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B.E. (Computer Engg.),

HOD & Assistant Professor,

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Dr. Zahid Parwez,(Ex-Senior research fellow, MANF) is an ardent academician, Advocate, Human Rights activist and at present an Assistant Professor at Xavier Law School, XIM University, Bhubaneswar, Odisha. He has completed his Ph.D. in Law from Utkal University, Bhubaneswar, Odisha and is a gold medalist in LL.M. having specialization in Human Rights. He has seven years of teaching experience in different law and management schools. His area of academic interest includes Company law, Personal law, Constitutional law, Human Rights and Environmental law. He is the president and founder of "Human Rights Research Foundation" which works for the disadvantaged and underprivileged section of society for their upliftment and provides free legal aid at their doorstep. He has published around 30 research articles in different national and international journals and books.

Prof. Dr. M. Chinnadurai received Ