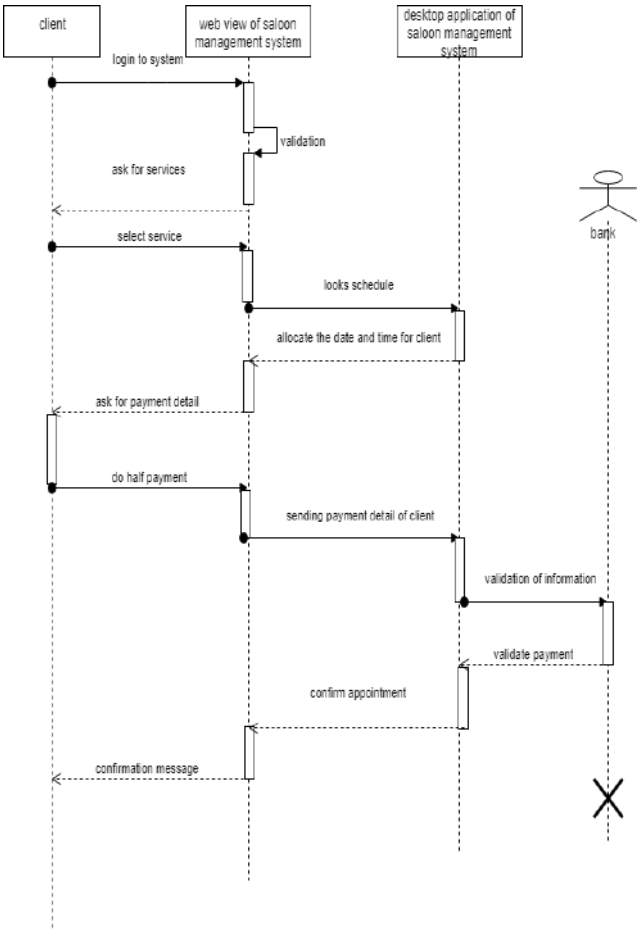
Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. Hence, when a system is analyzed to gather its functionalities, use

cases are prepared and actors are identified. Actors can be a human user, some internal applications, or may be some external applications.



- **Sequence diagram**

A sequence diagram is an interaction diagram that shows how objects operate with one another and in what order. It is a construct of a message sequence chart. A sequence diagram shows object interactions arranged in time sequence.



VI. CONCLUSION

The project entitled as "**Web-based salon management system with mobile application**" is the system that deals with managing all the data related to salon system like employee salary, schedule of salon, services which will display on client side and also observed the maintenance of products. It is also used by client for setting their appointments by checking the services. Thus, in proposed system we are using a set of techniques of web application based on user requirements. In order to keep up with growing technology, we must seek ways to make certain processes less time consuming, more error free and more user friendly.

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Green Human Resource Management

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Abstract:

Today, the management scholars adopt various techniques of green polices for the environmental protection. In the corporate world also going global is very important because it helps in exploring green polices of management in business as well as in environment. It is important for managers, employees, stakeholders and other customers. However there are very few research studies that believe the task of human resources management structure in organization to achieve ecological sustainability. Thus there is a rising requirement for environmental management in human resource management (HRM- Green HRM).Within human resources management, Green initiatives programmers are a part of corporate social responsibility (CRM). (Mello L et al, 2016) Green HRM is a manifesto which helps to create green workforce that can understand and appreciate green culture in an organization. Green HRM involves two necessary elements like- environmentally friendly (ECO Friendly) HR practices and the preservation of knowledge capital (Mandip, G.2012). In the company green scores increased by 4% in 2016 as compared to previous year 2015. This paper deal with Green HRM and Green HRM practices and also include corporate social responsibility of company.

Key words- ***Corporate social responsibility, Ecological sustainability, Green HRM, Green Manifesto, Green workplace, Green culture .***

I. INTRODUCTION

Now a day, it is observed that the business communities adopt environment management system which in turn is a tool to provide competitive advantages and helps in controlling the environmental impacts. Green HRM practices retain good employees in organization by reducing replacement cost (Shikha Y, 2017). Now companies realize and build up social consciences for Green HRM practices and corporate social responsibility. The HRM functions develop environmental sustainability within the organization through the Green HRM practices and policies with sustainability goals reflecting 'Eco-focuses'. Green HRM includes all related HRM practices like- selection and recruitment, training and development, compensation and rewards, performance appraisal and employment relations etc (Dechant, K., & Altman, B 1994).Green HRM practices are capable to attract and hold good employee in the organization and also helps in promoting and reducing the replacement cost. Strategic Green HRM practices and polices support sustainable use of wealth in the organization and develops employee confidence and satisfaction.

(Image Source : Secondary Data)

II. LITERATURE REVIEW

Deepika & Karpangam (2016); in their study "A Study on Green HRM Practices in an Organization", found that Green human resources effort have resulted in increased efficiencies, employee preservation and enhanced productivity and also other physical benefit.

Liu (2010); "The Environmental Responsibility of Multinational Corporation" according to the author, application of new technology could progress the environmental decline by developing for example- the biotech product and by searching for alternative energy to reduce the use of finite natural resources. However, the organization should put more effort into the research in new technology to minimize the impact of environmental destruction by creating products that are less harmful and less polluted for the environment.

Cherian & Jacob (2012); in their study "A Study of Green HR Practices and its Effective Implementation in the Organization: A Review" investigated that significance of Green HRM practices is to encourage employee confidence and to reimburse both business and employee. Green HRM principle includes improvement and retention of employee, improving public image, attracting better employee, improving productivity & sustainability, competitiveness and overall performance and also reducing environmental impact of the company

III. OBJECTIVES OF THE STUDY :

a) To study the concept of Green HRM and Green Management in the organization.
b) To study the practices and strategies implementation of Green HRM in the organization.

IV. METHODOLOGY:

The study is based upon the secondary data. Extant literature elated to the Green HRM and Green HRM practices are available from websites and other available sources that are collected from different books, journals, research papers, and other media. This study represented the Green HRM practices and strategies implementation in the organization.

Green HRM:

Green HRM is a new scheme in human resource management and HRM literatures. The word of Green HRM 'is mainly used in corporate environmental program and also regular use in public management policies and practices. Green HRM involves environment friendly HR initiatives which in turn lower cost and help in better employment engagement and retention. Green HRM also helps organization to reduce employee carbon footprints by the following ways like electronic filing, car sharing, job sharing, teleconferencing and virtual interviews online training, recycling etc. Green HRM use human resources management policies to support the sustainable use of available resources within business and mostly these resources are environment sustainable. Green HRM helps in implementation of green human resources policies like as– planning, selection, recruitment, training & development, compensation etc. In this green World, the green HR or people management function has sustainability and its people management and talent management engage with the people and customers, communities and contractors all turn into equal employees along with shareholders (Mandip, 2012)

Green HRM mainly involves two elements like- Environment friendly HR practices and Preservation of knowledge capital (Opatha &Anton Arulrajah, 20014). In the Green HRM employee focused on achieving the organizational goal and solve the environmental related problems. However, the organization has set up the duties and responsibility that integrated the environmental activities

Green Job Design and Analysis:

In the Green HRM, Job Description can be used to correlate with the environmental protection task, duties and responsibilities. Now days, mostly companies included the environmental and community task, duties and responsibilities in every job to keep the environment protected. Job specification also include environmental, personal, social and technical requirements in every job in the organization as far as feasible, like as duties related with the environmental protection and also allocate the role and safety tasks according to the health of the employees. Today most of the companies have designed their organization job structure according to environmental management. It is truly precious initiative and practice to protect the environment for the viewpoint
of HRM.

Editorial Green Recruitment

Green recruitment means recruitment process in the organization is paperless with minimum environmental impact. It is a system where major focus is given on the importance of environment and making it a chief component within the organization. (Holtom BC, et al, 2008). Today companies focused on various websites for hiring employee which reduce the CV/Resume printing and courier cost and leads to less usage of paper (Shika, 2017). Companies select the CV/Resume whenever needed of appropriate applicant and download them and print them (Bassam K & Rahman, 2016).Therefore sustainable development matter must be included into the recruitment process as green recruitment process help in attracting and retaining competent employee in the organization.

Green Selection

In the selection framework, some companies takes into account candidate's environmental concern, and while making selection for the job in the companies, environmental related questions are asked at the time of selection process. These are the excellent Green selection practices for any organization and for the selection of environmental friendly people, and it is best selection criteria.

Green Learning

There is a dire need of research focusing the barriers and obstacles to effective environmental training. Insufficient need analysis, poor training provided for the job, poor trainee readiness, lack of perceived or actual commitment in leaders, top management and employees and other related problems are some of the reasons of the need of the initiative of the environmental training (Wehrmeyer & Vickerstaff, 1996) .For example, research studies related to the training readiness revealed that learning opportunities exposure is more effective in case of highly motivated employees who are psychologically ready for learning (Goldstein & Ford, 2001) . Hence, the efficacy of the initiative of environmental training could be improved if the assessment of environmental learning readiness is included. There is also a need of research on

the assessment of individual readiness for environmental learning and the ways for enhancing learning readiness of employees.

Green Training and Development

The green training and development is a practice that focuses on development of employee's knowledge, skills and attitude. The green training and development educate employees about environmental training and development and also educate employees about energy awareness in the organization and reduce wastage, and solve environmental problem in the organization (Zoogahs, 2011). Training is a key instrument for the employees for controlling wastage (in terms of both prevention and reduction) in the organization. So it important for organization to instruct good training to employees and guide them and also update them about the Green practices, policies and procedure.

Green Performance Appraisal

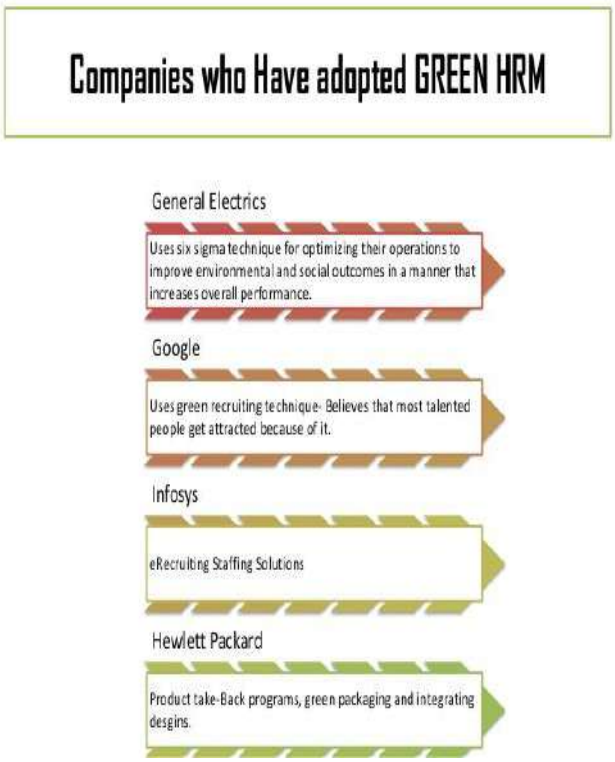
When the appraisal of the employee comes into account in the organization it is important to think about Green Targets, purpose, Green initiates and responsibility taken by employees and conclusion of green results. However, performance appraisal method should also include Green target one of the key presentation area of employee.

Green Compensation and Reward System

Compensation and reward is the major Green HRM practices through which employees are rewarded for their performance. Variable pay system added in compensation system by link it by eco performance. Compensation packages are something related to acquiring designed green skill and they are having long term impact

Green Employee Relation

In the organization, the employee relation is the important aspect of HRM which is concerned with establishing good employer and employee relationship. Through this Green HRM practices, the motivation and confidence of the employees will increase and it improve productivity of employees. The Green HRM encourages employees to produce potential solution to the ecological problems through behaviors of supervisors towards employees in employees' engagement (Ramus, 2001).



(Image Source : Secondary Data)

V. CONCLUSION-

The major challenge for the human resource professionals is the understanding of the scope and depth of green HRM in the process of transformation of their organizations to green entities. Ultimately, this effort leads the organization to perform better in terms of environment. Stating differently, greening of HRM functions will eventually decrease negative environmental effects of the organization and helps in enhancing the positive environmental effects of the organization. Training and development, recruitment, and learning play key role in improving environmental performance of the organization. Green HRM practices are of crucial importance in creating, practicing and maintaining environmental related employees' innovative behaviors along right attitude of greening. It is difficult to create and maintain sustainable environmental performance without proper green HRM practices. Therefore, this is stated that the comprehension of the scope and depth of green HRM practices by the organizations is significant and helps organizations to perform better in terms of environment than before.

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A study of Investment Preferences of Individual Investors towards Mutual Funds with reference to Kolhapur City

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Abstract: Indian economy has been rapidly changing since last two decades and with the development of the economy earning capacity of the people has increased. So people are investing their money for their future obligations. Since 1991 Indian capital market has developed tremendously and provides variety of investment options to the investors. There are various investment options available to individual investors like bank fixed deposits, post office schemes, government bonds, debentures, life insurance, shares, mutual funds, real estate, precious metals, commodity market and currency. Single investment option does not suffice the investment motives of the investors because there are various risks associated with each investment avenues. Among the available investment avenues, mutual fund is the best option of investment because it is less risky and gives professionally managed funds at a minimum cost. The main focus of the study is to know the awareness, preferences & motives of mutual fund investors. For the purpose of the study primary data was collected from 100 respondents. Samples were selected on the basis of non probability convenient sampling method. The findings of the study shows majority of the investors are aware about mutual funds and they become aware through internet, television & financial advisor. The data further reveals that investors' shows positive approach for investment in mutual funds and they invest through systematic investment plan for the purpose of diversification and hedge against inflation. Present study will be useful for asset management companies, brokers, academicians and investors.

Keywords — Awareness, Financial Assets, Individual Investors, Investment, Preferences, Mutual funds, Objectives, Savings

I. INTRODUCTION

Every person tries to save or invest money for his/her future obligations; it may be higher education, marriage, buy a new house, buy a new car, child education or retirement. So he/she has to invest money in various investment options. With the rapid changing technology, there are various sources of awareness for the investors to get the required information for investment. In today's competitive edge, various investment options are available to the individual investors. Each investment avenue has advantages & disadvantages. Investor tries to balance the benefits & shortcomings of different investment avenues before investing in them. Among various investment avenues mutual fund is the most favorable investment option of common investor because it gives better returns as compared to other investment options at a lesser cost. Mutual funds give an opportunity to the individual investor to invest his/her money in diversified portfolio with professionally managed funds. Present study tries to study the awareness & preferences of mutual fund investors. The study will be helpful for the asset management companies, brokers, investors & academician.

II. LITERATURE REVIEW

Y Prabhavathi and N T Krishna Kishore (2013) in their research entitled 'Investors preferences towards Mutual Fund and Future Investments: A Case study of India carried out in three different areas concluded that open ended scheme & equity fund scheme is mostly preferred by investors. Investors also prefer SIP as mode of investment for better returns. In terms of future investment the study shows that investor prefer gold as an investment option following shares, real estate and then mutual funds.

Priti Mane (2016) The researcher carried out the study with the aim to know the investors view towards mutual fund, awareness of mutual fund and to know the preference of investors towards investment. The data was collected from primary sources using questionnaire method. The study shows that investor mostly rely on bank deposit rather than mutual fund as investment in mutual fund is risky than other investment option. The awareness level of mutual fund various schemes among the investors is very low due to less knowledge of mutual fund which prevent them to invest in mutual fund to avoid risk.

Dr. N. M. Vechalekar and Gauri Prabhu (2013) conducted a survey in Pune city to study the perception of Indian investor and to determine the awareness level of

investor towards mutual funds. This research concludes that investors prefer mutual fund as an investment avenue as they are totally aware about the benefits of investing in mutual fund. The study shows that investors are giving more importance to higher return, less risk and reputation of the company before investing in any mutual fund. Most of the investors find relevance in investing diversified mutual fund scheme and diversified factor of mutual fund attracts mostly to the investor for investing in mutual fund. The study concludes that investors are aware about the monthly income plan of mutual funds and preferred reason to invest in mutual funds is the consistent returns on investment.

Ms. Avani Shah and Dr. Narayan Baser (2012) conducted a survey in Ahmadabad city with an objective of study the investor's preference in selection of mutual funds. Researcher has taken two variables i. e. age and occupation and tried to find the impact of these two variables on investors preference towards mutual funds. The study concludes that occupation is a variable that affect the investors preference but age does not play any vital role while investing in mutual funds.

Soumyasaha and Munmun Day (2011) carried out the survey on "Analysis of Factors affecting investors perception of Mutual fund investment". Researcher had focused on investors expectation with respect to various investment alternatives available to the investors. The study finds that the mutual fund is very popular means of investment option & it meets the investors expectations.

Dr. Ravi Vyas, The study was conducted in Indore city on investor's behavior & perception towards mutual funds. The study shows the results that investors were not so much aware towards mutual funds & they prefer to invest in bank FD's, post office deposits. Very few investors invest in mutual funds for the duration of 3 years. Investors consider risk factor while investing in mutual funds & they prefer to invest through SIP.

Dr. Shantanu Mehta, Charmi Shah, the study was conducted in Ahmedabad & Baroda City on 100 educated investors. Study finds that various factors influence the behavior of the investor while investing in mutual funds. Most of the investors of Ahmedabad city prefers to invest in mutual funds.

III. OBJECTIVES OF THE STUDY

1. To study the awareness of investors towards mutual funds.
2. To study the sources of awareness of investors towards mutual funds.
3. To study the investment objectives of investors.
4. To study the investment preferences of investors towards various mutual funds.

IV. RESEARCH METHODOLOGY

Research Design

This research is primarily a descriptive in nature & quantitative in approach.

Data Collection

Primary data was collected with the help of structured schedule designed for the study & secondary data was collected with the help of Journals, websites, research papers & magazines.

Sampling Plan

Universe: Investors above 18 years of age.

Targeted Population: Retail Investors (Individual Investors)

Sampling Unit: Individual Investors investing in mutual funds

Sampling Method: Non Probability Convenient Sampling Method

Sample Size: 100

Sampling Area: Kolhapur

V. DATA ANALYSIS & INTERPRETATION

Collected data is classified, tabulated & analyzed with the help of statistical tools & its findings have been presented in systematic manner.

Table No. 1: Distribution of respondents on the basis of their age

Gender	Respondents	Percentage
Male	74	74
Female	26	26
Total	100	100

Interpretation: It is found that 70% respondents are male & rest 30% respondents are female.

Table No. 2: Distribution of respondents on the basis of their Marital Status

Marital Status	Respondents	Percentage
Married	82	82
Unmarried	18	18
Total	100	100

Interpretation: It is found that 80% respondents are married & rest 20% respondents are Unmarried.

Table No. 3: Distribution of respondents on the basis of their age

Age	Respondents	Percentage
18 yrs – 30 yrs	34	34
30 yrs – 45 yrs	47	47
45 yrs – 60 yrs	16	16
60 yrs & above	03	03
Total	100	100

Interpretation: It is observed that majority of the investors i. e. 47% belongs to the age group of 30 yrs – 45 yrs, 34% respondents belongs to the age group of 18 yrs – 30 yrs.

Table No. 4: Distribution of respondents on the basis of their Educational Qualification

Education	Respondents	Percentage
SSC	02	02
HSC	05	05
Graduate	46	46
Post Graduate	37	37
Professional	9	9
Other	01	01
Total	100	100

Interpretation: It is found that 46% respondents are graduates & 37% respondents are having qualification of Post graduate.

Table No. 5: Distribution of respondents on the basis of their Occupation

Occupation	Respondents	Percentage
Businessman	18	18
Govt. Servant	30	30
Pvt. Sector Service	36	36
Farmer	02	02
Professional	09	09
Other	05	05
Total	100	100

Interpretation: It is observed that 36% respondents belong to Pvt. Sector Employees whereas 30% respondents are Govt. Employees.

Table No. 6: Distribution of respondents on the basis of their Income

Income	Respondents	Percentage
Below Rs. 1,00,000/-	01	01
Rs. 1,00,001/- to Rs. 3,00,000/-	34	34
Rs. 3,00,001/- to Rs. 5,00,000/-	42	42
Rs. 5,00,001/- to Rs. 7,00,000/-	11	11
Rs. 7,00,001/- to Rs. 10,00,000/-	07	07
Rs. 10,00,001/- & Above	05	05
Total	100	100

Interpretation: It is observed that 42% respondents belong to Income group of Rs. 3,00,001/- to Rs. 5,00,000/- whereas 34% respondents belongs to the income group of Rs. 1,00,001/- to Rs. 3,00,000/- & only 5% respondents belong to the income above Rs. 10,00,001/-.

Table No. 7: Distribution of respondents on the basis of Perception towards various investment avenues in terms of returns.

Investment Avenues	Rank
Bank Fixed Deposits	7
N.S.C./ N.S.S.	10
Post Office Schemes	9
P. F./ P. P. F.	8
Debentures/ Bonds	4
Life Insurance	6
Land/ Real Estate	1
Gold/ Diamonds	5
Mutual Funds	2
Equity Shares	3

Interpretation: It is observed that majority of the investors invest their hard earn money in real estate, mutual funds & shares respectively for getting better returns as compared to other investment avenues, whereas few investors invest their money in safe invest options like Bank FD, PF, Life Insurance etc for safety purpose.

Table No. 8: Distribution of respondents on the basis of factors consider while investment in mutual funds

Factors	Respondents	Percentage
Risk	18	18
Returns	38	38
Safety	15	15
Liquidity	08	08
Tax Benefit	20	20
Other	01	01
Total	100	100

Interpretation: It is observed that 38% respondents consider return factor while investment, 20% respondents looking for tax benefits whereas 18% respondents consider risk.

Table No. 9: Distribution of respondents on the basis of motives (Objectives) of their investment

Motives	Respondents	Percentage
Returns	36	36
Capital Appreciation	19	19
Future Obligation	08	08
Security	14	14
Tax Savings	17	17
Hedge Against Inflation	06	06
Total	100	100

Interpretation: It is found that 36% respondents invest their money for the purpose of better returns, 19% respondents invest for capital appreciation whereas 17% respondents invest their money for tax savings & only 6% respondents invest for hedge against inflation.

Table No. 10: Distribution of respondents on the basis of their Awareness towards Mutual Funds

Awareness	Respondents	Percentage
Aware	96	96
Not Aware	04	04
Total	100	100

Interpretation: It is found that 82% respondents having awareness about mutual funds & rest 18% respondents are not aware about mutual funds.

Table No. 11: Distribution of respondents on the basis of sources of awareness towards mutual funds

Sources of Awareness	Respondents	Percentage
T. V.	22	23
Internet	28	29
News Paper	09	09
Friends	12	13
Magazines	04	04
Financial Advisor	21	22
Total	96	100

Interpretation: It is observed that 29% respondents are

aware about mutual funds through internet, 22% respondents having knowledge about mutual funds with the help of financial advisor & 23% respondents are aware about mutual funds through television.

Table No. 12: Distribution of respondents on the basis of preferences of investment towards various mutual funds

Investment Preference	Respondents	Percentage
Reliance Mutual Fund	13	14
SBI Mutual Fund	24	25
ICICI Mutual Fund	17	18
Kotak Mutual Fund	11	11
UTI Mutual Fund	21	22
Franklin India Mutual Fund	07	7
Other	03	3
Total	96	100

Interpretation: It is observed that 25 % respondents invest in SBI Mutual Funds, 22% respondents invest in UTI Mutual Funds whereas 18% respondents invest in ICICI mutual fund.

Table No. 13: Distribution of respondents on the basis of preference for Mutual Fund Schemes

Mutual Fund Schemes	Respondents	Percentage
Equity Schemes	34	35
Debt Schemes	13	14
Hybrid Schemes	28	29
Tax Relief Schemes	17	18
Other	04	04
Total	96	100

Interpretation: It is found that 35% respondents prefer for equity schemes, 29% respondents prefer for Hybrid (Balance) fund whereas 18% respondents prefer for Tax Savings schemes.

Table No. 14: Distribution of respondents on the basis of preferred mode of investment in mutual funds

Mode	Respondents	Percentage
One Time	22	23
SIP	74	77
Total	96	100

Interpretation: It is found that 77% respondents select Systematic Investment plan as a mode of investment in mutual funds whereas 23% respondents preferred for one time investment in mutual funds.

VI. FINDINGS

1. Majority of the respondents are male.
2. Majority of the respondents belongs to the age group of 30 yrs to 45 yrs.
3. Most of the respondents are married.
4. Majority of the respondents having qualification of graduation & post graduation.
5. It is found that Pvt. Sector employees & Govt. employees preferred to invest in mutual funds.
6. Majority of the respondents belong to the income group of Rs. 3,00,001/- to Rs. 5,00,000/-.
7. Respondents prefer to invest their hard earn money in real estate, mutual funds & equity share for return.
8. Respondents consider return factor while investment followed by tax benefit factor.
9. Majority of the investors invest their money for the purpose of returns & capital appreciation.
10. Respondents come to know about mutual funds through internet, T. V. & financial advisor.
11. Most of the respondents prefer to invest in SBI & UTI mutual funds.
12. Majority of the responders prefers for Equity & Hybrid schemes of mutual funds.
13. 77% respondents prefer to invest in mutual fund through Systematic Investment Plan (SIP).

VII. CONCLUSION

This research is made as an attempt to find out the investment preferences, motives of investment of individual investors. As young investors having high risk taking capacity because they have lesser responsibilities & they prefer to invest in equity shares, mutual funds & ULIP Insurance plans whereas older investors invest their money in safe investment options like Bank FD, PF, Post office schemes etc. By understanding the investment preferences of individual investors of mutual funds, it will help to the Asset Management Companies to find business potential & investment pattern of the investors of Kolhapur city.

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Review on IoT Based Solar-Wind Hybrid Power System

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Abstract: one of the basic requirements for socio-economic growth of nation is to provide reliable and sufficient electricity supply to the industries, home appliances and other services. Now a day, the whole country is facing a problem of lack of power back-up, exhaustion of fossil energy and global warming. All the conventional energy resources are vanishing day by day. Hence, a convenient, cost-effective, pollution free and reliable power supply is an essential factor in the development of villages. This paper focuses on electricity generation using Solar Wind hybrid system The two main reason to design solar and wind hybrid generation system using the renewable energy source are power reliability in varying weather condition and cost. In the proposed system, we are introducing the reliability to deliver continuous supply of load and monitoring it with IOT interfacing. The system consists of a wind turbine, PV solar, charge controller, battery, inverter, grid and IOT system for monitoring electrical parameters of the system. Advantage of IOT system is that the operator can know the updated electrical parameters from anywhere and anytime.

Keywords — Hybrid System, IOT, Nano Antenna, Renewable Energy, Sensor, Solar Panel, Windmill.

I. INTRODUCTION

In India, nearly 70% of people live in villages and as per recent survey, only 7.3% of the total, have 100% household connectivity, and about 31 million homes in villages are still in the dark. It seems very difficult to supply electricity to rural areas as the cost is very high to install the distribution lines. In most of the rural and non electrified locations, extension of utility grid lines involves high capital investment, high lead time, low load factor, poor voltage regulation and frequent power supply interruptions. In our country, one of the basic requirements for socio-economic growth is to provide reliable and sufficient electricity supply to the industries, home appliances and other services. Now a day, the whole country is facing a problem of lack of power back-up, exhaustion of fossil energy and global warming. Hence, a convenient, cost-effective, pollution free and reliable power supply is an essential factor in the development of villages. Electricity can be generated either by using conventional energy resources such as wood, coal, natural gas, oil, etc. or by using non-conventional energy resources.

The main drawback of these conventional energy sources is that it produces large amount of waste and taking care of this wastage is very costly. It also affects the environment. The nuclear waste is very harmful to all living beings. All the conventional energy resources mentioned are vanishing day by day. Hence alternate way for electricity generation is required. The better alternative way is to generate electricity by using non- conventional energy resources. There are many non-conventional energy resources like geothermal, tidal, wind, solar, hydro power etc. The disadvantage of tidal energy is, it can only generated on sea shores. While geothermal energy is a large process to extract heat from earth. As hydro-electricity power generating system is season based, it cannot afford much power. The non-conventional energy resources like solar, wind can be good alternative source and are easily available in all condition. Electrical energy could not be produced in cloudy and rainy season from Solar. So we need to use two energy resources so that any one of source fails other source will keep generating the electricity and in good weather condition we can use both sources combine.

II. LITERATURE REVIEW

In literature, a lot of work is there on using renewable sources to generate energy for desalination plants. They have been analyzed from the perspective of the physical/chemical process as well as the engineering and financial aspects. However, as we will show in the next section, they have yet to be analyzed/ simulated from the perspective of IoT [1].The purpose of the project is to get reliable electricity from the solar wind hybrid generation system to the user with uninterrupted electrical power supply, with affordable cost without damaging the natural balance.

Soham Adhya et al. proposed an IoT based remote monitoring system for solar power plant, the approach is studied, implemented and successfully achieved the remote transmission of data to a server for supervision [2]. But a provision of advance remotely manage the Solar PV plants of various operations like remote shutdown, remote management is yet not implemented and this system fails in rainy season.

Rahul Mishra et al. proposed Biomass and Photovoltaic based hybrid renewable energy system (HRES) for meeting the electricity demand from households and other community loads which comprises the load demand of school, dispensary, shops, community offices etc. [3]. In this paper, efforts are made to exploit biomass and solar resources in the region and suggest some of the cost

effective and environment friendly ways to meet the demand. The cost analysis predict in spite of having huge capital and installation cost renewable energy sources prove to be more reliable and environmental friendly source to provide electricity in remote or off grid areas. But generated energy is not sufficient to fulfill the requirement in city areas.

III. PROBLEM FORMULATION

The approximate amount of energy generated from various Renewable Energy sources in India by IREDA is shown below.

Sr. No	Energy source	Potential
01	Solar	20MW/sq.km
02	Wind	20,000 MW
03	Small Hydro	10,000MW
04	Ocean Thermal	50,000MW
05	Tidal	10,000MW
06	Biogas	12 Million plants
07	Bagas based cogeneration	3500MW
08	MSW	1000MW

Table 1: Renewable Energy potential in India

A) SOLAR POWER:

Solar power is the cleanest, most reliable from of energy available, and it can be use in several forms. The amount of power generated through solar photovoltaic system is about 20 MW / Sq.km in India. The proportion of the sun's rays that reaches the earth's surface is enough to provide for global energy consumption 10,000 times over. On average, each square meter of land is exposed to enough sunlight to produce 1,700 kWh of power every year. Solar Power system consists of three major components namely solar panels, solar photovoltaic cells, and batteries for storing energy. Solar powered photovoltaic (PV) panels convert the sun rays into electrical energy by exciting electrons in silicon cells using the photons of light from the sun. Most of the solar panels placed on the root to get sun rays on panel. It contains photovoltaic cells made from silicon that transform incoming sunlight into electricity than heat. The electrical energy (DC power) generated using solar panels can be stored in batteries or can be used for supplying DC loads or can be used for inverter to feed AC loads.

B) WINDMILL:

Solar Energy is available only during the day time whereas wind energy is available throughout the day depending upon the atmospheric conditions. Wind energy is also one of the renewable energy resources that can be used for generating electrical energy with wind turbines coupled with generators. Wind energy is the kinetic energy associated with the movement of atmospheric air. Wind power converts the kinetic Energy in wind to generate electricity or mechanical power. Wind turbine can be defined as a fan consisting of 2 or 3 blades that rotate due to blowing wind such that the axis of rotation must be aligned with the direction of blowing wind. A gear box is used for converting energy from one device to another device using mechanical method. There are different types of wind turbines, but the frequently used wind turbines are horizontal axis turbines and vertical axis turbines. Advantages of windmill include clean power generation, cheaper than solar generation and there should be no shortage of wind, especially in coastal areas.

IV. PROPOSED SYSTEM

A. SMART SOLAR WIND HYBRID POWER SYSTEMS:

The combination of renewable energy sources, wind & solar are used for generating power called as wind solar hybrid system. This system is designed using the solar panels and small wind turbines generators for generating electricity. The block diagram of solar wind hybrid system is shown in the figure in which the solar panels and wind turbine are used for power generation.

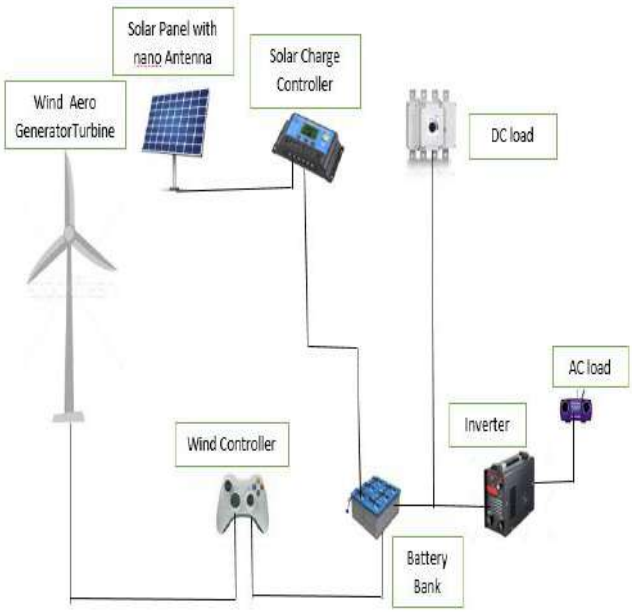

Fig.1 The Solar-Wind with Nano-antenna Power Generation System

Wind and solar energy are complementary to each other, which makes the system to generate electricity almost throughout the year. The main components of the Wind Solar Hybrid System are wind aero generator and tower, solar photovoltaic panels, batteries, cables, charge controller and inverter. The Wind - Solar Hybrid System generates electricity that can be used for charging batteries and with the use of inverter we can run AC appliances. Wind aero-generator is installed on a tower having a minimum height of 20 meters from the ground level.

Because of the height, the aero-generator gets wind at higher speed and thereby generates more power. The Solar-Wind with Nano-antenna Power Generation System is designed as shown in Fig. It has some special equipment which is used to charge the battery or the power storage (accumulator) circuit. Control circuit ad-joint with electric power generating system provides necessary control functions such as adding or summing up electric power derived from more than one sources at a time i.e. solar and wind power simultaneously, solar with Nano antenna and wind power. Simultaneously, over voltage protection, amount of electric power directed to the load and the battery etc. Thus by implementing integrated Solar-Nano-antenna Wind-Lightning Power Generation System in a compact package, we have an uninterrupted power supply at the minimum cost to all places at all times.

B. IMPROVING SMART SOLAR WIND HYBRID POWER SYSTEMS USING IOT:

The internet of things (IOT) is the network of physical devices, vehicles home appliances and other items embedded with electronics software, sensors, actuators and connectivity which enables these objects to connect and exchange data. In this system of managing smart grid power generation facilities by using power generation facility INTERNET OF THINGS based technology is used. This system recognizes smart grid power generation facility image in real time by using image sensor and GPS sensor and it provides site manager with detailed information, hardware drawing, sensor data, and history of power generation facility. In addition, it provides location information of facilities so that site manager could identify the facilities of other environmental surroundings conveniently. Also site manager could perform regular check-up and maintenance of repair conveniently.

V. SOCIAL ASPECTS AND ADVANTAGES:

Health Aspects: - A pollution free clean and pure energy can be generated.
Environmental Aspects: - It will provide uninterrupted power supply to all appliances with very high reliability and it can be used for 24 hour power generation irrespective of changing weather conditions.
Economic Aspects: it is cost saving. Also have less maintenance cost.

VI. CONCLUSION

This combination of solar-wind energy source will be highly effective in commercial areas. It is eco-friendly at the same time prevents accidents due to lightening. It is used to cut short power charge. By this system electricity charge could be saved as very less maintenance charge is required for equipment. Moreover there is no power cut or load shedding at any times. In addition to this, the system is controlled by INTERNET OF THINGS as site manager is able to receive detailed information of facility at site, efficient maintenance for regular checkup and failure could be performed conveniently. It is the most reliable and cost efficient. This research is at an underdeveloped stage and may take years to bring it into market. We encourage the scientific community to consider this technology along with others when contemplating efforts and resources for renewable energy.

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Design & Development of Compact Size, Vertical Axis, Spiral Shaped Wind Turbine

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Abstract: - Residing in Konkan region, we have abundance of the Wind Energy, which is the sources of Non-Conventional Energy. The main objective for choosing this project is to harness these Non-Conventional Sources and make the availability of Energy for Household and other purposes. As these source, Wind Energy is readily available free of cost in surrounding areas, it makes the whole process Cost-effective. So the purpose of this research is to design a wind turbine that can work on surrounding winds, a system that is relatively cheap, portable, and depends only on renewable energy.

Due to increasing usage of fossil fuels it has led to the extinction of fossil fuels. This has made a necessity for harnessing of non-conventional energy resources. This could be sun, wind or even water. But harnessing of wind through wind turbine is a bit easy. Installation of wind turbines is not cost effective due to their large size that is why we are going to introduce a new technology that will be compact as well as cost effective.

Keywords- Renewable Energy, Non-Conventional Sources, Wind Turbine, Compact Shape.

I. INTRODUCTION

Wind is the basic non-conventional sources of energy along with solar and tidal energy. But the harnessing of tidal energy and solar energy is expensive as compare to wind energy. This can be only explained by comparing of size and energy output of the systems. The power output for same amount of energy from solar and wind energy is more for wind energy when in compared with the size of solar panels and wind turbines. For this purpose, harnessing of wind energy is extremely effective. Moreover, typical non-conventional harnesses are easily damaged or compromised by disasters, natural or otherwise. This results in a very challenging situations for individuals trying to prepare for such situations. Everyone wants to find out the solution of the problem of harnessing wind energy in a cost effective way. Fortunately, there is solution to this problem. It is a technology that is compact, energy efficient, but is also simple, cost effective, and environment friendly.

Windmill or wind turbine is one of the devices that can be used for harnessing of wind energy. This requires energy input in the form of wind or air streams. In this process the wind energy is strike on the blades of wind turbines and the rotary motion of this wind turbine is used to produce electrical energy. Wind energy is one of the most important energy sources. The concept of wind energy is transforming the wind's kinetic energy into mechanical energy. This energy drive blades that turn generators that produce electricity. The proposed project requires following parts.

Pipe- The Component used to hold all the turbine blades together on the shaft is the pipe. This acts as the ribs for the blades.

Blades- The Component where the air will strike is the blades. This are curved shape blades that will convert the wind force into rotary motion.

Shaft- The Component that will hold the pipes altogether is the shaft. This is Backbone of the System.

Branch pipe- The main base component on which the Shaft and the Generator is mounted is the Branch pipe.

Generator- The device that will help in harnessing the Wind Energy in the form of Rotary energy of the Blades and Generate Electricity is the generator.

II. LITERATURE SURVEY

Energy is the main economy base of any country. Sources of energy are not easy to have. Having multiple sources of energy is extremely important to secure the basic living requirement of any country. Utilizing the nature could help in converting some of the natural phenomenon such as sun, wind, sea and oil into useful energy[1,2]. This kind of energy called renewable energy. The current power demand in India is very high compared to power consumption across the world. Also the Electricity demand is more than the production here[3].

Science Daily Research Newspaper has defended renewable energy as The most common

definition is that renewable energy is from an energy resource that is replaced rapidly by a natural process such as power generated from the sun or from the wind[4].

VAWT is not as commonly used as the Horizontal Axis Wind Turbine. The reason behind that is that VAWT is less efficient than HAWT when considered as a power plant generator. However, for the small scales like homes, parks, or offices VAWT is more efficient. Vertical axis turbines are powered by wind coming from all 360 degrees, and even some turbines are powered when the wind blows from top to bottom[5,6]. Because of this versatility, vertical axis wind turbines are thought to be ideal for installations where wind conditions are not consistent, or due to public ordinances the turbine cannot be placed high enough to benefit from steady wind[7].

III. SIGNIFICANCE OF WORK

Our project concerns on converting the mostly available air streams or in simple words wind energy into electrical energy. After researching and investigating, we outlined some of the needs:

- Efficiently produce at least 50 Watts of electrical output.
- Able to power on tube lights, bulbs and even sometimes fan.
- Relatively inexpensive to remain accessible to a wide range of audience.
- Fit and forget setup and operation.
- Reasonably compact and portable.
- Less maintenance.

IV. PROPOSED WORK

Conventional Windmills Have Existed since 18th century. They have considerably increased in size since their inception. Also their output has increased. This has come at a cost of heavy investment in capital. Also maintenance is very expensive.

So we have come up with an idea of a compact size, vertical axis wind turbine. The size of this turbine will be almost of 10% of the normal windmill. Also it will be spiral shaped and will have attractive design. The proposed wind turbine will have an output of around 50 to 100 watts depending on the size of the blades used and the speed of the wind streams.

V. PROPOSED DESIGN

The Blades will possess a spiral shape so they can consume air all around itself for its functioning. While its installation in vertical axis will make it easy to install in less spacious areas. The proposed designs and schematic diagrams are as shown below.

Fig.no.1 Proposed design of turbine blades.

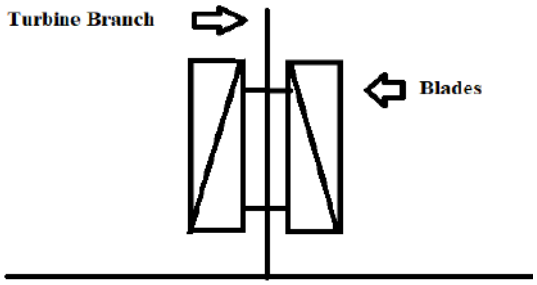

Fig.no.2 Proposed Diagram of Wind Turbine.

VI. COMPARITIVE ANALYSIS

The savings through the utilization of a modified version of compact shaped wind turbine will result in cost effective as well as energy efficient method. However, the saving of fossil fuels can be optimised using this technology. All the savings have been estimated in terms of consumption annually.

By using this compact shaped, vertical axis wind turbine one can not only save the fuels or money but also keep the environment free from pollution and make complete utilization of wind energy systems at a single place.

The positive point of wind energy is that unlike solar energy that only can be used with sunlight only. Wind energy can be useful all the 24 hours all the year. This project is green source of energy and has no effect on the life of earth. There are no effects on the environment at all. Moreover, it is reducing the CO2 and CO gases that effect the environment in the earth. One of the biggest challenges is the social accept of Vertical Axis Wind turbine.

VII. ADVANTAGES AND LIMITATIONS

- Advantages: -

The advantages of Compact Size, Vertical Axis, Spiral Shaped, Wind Turbine are –

1. Produce clean energy.
2. Compact in shape and size.
3. No operator required and less maintenance.
4. Comparatively cost is less than any other non-conventional harnessers.

- Limitations: -

1. Speed of wind streams are required.
2. The speed of winds is never constant.

VIII. CONCLUSION

By using this wind turbine, we can harness wind energy as we do in normal windmills. From the result of the project, A truthful estimation is possible for the prototype which will be most energy efficient and cost effective substitute of normal windmills. From this there is efficient use of renewable energy resources in the form of wind energy.

Energy resources are getting more difficult to get. With the increasing of the population, and high demand of the power, and taking in consideration the current situation of the oil prices and it reliability. India has to start as soon as possible implementing the use of renewable energy. Wind energy can be very useful for this purpose. This project and research as any other similar studies are convincing that wind energy can help a lot the country supplying power with these renewable energies which can be costly at the beginning, but it will be the most reliability solution that can apply the concept of sustainability.

IX. RESULT AND DISCUSSION

By using above specification which is result of design and development used; Wind turbine can be fabricated and one can get energy very easily. Also in this project we have made efficient use of renewable energy resources in the form of wind energy.

This project presents a review on the performance of Spiral wind turbines. This type of turbine is not commonly use and its applications for obtaining useful energy from air stream is still considered as an alternative source. This project consists of three phases; designing, fabrication, and evaluating. An actual of gained power is reported to be 31-35% relative to the theoretical gained power due to the instability and inefficient of the wind speed.

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AN INNOVATIVE APPROACH FOR EXTRACTION OF ENERGY FROM WASTE HEAT

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Abstract: These research paper aims to develope an Innovative approach towards extraction of heat energy.*In present, for generation of electricity there is a shortage of fossil fuel, oil, gas, etc. burning of these fuels causes environmental problem like radio activity pollution, global warming etc. To reduce these problems we are designing these system by using thermoelectric generator. By using this, energy is used to charge the mobils, , run home appliances, dc lighting etc,.*

***KEY WORDS*- Thermoelectric generator, waste heat, global warming.**

1. INTRODUCTION

As the title mention this system will prove to be an effective alternative for extraction/ generation of desired energy from waste energy. According to energy conversation law, energy can't be created or destroyed it will be transformed from one form to another but during transformation there is a energy loss. In our system we are going to use this energy in an efficient way i.e. one of the daily used vehicle is our private cars. So as most of the vehicles are using internal combustion engine this produces a considerable heat and dissipated into the environment. We have proposed a system with a thermo-electric generation technique in which a direct energy transducers are used which produces the electrical power proportional to heat difference maintain around the transducer. Basically this transducer are working on the principle of thermo-couple technique in which it states that whenever there is a difference between the two junction of a material made with a combined elements so that this temperature difference makes the electron flow between the two junction held at different temperature. To enhance the efficiency and utilization a post generation module is implemented which generates the different form of voltages to drive and satisfy our daily needs like mobile charging, home dc as well as ac lightening.

2. LITERATURE SURVEY:

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2. Prashantha.K, Sonam Wango (BCET), India;"Smart Power Generation from Waste heat by Thermoelectric Generator" special issue, Sep-2016:- in these paper, method for electricity generation is converting thermal energy into mechanical energy by turbine then into electricity by generator.

3.COMPONENTS USED

1.TEG: TEG stands for thermoelectric generator transducer.

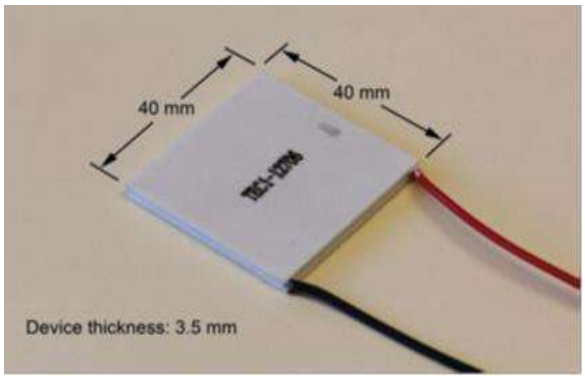


Fig.1.1 TEG

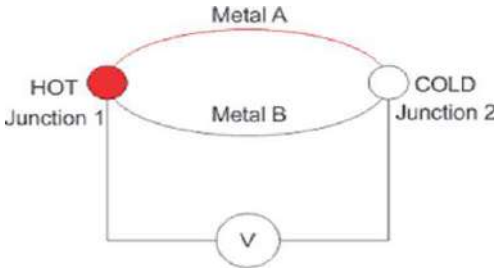


Fig.1.2 difference between two junctions

A Thermoelectric is a sensor used to measure temperature. TEG consist of two wire legs made from different metals. The wires legs are welded together at one end, creating a junction. This junction is where the temperature is measured. When the junction experiences a change in temperature, a voltage is created. A TEG is a type of temperature sensor, which is made by joining two dissimilar metals at one end. The joined end is referred to as the HOT JUNCTION. The other end of these dissimilar metals is referred to as the COLD JUNCTION. The cold junction is actually formed at the last point of thermoelectric material.shown in fig.3.2.

2.Radiator fans

Fig.2.1. View of Radiator fans

Radiators are heat exchangers used for cooling internal combustion engines, mainly in automobiles but also in piston-engine aircraft, railway locomotives, motorcycles, stationary generating plant or any similar use of such an engine. Internal combustion engines are often cooled by circulating a liquid called engine coolant through the engine block, where it is heated, then through a radiator where it loses heat to the atmosphere, and then returned to the engine. Engine coolant is usually water-based, but may also be oil. The radiator transfers the heat from the fluid inside to the air outside, thereby cooling the fluid, which in turn cools the engine. Radiators are also often used to cool automatic transmission fluids, air conditioner refrigerant, intake air, and sometimes to cool motor oil or power steering fluid. Radiators are typically mounted in a position where they receive airflow from the forward movement of the vehicle, such as behind a front grill. Where engines are mid- or rear-mounted, it is common to mount the radiator behind a front grill to achieve sufficient airflow, even though this requires long coolant pipes.

3.Heat Sink

A heat sink (also commonly spelled heat sink) is a passive heat exchanger that transfers the heat generated by an electronic or a mechanical device to a fluid medium, often air or a liquid coolant, where it is dissipated away from the device, thereby allowing regulation of the device's temperature at optimal levels. A heat sink is designed to maximize its surface area in contact with the cooling medium surrounding it, such as the air. Air velocity, choice of material, protrusion design and surface treatment are factors that affect the performance of a heat sink.

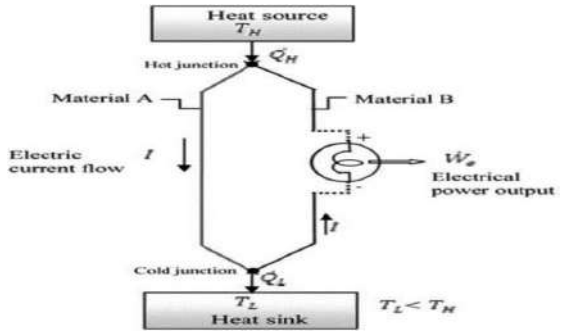


Fig.3.1. Process and view of heat sink

4. Battery

The lead-acid battery was invented in 1859 by French physicist Gaston Planet and is the oldest type of rechargeable battery. Despite having a very low energy-to-weight ratio and a low energy-to-volume ratio, its ability to supply high surge currents means that the cells have a relatively large power to weight ratio. These features, along with their low cost, makes it attractive for use in motor vehicles to provide the high current required by automobile starter motor.

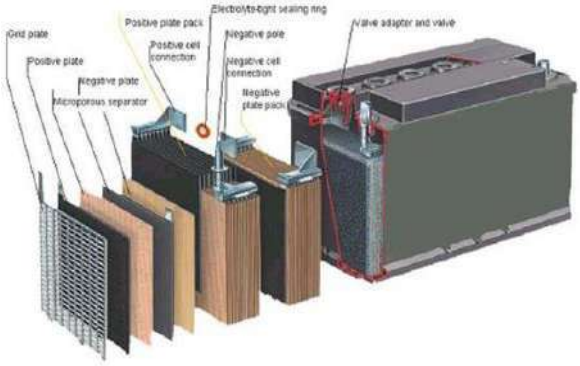
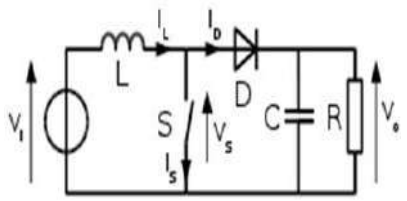


Fig.4.1.internal view of battery

5. Boost Converter:

boost converter (step-up converter) is a DCtoDC A power inverter, or inverter, is an electronic device or circuitry that changes direct current (DC) to alternating current (AC).A power inverter can be entirely electronic or may be a combination of mechanical effects (such as a rotary apparatus) and electronic circuitry. Static inverters do not use moving parts in the conversion process The waveform in commercially available modified-sine-wave inverters is a square wave with a pause before the polarity reversal, which only needs to cycle back and forth through a three-position switch that outputs forward, off, and reverse output at the pre-determined frequency.



6. Inverter:

DC to AC power inverters, which aim to efficiently transform a DC power source to a high voltage AC source, similar to power that would be available at an electrical wall outlet. Inverters are used for many applications, as in situations where low voltage DC sources such as batteries, solar panels or fuel cells must be converted so that devices can run off of AC power. The method in which the low voltage DC power is inverted, is completed in two steps. The first being the conversion of the low voltage DC power to a high voltage DC source, and the second step being the conversion of the high DC source to an AC waveform

V.OBJECTIVE OF THE PROJECT:

In private transportation

- In public transportation
- On large cooling system radiators
- Solar water heater add on for dissipated heat

VI. ADVANTAGES:

- Efficient way to use waste energy
- Better utilization of power
- Save money and reduce overall cost to run nominal

home appliances

VII. RESULT: In this project we extract energy from th waste heat.

CONCLUSION: Thus by considering above said system we conclude that, this system will definitely solve the problem of electricity utilization up to some extends by eliminating the use of some of the daily used appliances like charger and dc lightening. At the same time the energy generation method is pollution free so that it will help to build a green energy solution.

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DESIGN DEVLOPMENT & MANUFACTURING OF HYDRAULICALLY OPERATED COIL SPRING COMPRESSOR FOR MACPHERSON TYPE SUSPENSION SYSTEM

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An improved spring compressor tool for use on, for example, a MacPherson-type independent suspension assembly of a vehicle, without the necessity of removing the suspension from the vehicle. The tool includes upper and lower U-shaped pressure shoes having helical-shaped outer peripheries which define slots for receiving spaced coils of the spring intermediate the opposed connected ends of the spring. At least one of the shoes is linearly adjustable and both shoes are rotatably adjustable for initial alignment with the spaced spring coils. Pair of pneumatic cylinders are positioned side-by-side between the upper and lower shoes. Air pressure is provided through novel valves mounted on a handle for the tool to the cylinders for moving the shoes toward one another to compress the spring and to vent the cylinders for releasing the spring. Return springs are provided in the cylinders to urge the shoes to a non-compressed position during venting. In a mod ified embodiment of the tool, the lower shoe is replaced with a bench-mounted clamp which engages the suspension assembly below the spring.

I. INTRODUCTION

Coil spring puller are tools that are used to service certain types of automotive suspensions. Some vehicles use components known as struts, which combine a shock absorber and spring into an integral component of the suspension system. The springs are very strong, and under significant tension, so simply taking a strut apart can be quite dangerous. To safely accomplish this task, and to facilitate the reassembly of a strut, a coil spring puller is typically required.

Struts have three primary components, which are a housing, strut, and coil spring. The housing typically bolts up to a steering knuckle and a strut tower, and the strut fits inside. A strut plate typically sits on top of the strut, and a coil spring is installed between the housing and the plate. In most cases, some type of bushing will also be installed between the plate and the tower. A coil spring puller is usually required to permit the replacement of items such as struts and bushings.

The purpose of a coil spring puller is to remove the tension from a strut assembly so that it can be safely

disassembled for service and then reassembled afterwards. This is accomplished by inserting the feet or hooks of the puller into the spring, and then tightening it with a ratchet or hand tool. When the coil spring puller is tightened, its feet or hooks cause the spring coils to draw closer together. That effectively removes the tension from the strut assembly so that the plate can be unbolted, and the strut may get replaced.

II. LITERATURE REVIEW

Gang jin, Pat. No. U.S. 6,972,982 B1 (2005), a tool for compressing a coil spring includes forcing screw having a threaded portion and a non threaded portion, a first clamping member rotatable about the non threaded portion, and second clamping member rotatable about the second person. This invention generally relates to automotive tools and more particularly to a strut spring compressor tool. One of the strut spring compressor device eg U.S. Pat. No. 3,982,730 entitled "strut spring compressor" discloses a device including two spring compressing plates which are U shaped and which oppose each other.

Charles T. Mattson, Pat. No.4,276,684 (1981) hand tool particularly adapted for compressing an automobile shock absorber spring to facilitate repairs. The tool comprises a handle with a hook pivoted at the end thereof adapted to engage under a spring coil. An arm is pivoted near one end thereof intermediate the ends of the handle, and a downwardly facing hook on the end of the arm is adapted to engage over a higher coil of the spring. By pushing the handle with the hooks engaged, the hooks or jaws are brought closer together and a short extension of the arm swings across the handle, camming back a lock sleeve slidable thereon. When the arm extension and handle are in alignment, the lock sleeve is extended by a small spring to enclose the arm extension and prevent movement thereof. The com pressed coil spring exerts a force on the jaws trying to separate them. This forces the arm extension tightly against the inner surface of the lock sleeve, holding the sleeve firmly in place against inadvertent retraction.

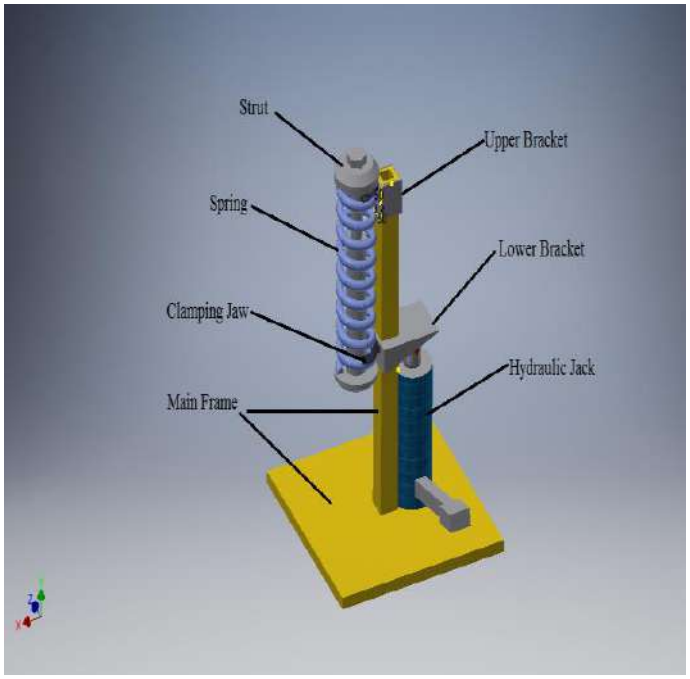
Willie R. Hutchins, Pat. No. 4,930,751 A coil spring compressing tool for use in compressing ilaris suspension springs of cars and trucks includes a pair of elongated rectangular blocks extending in spaced parallel relation. A pair of parallel guide rods is slidably received through aligned apertures provided adjacent opposite end portions on each of the blocks. An enlarged retaining stop is secured at each end of each of the guide rods for limiting maximum separation of the blocks. An elongated threaded rod has a first end portion received for free rotation in a central bore formed through one of the blocks and a second end portion in threaded engagement with a threaded bore formed centrally through the other block. A driving head is provided on an end portion of the threaded rod for engagement with a wrench. A pair of oppositely directed hooks are secured at aligned positions on side faces of the blocks and are dimensioned for engagement with a coil spring. Rotation of the threaded rod causes the blocks to move together to compress a coil spring.

Kenneth D. Kloster, U.S. Pat. No. 4,034,960 (1977) An improved spring compressor tool for use on, for example, a MacPherson-type independent suspension assembly of a vehicle, without the necessity of removing the suspension from the vehicle. The tool includes upper and lower U-shaped pressure shoes having helical-shaped outer peripheries which define slots for receiving spaced coils of the spring intermediate the opposed connected ends of the spring. At least one of the shoes is linearly adjustable and both shoes are rotatably adjustable for initial alignment with the spaced spring coils. Pair of pneumatic cylinders are positioned side-by-side between the upper and lower shoes. Air pressure is provided through novel valves mounted on a handle for the tool to the cylinders for moving the shoes toward one another to compress the spring and to vent the cylinders for releasing the spring. Return springs are provided in the cylinders to urge the shoes to a non-compressed position during venting. In a modified embodiment of the tool, the lower shoe is replaced with a

bench-mounted clamp which engages the suspension assembly below the spring.

From the above study it was concluded that coil spring compressor can be use successfully for removal of Macpherson strut type tubes. So our aim is to study Design Development and Manufacturing of Hydraulically operated coil spring compressor for Macpherson strut type suspension system.

III. PROPOSED MODEL:



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IV. COCLUSION

From the above study it was concluded that coil spring compressor can be use successfully for removal of Macpherson strut type tubes. So our aim is to study Design Development and Manufacturing of Hydraulically operated coil spring compressor for Macpherson strut type suspension system.

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Year-2017

Heart Disease Severity Prediction

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Abstract- *Todays heart disease death rate compels to predict the severity that person is prone to heart disease through the identification and evaluation of different controllable and uncontrollable risk factors which are causing heart disease. Age like uncontrollable risk factor can not be treated in curing or controlling heart disease whereas cholesterol like factors when exceed their normal range; contributes to disease and required treatment to bring it to their normal level. Controllable factors might dependent or independent as well as their affection towards disease may also different. If such correlation among them are found and analyzed over time, then definitely it will help in early and accurate diagnosis of disease. This may lead to time and cost effective treatments as well as assurance of speedy recovery of patients. Many data mining techniques serve this purpose. This paper proposes hybrid approach of predicting heart disease severity by using sequential combination of association rule mining and decision tree. Hidden relevance among factors is drawn by applying association rule mining and keeping relevant factors at root level further levels of tree are constructed. Leaf node labels 'High', 'Moderate' and 'Low' of resulting classifier-tree imply severity of heart disease.*

Keywords- Attribute_tagging, n-factor decision tree, confusion matrix, accuracy.

I. INTRODUCTION

Most of the people are ignorant of their health. It is observed that these people approach clinic when they find known symptoms of certain disease or when they get caught by disease due to which they lose their work efficiency. In minor diseases, treatments work out to cure it; but in severe diseases like cancer, heart attack, etc., such ignorance may cost the life of a patient. General worldwide survey tells Heart diseases death rate is 31% of all global deaths. Decision support system is needed to track all parameters (which are if abnormal or if reach to incurable level may attack heart) and analyze these to predict the severity in early stage or extent by which these are to be cared to avoid heart disease. This motto can be achieved with the proposed system. This predictor first identifies association among different heart disease causing risk factors, once association is evaluated for its trueness, it guides decision tree building. Leaf nodes of tree indicate class labels, "High','Moderate'or 'Low' are the ones used in this study.

II. LITERATURE SURVEY

Clinical decisions are often made based on doctor's intuition and experience[1]. Mostly different patients undergo the same treatment on diagnosis of same disease even though they are different in their physical statistics which may cause any side disease. Decisions are expected to be based on patterns hidden in the dataset storing risk factors. Data mining techniques are rich to drag out patterns, the health experts are interested in.

In order to apply any data mining technique training dataset is needed. Cleveland dataset from Cleveland Clinic Foundation is open for research work. This dataset contains many factors which can be grouped as Controllable, Uncontrollable[1].

Uncontrollable factors are age, gender, family medical background of patient. Controllable factors are smoking, blood pressure, etc[2]. These can be further classified as bad habits representing factors and physical statistics representing factors. Smoking, drinking addictions, poor diet, etc. are bad habits representing factors whereas physical statistics expressing factors are resting blood pressure, cholesterol, fasting blood sugar, maximum heart rate achieved, etc.

"Intelligent Heart Disease Prediction System Using Data Mining Techniques" [1]paper informs evaluation of Decision trees, Naive Bayes and Neural network independently towards making correct prediction and found Neural network is efficient among all. "Early Prediction of Heart Diseases Using Data Mining Techniques"[3] paper presented analysis through different decision tree algorithms-CART(Classification and Regression Trees), ID3(Iterative Dichotomiser), decision tree and concluded with CART as a more accurate in comparison of other whereas ID3 is time efficient. "Prediction of Heart Disease using Data Mining Techniques"[2] paper proposed the hybrid approach to attain more accuracy with which Decision tree and Bayesian classification are used to intimate about the possibility of heart disease.

III. PROPOSED SYSTEM

Even though decision tree takes into account the relevance among attributes, there is no any way to check the reliability of obtained order of attribute relevance. This issue is addressed by initiating the prediction process with association rule mining technique as shown in fig.1. Factors like age, gender, chest pain type, resting blood pressure, cholesterol, resting electrographic results, fasting blood sugar, maximum heart rate achieved, exercise induced agina, ST depression induced by exercise relative to rest, slope of the peak exercise ST segment, no. of major vessels colored by floursopy, defect type, obesity, smoking with their discrete values are used to build Association Rule Mining model.

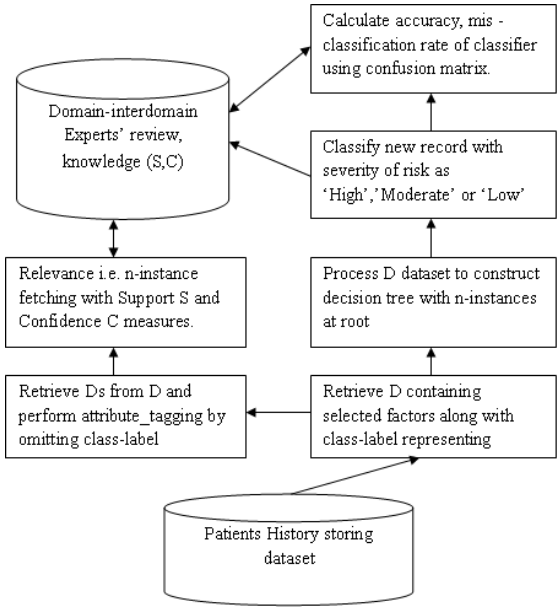

Fig.1 Architecture of Heart Disease Severity Predictor

Association rule mining is a technique to identify the relevance among the factors cause to heart disease. Currently available association rule mining is capable to work on the presence and absence of an instance in the tuple of given training dataset. In case of heart disease prediction the factors are to be used are representing physical statistics of a patient. So these factors' sure existence is recorded in dataset to be worked on. Taking absence and presence of instance into consideration is not suitable for determining relevance among the different factors responsible for heart disease and due to which existed factors are need to be expressed in innovative way. To achieve the same, we have adopted initiating two-step attribute_tagging stage. As all the factors involved in prediction are continuous valued, these are discretized with the help of domain experts. e.g. Age is categorized as 'youth' involving 0 to 25 aged, 'middle_aged' involving 26 to 45 aged and 'senior' for 46 above encompassing. Blood pressure is categorized as 'high' if valued above 120/80 mm, 'low' if valued below 90/60 mm and 'normal' otherwise. Likely all the factors are discretized to accomplish first step of attribute_tagging. With second step, attribute name and its value are concatenated, e.g. Age with three different values Youth, Middle_aged and Senior give rise to three different subfactors on concatenating it with its values which are Age_Youth, Age_Middle_aged and Age_Senior. All factors are processed in same manner to generate the final instances as shown in fig.2. These instances' presence and absence mentioned from original dataset to new table, that the association rule mining can be applied on.

Record from Ds	Age	Blood Pressure	Weight
	45	123/85	70
1.Discretization	Middle_aged	Normal	Normal
2.Concatenation of attribute and its value	Age_middleaged	Blood_pressure_normal	Weight_normal

Fig.2 Attribute Tagging

Association finding emerge candidate set for every possible combination of instances, its support can be determined by counting the occurrence/s of earlier obtained instances. By scanning dataset, Candidate-k for k=1,2,3,... instance sets can be generated. Frequent-k instance sets can be drawn out satisfying support threshold s. Support threshold, s and Confidence threshold,c satisfying instances are considered as reliable. For actual purpose of predicting severity, relevant data get fed to decision tree. Attribute relevance is taken into consideration by decision tree with which highest risk factor/attribute forms root of tree whereas all other attributes form intermediate nodes following root node according to their risk. With root node and every intermediate node, data get splited. This procedure is repeated till every record from dataset,D get classified as "prone to heart disease with risk 'High', 'Moderate' or 'Low' ". Leaf node denotes class label. Root node and internal nodes represent attributes whereas branches emerging out from node represent attribute values. 'n'-instances obtained from association rule technique application act as a root and forms 0^{th} level of decision tree. Tree with n-instances root is addressed as n-factor tree. This 'n'-instance is combination of attribute and its value which being a root splits dataset on basis of their values. For the obtained subset of dataset, as per attribute relevance decision tree is constructed. Decision tree will help in predicting severity of heart disease as high, moderate and low. Tree is optimized by pruning it.

Confusion matrix is a table in matrix form used as a performance describer of a classification model. Mentioned application resulting in three classes 'High','Moderate' and 'no'. Built decision tree is referred as classifier classifies the

tuple from training dataset itself either 'High', 'Moderate' or 'Low' .

		Predicted Class			
		High	Moderate	Low	Total Records
Actual Class	High	HH	HM	HL	P
	Moderate	MH	MM	ML	Q
	Low	LH	LM	LL	R

Fig.3 Confusion matrix

HH, MM, LL are no.of records correctly predicted as that of actual High, Moderate and Low class respectively.

HM,HL,MH,ML,LH,LM are no of records misclassified by classifier.

Total no.of records are (P+Q+R).

Accuracy can be decided as follows:

Accuracy(n-factor tree) = (HH+MM+LL) / (P+Q+R) We can obtain misclassification rate i.e. how probable classifier misclassify, as follows:

Misclassification rate (1-factor DT)= (HM+HL+MH+ML+LH+LM)/(P+Q+R).

Accuracy and misclassification rate can be calculated for every n-factor tree and highest accuracy offering tree is selected as classifier for further practical use.

Algorithm :Heart disease severity prediction.
Input:

- D, a database containing heart disease responsible factors.
- S, the minimum support threshold.
- C, the minimum confidence threshold.

Output:

Heart disease severity prediction as High, Moderate and Low.
Method:

(1) Retrieve Ds by excluding heart-disease-severity denoting attribute from D.
(2) Generate instance by concatenating attribute_name separately with its every possible attribute_value.
(3) Apply Apriori algorithm using 'S' to get frequent k-instance set/s.
(4) Apply 'C' to frequent n-instance set/s resulted in step (2), to obtain relevant instances.
(5) Retrieve Df, n-instances belonging dataset along with severity denoting attribute is extracted from D.
(6) Apply decision tree algorithm to construct tree with level-1 onwards using factors not in n-instance by keeping n-instances at 0^{th} level.
(7) Use confusion matrix to calculate accuracy of the hybrid model.

Once it is identified, heart disease is probability of its severity can be calculated by feeding record to Bayesian model. Bayesian technique assumes every attribute is independent and predicts class label along with its probability

Challenges

Accuracy- the sensitive fragment of datamining's practical use in medical field, may get hamperedS due to certain issues:

1. All attributes are not discrete in nature. E.g. Age : it need to categorized in ranges –say 0-25, 26-45, 46 and above.
2. Training data set used for building classifier must be complete. If it contains measurable incompleteness then even after processing such data affects the based classifier.
1. 3.Prediction system indulges reasonable human interference

i.e. domain expert's view from discretization of attribute values to tree optimization. Relevance finding may be affected by changed support and confidence thresholds. This is again depending upon his/her intellectual level as well as experience.

IV. CONCLUSION

Heart disease contributing factors are so many. If their relevance is determined, then with allowable specificity, heart disease severity can be predicted and accordingly effective treatment can be offered to patient. This work is capable to inform severity only, with certain updation it may be applicable to non-patients for predicting infuture chances of disease based on current physical statistics. Introducing temporal support and confidence threshold, periodically these factors may be reviewed to obtain more accurate results.

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Local Service Finder With Geo-Fence Capability

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Abstract- *This paper involves Android application development for connecting people with local service providers. This involves a GPS based location tracker, in which with the help of any mobile device (app installed); any other GPS enabled handset (app installed) could be located which helps service provider to get nearby requestor. Google Maps API is used to visualize users of application. Though target user may be located anywhere in the world, (s)he must have network connectivity and GPS enabled. Proposed system is based on geo-fence which gives location accuracy. QR code integration will popularize application free of cost and for quick access.*

Keywords- geo-fence, Google map, local service provider, service request

I. INTRODUCTION

This paper illustrate a GPS based application which will help us in locating the approximate geo-position of people depending upon their current location. Geo-position will be displayed on the map view on our android device and display functioning can analogue to the current usage of Google Maps.[7] Customer request is forwarded to all service provider as per the category within geo-fence. If required service provider not present in geo-fence then it can be extended. According to distance, service provider will decide which request to be process. Service provider and customer can interact with each other through chat or call. System has google map visualization to service provider which help to reach destination(Customer).Customer can give rating and feedback to service provider from which service seek. Proposed system is time saving for both customer as well as service provider. Customer have block list facility so they can restrict particular service provider. Proposed system generates QR code for service provider which contains basic information. It gives quick access to application and reduces advertisement cost.

A geo-fence is a virtual perimeter for a real-world geographic area.[1] A geo-fence could be dynamically generated—as in a radius around a store or point location, or a geo-fence can be a predefined set of boundaries, like school attendance zones or neighborhood boundaries.

This paper mainly focuses on providing local services to people using location based android application; with help of any android device (app installed); any other GPS enabled handset (app installed) could be located, which helps service provider to get nearby requestor. Ensures availability of local services spread across geographical region to the customers.

II. LITERATURE SURVEY

The paper presented by Vinayak Hegde gives idea about how distance is calculated by using the Haversine formula and how the clustering algorithm k-means is used to cluster the locations to get more accurate results. Google maps API is used to find out the latitude and longitude of each student residential address and visualized, which gives the minimum, maximum and average distance. This paper mainly focuses on the location wise distance analysis. The main purpose of this paper is to identify the distance in the kilometer of the student residential location from the Institute.[1]

Pratiksha Mittra's paper primarily deals with the generation of QR codes for Question Paper they have proposed encryption of Question Paper data using AES Encryption algorithm. The working of the QR codes is based on encrypting it to QR code and scanning to decrypt it. This paper propose the application of QR code which is a developed application that helps in secure transfer of question papers via websites and interfaced among various universities.[2]

Mfundo Masango's paper proposed an application which is based on Google timeline and auto save location. Safe zone is set for particular application with help of geo-fence. Whenever user move outside that geo-fence then security mechanism activated so only authorized user can access the application .Security provided based on location of user.[3]

Dijana Jagodic's paper gives basic idea of QR code and its use in android applications. QR code supports android version 2.3 and above. Implementation cost of QR code is less as it require only mobile phone with camera. Various applications of QR code are well mention in this research

paper. Security from unauthorized access to sensitive data is possible by QR code.[4]

Huiguang Liang's paper is based on Global Positioning System (GPS) and Network Location Provider (NLP) for localization. Accuracy of location is more in GPS+NLP than GPS only. Users of this system would get multiple path to reach their destination with exact distance. Effect of mobility and network delay on localization is represented in this paper. Location management is properly explain and the facts that affect localization is listed properly. [5]

Paper by Patricia Ortal states about real time location of moving objects on Google maps. Every move of object is captured and its location is stored in database then the location is shown on map.[6]

'Beginning Android 4 Application Development' book is helpful for location based service application, using Google Maps. It demonstrate way to obtain geographical location data and display that location on map. Also gives use of XML and JSON web service in android application. This book covers many topic with appropriate example, so learning is easy and efficient.[7]

III. EXISTING SYSTEM

There are many applications that provide local services like UrbanClab, Sulekha.com, HouseJoy, Babajobs, etc. We analyze the working of these existing system. There are some limitations such as no any map visualization, no blocking facility.

When any request submitted, current system broadcast user request to all corresponding registered service providers. System doesn't provide list of corresponding providers from similar request history. If any service provider accepts any request and if (s)he wants to cancel it due to certain reasons then it is not possible. After request get accepted, existing system doesn't provide any map visualization facility. There is no such way to view where exactly the requestor located. For any instance of time if user want to check for route to reach any location then there is no any direct route provider. From customers point of view any service provider is not helpful or does not satisfy customer expectation for particular service then customer doesn't have facility to block that service provider.

IV. PROPOSED SYSTEM

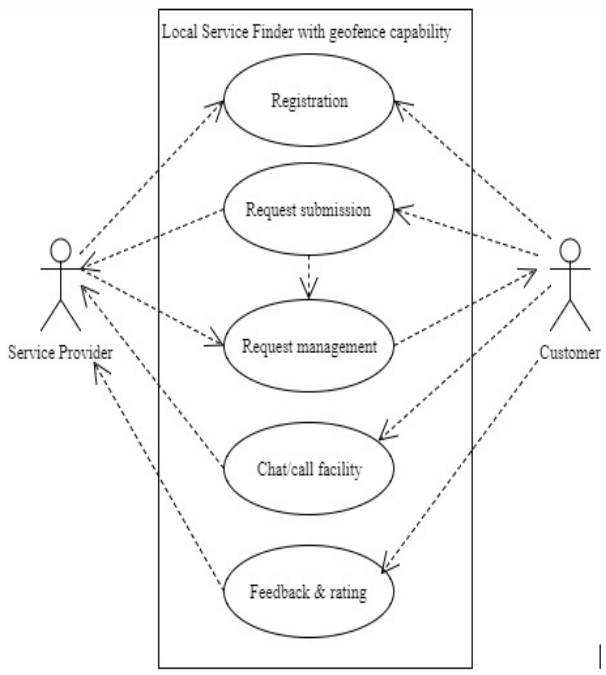

Figure 4.1 system flow diagram

Customer and service provider will register to system by providing essential information. For verification they have to enter OTP which is send by application to their provided email ID .Service provider will able to enter their specialties as well as experience. When customer login to application, they can request for service. While submitting their request they can mention budget and time. Customer can be request to only particular service provider if and only if those service providers previously provide service to that customer; otherwise the request is forwarded to all service providers within Geo-fence.

Service provider will receive notification of request. According to decision of service provider (Accept/Reject) notification send to customer. When service provider accept request, the corresponding customer communicate with service provider through chat facility. Proposed system will provide feedback and rating facility. So that customer can give feedback and rating to service provider who gives service. System will filter the feedback to positive and negative. According to rating the request will be forwarded by system to service providers who have high rating.

V. CONCLUSION

The Local Service Finder with geo-fence capability application we are developing, is intended to find local services in particular region. Customer request for any service

like electrician, plumbing, etc. fulfills the application in easy way. The GUI provided is very simple so that any novice can learn to use it. This project is partially implemented with some of the features as per requirements.

Service providers will also happy because of growth in their business or income source. Customer can easily communicate with service provider and get struggle free any kind of local services by sitting at their home.

VI. ACKNOWLEDGMENT

We take this opportunity to express our deep sense of gratitude towards one and all who have directly or indirectly helped us in the due course of doing this research and preparing this research paper.

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Design and Manufacturing of Multi-Degree Rotation of Fixture For Drilling Operation

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Abstract- *This research paper aims to provide multi-degree rotation of fixture for taking angles at 8^o and 15^o respectively.The main purpose of this fixture to ease the manufacturing of desired component without taking another fixture for various angles and put them into a single rotory fixture having various angles .Analytical calculations are done based on standard results to avoid vibration and to get desired accuracy.Objectives of this research is to provide accurate angle on fixture for drilling operation at 8^o and 15^orespectively.*

I. INTRODUCTION

The purpose of this project to design rotory fixture for drilling operation. Fixtures accurately locate and secure a part during machining operations such that the part can be manufactured to design specifications. To reduce design costs associated with fix turing, various Computer aided fixture design (CAFD) methods have been developed through the years to assist the fixture designer.

The machine tool industry has undergone sufficient changes as the requirement of user engineering systems changed; first it started with the manufacture of basic general purpose machine tools. These machines though offered higher flexibility were not suitable for mass production owing to longer set up times and the tedious adjustments of machine and tools besides requiring highly skilled operators.

With growing need of fast production to meet the requirements of industry, mass production machines are conceived. Hydraulic, tracer control machine tool, special purpose automatic and semi-automatic machines were introduced with the advancement of technology. These machines were highly specialized but inflexible. The use of these machines was with a success for mass production and they have considerably reduced the production costs by way of reduced machining times and labor costs.

II. LITERATURE REVIEW

Design and Manufacturing of Multi-Degree Rotation of Fixture for Drilling Operation we referred various papers:

Nirav P. Maniar, D. P.Vakhariamakes the review onComparative Study of Rotary Fixture Design.They found that Jigs and fixtures are the special production tools which make the standard machine tool, more versatile to work as specialized machine tools. They are normally used in large scale production by semi-skilled operators; however they are also used in small scale production by when interchangeability is important. Though various areas related to design of fixture are already been very well described by various renowned authors, a fixture design process to couple and apply all these research works to an industrial application is not yet formalized. This paper integrates all these aspects and the evolutionary functional approach of present research work is proved from the fact a real industrial knowledge model for fixture designing is developed. Careful review of the literature clearly reveals that methodology for mass balance of rotary fixture developed by investigators mostly act as post-mortem tool; calculating unbalanced mass after fixture is manufactured. A tool that could predict unbalanced mass during fixture design stage has not yet been developed. Hence in the present work, an attempt has been made to develop step by step procedure, which acts like a pre-mortem tool to predict unbalanced mass during fixture design stage well before manufacturing. The paper proposes the integrated approach of rotary fixture design for manufacturing. The innovative approach of use of Pro/Engineer Wildfire 5.0 is proposed to solve the mass balancing problem.

ShivajiMengawadeet.al (2016)gives the review onDesign and Analysis of Work Holding Fixture.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 termsof 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

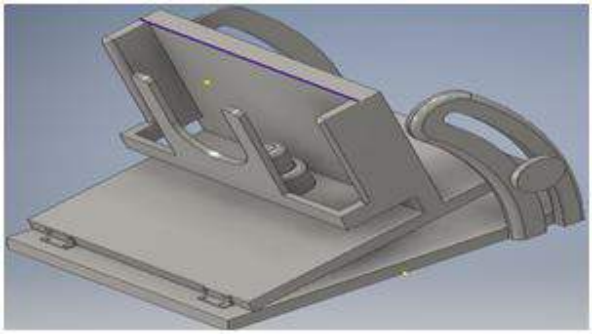
flexibility in holding forces and to optimize design for machine operation as well as process function ability.

ShaileshS.Pachbhai and LaukikP.RautpresentedA Review on Design of Fixture. In machining fixtures, minimizing work piece deformation due to clamping and cutting forces is essential to maintain the machining accuracy. The various methodology used for clamping operation used in different application by various authors are reviewed in this paper. Fixture is required in various industries according to their application. This can be achieved by selecting the optimal location of fixturing elements such as locators and clamps. The fixture set up for component is done manually. For that more cycle time required for loading and unloading the material. So, there is need to develop system which can help in improving productivity and time. Fixtures reduce operation time and increases productivity and high quality of operation is possible.

Nikhil G. Lokhande and C.K. Tembhurkarstudy Design of Angular Drilling Fixture and Analysis of Cutting Forces during Drilling on Cylindrical Surfaces Applications such as in defense sector, manufacturing of grenade fuse required angular holes on fuse body, producing holes in turbine blades for the aerospace industry, generating micro-holes in diesel fuel injection nozzles etc requires angular drilling. Trepanning, gun drilling are the operations available for drilling at specific angle, but they can be useful when drilling angle should be less than 10 degree. The job having a cylindrical shape and number of holes are required on it at an angle is challenging task for design engineer and hence Computer Aided Fixture Design (CAFD) is incorporated in manufacturing industry. It deals with the integration of CAD and CNC programming in CAM systems using softwares for fixture design. Except V block, no other option is available to hold cylindrical object and hence special type of fixture is designed for this case, which can be used for angular drilling. In this paper, a literature survey of computer aided 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 CAFD field, including their approaches and customer requirements are discussed.
N. P. Maniar and D. P. Vakharia gives Design & Development of Rotary Fixture for CNC.

Various areas related to fixture are already been described by renowned authors, still there is an urgent need to apply all these research works to an industrial application. This paper presents design and development of rotary fixture for real industrial component. The component is Flow TEE body of petroleum refinery. The operations to be performed are front facing, outside diameter turning, grooving, boring and back facing. Actually HMC is the best solution for performing the required operations, but HMC costs around 12.5 million rupees whereas CNC turning centre costs only about 2.5 million rupees. A fixture is designed which can be mounted on CNC turning centre and 10 million rupess are saved in installation cost as these operations can now be performed on CNC turning centre using the designed fixture. Methodology for mass balance of rotary fixture developed by investigators mostly act as post-mortem tool; calculating unbalanced mass after fixture is manufactured. In the present work, a pre-mortem tool is developed to predict unbalanced mass well before manufacturing. The present research also proposes alternate methods for mass balancing of rotary fixture. The paper sets the classical example of integrated approach of design for manufacturing.

III. PROPOSED METHODOLOGY



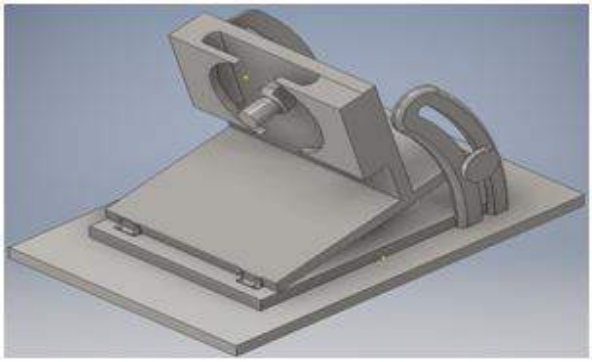


Figure shows proposed CAD model. The construction consists of clamp to hold the work piece horizontally from both the end and projection used to centered the work piece.Autocad Inventor is used as design software for fixture. The plane is provided to rotate the work piece with the help of scale which is located at the both sides of the plane.

IV. DISCUSSION

We have referred papers in the literature review. Various views from the study of different topics have been discussed. Nirav P. Maniar, D. P.Vakharia have summarized Comparative Study of Rotary Fixture Design. They performed an integrated approach of design and mass balancing of rotary fixture has been adopted in this work. According to Shivaji Mengawadeet. Al work holding fixture reduces or sometimes eliminates the efforts of marking, measuring and setting of work piece on a machine and maintains the accuracy of performance.

V. CONCLUSION

The review paper provides the knowledge model for formalization of design and mass balancing of rotary fixture is developed to enable the researcher to apply principles of fixture designing in shop floor. Work holding fixture reduces the production cycle time so increases production capacity. Simultaneously working by more than one tool on the same work piece is possible. The operating conditions like speed, feed rate and depth of cut can be set to higher values due to rigidity of clamping of work piece by fixtures. Operators working become comfortable as his efforts in setting the work piece can be eliminated. Semi-skilled operators can be assigned the work so it saves the cost of manpower also. There is no need to examine the quality of produce provided that quality of employed fixtures is ensured.

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A Survey on IOT Based Theft Prevention & Security System

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Abstract-*This paper introduces Internet of Things (IoTs), which offers capabilities to identify and connect worldwide physical objects into a unified system In the present age Internet of things (IOT) has entered a golden era of rapid growth. The Internet of things is a concept that aims to extend the benefits of the regular Internet—constant connectivity, remote control ability, data sharing, and so onto goods in the physical world. Everyday things are getting connected with the internet. Also security is main issue for protecting resources. Many people are using various types of security systems. We have found that most of the security systems are developed using Raspberry Pi, because the Raspberry Pi is a powerful small credit card size computer. Raspberry Pi works as computer it allow user to remotely access and control resources, it is affordable system than any other security systems. Using Raspberry Pi user can monitor and provide security to their homes and commercial spaces.*

Keywords-Internet of Things (IOT),Raspberry Pi, .Camera, Smart Phone.

I. INTRODUCTION

In this modern world crime has become ultra modern too! In this current time a lot of incident occurs like robbery, stealing unwanted entrance happens abruptly. There are several monitoring systems such as camera, CCTV etc. However, today even if the person is moving from one place to another place person can monitor and prevent the criminal activity. Video surveillance systems play very vital role in various fields of our society such as in personal security, banking, business etc.

However, it is expensive for normal peoples to set up such Kind of system so the peoples are using IOT based low cost security systems which will help them for secure their commercial places. Raspberry Pi[1] is a credit card-sized single board microcomputer developed in UK by the Raspberry Pi Foundation. It was finally released in February 2012. It has provided new opportunities to enhance tools for education. It also helps to enable developers to access in affordable cost and easy to program. It primarily uses Linux kernel based operating system, the latest version of Pi support windows10 operating system.

In raspberry Pi based security systems sensors are installed to detect the intruders, and alarm is generated. Raspberry Pi security system uses wireless technology and smart phones for security purpose. The main Benefits of the current security systems is simple to implement, Small size portable capable with immediate alert, truly Low-cost for residential use. The Raspberry Pi based security system focused to save valuable lives, money and time.

II. LITERATURE SURVEY AND RELATED WORK

We have found different papers related to security system. Different security uses different purposes.

Authors in paper [1] proposed system is being developed to connect any door with the internet so that the access control system can be controlled from anywhere in the world.In this paper raspberry pi is used for interfacing inputs and outputs.

In input section there is calling bell, PIR sensor & wireless camera. Raspberry pi is equipped with wifi dongle. And on the output terminal there are Lcd, magnetic door lock, emailing & tweeting services. A calling bell is placed on door so that if someone visits the user the person will press the bell and the bell will generate a signal to raspberry pi indicating presence of a person. There is also another way of sensing human and that is passive infra red human motion detection sensor. If any thief tries to break into the house PIR sensor will identify the motion of that human and will transmit an alarm to raspberry pi.

Authors in paper [2] presented smart monitoring system using Raspberry Pi, PIR sensor and mobile device. Authors have also used smoke detector to detect the fire. User will be notifying about the intruder or fire after capturing the image to user mail via Wi-Fi. They have used background subtraction algorithm for motion detection and smoke detection algorithm. They have stated advantages like reliability and privacy.

Authors in paper[3] have implemented security system where if any person comes at door it will be notify to the home owner via e-mail and twitter then the user can see the person comes at door using camera from remote location. The image of person captured and sends to twitter and e-mail. They have stated that user can control the door remotely. They have concluded that this system is useful for preventing unauthorized access [3].

Authors in paper [4] proposes smart surveillance system using thing speak, raspberry pi. In this paper authors designed very a small portable monitoring system for home and office security. The model uses hardware mechanism such as Raspberry pi (model B), Gyro sensor and Raspberry pi camera. In this device the MPU 6050 sensor is used to sense the door movement.MPU6050 consists of 3-axis accelerometer and 3-axis gyroscope.When a normalised movement signal is detected, theRaspberry Pi captures the picture using Raspberry Picamera and then send out an alert email along with the image to the user by using Wi-Fi adaptor as per the program written in python environment in software implementation .Authors also shows the result and concluded that the system is very small and portable.

III. IMPROVEMENT AS PER REVIEWER COMMENTS

Authors in paper[5] have developed the security system with proximity sensor, Raspberry Pi, and Camera, proximity sensor detect the person after detecting the person camera will be initiated and capture the image and image will be uploaded to drop box and user gets the notification about the intruder in the form of SMS. They have discussed few advantages like cost effective, portable. Authors concluded that this security system is useful for security of homes [5].

Authors in paper [6] Conducted survey on various Surveillance System, they have discuss the importance of video surveillance and benefits of many security systems. They have discussed why the security system is important Authors also explained Architecture of proposed system, they have concluded that new design will be implemented to provide security and safety [6].

Authors in paper [7] presented smart security system with Raspberry Pi and IR sensor if IR sensor detects the person camera will capture image as well as video of the person, the data then encrypted first and then decoded. User will get notification on his mobile device. Authors discussed that user can also perform the live streaming and provide security. Authors have concluded that this system is important for commercial places; they have discussed few advantages of the system [7].

Applications of IOTs

A survey done by the different papers which are mentioned in references .The applications of IOTs based projects are Transportation, Smart Home, Smart City, Lifestyle, Retail, Agriculture, Smart Factory, Supply chain, Emergency, Health care, User interaction, Culture and tourism, Environment and Energy.

A survey done by the IoT-I project This completes the entire process required for widespread of research work on open front. Generally all International Journals are governed by an Intellectual body and they select the most suitable paper for publishing after a thorough analysis of submitted paper. Selected paper get published (online and printed) in their periodicals and get indexed by number of sources.

IV. CONCLUSION

Based on the survey of all these papers different authors have presented different security systems. We have found that most of the security systems are developed using Raspberry Pi because it is cost effective and it is compatible with many programming languages. Raspberry Pi can work with various sensors like PIR to detect movement of person, smoke sensor to detect fire and temperature sensor to detect temperature. With the help of Raspberry Pi person can implement security system which will be accessed remotely and user will be notify about the illegal activity.We can conclude that every person needs cost effective security system. There are different tools and parameters are used to provide the security. These security systems are useful for securing many places from remote location using mobile devices. In future we can implement energy efficient security systems.

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Review of Bandwidth Step Up Techniques For Microstrip Antenna

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Abstract-*In This paper a method for bandwidth enhancement of microstrip antennas by combination of individually investigated methods like electrically thick elements, stacked multipath, multilayer elements, and multiple-resonator element etc hence improve bandwidth different techniques are used. This review paper delivers various bandwidth enhancement techniques since last few years.*

Keywords-Microstrip antennas, resonator elements, bandwidth enhancement.

I. INTRODUCTION

Microstrip antenna plays significant role in modern communication. Antennas have many interesting properties (e.g., low profile, light weight, cheapness) but applications in many systems are impeded by their inherent narrow bandwidth.

Microstrip antenna has a narrow bandwidth besides that today wireless communication system demands higher operating bandwidth. These communication devices need higher bandwidth so as to work in the broader band in order to shoulder high speed internet, multimedia communication like for a digital communication system (1710-1880 MHz), for universal mobile telecommunication system (1920-2170 MHz), for global system for mobile communication (890-960) [1].

In order to fulfill the demands of the bandwidth various techniques are employed and some of them are described in this review paper.

II. STRUCTURE OF MICROSTRIP ANTENNA

In its most basic form, a Microstrip patch antenna consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side as shown in Figure 1. The patch is generally made of conducting material such as copper or gold and can take any possible shape. The radiating patch and the feed lines are usually photo etched on the dielectric substrate [2].

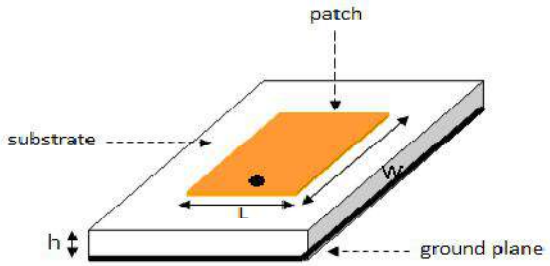


Fig.1 Microstrip patch antenna

Techniques To Enhance Bandwidth Of Microstrip Patch Antenna

The techniques used to boost the bandwidth of the microstrip patch antenna are described below.

Modified Patch Shapes

Bandwidth is enhanced by simply modifying the shape of radiating patches the bandwidth improves. The quality factor reduces, as the less energy will be stored under the patch and produces higher radiation [4].

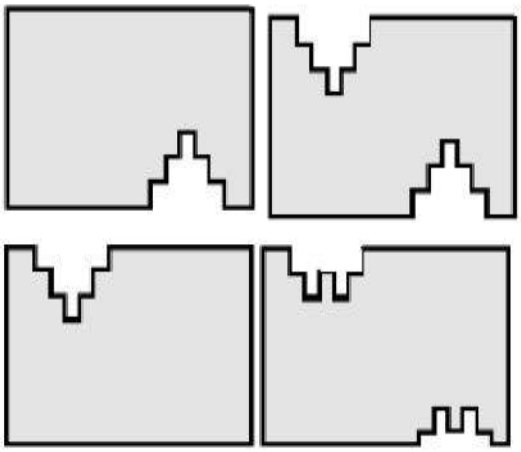


Fig.2 Slots with irregular shapes

Multilayer Configuration

In case of multilayer configuration. The patches are planted over the various dielectric substrates and are stacked on each other, Multilayer structures provide maximum

bandwidth but its size increases with the increase in number of layers.

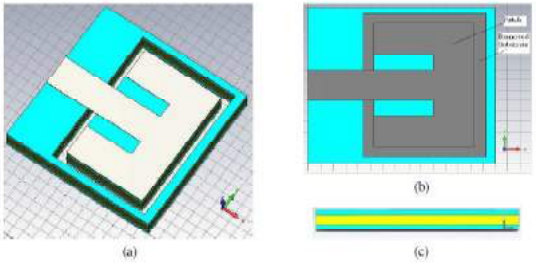


Fig.3 Multilayer Configuration (a) Isometric view (b) Top view (c) Side view

Multiresonator Configuration

In the planar multi-resonator configuration the multiple resonators are placed close to each other and only one is fed and others are parasitically coupled also called as gap coupled.

Limitation of this configuration is that this configuration is not suitable for an array configuration, as their size is too large and there are changes in the radiation pattern over the impedance matching [5].

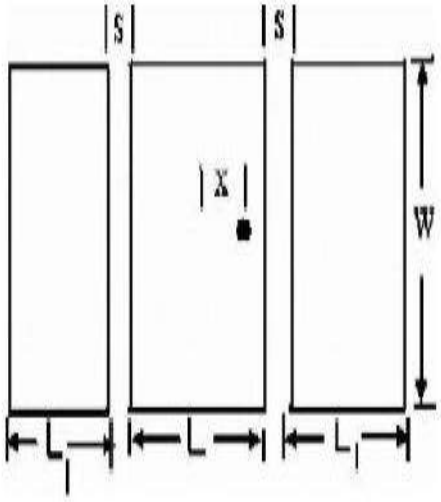


Fig.4 Multiresonator gap coupled patches

Multilayer Multiresonator Configuration

In this configuration combination of Multilayer configuration and multi-resonator configuration had done in order to further enhance the bandwidth. It provides very high bandwidth and gain but size of the stacked multi-resonator microstrip patch antenna is large [1].

Dual Feed

Dual feed structure is another available technique to enhance bandwidth, especially at higher resonating frequencies.

Double feeding configuration in antenna structure is used to enforce the vertical current mode. It also prevents other modes such as horizontal and asymmetrical current modes from being excited. These horizontal and asymmetrical current modes degrade the polarization properties and reduce the impedance and gain performance of the antenna

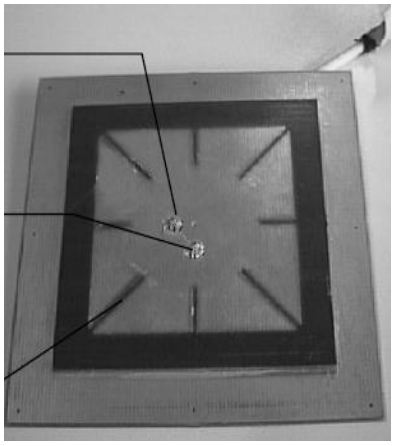


Fig. 5 Microstrip patch antenna with dual feed

Suspended antenna configuration

To improve the Bandwidth of antenna increases the height of substrate and decrease dielectric constant. This effect can be realized by using suspended nature of the antenna .In this configuration patch is fabricated at one side of the dielectric substrate and it is suspended in air with air gap Δ. Suspended

In this suspended antenna weight of the antenna gets reduced due to the air gap [3].

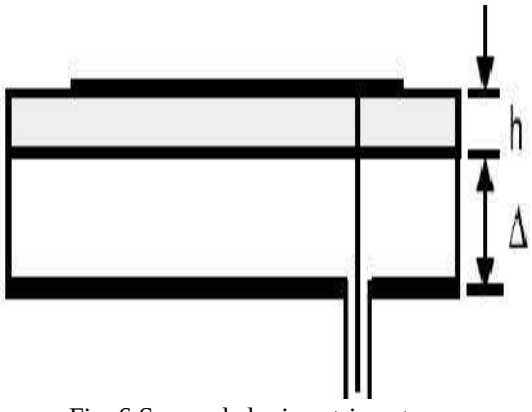
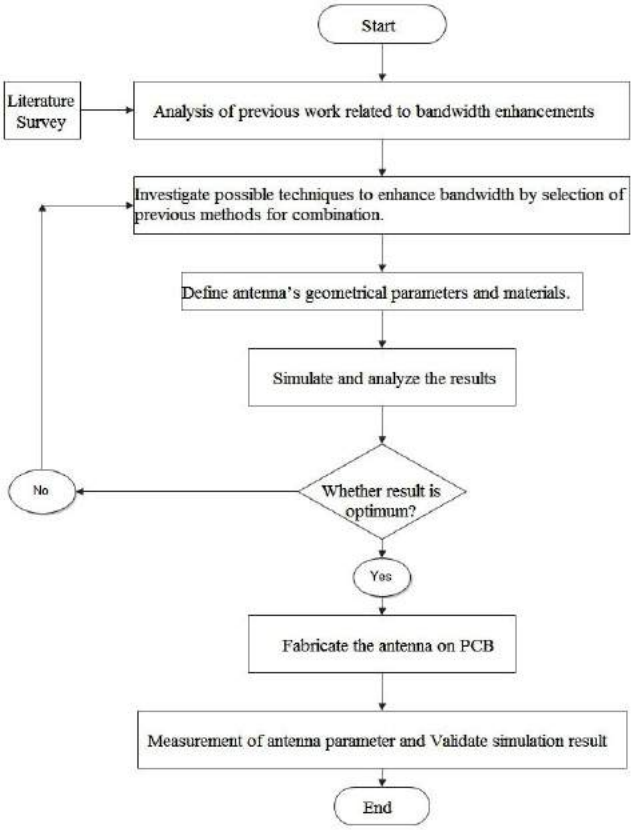


Fig. 6 Suspended microstrip antenna

III. METHODOLOGY

The proposed work will consider all earlier approaches and work .It proposes to combine earlier methods in order to effectively increase bandwidth of microstrip antenn



IV. CONCLUSION

Low bandwidth is always the limitation of MPA. The impact of different configurations on the bandwidth of the microstrip patch antenna has been reviewed in this paper so as to increase the operating bandwidth. After an extensive study of literature work it is supposed that each configuration has certain limitations and advantages. If we combine any two methods we can have better result of bandwidth improvement in minimum limitations.

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Design of Wideband LNA for RF Receiver

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Abstract-*One of the challenging task and vital thing at the receiver is LNA design because received signal will always be weaker in amplitude and degraded by noise in wireless communications. It should provide low noise figure not only at one frequency but over range of frequencies of interest. Also requirements of minimum noise figure and maximum gain will always be design trade-offs and can't be met simultaneously. An optimization and fine tuning of component values is necessary to get the optimum results. For certain applications like astronomy, it's desirable to have wider bandwidth, low noise figure and good gain. Sometimes we need to sacrifice gain for bandwidth. High electron mobility transistor (HEMT) plays a crucial role and is extensively used in ultra low noise amplifiers. This paper emphasizes in the design of Wideband LNA to achieve desired specifications.*

Keywords-Bandwidth, HEMT, Impedance Matching, LNA, Noise Figure

I. INTRODUCTION

A low noise amplifier (LNA) is a device used in communication systems which amplifies very weak signals captured by the antenna. Almost in any communication system, the LNA is located very close to the receiving antenna; in fact, the first component after the antenna is the low noise amplifier.LNA should boost desired signal power while adding as little noise and distortion as possible [8]. An LNA is the combination of low noise, high gain and stability over the entire range of operating frequency. Impedance and noise matching over wide bandwidth is the most challenging task in wideband LNA design. Wireless communications are very lossy, so signals travelling from far away normally suffer from a lot of degradation. When these signals are received at the antenna, they are very weak, that is why the LNA is used very close to the antenna. Also losses in the feed line become less critical if LNA is located very close to the antenna.

The received signal is typically filtered, amplified by an LNA and translated to the base-band by mixing with a local-oscillator. After being demodulated, the signal is applied to an Analog-to-Digital Converter (ADC) which digitizes the analog signal. The digital signal is then processed in a Digital Signal Processing unit (DSP).

Noise figure is the most important parameter in radio telescope as the sensitivity depends on its value, the smaller it is, the higher is the sensitivity of the telescope [9].

II. TECHNICAL SPECIFICATIONS

Design Specifications:

- Bandwidth – 1 to 2GHz
- Operating frequency range -1 to 3 GHz
- Noise figure - 0.2 to 0.6dB (as it should be as low as possible)
- Gain > 20dB
- Input and output VSWR – Between 1 to 2

III. FLOWCHART

Fig.1 shows generalized flowchart of LNA design.

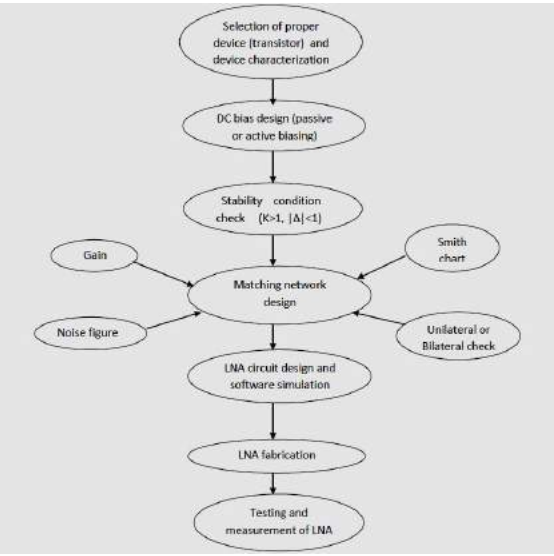

Fig.1 Generalized flowchart of LNA design

IV. DESIGN CONCEPT

First essential step while designing LNA is suitable component (active device) selection. We must keep in mind the trade-offs between various key parameters while designing. S-parameters and noise figure parameters are required to characterize the device [1]-[3]. Key design parameters to be considered for LNA are,

- Desired noise figure (in dB)
- Gain and gain flatness (in dB)

- Operating frequency and Bandwidth (in Hz)
- Input and output reflection coefficients (or VSWR)
- Selection of proper transistor (first important step)
- Amplifier's stability (K>1, |Δ|<1)
- Third order intercept point (TOIP) (in dBm)
- Good sensitivity is desirable
- Good linearity
- Good dynamic range (for astronomy applications).The spurious-free dynamic range refers to the output power range where no third-order products are observed [4].

Based on the amplifier's specifications and application we have to select an appropriate device. We should apply suitable DC bias for proper functioning of the transistor. Input and output matching networks can be designed by either transmission line sections or reactive components or combination of both. Fig.2 illustrates the basic block diagram of LNA [2].

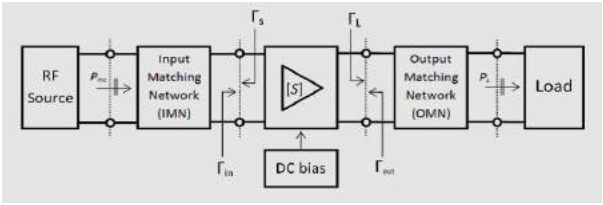

Fig. 2 Generalized block diagram of LNA design

A. Device Selection

Active device selection is the first essential step in LNA design. The designer should carefully review the transistor selection keeping the most important design tradeoffs in mind.Examination of the data sheet is a good starting point in the transistor evaluation for LNA design. We have selected ATF 35143 pHEMT which is a depletion mode device.

B. Stability Check and Enhancement

Stability of the circuit is nothing but it's resistance to oscillations. Stability is an indispensible part of LNA. Unconditional stability is the goal of the designer. It means that for any source and load impedance the circuit should not oscillate. Otherwise proper techniques are applied to make it stable for given frequency range. S-parameters play a significant role in stability analysis.

1) Analytical solution of stability criteria:

Two parameter test (K>1, |Δ|<1) where

$K = [1 - |S_{11}|^2 - |S_{22}|^2 + |\Delta|^2] / [2|S_{12}||S_{21}|]$

and $|\Delta| = |S_{11}S_{22} - S_{12}S_{21}|$

2) Graphical solution of stability criteria:

Single parameter test ($\mu>1$), $\mu_A>\mu_B$, Device A more stable [1]. Smith chart is used to plot input and output stability circles for conditional stability ($|\Gamma_{IN}|>1$ and $|\Gamma_{OUT}|>1$) where

$\Gamma_{IN} = S_{11} + [(S_{12} S_{21}\Gamma_L) / (1 - S_{22}\Gamma_L)]$ and

$\Gamma_{OUT} = S_{22} + [(S_{12} S_{21}\Gamma_S) / (1 - S_{11}\Gamma_s)]$

3) *Stability Enhancement:*

Different techniques are used to enhance the stability. Some of them are:

(a) Adding a series resistance:

A small resistance is added in series or shunt with the drain of the transistor.This will increase the noise figure of the amplifier.It's preferable not to use any noisy component like resistor.

(b) Use of source inductance (inductive degeneration):

Another method of improving stability is to add an inductor to the source leg. A source inductor acts like a noise less resistance. But this reduces gain by a small factor.The additional inductance between the source and ground provides lossless negative series feedback.An added benefit arising from the use of the source inductance is that the input conjugate match, Γ_{11}*, is moved closer to the optimal noise match, Γ_{opt} [7].

C. Biasing of the Device

DC biasing network is required to provide stable operating point for the device.Biasing circuit must be protected from the high frequency effects. For that purpose RFC and blocking capacitors are useful. We have used passive biasing due to it's simplicity and selected V_{DS}=2V, I_D=10mA with negative V_{GS}. So we require dual power supply. Our device is a depletion mode device.

$V_{GS} = V_P(1 - \sqrt{Id/Idss})$

So by controlling V_{GS} we can get control over I_D.

The gate voltage required to set the drain current, I_d, is dependent on the device pinch-off voltage, V_p, and saturated drain current, I_{dss}.

D. Gain Considerations

Gain of the amplifier is the ratio of output power to input power. For LNA design there are three power gain definitions appears in the literature.

- Transducer power gain (G_T)
- Operating power gain (G_P)
- Available power gain (G_A)

Out of these, transducer power gain is the most useful gain definition which accounts for both source and load mismatch.

E. Noise Figure Considerations

The lower the noise figure, the better the LNA as it means less noise is added by the LNA. In telecommunications, noise factor is the measurement of degradation of signal to noise ratio.

Noise figure (F) = 10 log $[(S/N)_{in}/(S/N)_{out}]$

In generalized form, $F= F_{min}+ (R_n / G_s) |Y_s-Y_{opt}|^2$

For two stagecascade,

$F = F_1 + (F_2-1)/G_{A1}$ or $T_e= T_{e1} + (T_{e2}/G_{A1})$

So First stage N.F. and gain has a large influence on overall N.F. or noise temperature. So the key to low overall N.F. is to focus on first stage by reducing it's noise and increasing it's gain. Later stages have greatly reduced effect on the overall N.F. [1]-[2].

F. Impedance Matching

Input and output matching networkstransition the device to the outside world. Basic objective of matching network is not only to transfer maximum power but also to improve SNR [1].

To have a best compromise between gain and N.F., lossless matching networks (ideally) must be designed to transform the input and output impedance to source and load impedances required in the design specifications. Inter stage matching networks are required in case of cascading. The losses of the matching networks are related to the Q of the components and associated printed circuit board loss.

Input matching network at the input side should give minimum noise matching principle and output matching network is required for maximum gain matching principle and its flatness [5].

That is, $\Gamma_S= \Gamma_{opt}$ to get $F=F_{min}$for simultaneous i/p and noise matching and $\Gamma_L = \Gamma_{out}^*$ or $Z_L= Z_{out}^*$ for output matching.

IV. DESIGN AND SIMULATION

It is found that the selected ATF 35143 is unstable in the desired frequency range. We can verify this in AWR using stability circles. Usually at low frequency, FET is potentially unstable without the addition of Ls and some resistive element. As the source lead inductance is increased, the stability factor increases rapidly. Also we have added extra resistor at the drain side to get unconditional stability throughout the frequency range of interest. Fig. 3 shows unstable regions on the smith chart

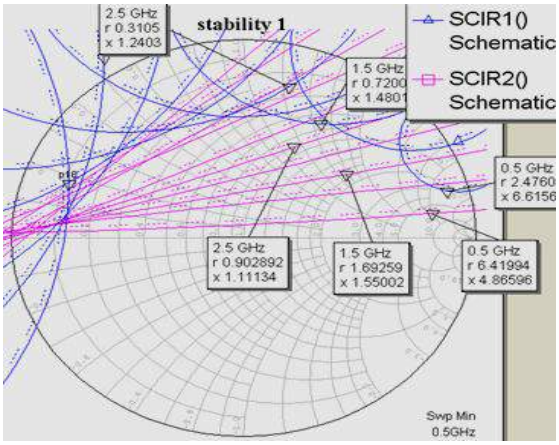

Fig. 3 Stability check for the device in AWR

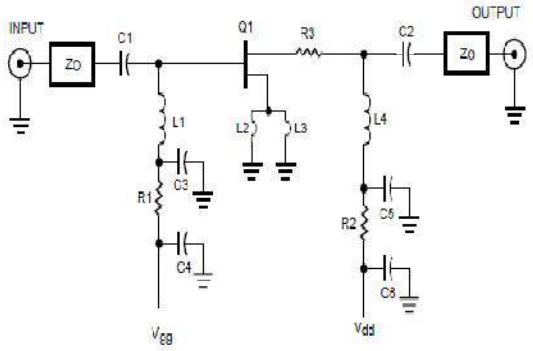

Fig. 4 Circuit diagram for single stage LNA

As shown in Fig.4, the amplifier uses a high-pass impedance matching network for input noise match and output conjugate match. The high pass network consists of a series capacitor and a shunt inductor.The L-section matching networks also double as a means of inserting gate and drain voltages for biasing. Additionally, the series capacitors C1 and C2 also function as DC blocking capacitors.L1 also doubles as a means of inserting gate voltage for biasing up the pHEMT. This requires a good bypass capacitor in the form of C3.

The Q of L1, L4 is also extremely important from the standpoint of circuit loss which directly relates to noise figure. Resistor R3 and capacitors C3, C5 provide in-band stability, while resistors R1 and R2 provide low frequency stability by providing a resistive termination. The resistive loading, R3, is one of the main contributors to stability along with the inductance in the ground path. C4, C6 performs low frequency bypassing. Also extra capacitor may be needed to minimize power supply noise from modulating the DC. Increasing L2, L3 reduces gain and improves input-IP3, but we have to look for microwave oscillation with excessive source inductance [6].

In the similar way we have designed two stage LNA by incorporating inter stage matching network between two transistors.The topology uses two amplifiers and it is an extension of single stage. It gives more gain and stability than single stage. Also we have observed the improvement in the input and output return loss bandwidth due to greater amount of flexibility in tuning for matching networks. Fig.5 and Fig.6 depicts two stage LNA simulated results.

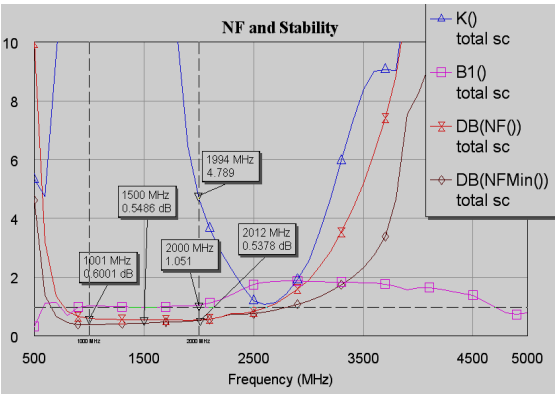

Fig. 5 Stability and noise figure of two stage LNA

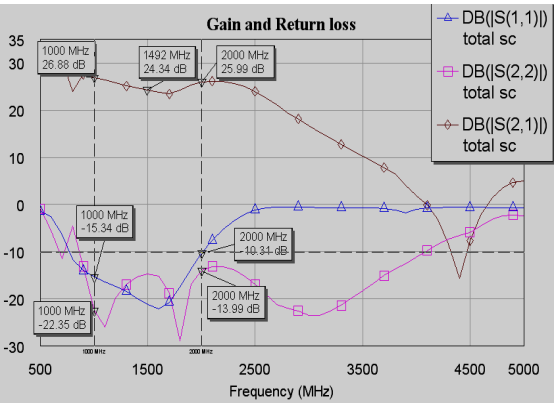

Fig. 6 Gain and return loss of two stage LNA

V. RESULTS FOR TWO STAGE LNA

Following table shows results for important parameters.

Parameter	Two stage LNA
Stability (K and β)	K>1 and β1>0 throughout 500Mhz to 5GHz
Noise Figure (in dB)	0.54 to 0.58 dB from 1 to 2 GHz
Gain (S_{21} in dB)	24 to 27 dB from 800Mhz to 2.5GHz
Return loss (S_{11} and S_{22} in dB)	S_{11}< -10dB from 750MHz to 2 GHz (BW > 1GHz) S_{22}< -10dB from 860MHz to 4 GHz (BW 3GHz)

Table 1: AWR software results for two stage LNA

VI. LAYOUT AND FABRICATION OF LNA

Layout is a critical part of high frequency circuit design and simulation. Layout is the view of the physical representation of a schematic. The first step in fabrication of the LNA is generating the layout from the schematic. For creating a layout of the design, all the wires are removed and the lumped components and devices are connected using the microstrip lines. If there is a node where three circuit paths are being combined, it has been replaced by a MTEE microstrip line. To make a connection between the two components on the circuit path, MLIN microstrip line has been used. To make a layout for any RF circuits the designer needs a real component foot prints. For this task, real components from Coilcraft, TOKO, ATC, Panasonic are chosen.

During the fabrication process, Plating Through Hole (PTH) requirement arises when grounding the source of the device. There is ground on one side of the substrate and circuit lies on the other, in between the two is a dielectric. We have used FR-4 as a commonly used dielectric material having thickness of 0.8 mm. Fig.7 represents layout of two stages along with real component footprints and PTH.

The components used in the circuit are 0603 or 0805 packaged SMD components which are very small having width and length of 1 or 2 mm. To reduce unwanted lead inductance and capacitance, a smaller package size with shorter leads is preferred. This also enables miniaturization of the physical circuit. Soldering such small components on the surface of PCB is very skilled job. In RF circuit even small variation in the width and length can cause significant changes in the results.

For testing purpose, it's desirable to place the PCB inside chassis or metal box in order to avoid external EMI. So mechanical design of chassis considering it's height, width and length is an essential requirement. We have used 4 hole SMA flange connectors for applying input and output power. Vector network analyzer, Noise figure analyzer and noise source is required for testing purpose.

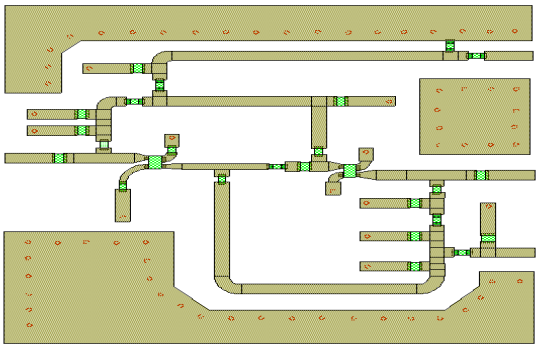

Fig.7 Layout of double stage LNA

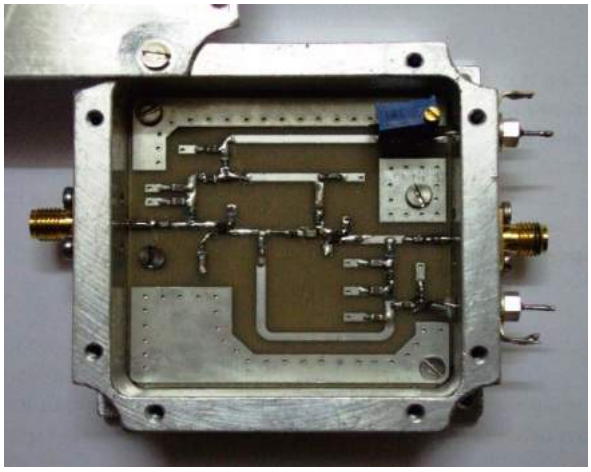

Fig.8 Physical realization of chassis

VII. CONCLUSION

In LNA design, the designer's first goal is to achieve the unconditional stability over the complete range of frequencies along with substantial gain and low noise figure which we have achieved in AWR simulation. Source inductance acts as a series negative feedback which helps to improve input VSWR and low noise by reducing the gain. Extra series resistance at the drain of the transistor is added for unconditional stability. So NF and gain are sacrificed. We have designed two stage LNA at the centre frequency of 1.5 GHz and achieved bandwidth of around 1.2 GHz while maintaining noise figure of 0.54 dB, unconditional stability and gain of 25dB using AWR Microwave Office software.

ACKNOWLEDGMENT

I am extremely thankful to Dr.S.P.Mahajan (COEP,Pune),Dr. B. C. Joshi(NCRA,TIFR*)* for giving me useful insights and valuable suggestions in the work. Also I would like to thank Dr S. Anantkrishnan, Department of Electronic Science, University of Pune for allowing me to use their RF lab. My sincere thanks are also to all those who helped me directly or indirectly in completing this project.

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3D Printing Using Fused Deposition Modelling (FDM)

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Abstract- *Fused Deposition Modelling (FDM) is an Additive Manufacturing Technology for printing 3D objects layer by layer. The main purpose of the research is to develop a low cost 3D Printer using easily available materials and conventional methods for fabrication which can be used to print objects confined within 200x200x200 (in mm) Printing Area. Many Industries today uses traditional methods for developing proto type for analysis rather than using technologies like 3D printing because it is expensive.*

After thorough market survey, we came to a conclusion that 3D Printers available in the Indian market are priced around Rs.50,000 to 60,000 due to type of supporting material used. Main objective of research is to develop a printer which is cost effective and to encourage manufacturers to adopt the method of 3DPrinting.

Keywords- Fused Deposition Modelling (FDM), Polylactic Acid (PLA), ABS, CAD

I. INTRODUCTION

3D printing (or additive manufacturing, AM) is any of various processes used to make a three-dimensional object. In 3D printing, additive processes are used, in which successive layers of material are laid down under computer control. These objects can be of almost any shape or geometry, and are produced from a 3D model or other electronic data source. A 3D printer is a type of industrial robot.3D printing in the term's original sense refers to processes that's equentially deposit material on to a powder bed within kjet printer heads.More recently the meaning of the term has expanded to encompass a wider variety of techniques such as extrusion ands intering based processes. Technical Standards generally use the term additive manufacturing for this broader sense.[1].

A. How FDM Works

3DprintersthatrunonFDMTechnologybuildpartslayer-by- layer from the bottom up by Heating and Extruding thermoplastic filament. The process is simple:

- **Pre-processing:** Build-preparation software slices and positions a 3D CAD file and calculates a path to extrude thermoplastic and any necessary support material.
- **Production:** The 3D printer heats the thermoplastic to a semi-liquid state and deposits it in ultra-fine beads along the extrusion path. Where support or buffering is needed, the 3D printer deposits a removable material that acts as scaffolding.
- **Post-processing**: The user breaks away support material away or dissolves it in detergent and water, and the part is ready to use.
- **FDM Benefits**

- The technology is clean, simple-to-use and office-friendly
- Supported production-grade thermoplastics are mechanically and environmentally Stable
- Complex geometries and cavities that would otherwise be problematic become practical with FDM technology

FDM, a prominent form of rapid prototyping, is used for prototyping and rapid manufacturing. Rapid prototyping facilitates iterative testing, and for very short runs, rapid Manufacturing can be a relatively inexpensive alternative. FDM uses the thermoplastics ABS, ABSi, polyphenylsulfone (PPSF), polycarbonate (PC), and Ultem 9085, among others. These materials are used for their heat resistance properties. Ultem 9085 also exhibits fire retardancy making it suitable for aerospace and aviation applications.
FDM is also used in prototyping scaffolds for medical tissue engineering applications. [4]

a. PolylacticAcid(PLA)

We have used 3D Printing filament as Polylactic acid or polylactide (PLA, Poly) which is a biodegradable thermoplastic aliphatic polyester derived from renewable resources, such as cornstarch (in the United States),tapioca roots, chips or starch (mostly in Asia), or sugarcane (in the rest of the world). In 2010, PLA had the second highest consumption volume of any bioplastic of the world.[14] The name "polylactic acid" does not comply with IUPAC standard nomenclature, and is potentially ambiguous or confusing,

because PLA is not a polyacid (polyelectrolyte), but rather a polyester.[3]

B. Complete Design and Fabrication of 3D Printer

Complete design of 3D Printer was made taking into consideration the printing area. Fabrication of frame and base along with the other supporting structure was made using low cost and lightweight materials.

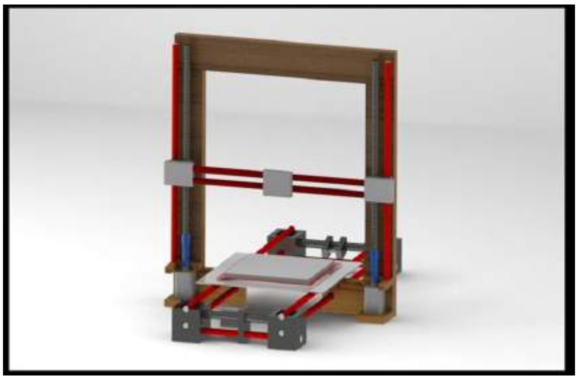


Figure 1: Complete design of 3D Printer[6]

C. Printing Process

STEP 1: Part Design in Solid works

There are various steps involved in the process of printing of a part or model using a 3D Printer. here all the steps involved in the printing process in our 3D Printer are explained in detail.

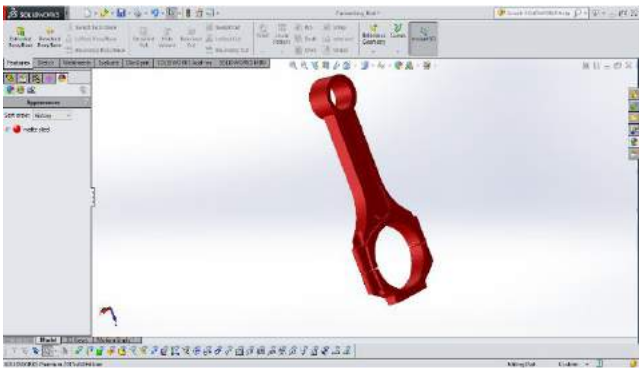


Figure 2: Part design in solidworks

The first and foremost step in the process of 3d Printing is to design the part or model to be Printed in any of the 3D Modelling Softwares such as Pro-E, Catia, Solid works…etc.

- In our case we had used Solidworks 3D Modelling Software to design a part for example in this case a Twisted Hexagon with a circular cut in between.
- Required dimensions for the part to be printed is decided in the design stage for example the height of this hexagon is15mm.

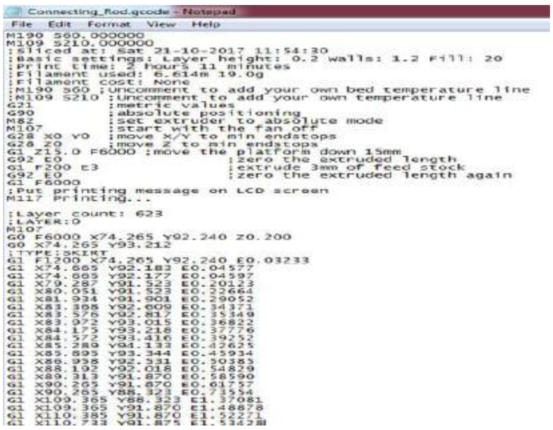
STEP 2: Saving the Design in .STL format

- The designed file is saved as .STL format (STereoLithography).This file format is supported by many software packages; it is widely used for rapid prototyping, 3D printing and computer-aided manufacturing.
- An STL file describes a raw unstructured triangulated surface by the unit normal and vertices (ordered by the right-hand rule) of the triangles using a three dimensional Cartesian coordinate system.

STEP 3: Opening file in Cura Software

- The. STL file is opened in Cura Software (open source software)where the view of the object or the position in which the object would be printed can be seen.
- After checking the view the G-code of the design in this case a object can be generated by clicking on the option ‘ExportG-Code’.

Figure 3: Part design in SlicingSoftware Cura-15.04.6



Connecting_Rod.gcode - Notepad

File Edit Format View Help

```
M190 S60.000000
M109 S210.000000
;Sliced at: Sat 21-10-2017 11:54:30
;Basic settings: Layer height: 0.2 Walls: 1.2 Fill: 20
;Print time: 2 hours 11 minutes
;Filament used: 6.614m 19.0g
;Filament cost: None
;M190 S60 ;Uncomment to add your own bed temperature line
;M109 S210 ;Uncomment to add your own temperature line
G21        ;metric values
G90        ;absolute positioning
M82        ;set extruder to absolute mode
M107       ;start with the fan off
G28 X0 Y0  ;move X/Y to min endstops
G28 Z0     ;move Z to min endstops
G1 Z15.0 F6000 ;move the platform down 15mm
G92 E0                  ;zero the extruded length
G1 F200 E3              ;extrude 3mm of feed stock
G92 E0                  ;zero the extruded length again
G1 F6000
;Put printing message on LCD screen
M117 Printing...

;Layer count: 623
;LAYER:0
M107
G0 F6000 X74.265 Y92.240 Z0.200
G0 X74.265 Y93.212
;TYPE:SKIRT
G1 F1200 X74.265 Y92.240 E0.03233
G1 X74.665 Y92.183 E0.04577
G1 X74.665 Y92.177 E0.04597
G1 X79.287 Y91.523 E0.20123
G1 X80.051 Y91.523 E0.22664
G1 X81.934 Y91.901 E0.29052
G1 X83.368 Y92.609 E0.34171
G1 X83.576 Y92.817 E0.35349
G1 X83.972 Y93.015 E0.36822
G1 X84.175 Y93.218 E0.37776
G1 X84.572 Y93.416 E0.39252
G1 X85.289 Y94.133 E0.42625
G1 X85.895 Y93.344 E0.45934
G1 X86.958 Y92.531 E0.50385
G1 X88.192 Y92.018 E0.54829
G1 X89.313 Y91.870 E0.58590
G1 X90.265 Y91.870 E0.61757
G1 X90.265 Y88.323 E0.73554
G1 X109.365 Y88.323 E1.37081
G1 X109.365 Y91.870 E1.48878
G1 X110.385 Y91.870 E1.52271
G1 X110.733 Y91.875 E1.53428
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Figure 4: G-Code of .STL object from Cura

II. CONCLUSION

The intention behind this research was to develop a low cost 3D Printer with good surface finish by using materials which are easily available and cost effective. We have been successful in reducing the cost to a considerable extent i.e about 10-15 %. The parts made in 3D design software are successfully imported in the printing software and the product obtained has the same dimension given during the design stage of the product i.e an accuracy close to 100%. It is possible to fabricate 3D printer according to its virtual design proposed at reduced cost

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Design and Fabrication of Pneumatic Paneer Cutting Machine

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Abstract- *This research paper deals with problems of manual paneer cutting in industry. The manufacturing process is now continuously in process. After manufacturing, the paneer pieces should be cut in the required sizes, as the manual interference is involved, the cutting operation creating problem. Also it is time consuming. Moreover when the pieces get cut, it should be of the required weight. So, there is scope for some improvement as it affects quality & production rate. For that the main purpose is to concentrate on paneer cutting. Hence, the purpose of this project is to design of a semi-automatic low cost paneer cutting machine for small scale industry.*

I. INTRODUCTION

Industries nowadays are trying hard to improve machine efficiencies to maximize outputs. The higher the efficiencies the more amounts of energy and cost are reduced. Hence, this will directly increase the profit. [4] A pneumatic system is a system that uses compressed air to transmit and control energy. The use of pneumatic systems in automatic technology is always up-to-date, which is documented by their large application in productive, as well as non-productive sector. Production, assembling and packing machines are operated worldwide with electro-pneumatic control. Changes of the requirements and technical progress have considerably modified the ways of control [3]. The primary objectives, upon which, the present work is based are providing an alternative to the existing manual cutting system mainly, targeting the initial investment factor, and thereby eliminating the associated difficulties of manual Paneer cutting. [2].

II. OBJECTIVE

- To increase production rate
- To eliminates power fluctuation
- Simple in construction
- Continuous operation is possible without stopping
- To reduce the wastage of human energy

III. CONSTRUCTION

Aim is to cut paneer pieces into 200 gms from a 5 kg piece. Now the equipment is based on pneumatic system. It is a vertical platform having a box like arrangement at the bottom. The pneumatic system will lift that box up & down causing the vertical movement. Now the main purpose of this mechanism is to cut paneer pieces. For that a frame is attached in the box at bottom. The frame carries thin wires separated at a specific distance. As the mechanism moves up & down, the frame carrying the wires cuts the paneer into the required sizes. Thus, the required sizes of paneer are obtained.

3.1 Size of machine

- Base – 35cm X 30cm
- Vertical Platform – 90cm X 35cm
- Wire Cage – 32cm X 28cm

3.2 Material selection

As the material plays important role while working of a system. It may not affect the paneer properties. Hence material selected for the wire is galvanized stainless steel. [5] The information about component with material is given in the following table:

Sr. No.	Component	Material
1	Cylinder	Mild steel
2	Piston	Mild steel
3	Support Bar	Cast Iron
4	Wire cage	Galvanized stainless steel
5	Base /Bed	Cast Iron

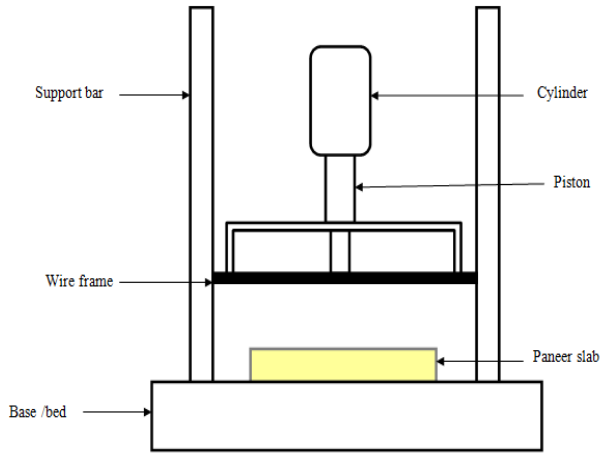

Fig 1. Schematic diagram of pneumatic paneer cutting machine

III. CONCLUSION

Thus, this work provides an alternative to the existing manually paneer cutting, in terms of automating the paneer entry into the cutting apparatus, eliminates power fluctuation and lesser initial investment. Time consumption is less when compared to manual cutting. This work provides the desired output and the variety of the cuts is done by use of different cutting grid.

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Design and Development of Solar Powered Bi-Cycle

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Abstract- *As we all know there is increase in Global Warming which is cause due to pollution. People use automobiles to travel short distance which contribute to the pollution. Also, there is problem of increasing rate of fuel. To avoiding this, we can use the alternative and eco-friendly source for transportation like solar bi-cycle.*

Keywords- DC motor, eco-friendly, Solar Energy

I. INTRODUCTION

As we all know there is increase in pollution which leads to the global warming. Also, there is increase in fuel rates and as it is non-renewable, it may exhaust in future. Keeping the environment in concern, it is better to move to alternate source which is pollution free and economical. There are many alternatives like normal cycles which we need to paddle, electrical scooters and bi-cycles. To overcome above disadvantages solar powered bicycle is best remedy.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

1. From this paper we came to know that Solar Assisted bi-cycle is modification of normal bicycle and solar energy is primary energy source. It can be widely used for short distance travelling by school children, postman, villagers etc. The important feature of this bicycle is, it is Eco-friendly, Economical and does not consume any fuel sources.

2. From this paper we came to know that it can be run on city as well as country roads which are made up of cements, asphalts and mud. Operating cost is minimum. We can manually paddle in case of any emergency. Mountings and dis-mountings are easy so maintenance cost is less.

3. From this paper we came to know that high capacity motor is used for higher power generation. The ride of the bi-cycle is noiseless, eco-friendly and cheaper than the motor or e-bikes. Battery can be charge even when bi-cycle is in motion.

4. From this paper we came to know that the concept of the project is easy ridding and conserve the energy by all possible ways. Resistance in paddling while going up the hills is also minimized. It can work in both the conditions (normal as well as cloudy).

III. WRITE DOWN YOUR STUDIES AND FINDINGS

Study of Solar Energy

A solar bicycle is completely powered by Solar energy which uses photovoltaic effect. The photovoltaic effect involves the creation of a voltage into an electromagnetic radiation. The photovoltaic cells are contained in solar panel which converts energy.

Working of Solar powered Bi-cycle

Solar panel are place on top of bi-cycle carrier and battery is connected to it. Voltage regulator is used to control the battery voltage. Brushless DC motor are placed in hub of motor it is used to run the bicycle. Accelerator is used to control the increase the motor speed

Components in Solar powered bicycle.

1. Hub Motor: It is an electric motor that is incorporated into hub of the wheel and drives it directly.

2. Solar panel: Used to absorb solar energy and convert into electric energy.

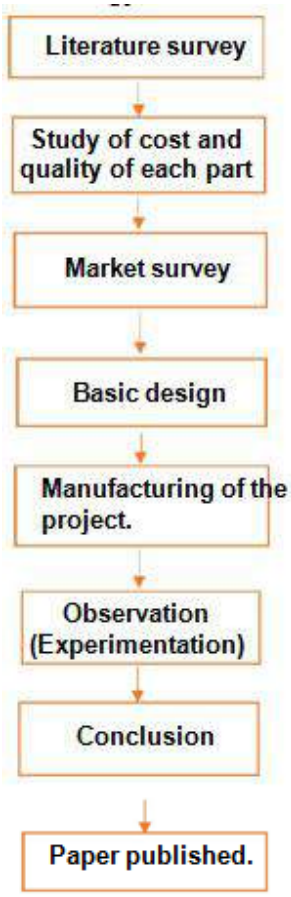
3. Voltage regulator: Used to maintain a constant voltage level.

4. Battery: To provide electric power to bicycle.

5. Motor controller: Used to monitored Amount of power supply to hub motor.

6. Accelerator: Used for varying speed of bicycle.

Methodology



IV. CONCLUSION

Solar assisted bicycle is modification of existing bicycle and driven by solar energy. This bicycle is cheaper, simpler in construction & can be widely used for short distance travelling. . It is eco-friendly & pollution free, as it does not have any emissions. Moreover it is noiseless and can be recharged with the AC adapter in case of emergency and cloudy weather.

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Design and Development of Bicycle Using Kinetic Energy Recovery System

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Abstract- *Kinetic Energy Recovery System (KERS) is a system for recovering the kinetic energy of moving bicycle under the braking and it also convert this energy into gain in kinetic energy. When riding a bicycle, high amount of energy gets lost under braking so that the human efforts get reduced.*

So here we used KERS with flywheel to store the energy which get lost during braking and it is use for further boosting of bicycle. The flywheel is used for increases acceleration and about 10% pedal energy can be saved when the normal speed is about 12.5 to 15 mph.

Keywords- KERS, Flywheel energy storage, Flywheel bicycle, Mechanical KERS, Clutch mechanism.

I. INTRODUCTION

Kinetic Energy Recovery System (KERS) is a system for recovering the kinetic energy of moving bicycle under the braking and it also convert this energy into gain in kinetic energy. KERS store energy when the vehicle is braking and it use for further acceleration. While applying the brake kinetic energy get lost in the form of heat energy and sometimes is in the form of sound energy. Bicycle with KERS are able to avoid reduction of this kinetic energy by a proper mechanism. This stored energy is converted back into kinetic energy giving the vehicle extra boost of power. KERS uses flywheel for storing of energy and clutch mechanism is used for engagement and disengagement of the clutch to flywheel according to energy transmission.

II. RESEARCH AND COLLECT IDEA

[1] From this paper we conclude that the KERS system recover the moving bicycle kinetic energy while braking and also convert it into gain in kinetic energy. It also give information about how the KERS system works.

[2] From this paper we came to know KERS system is used for the energy storage and this energy is further used for the boosting of bicycle. KERS system with flywheel is used for energy storing purpose. It has been found out that the flywheels are 10 to 15 percent more efficient in storing the energy when compared to the batteries.

[3] From this paper we came to know that mechanical KERS system is efficient than electric KERS system. The global energy conversion efficiency exceeding 70%, more than twice the efficiency. When riding speed ranges between 12.5 to 15 mph there is increase in maximum acceleration and about 10% of net pedal energy.

[4] This paper gives information about how the flywheel can be used for storing of lost kinetic energy and what are the steps required to calculate the appropriate specifications of flywheel. It was found that if an ordinary cycle is fitted with flywheel to store energy, then almost 65-70% of the total energy, which was being wasted, can easily be recovered. The remaining 30-35% of energy cannot be recovered due to the presence of friction in bicycle

[5] The above paper give us the knowledge about flywheel based kinetic energy recovery system.

III. STUDIES AND FINDINGS

Study of KERS.

KERS means Kinetic Energy Recovery System. It is system for recovering the moving vehicle kinetic energy under the braking. KERS is a collection of parts which takes the kinetic energy of moving vehicle under deaccelerating and store this energy by using some reservoir as like flywheel. This store energy can use for the further acceleration of the vehicle giving extra boost power to the vehicle. The basic principle of KERS is store the energy while deacceleration and it will use for further acceleration.

There will be two types of KERS as Electrical KERS and Mechanical KERS. In Electrical KERS there will more forms of energy conversion so at the output we don't get that much power. In Mechanical KERS there will be no such types of energy conversion it just uses the kinetic energy. So we

decided to use KERS for our project. In mechanical KERS flywheel is used for the storing of energy. So the KERS system is best for the increase the efficiency of any moving vehicle with energy recovery mechanism.

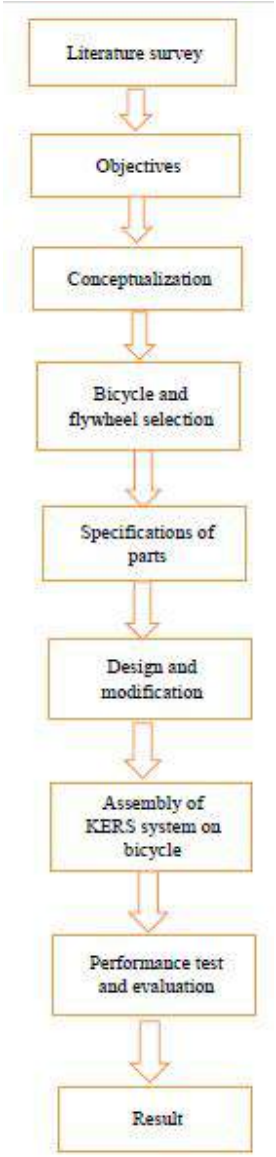
Working of KERS Bicycle

A crank wheel connected to the rear wheels of bicycle. By using the chain transmission mechanism there is engagement and disengagement of clutch to the flywheel. For increasing the overall speed of flywheel specific gear ratio is needed. Now at a time when there is need to apply the brake, by using the mechanism engage the clutch to the flywheel. Then the flywheel starts rotating and speed of bicycle is reduces. So that the energy is stored in the flywheel. Now in this case even clutch is disengage flywheel is in rotating motion. When we again ride the bicycle just engage the clutch to the flywheel from that store energy which is in flywheel transmitted to the rear wheel of bicycle through the clutch and chain mechanism. From that we can reduce some amount of human energy and extra boost power is given to bicycle. This application we can used when situation like traffic jam , down climbing a hill. By KERS system we can used the store energy for efficient working of bicycle and to reduces the human energy.

Components in KERS bicycle.

1. Flywheel: Flywheels are widely used as storage device which stores the energy of rotation with the help of its moment of inertia The flywheel stores energy in the form of mechanical energy rather than in the form of chemical energy. The flywheel is the most important component in this fabrication process.
2. Clutch plate mechanism: This mechanism used for energy transmission. Engagement and disengagement of flywheel according to energy transmission clutch mechanism is used in bicycle.
3. Sprocket: It is a profiled wheel which has a number of teeth on it. The teeth on this wheel are designed and placed properly based upon various calculations of the design. The main objective of this sprocket wheel is to mesh with the chain drive for the transmission of the power from one circuit to the other.
4. Chain drive: chain drive is used for the transmission of energy or power. Here we used two chain drive for transmission of power between wheel and pedal and also between the rear and sprocket to the flywheel.
5. Axel: axel is used for carrying flywheel and clutch unit.
6. Bearing: Transmission purpose

IV. METHODOLOGY



V. CONCLUSION

Kinetic energy recovery system is used in bicycle for the purpose of energy storage which was lost during the braking. It can be concluded that in future KERS can be considered as a fundamental of energy storage. And it can be also seen as a source of minimizing energy losses. KERS with flywheel and clutch mechanism has high efficiency. From some result around 30% of energy we can recovered by KERS.[2].

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Design And Fabrication of Air Intake For FSAE Race Car

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Abstract- *This research paper aims to optimize a venturi type restrictor which is to be fitted in the intake manifold of a Formula SAE car engine. The main purpose of 20mm restrictor in intake manifold is to restrict mass flow passing to the engine thus reducing its maximum power. Analytical calculations are done based on standard results to get maximum mass flow rate and CFD tool is used to calculate minimum pressure drop across the restrictor buy varying converging and diverging angles of venturi. Objectives of this research is to optimize a venturi type design to allow maximum possible mass flow rate to the engine from 20 mm restrictor by reducing the difference in pressure across venturi at all speeds.*

Keywords- Runner, Plenum, Air Restrictor, Throttle Body.

I. INTRODUCTION

The purpose of this project to design intake manifold for a Formula SAE race car. Formula SAE is a student design competition organized by Society of Automotive Engineers International.

The FSAE rules committee imposed a rule that power of any four-stroke engine used in the competition should be limited by a 20 mm intake restrictor. The Engines used in FSAE are limited to 610 cc engines having an output of 120 horsepower with 15000 revolutions.

After including the 20 mm restrictor the engine revolutions are controlled from 10000 RPM to 7500 RPM. At such high speed, engine requires large amount of air for combustion. Thus, the mass flow rate should increase the air has to pass with very high velocity to fulfill the engine with required quantity of air. According to studies, mass flow rate is a fixed parameter for 20 mm restrictor used for the calculations in further optimization. Thus, the objective is to allow maximum possible mass flow with minimum pressure drop across the venture type restrictor.

II. LITERATURE REVIEW

Design and Fabrication of Air Intake for FSAE Race Car we referred various papers:

Singhal, A., &Parveen, M. (2013) It found that optimal solution to achieve the maximum mass flow with minimal pull from the engine. From the data gathered through the numerous simulations in Solid Works Flow Simulation, optimized values for converging angle & diverging angle of the Ventures.

Ryan Ilardo, Christopher B. Williams (2012) In this paper performed the analysis based on fused deposition modeling is used to create geometry of the intake system and use of composite material. It is found that Geometric flexibility in the design of manifold, sufficient strength and heat resistivity to survive operating environment.

Shinde, P. A. (2014) In this paper performed analytical calculations based on standard results to get minimum air flow rate and CFD tool is used to calculate minimum pressure drop across the restrictor by varying converging and diverging angles of venture.

Logan M. Shelagowski and Thomas A. Mahanak. In this paper Computational fluid dynamics (CFD) flow modeling software used analyze and visualize fluid flow to Reached maximum flow, higher volume flow rate (4.8 CFM on average), will create a more robust low- to mid-range torque, to optimize engine performance

Rahul Puri et.al (2016) This studied the design process of the air intake and exhaust system of the SAE Supra Race Car. Flow analysis for individual components are carried out, and verified against performance simulations of the entire engine system, followed by physical testing of several of the components using a flow bench. They achieved the purpose of compensating the pressure losses because of restrictor of 20 mm according to SAE rulebook and ultimately the power losses of engine.

Sachin N Waghmare et.al (2016) In this paper optimize the venture type of restrictor included in the intake system as imposed in the FSAE rule.

The fluid flow through the intake was analyzed using CFD flow modeling software. The optimum solution is to achieve the maximum mass flow rate of air through the flow restriction device. Venture serves the best design for this objective. It allows a maximum flow rate of 0.0703 kg /sec of air flow to the engine. From the above research, it is found that converging angle of 12 degree and diverging angle 6 degree gives minimum pressure drop at the exit of expansion cone.

Oh Yide & Andre (2012) in this paper create a foundation of knowledge on which to build the next generation of air intake systems. Computational Fluid Dynamics software, aid the design process through virtual simulations, including data acquisition and analysis of design variations for better information on the effects without cycling through the manufacturing and assembly processes

Shubham Raj et.al (2016) It purposed that venturi type design to allow maximum possible rate to the engine from 20 mm restrictor buy difference in pressure across venturi Analytical calculations are done based on to get maximum mass flow rate and CFD calculate minimum pressure drop across the varying converging and diverging angles of be observed from CFD results that for diverging angle of 14 degrees and 6 degrees minimum pressure drop can be achieved.

Kaushal Kishor (2015) The author approached for designing, analyzing and manufacturing of air intake and exhaust system is discussed for prototype model of a Formula style car with the locally available resources in hand as per the rules specified by the two major student level events organized in India. Design was analyzed in CAD software (SOLIDWORKS) It also gives a brief introduction to the flow simulation of the designed models.

HONG Han-chi et.al (2012) In this paper Computational fluid dynamics (CFD) flow modeling software used analyze and visualize fluid flow to Reached maximum flow, higher volume flow rate will create a more robust low-to mid-range torque, to optimize engine performance1-Dimensional software GT-Power was applied to simulate the engine performance. The parameters including the sphere style plenum diameter, the intake runner diameter, exhaust runner lengths and the position of retractor were optimized via a combination of the 1-Dimensional simulation and an orthogonal L9 (34) testing design.

III. STUDIESANDFINDINGS

The mixing of air flow and fuel is a turbulent phenomenon. Thus we have to apply turbulence flow on this model. Turbulence or turbulent flow is a flow regime in fluid dynamics characterized by chaotic changes in pressure and flow velocity. It is in contrast to a laminar flow regime, which occurs when a fluid flows in parallel layers, with no disruption between those layers.In CFD analysis, turbulence flow simulations are divided into various sections, but for our project two types of CFD analysis is considered “k-epsilon” and “k-omega”.

K-omega: -

This type of simulation is applied for high velocity objects such as planes, jet planes, etc. since the FSAE race cars doesn’t reach that much high speed we have to check an alternate method for this analysis.

K-epsilon:-

This type of analysis are used for moderate velocity objects such as cars, bikes, etc. since the FSAE race cars are ranged in this speed criteria we use this type of analysis. K-epsilon is further sub-divided but we use “K-epsilon resilience” for our model

To perform the CFD analysis for this model we use the “K-epsilon resilience type of CFD analysis.

Helmholtz Theory (S.N. Waghmare, et al, IJETMAS February 2016, Volume 4, Issue 2, ISSN 2349-4476)

Helmholtz theory addresses the fact that an Internal Combustion Engine creates pressure waves that propagate in the engines intake system. Air compressibility can be linked to a spring force introducing resonance in the intake manifold as the wave propagation takes place. A single cylinder and intake runner with its intake valve open constitutes a Helmholtz resonator. Tuning peak takes place when the natural frequency of cylinder and runner is about twice the piston frequency. 3) Design Constants and Variables: Since the aim is to optimized the intake restrictor, the mass flow rate calculation is to be done.

Maximum flow rate is: m = r*V*A
For an ideal compressible gas:

$$m_{max} = A * P_0 \sqrt{\frac{k}{RT_0}} \left(\frac{2}{k+1}\right)^{(k+1)/[2(k-1)]}$$

Where A = cross-sectional area at which the flow is sonic, P0 is the stagnation pressure, T0 is the stagnation temperature, R is the specific gas constant, and k = cp/cv is the specific heat ratio of the gas. The maximum flow rate can be expressed in terms of inlet temperature Ti and inlet pressure Pi by expressing the stagnation temperature and stagnation pressure as

$$T_0 = T_i + \frac{V_i^2}{2c_p}$$

$$P_0 = P_i \left(\frac{T_0}{T_i}\right)^{k/(k-1)}$$

Where Vi is the inlet velocity.

Mass flow rate is maximum when M = 1. At these conditions, flow is choked.

The mass flow rate from above equation is calculated using the following data values :

M = 1
A = 0.001256 m2 (20 mm restriction)
R = 0.286 KJ/Kg-K
ϒ = 1.4
P0= 101325 Pa
T = 300 K
Mass flow rate = 0.0703 kg/sec

The conical spline intake design is chosen because it haslowest loss of total pressure through the restrictor. The complete air intake system is design in Solidworks & analyze in Ansys Fluent Workbench with appropriate boundary conditions.

Air intake system is divided in 3 parts i.e., Restrictor, Plenum & Runner.

1. Restrictor

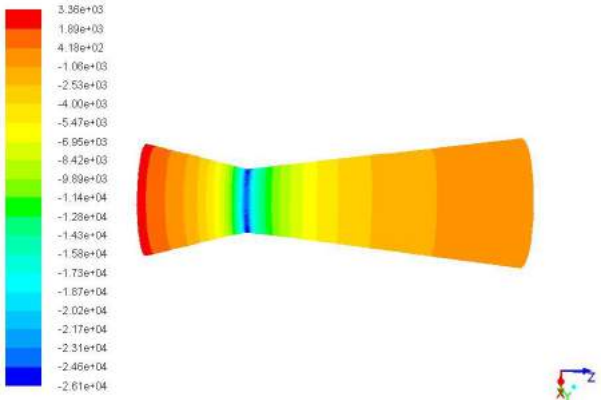
For the restrictor, we considered the design of convergent-divergent nozzle. Total length of restrictor is 145mm. For convergent section, both the end diameters are constrained (36mm of throttle body and20mm of the restrictor). For divergent section outlet diameter is 41.5mm.
Boundary Conditions:

Inlet : PRESSURE INLET = 1 Atmosphere
Outlet: MASS FLOW OUTLET = 0.0703KG/S

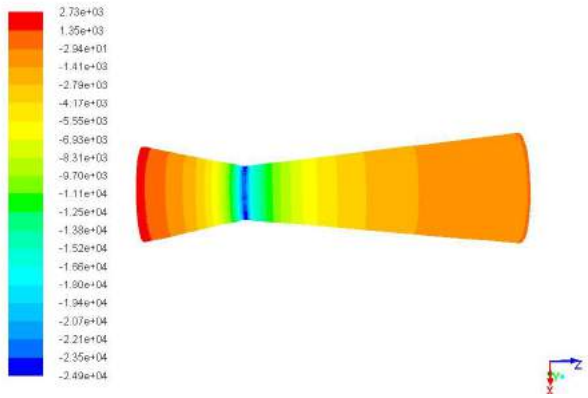
The results of iterations carried out at various converging and diverging angles are as follows:

Iteration no	Converging Angle (degree)	Diverging Angle (degree)	Pressure Difference (Pa)
1	14	7	2154.55
2	12	6	1894.48
3	10.5	6	1856.20

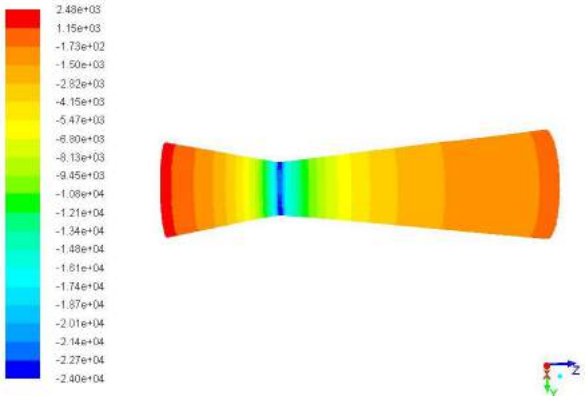
(Table no. 1)



(Fig.1.a) Contours of Pressure for Iteration 1(Pascal)



(Fig.1.b) Contours of Pressure for Iteration 2(Pascal)



(Fig.1.c)Contours of Pressure for Iteration 3(Pascal)

Convergent angle of 10.5° & Divergent angle of 6° are selected for restrictor because they gives minimum pressure loss through the restrictor.

2. Plenum

Spherical shape type plenum was considered. Performance of engine at higher speeds improves with increase in plenum volume. Volume of plenum is 1.2 liter, which is almost 3 times the engine displacement.

3. Runner

Calculation of Runner Length:

Speed of pressure wave = 1116.44 feet/second
Effective Cam Duration (ECD) = 226°
EVCD = Effective Valve Closed Duration
= 720-(ECD) = (720-226) + 20
= 514°

5000 rev/minute divided by 60 seconds/minute
= 83.33 rev/second
83.33 rev/second X 360°/rev = 30,000°/second
514° / 30,000° per second = 0.0171 seconds.
At 5000 RPM, 514° = 0.0171 seconds

This 0.0171 seconds is the critical time factor. During this 0.0171 seconds that the intake valve is closed, the pressure wave is moving at 1116.44 feet/second and travels 19.12 feet.

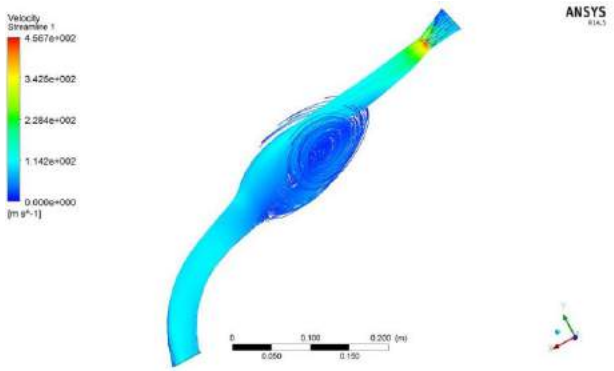
At resonant conditions, the pressure wave has to travel 19.12 feet to arrive at the intake valve when it is open. Since the pressure wave spends this time going up the runner AND going back down the runner, the runner length is actually only half of 19.12 feet, or 9.56 feet, which is equal to 114.77 inches.

But, here we can't use such long runner, so we divide it (by 7) as suitable.

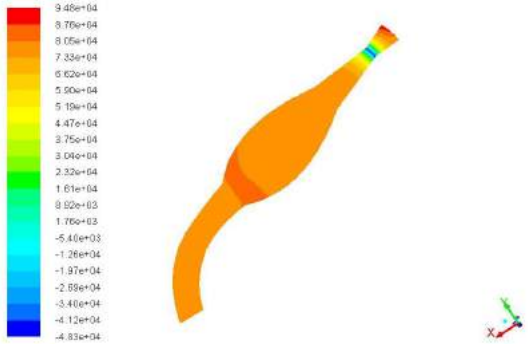
Runner Length = $\frac{114.77}{7}$ = 16.39 inches = 416 mm

According to RAM Theory, intake system was tuned at 5000 RPM, resulting in total runner length of 416mm.

The CFD of whole air intake system is also done at the end in Ansys Fluent by applying appropriate boundary conditions.



(Fig. 2.a) Velocity Streamline



(Fig. 2.b) Contours of Pressure (Pascal)

Also to mount the intake system to the engine, especially design mounting is used. This is fixed mechanically to engine by using 3 countersunk bolts. The mounting is made of Duraform PA Plastic material & manufactured by SLS 3D printing method.

Properties of Duraform PA Plastic:
Heat Deflection Temperature = 184°c
Tensile Strength = 44MPa

The whole air intake system is also made of ABS Plastic material by 3D printing method.
Properties of ABS Plastic:
Heat Deflection Temperature = 105°c
Tensile Strength = 46MPa

(Fig. 3) Air Intake Assembly

IV. CONCLUSION

The flow analysis using Computational fluid dynamics (CFD) helps to analyze the flow in the intake manifold. The entire intake system should be optimized to reduce pressure loss and improve engine performance. Convergent angle of 10.5° & Divergent angle of 6° are selected for restrictor because they gives minimum pressure loss through the restrictor.

V. ACKNOWLEDGMENT

We would like to express my sincere thanks to our friend Yogesh Desai who helped us out in performing the Computational Fluid Dynamics accurately, after a lot of practice and hours put into it. Our sincere thanks to Prof. S. N. Waghmare of Mechanical Department for giving us the opportunity to take up this paper, for his guidance and supervision in all respects of this paper.

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Experimental Performance Analysis of Triple Tube Heat Exchanger with Dimple Tubing

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Abstract- *The experimental performance analysis of triple concentric heat exchanger is presented with reference to a double tube heat exchanger. The problem corresponding to double tube heat exchanger is that it occupies larger tube length and space. To overcome this, a modified version of double tube heat exchanger is developed which is a triple tube heat exchanger. Triple tube heat exchanger provides larger heat transfer area per unit length of heat exchanger as compared to double tube heat exchanger. To enhance the effectiveness dimples have been made on the middle tube. The working fluid used is water. Hot water will flow through the middle annular space while cold fluid will flow through the inner tube and outer annular space. The study is carried out to determine the effectiveness of triple tube heat exchanger with dimple tubing. Experimental investigation is carried out for different flow rate of cold & hot fluid. The relationships between different performance parameters such as Nusselt number, Prandtl number, friction factor and Heat exchanger effectiveness also presented.*

Keywords- Dimple Tubing, Heat exchanger, Triple tube

I. INTRODUCTION

With increasing consumption rate of energy, there is continuous growth in increasing the performance of Heat exchanger. Heat exchanger is defined as a device which transfer heat from hot fluid and cold fluid, but while transferring heat it must be with maximum rate and minimum capital cost. Heat exchangers are mostly used devices in many areas of the industries such as processing of material, food preparation refrigerators, radiators for space vehicles, automobiles & air conditioning etc. Heat exchangers have several industrial and engineering applications [1]. There are several kinds of heat exchangers are used in industry such as plate type heat exchanger, shell and tube heat exchanger, double pipe heat exchanger, helical tube heat exchanger etc. Double tube heat exchanger is conventionally used because of its cheaper cost and simple construction. But it occupies more space. To resolve this problem a new heat exchanger was introduced i.e. triple tube heat exchanger. It provides additional flow passage with compact design and greater heat transfer area per unit length of heat exchanger as compared to the double pipe heat exchanger. Dimple tubing is also introduced to enhance the heat transfer. Experimental study is carried out to find the effectiveness of triple tube heat exchanger. Dimples on the tube surface can significantly increase the heat transfer rate. Introduction of dimples on the tube surface can increase surface area available for heat transfer. Also it reduces the hydrodynamic resistance of fluid flow over the surface by disturbing hydrodynamic boundary layer. Also the vortices formed inside the dimples results in thinning and disturb thermal boundary layer. These two effects ultimately results in heat transfer enhancement [4].

II. LITERATURE REVIEW

Theoretical study of triple tube heat exchanger concludes that various factors are affecting the performance of triple tube heat exchanger. In triple tube heat exchanger there is saving of considerable amount of space as well as material as compared to double pipe heat exchanger. Heat transfer rate are affected by number of fins, fin length and fin thickness. Triple tube fouling occurred greater extend toward the outlet and with the increase in time (Dharmikumar A. Patel, *et al,* 2014).

An experimental study on one modification of triple tube heat exchanger which is triple U tube heat exchanger. It is found that heat transfer rate of triple U tube heat exchanger is greater than conventional model. The model is compact and unique one. This U tube design can also be implemented to double pipe heat exchanger. The implementation may result in high heat transfer rate (N. R. Parthasarathy, *et al,* 2015).

A numerical analysis is done on sizing of triple tube heat exchanger. During this analysis they compared triple tube heat exchanger with double tube heat exchanger for same heat transfer rate. For this, all input parameter same for both heat exchanger. It was found that length of triple tube heat exchanger was less as compared with double pipe heat exchanger. The analysis can be used for determining the dimension size of triple tube heat exchanger. It is also concluded that the triple pipe heat exchanger provide better

heat transfer efficiencies per unit length of heat exchanger as compared to double pipe heat exchanger (Tejas Ghiwala, *et al,*2014).

A computational simulation of triple tube heat exchanger is carried out &found that heat transfer occurring between three fluids at different temperature. They assumed that outer tube is thermally isolated from surrounding. It is considered as hot water in middle space which cold water and normal water in inner and outer space. Different graphs showing variation of temperature with various parameters such as length, Reynolds number etc. Finally it is found that heat transfer most likely or predominantly takes place between hot fluid and cold fluid because of the greater temperature difference between them irrespective of mass flow rate (Vishwa M. Bahera, *et al,* 2014).

In design and analysis of triple tube heat exchanger with fins, it is found that fins provide greater extent of heat transfer in the tubing. But the fin size should be optimum so that it can allow maximum heat transfer. It was found that at particular fin height the effectiveness and efficiency is maximum is 72%. Hence more compact design can be implemented to achieve desired effectiveness (Rajasekar k, *et al*)

In the study of the effect of dimpled tube in pipe in pipe heat exchanger, comparison was made between the flows over plane tube as well as dimpled tube. It is found that when the Reynolds number varied from 2900 to 6000 the Nusselt number with dimpled tube where greater than 30-40% than with plane tube. Also the convective heat transfer coefficient has slightly increased when we use dimpled tube. Also the effectiveness of heat exchanger with dimpled tube was 37% greater than effectiveness of heat exchanger with plane tube (Yogesh D. Banekar, *et al,* 2015)

Comparative study of 4 types of dimpled tube with plane tube is carried out & the inlet temperature as well as the mass flow rate of both hot and cold fluid is varied. It correlate heat transfer to the geometry of the dimple. It is concluded that convective heat transfer coefficient is inversely proportional to depth of the dimple. Also as the dimple diameter or depth decreases significant increase in Nusselt number is observed (Vilas Apte, *et al,* 2015).

Various type heat transfer enhancement process was studied. Swirl generation is one of future scope method heat transfer enhancement. Both by active and passive method give good heat transfer rate as compared with other type methods. It is conveyed that swirl generation effectively increases the heat transfer rate as well as reduces boundary layer generation which may result low pumping power (Shekhar S. Babar, *et al,* 2015).

III. EXPERIMENTAL SETUP

Experimental setup comprises of 3 tubes which are concentrically fitted into each other. First tube is of copper and of ID 16 mm, OD 19 mm and length 800 mm. Second tube is of aluminium with ID 32 mm, OD38 mm and length 750 mm. Third tube is of mild steel with ID 44 mm, OD 48 mm and length 650 mm.

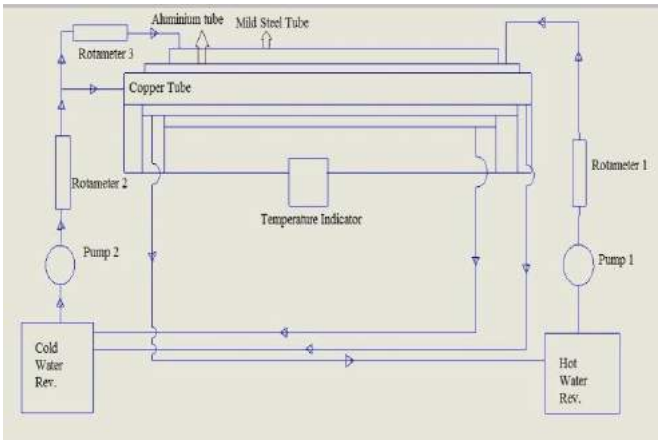

Fig.1 Line diagram of Setup

Also for the flow measurement 3 rotameters (Acrylic, 0-600 LPH) are used for 3 concentric tubes for better control over discharge. Also 2 separate reservoir for hot water and cold water of 64 liter each. One pump (Centrifugal self-primed pump, 900 LPH, closed impeller) is used for flow creation of hot water and one pump is used for flow creation of cold water. For heating water, geyser is used. Water first passes through pump and then through geyser where it get heated. Thermocouple sensor (K-type, range 0 ºC to 1260 ºC) are fitted to each inlet and outlet of each tube for measuring temperature and are connected to the temperature indicator. Second tube used is of aluminium and comprises of 2 dimples over it. These two dimples are made by using hammering on the tube. More dimples may destroy the tube in these cases so it is limited to have number of dimples only 2. At various positions brass valves are provided to adjust in the tubes whose measurement is done through rotameters. Also there is bypass to both pump provided with a valve so that low flow can be obtained by adjusting the bypass valve

Fig. 2 Photograph of Experimental Setup

IV. EXPERIMENTAL PROCEDURE

Testing is carried out by keeping hot water flow rate constant and varying cold water flow rate for different flow rate of hot water flowing through inner annulus. The flow rates of hot & cold water are controlled by using the valves assigned for each concentric tube. Assumption was made that pressure drop along the flow of fluid is negligible. For hot water flow rates are selected as: 150 LPH, 200 LPH, 250LPH, 300 LPH & for cold water flow rates are 240 LPH, 300 LPH, 360 LPH, 420 LPH. After achieving steady state various temperature are recorded and according to the various procedures effectiveness is calculated. Also the flow in both tubes through which cold water is flowing is kept constant.

V. RESULT & DISCUSSION

For various combination of flow rates of hot & cold fluids observations are noted & different results are plotted. Fig. 3 shows the variation of effectiveness with respect to Reynolds number (hot fluid) for counter flow. From fig. it is observed that effectiveness increases with decrease in Reynolds number (hot fluid).

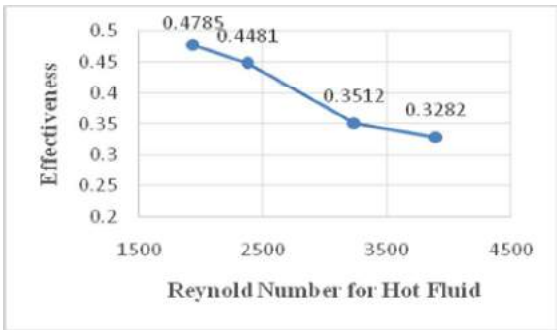

Fig. 3 Effectiveness Vs Reynolds Number (Hot Fluid)

Values of effectiveness vary from 0.3282 to 0.4785. Maximum value of Effectiveness is 0.4785 obtained at Reynolds number 1944.9454. Low Reynold number ensures maximum period of contact between the flowing fluids (hot & cold fluid).

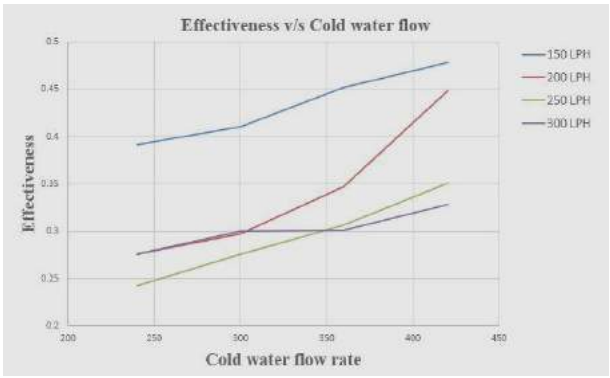

Fig. 4 Effectiveness Vs Cold Water Discharge

The effectiveness for various flow rates of cold water is determined. Fig. 4 shows variation of effectiveness with cold fluid flow for various hot water flow rates. The effectiveness goes on increasing as the cold water flow increases.

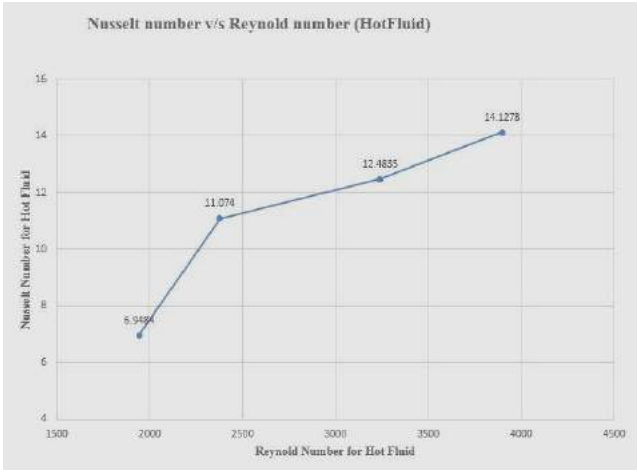

Fig. 5 Nusselt number Vs Reynolds Number (Hot Fluid)

Fig. 5 shows variation of Nusselt number with Reynolds number. Both of which are calculated for hot fluid flow. It shows that as the Reynolds number increases with Nusselt number. This is because as flow rate increases heat transfer increases.

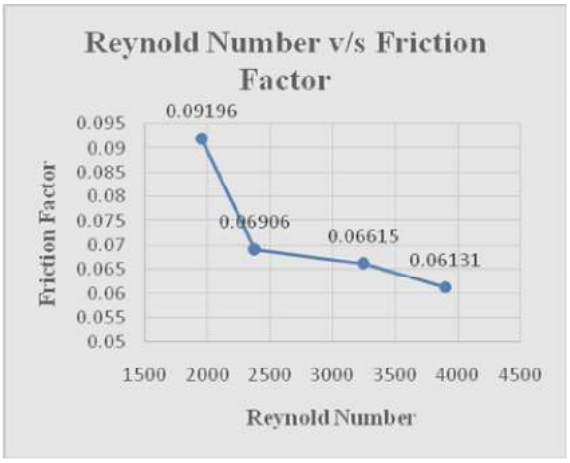

Fig. 6 Reynolds Number (hot fluid) Vs Friction Factor

Fig. 6 shows the variation of Friction factor with respect to Reynolds number for counter flow. From fig it is observed that Friction factor decreases with increase in Reynolds number. Values of Friction factor vary from 0.06131 to 0.09196. Minimum value of Friction factor is 0.06131 obtained at Reynolds number 3897.7714.

VI. CONCLUSION

Following conclusions were observed during this experimentation:

1. It is found that for the same Reynolds number effectiveness of triple tube heat exchanger is 60% more than double tube heat exchanger.
2. From the experimental data we found that Nusselt number is 1.25 times of predicted Nusselt number.
3. Increasing effectiveness from 0.27 to 0.5 with respect to varying mass flow rate of cold water at same range of 'Re' varies from 1500 to 4500.
4. Friction factor on hot fluid side is decreases as 'Re' increases and hence pumping power is reduced.
5. Hence from the above discussion we conclude that triple tube HEX is suitable for all industrial as well as automotive vehicles (it depends on temperature range). .

VII. FUTURE SCOPE

Triple tube concentric heat exchanger performance analysis is to be carried out by using Nano fluid mixed with cold water for different concentrations & similar results will be discussed.

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An Effectual CBHDAP Protocol For Gray Hole And Black Hole Attack Detection Along With A Queuing Technique CBCRTQ For Traffic Management In MANET

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Abstract- *Open medium, absence of centralized monitoring point and dynamic topology are various features of MANET. Beside all this, gray hole and black hole are few security attacks in MANET. Here we are going to describe an efficient Crypto-key based Black Hole Detection and Avoidance Protocol (CBHDAP). It generates a group key using Diffie-Hellman key generation algorithm. Then, the generated key is forwarded to the authenticated group members. Before initiating the actual transmission, validation of nodes in the route is done with this key. Various parameters considered in this protocol are Route Reply (RREP), Packet Delivery Ration (PDR) and hop count. To validate the efficiency of this protocol, it is compared with existing protocols.*

In Ad hoc network, nodes travel liberally and separately to be in touch with others from side to side wireless relations, which is represented as bunch of clusters by combining nodes in near proximity with one another. This free movement increases the traffic overhead, so Queuing is one of the important mechanisms in traffic organization. Class Based Cluster Round Trip Queue (CBCRTQ) is an algorithm used for selection of cluster head, which might be used to direct packets in the cluster. Load balancing is done with this technique to manage traffic.

Keywords- CBHDAP; CBCRTQ; Gray hole and Black hole attack; Key exchange; MANET; Traffic management;

I. INTRODUCTION

By the improvement in wireless technologies at a quick pace, there is an importance of keeping the communication protocols unfailing. MANET (Mobile Ad hoc Network) is a wireless network without any infrastructure in which each of the node or the user of node has ability to search the best route. Routing Protocols greatly affect system routine, so the consistency of the protocol in deriving a route is very significant on the resulting QoS (Quality of Services). Multi-hop nature of MANET introduces various attacks leading to failure of security like black hole attack, wormhole attack, sink hole attack, and gray hole attack. Among these different security challenges, black hole attack is a legitimate risk. It is a kind of active attack in which hateful node forwards a fake Route Reply (RREP) packet to the starting node which initiates route detection in order to imagine being a destination node. This attack is launched by malicious node by promoting fresh route with least hop count and peak destination sequence number to the node which initiates route invention.

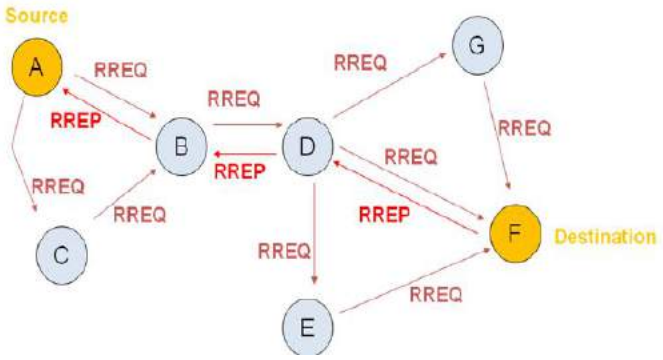

Fig 1 : Route Discovery Process (Ref: www.researchgate.net)

Gray hole attack is somewhat deviation of black hole attack in which hateful node may behave as an sincere node during route invention process and then may change its state to hateful and vice versa. Effective CBHDAP protocol will avoid both these attacks in routing.

CBCRTQ is one of the traffic management algorithm in which messages will be well organized in cluster by selecting cluster head and following the instructions of it.

II. THEORY

A. Mobile Adhoc Network (MANET)

Mobile Ad hoc Network (MANET), is a collection of self-governing mobile nodes that can communicate to each other via radio waves. Movable nodes that are in near proximity of one another can directly communicate, whereas others need the help of midway nodes to route their packets. These networks are entirely dispersed, and can work at any position without the assistance of any infrastructure. Due to this feature these networks highly elastic and strong. Routing will be a challenging task due to random change in MANET. The presented path is rendered incompetent and infeasible. The most important issues for mobile ad hoc networks are routing, medium access control (MAC), and providing quality of service and security. This article addresses the routing problem in a mobile ad hoc network (MANET) without considering the other issues like security and medium access control. Routing in MANET means the designed flow of data from source to destination with utmost network performance.

The characteristics of these networks are summarized as follows:

- Communication via wireless Network.
- Absence of centralized director and infrastructure.
- Active network topology.
- Regular routing updates.
- Nodes can work both as hosts as well as routers.
- Built-in mutual trust.

Few applications of MANETs are

- Tragedy relief operations.
- Defense Development.
- Insistent Business meetings.
- Mine place operations.

B. Black hole Assault

Black hole assault is a very serious problem in MANET, because it affects security. During the route discovery process, malicious node shows highest destination sequence number and shortest path towards the destination. Source node will select it as an intermediate node to forward packets to destination. It will drop or consume that packet and do not allow forwarding it to the next node. It may affect uninterrupted delivery ratio, packet release ratio and throughput.

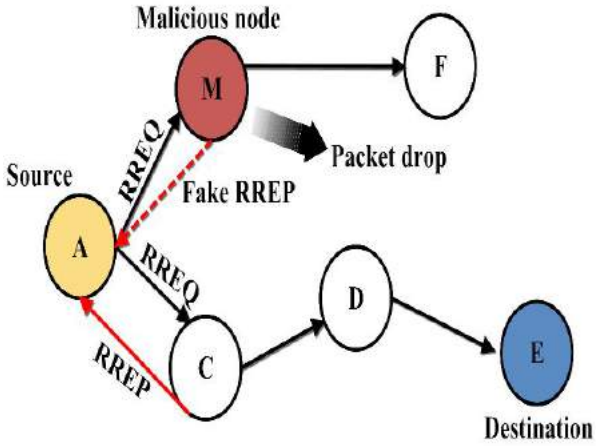

Fig 2: Black Hole Attack (Ref: www.slideplayer.com)

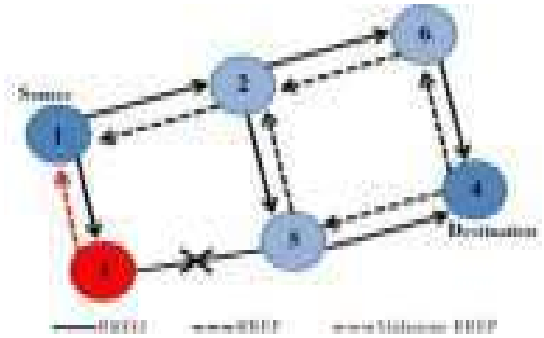

Fig 3: Single Black Hole Attack (Ref: hcis-journal.springeropen.com)

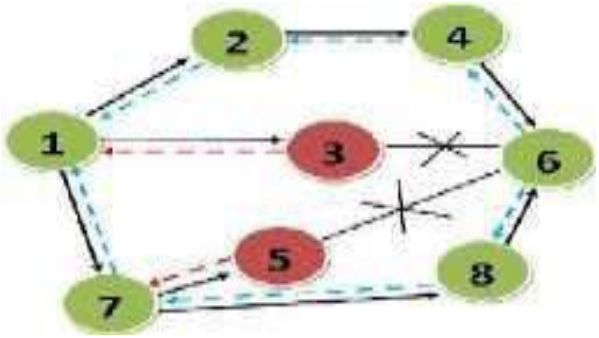

Fig 4: Collaborative Black Hole Attack (Ref: www.ijser.org)

Multiple techniques like MEAODV, Modified Enhanced Ad hoc On-demand Distance Vector, GBHASM, Grouped Black Hole Attack Security Model, MDSR, Modified Dynamic Source Routing, etc. are available for black hole attacks detection. These techniques detect only collaborative black hole assault, whereas CBHDAP protocol will detect single black hole assault as well.

C. Gray hole Assault

A variation of black hole assault in which hateful node behaves as a truthful node during route invention and then may change its state to hateful and vice versa is said to be

an gray hole attack. That hateful node might drop some or all of the data packets. Due to congestion overload and capability of changing states, it is difficult to detect gray hole attacks. CBHDAP protocol will help to detect the current state of node i.e. whether it is malicious or honest.

D. Traffic Management

As nodes moves freely and independently in wireless network, it increases the traffic overhead. In such a heavy traffic, there are lot many chances of collision and loss of packets. To avoid this one must manage the traffic efficiently by using a queuing technique, because all the packets are of same capability. For successful delivery of packets to the destination, a queuing technique must be used in a cluster. CBCRTQ is one of the best options of queuing technique. Due to same capability, convinced nodes are chosen to form the cluster heads.

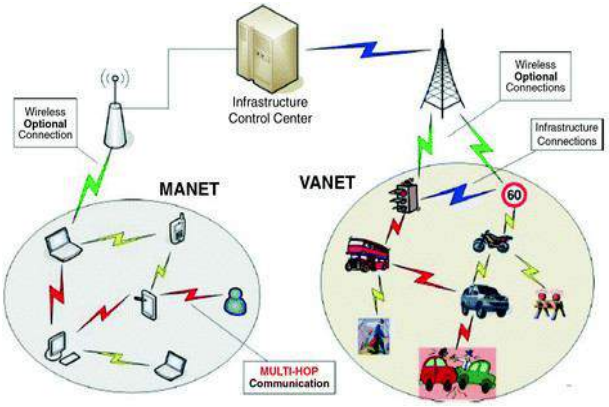

Fig 5: Traffic Management (Ref: www.researchgate.net)

E.CBHDAP Protocol

CBHDAP i.e. Crypto-key based black hole detection and avoidance protocol is used for detection and avoidance of single plus collaborative black hole and gray hole assault. The fundamental goals of it are:

- To execute key agreement detection algorithm for finding nearness black hole assault and gray hole assault in MANET.
- To avoid black hole assault and gray hole assault by accepting the parameters like hop count, packet delivery and time.

A general stream of CBHDAP protocol is shown below which includes following steps:

- Network formation
- Group key sharing
- Route discovery
- Packet transmission

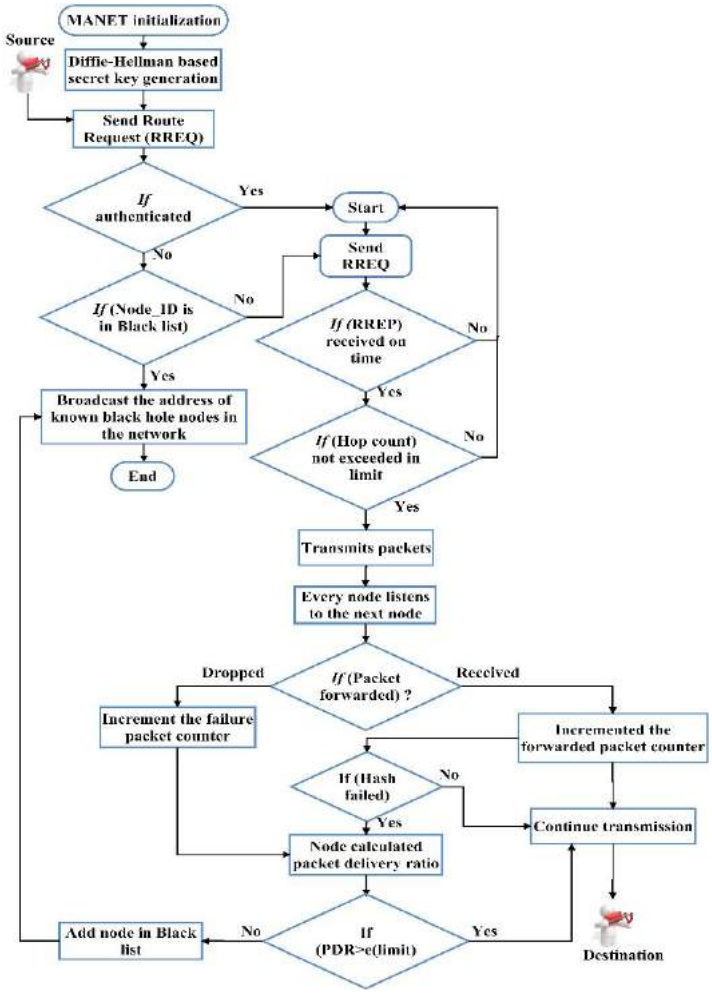

Fig 6: Overflow of CBHDAP Protocol

1) The 1st step of CBHDAP protocol is network formation with 100 no of nodes by using NS2 tool.
2) The 2nd step is to generate group key by using Diffie-Hellman algorithm. This key is shared by nodes in the network that enables communication between group members.
3) The 3rd step is route discovery in which estimation of optimal route between sender and receiver is done. This estimation is based on 2 steps such as:

3.1) Node Authentication:

Authenticity is based on 2 metrics such as time and hop count. First we have to decide conceivable path to the destination, then source node broadcasts RREQ message, then neighboring nodes evaluate the count of hops required to arrive at destination and sends RREP message. If time interval between RREQ and RREP message satisfy the Time to Live (TTL), then the corresponding neighboring node is considered

as authentic else it is considered as unauthentic and added to black list. Another metric to check authenticity is hop count. In the RREP message, every neighboring node sends the count of number of nodes required for transmitting data from source to destination in the form of hop count. If hop count exceeds the hop limit, then corresponding node is considered as unauthentic and added to black list.

3.2) Black list verification:

Black list is a list which contains ID of malicious nodes obtained from the history of previous attacks. Every node in the network maintains this list. Before forwarding RREQ message by the source node, it first verifies its black list and then sends message to the nodes that are not in black list.

4] In 4th step the actual packet transmission is initiated. During this transmission every node listens to the next node. Successful transmission of packet increments the forwarded packets counter whereas unsuccessful transmission increments the failure packets counter. To avoid black hole attack, hash value of the packet is validated. If hash value fails, then it indicates non appearance of black hole attack and hence transmission is continued, or else PDR is calculated. If PDR is greater than the limit, then it indicates that there is no packet drop hence transmission is continued else this node is added to the black list

F.CBCRTQ Protocol

Group of nodes in the close proximity of one another is termed as cluster, whereas the process of forming clusters is termed as clustering. Cluster Head (CH) is selected from every cluster based on their priority and capability. Each CH acts as a manager within its zone. Each router in the network must implements some queuing discipline which governs how packets are buffered for communication. Therefore queuing is one of the significant mechanisms in traffic management.

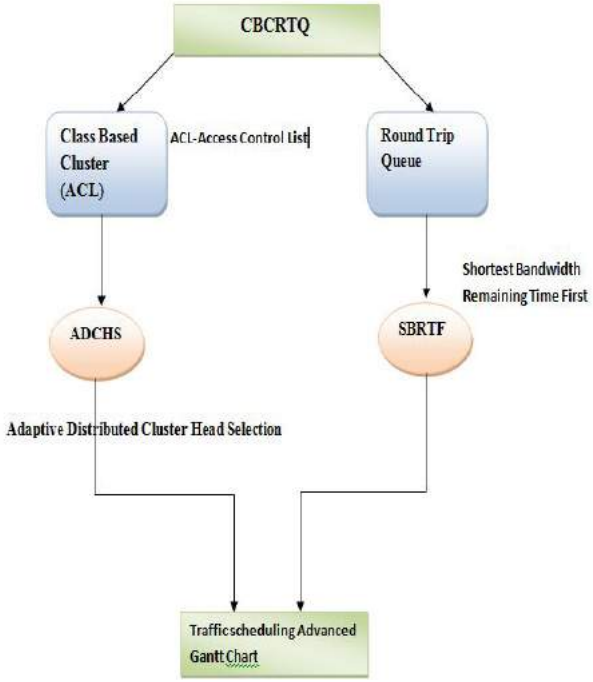

Fig 7: Classification Diagram of CBCRTQ

III. RESULT AND ANALYSIS

This section indicates the behavior and result of CBHDAP protocol for detection and avoidance of black and gray hole assault. Performance of Adhoc On demand Distance Vector (AODV), Modified Reverse AODV (MRAODV) and Dynamic Source Routing (DSR) are compared based on several parameters like Packet Delivery Ratio (PDR), Throughput, Routing Overhead, E2E Delay, Node Outage Count, Detection of attacks, Energy consumption and Packet Transfer Rate.

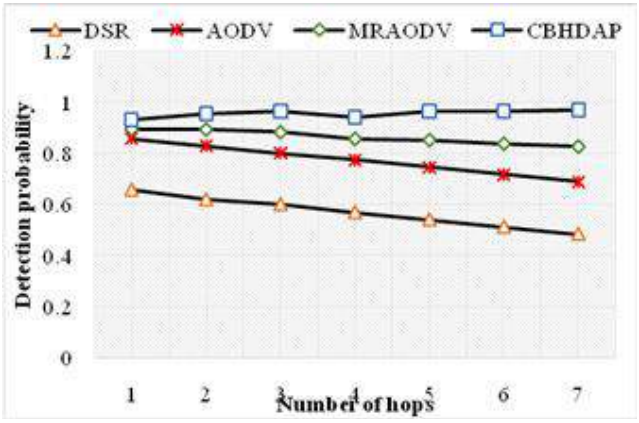

Fig 8: Comparison of detection of black hole nodes for the existing and proposed protocols

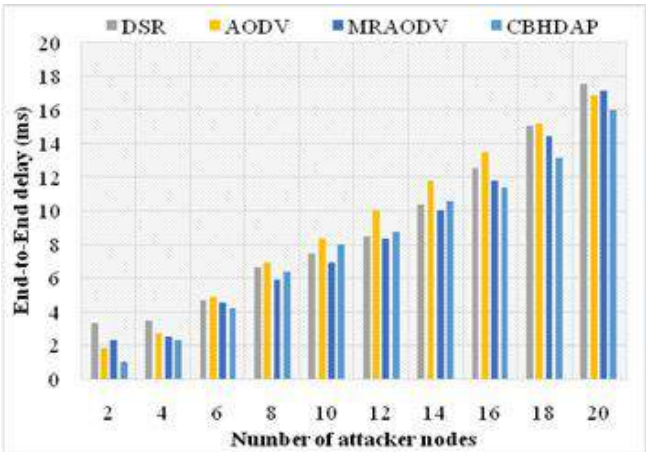

Fig 9: Comparison of End-to-End delay for the existing and the proposed protocols

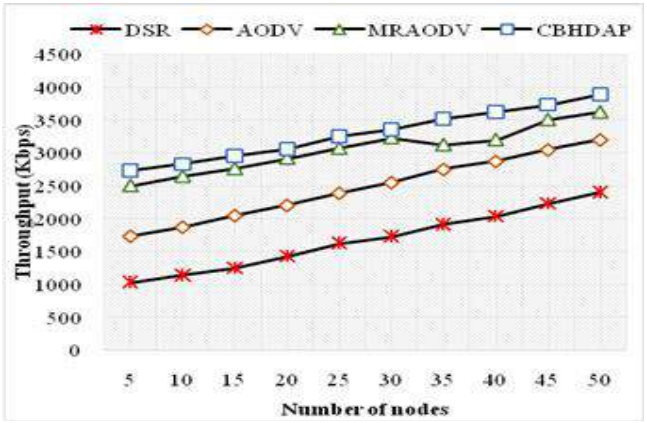

Fig 10: Comparison of throughput for the existing and the proposed protocols

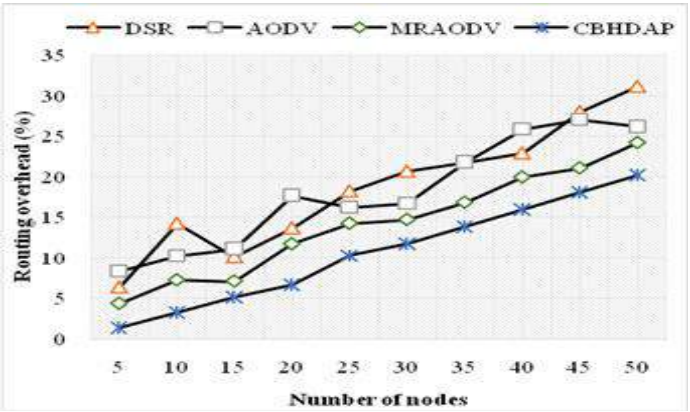

Fig 11: Comparison of routing overhead for the existing and proposed protocols

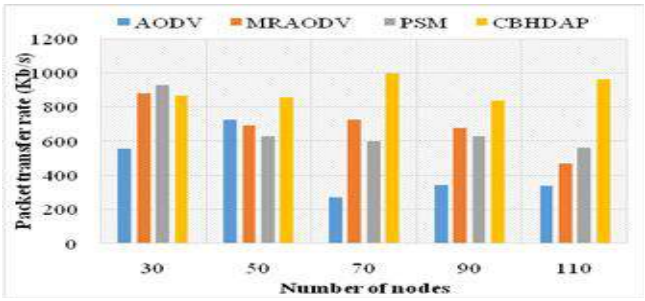

Fig 12: Comparison of packet transfer rate for the existing and the proposed methods.

IV. CONCLUSION AND FUTURE WORK

From the above compared outcome we can clearly conclude that CBHDAP is an effectual algorithm for detecting and avoiding attacks like black hole and gray hole. Initially sender uses Diffie-Hellman algorithm for generation of group key, which is shared between group members. The actual transmission is initiated by broadcasting RREQ message. After receiving RREQ message, every neighboring node sends RREP message. If RREP is found unauthentic, the corresponding node ID is added to the black list and address of it is broadcasted to remaining group members. On the other hand, if RREP is authentic, the time gap in between RREQ and RREP is checked. If it exceeds TTL then node is added to black list, else it checks hop count of all neighboring nodes. If hop count is satisfactory, the transmission is initiated.

The Reduced traffic in VoIP and time consumption of wireless sensor node increases the network life time because traffic has not been used for whole time instead it is used for particular time in CBCRTQ protocol. Hence, we can clearly conclude that CBCRTQ is an efficient queuing technique used for traffic management in MANET.

V. ACKNOWLEDGEMENT

Abbreviation	Full Form
MANET	Mobile Ad-hoc Network
MAC	Medium Access Control
QoS	Quality of Service
RREP	Route Reply
RREQ	Route Request
CBHDAP	Crypto-key based Black Hole Detection & Avoidance Protocol
CBCRTQ	Class Based Cluster Round Trip Queue

AODV	Ad-hoc On-demand Distance Vector
SAODV	Secure Ad-hoc On-demand Distance Vector
DPRAODV	Detection, Prevention & Reactive AODV
REAct	Resource Efficient Accountability
DSR	Dynamic Source Routing
PDR	Packet Delivery Ratio
DRI	Data Routing Information
DCM	Distributed Cooperative Mechanism
SN	Source Node
IN	Intermediate Node
NHN	Next Hope Node
PRF	Pseudo Random Function
MAC	Message Authentication Code
PKI	Public Key Infrastructure
BBN	Backbone Nodes
RIP	Restricted IP
BDSR	Bait DSR
VoIP	Voice over Internet Protocol
CH	Cluster Head
ADCHS	Adaptive Distributed Cluster Head Selection
SBRTF	Shortest Bandwidth Remaining Time First
UDP	User Datagram Protocol
VGA	Video Graphics Array
NAM	Network AniMator
NS2	Network Simulator (Version 2)
OTcl	Object-oriented Tool Command Language
Tcl	Tool Command Language
TclCL	Tool Command Language with classes

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DESIGN, ANALYSIS & FABRICATION OF SHAFT DRIVEN BICYCLE

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ABSTRACT

The conventional bicycle employs the chain drive to transmit power from pedal to the rear wheel and it requires accurate mounting & alignment for proper working. The least misalignment will result in chain dropping. So this problem can be overcome by introducing the shaft drive system. This project includes design and fabrication of shaft driven bicycle. In this project, two spiral bevel gears are used at the pedal side and two straight bevel gears are used at rear wheel side. The drive shaft has two gears mounted one at each end. One is spiral bevel pinion at pedal end and one is straight bevel pinion at the rear wheel end. The use of bevel gears allows the axis of the drive torque from the pedals to be turned through 90 degrees. The bevel gear at the rear end of drive shaft then meshes with a bevel gear rear wheel hub where the rear the flywheel unit would be on a conventional bicycle and canceling out the first drive torque change of axis.

Keywords: Analysis, Bevel gears, drive shaft, shaft driven bicycle.

I. INTRODUCTION

The Shaft driven bicycle has a drive shaft which replaces achaindrive to transmit power from the pedals to the wheel. The arrangement for shaft driven bicycleis as shown in fig 1. Shaft drives were introduced over a century ago but were mostly supplanted by chain-driven bicycle due to the gear ranges possible with sprockets and derailleur. Recently, due to advancements in internal gear technology, a small number of modern shaft-driven bikes have a large bevel gear where a conventional bike would have its chain ring. This meshes another bevel gear mounted on the drive shaft which is shown in fig 1.

Fig.1 Replacement of Chain drive bicycle with drive shaft

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The use of bevel gears allows the axis of the drive torque from the pedals to be turned through 90 degrees. The drive shaft then has another bevel gear near the rear wheel hub which meshes with a bevel gear on the hub where the rear sprocket would be on the conventional bike and canceling out the first drive torque change of axis.The design of bevel gear produces less vibration and less noise than conventional straight cut gear.

1.1 Use of drive shaft

The torque that is produced from the pedal and transmission must be transferred to rear wheels to push the vehicle forward and reverse. The drive shaft must provide a smooth, uninterrupted flow of power to the axles. The drive shaft and differential are used to transfer this torque.

1.2 Functions of the drive shaft

1. First, it must transmit torque from the transmission to the foot pedal.
2. During the operation, it is necessary to transmit maximum low-gear torque developed by the pedal.
3. The drive shaft must also be capable of rotating at the very fast speeds required by the vehicle.
4. The drive shaft must also operate through constantly changing angles between the transmission, the differentials and the axle.

II. LITERATURE REVIEW

The first shaft drives for cycles appear to have been invented independently in 1890 in the United States & England. In those days manufacturing of bevel gears was not so precise and cost effective; therefore it was not possible to replace chain drive shaft driven gear system. In shaft drive at both ends of shaft pair of spiral gears is used. Most familiar application of the spiral bevel gear is in automobile differential, in which the direction of drive from the drive shaft must be turned 90 degrees to drive the wheels of the vehicle. The shaft drive bicycle has more efficiency than conventional chain drive bicycle. Moreover, the application of chain drive leads to underutilization of human effort due to the fact the maximum transmission of the bicycle chain remains below 70 per cent due to polygon effect in chain sprocket drives. Thus there is need to replace conventional chain drive using the spiral bevel gear arrangement. In ashaft driven bicycle, a drive shaft is used instead of a chain to transmit power from the pedals to the wheels. The drive shafts carry of torque. The steel drive shaft satisfies three design specifications such as torque transmission capability, buckling torque capability & natural frequency in bending mode. The shaft drive increases power transmission efficiency.

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III. COMPONENTS

3.1 Bevel gear

Fig.3.1 Bevel gears

A kind of gear in which the two wheels working together lie in different planes and have their teeth cut at right angles to the surfaces of two cones whose apices coincide with the point where the axes of the wheels would meet.

3.2 Drive shaft

A shaft- driven bicycle is a bicycle that uses a drive shaft instead of a chain to transmit power from the pedals to the wheel. Shaft drives were introduced over a century agobut were mostly supplanted by chain-driven bicycle due to the gear ranges possible with sprockets and derailleur. Recently, due to advancements in internal gear technology, a small number of modern shaft-driven bicycles have been introduced.

Fig.3.2 Drive shaft & Bearing

3.3 Bearing

For the smooth operation of the shaft, the bearing mechanism is used. To have very less friction loss the two ends of the shaft are pivoted into the same dimensions bearing.

3.3 Merits of drive shaft

1) They have high specific modulus and strength.
2) Reduced weight.
3) Due to the weight reduction, energy consumption will be reduced.

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4) They have high damping capacity hence they produce less noise and vibration.
5) They have good corrosion resistance.
6) Lower rotating weight transmits more of available power.

IV. WORKING PRINCIPLE

The job involved is the design for the suitable drive shaft and replacement of chain drive smoothly to transmit power from pedal to the wheel without slip. It needs only a less maintenance. It is cost effective. Drive shaft strength is more and also its diameter is less. The both ends of the shaft are fitted with a bevel pinion, the bevel pinion is engaged with a crown and power is transmitted to the rear wheel through the drive shaft.

V. DESIGN METHODOLOGY

5.1 Design assumption

A. The shaft rotates at constant speed about its longitudinal axis.
B. The shaft has a uniform, circular cross section.
C. The shaft is perfectly balanced, i.e. at every cross section, the mass center coincides with the Geometric center.
D. All damping and nonlinear effects are executed.
E. The stress-strain relationship for thecomposite material is linear & elastic; hence, Hooke's law is applicable for composite materials.
F. Acoustical fluid interactions are neglected, i.e. the shaft is assumed to be acting in a vacuum.
G. Since lamina is thin and no out-of-plane loads are applied, it is considered as under the plane stress.

5.2 Design calculation

5.2.1For Drive Shaft

Diameter of shaft (d) = 0.025 m

Length of shaft (L) = 0.35 m

Length of pedal crank (l) = 0.175 m

Speed of pedal gear = 120 rpm

If person does not turn the pedal then he will stand on it and so the maximum torque will be,

T = (body mass of the rider) x (g) x (length of pedal crank)

T = 80 x 9.81 x 0.175

$\therefore$ T = 137.34 N-m

Power (P) = $2\pi NT / 60$

P = 2π x 120 x 137.34 / 60

= 1725.86 watts

J = $\pi d^4 / 32$

= π x 0.025^4 / 32

= 3.835 x 10^{-8} m^4

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Shear stress (τ) = TR / J

=137.34 x 0.0125 / 3.835 x 10^{-8}

= 44.76 x 10^{6} N/ m^2

I = πd^4 / 64

= π x 0.025^4 / 64

= 1.917 x 10^{-8} m^4

Bending moment,

M = EI / R

=2.06 x 10^{11} x 1.917 x 10^{-8} / 0.0125

= 315921.6 N-m

Rate of twist = T /GJ

= 137.34 / (0.84 x 10^{11} x 3.835 x 10^{-8})

= 0.0426 rad / m

Θ = TL / GJ = Rate of twist x Length of shaft

= 0.0426 x 0.35

= 0.0149 rad

5.2.2. For bevel gears

Speed of gear (N_g) = 120 rpm

Velocity ratio (i) = 4.33

Teeth of pinion (Z_p) = 9

Diameter of crown = 0.15 m

Diameter of pinion = 0.045 m

Select suitable teeth on crown,

i = Z_c / Z_p = N_p / N_c

4.33 = Z_c / 9 = N_p / 120

Z_c = 39

N_p = 520 rpm

Pitch angle,

For pinion

tanγ_p = Z_p / Z_c

= 9 / 39

γ_p = 13

for crown

tanγ_c = 39 / 9

= 77

Module (m)

Diameter = module x teeth

150 = m x 39

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m = 3.589 mm

Normal module (m_n) = 3.5 mm

$m_n = m \times \cos\beta$

$3.5 = 3.589 \times \cos\beta$

$\beta = 12.78°$

Cone distance,

$A = 0.5 \times \sqrt{(150 * 150 + 45 * 45)}$

A = 78.30 mm

Pitch circle diameter

$P_c = \pi m$

$= \pi \times 3.589$

= 11.27 mm

Virtual number of teeth,

For crown

$Z_{vc} = Z_c / \cos\delta \times \cos^3\beta$

$= 39 / \cos(77) \times \cos^3(12.78)$

= 187

$Z_{pc} = Z_p / \cos\delta \times \cos^3\beta$

$= 9 / \cos(77) \times \cos^3(12.78)$

= 43

Tangential force (F_t)

$F_t = P_d \times C_v / V$

Where, $P_d = 1.25 \times 1725.86$

= 2.157 KN-m / sec

For medium shock of service factor

$C_s = 1.50$

$V = \pi dN / 60$

$= \pi \times 0.045 \times 520 / 60$

= 1.225 m/s

$F_t = 1000 \times 2.157 \times 1.50 / 1.225$

= 2.641 KN

Dynamic load calculation

$F_d = C_v N_{sf} k_m F_t$

Where, $C_v = [(5.5 + V_m^{0.5}) / 5.5]^{0.5}$

$= [(5.5 + 5^{0.5}) / 5.5]^{0.5}$

= 1.18

$N_{sf} = 1.5$

$k_m = 1.1$

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F_d = 1.18 x 1.5 x 1.1 x 2.641

= 7.011 KN

Beam strength calculation,

Lewis equation

$F_s = ([\sigma_b]\ b\ Y_v\ (1- b/A)) / P_d$

= 720 x 25 x 0.4686 x (1 – 25 / 78.30) /0.2

= 28.708 KN

Hence, $F_s > F_d$

Wear strength calculation,

F_w = dbQK

Where, $Q = 2Z_c/(Z_p + Z_c)$

= 2 x 39 / (9+39)

= 1.625

$K = \sigma_{es}^2 \sin\alpha\ (1/E_p + 1/E_c) / 1.4$

σ_{es} = 2.75 x (BHN) – 70

= 2.75 x 265 – 70

= 658.75 N/ mm^2

$K = 658.75^2$ x sin (20) x (2/ 540) / 1.4

K = 392.64

F_w = 45 x 25 x 1.625 x 392.64

= 717.8 KN Hence $F_w > F_d$

VI. Result

Sr. no.	Parameter	Symbol	Unit	Value
1	Moment of inertia	I	m^4	1.917 x 10^{-8}
2	Polar moment of inertia	J	m^4	3.835 x 10^{-8}
3	Torque	T	N-m	137.34
4	Power	P	W	1725.86
5	Shear stress	τ	N/m^2	44.76 x 10^6
6	Bending moment	M	N-m	315921.6
7	Angle of twist	Θ	rad	0.0149

Table 6.1 result

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VII. ANALYSIS OF SPIRAL BEVEL GEAR

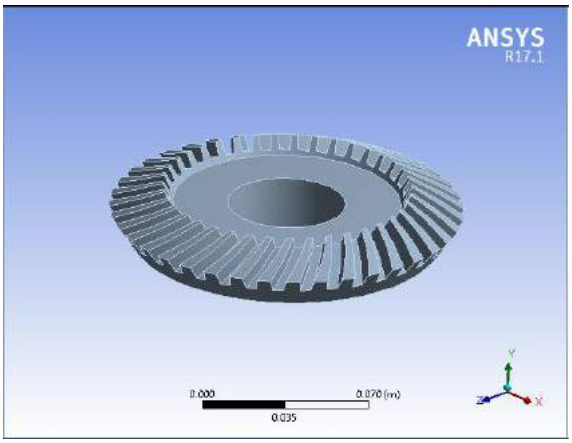

Fig.7.1 CAD Model of spiral bevel gear

The CAD geometry is created by using SOLIDWORKS and used for finite elemental analysis in ANSYS.

FE model is created using ANSYS. Second order tetrahedral elements are used to capture bevel geometry for better accuracy.

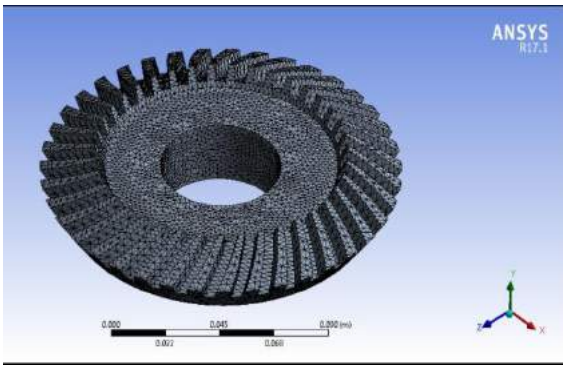

Fig.7.2 FE Model of spiral bevel gear

All translational degrees of freedom and rotation about bevel gear is fixed for FE analysis. These are minimum required boundary condition to get proper convergence of the model. Tangential load is applied on the four teeth of the bevel gear.

Equivalent von Mises stress and deformations within gear are plotted. Stress observed in gear is well within acceptable limit.

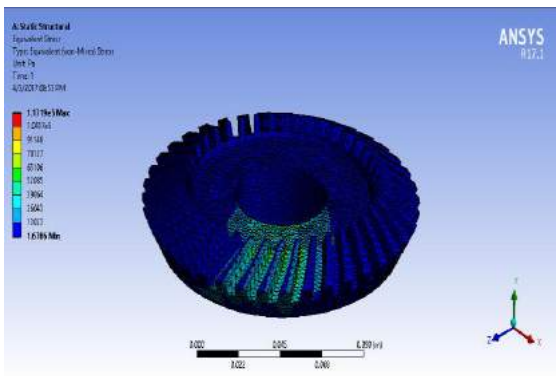

Fig.7.3 Von Mises stresses

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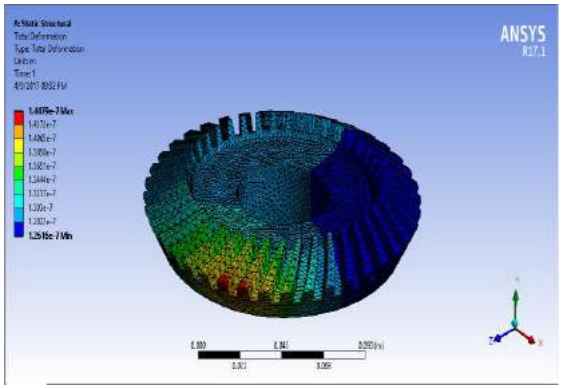

Fig. 7.4 Tooth deformation

1) Maximum stress induced in the gear is1.17×10^5 N/m^2< allowable stress 44.76×10^6.

2) Maximum deformation is 1.447×10^{-7} m.

VIII. CONCLUSION

The shaft driven bicycle is designed successfully. The bicycle works efficiently and transmits the power from pedal to rear wheel smoothly, but it is requiring slightly more initial torque compare to drive torque. The noise and the vibration of the gear pair are considerably reduced.

This bicycle can be used for racing purpose and off-road riding. As the speed of the shaft driven bicycle is more enough, it can be utilized for generating pedal work.

The result obtained from this work is a useful approximation to help in the earlier stages of the development, saving development time and helping the decision-making process to optimize the design.

The drive shaft with the objective of minimization of the weight of shaft which was subjected to the constraints such as torque transmission, torsion buckling capacity, stress-strain etc. The stress distribution and maximum deformation in the drive shaft are the functions of stacking of the material. The optimum stacking of material layers can be used as the effective tool to reduce weight and stress acting on the drive shaft.

IX. TROUBLESHOOTING

When abnormal vibrations and noise are detected in drive shaft area, following chart can be used to help to diagnose possible causes.

Problem	Caused by	Remedy
Gear slip at rear side	More load on pedal	Precise alignment of gear and sufficient lubrication
More torque required	Large gear ratio	Reduce gear ratio
Noise	Insufficient lubrication	Provide sufficient lubrication
Gear pitch circle not coincides	Vibrations	Precise alignment of gear
Jamming of gears	Foreign dust particles	Provide casing

Table 9.1 Trobleshooting

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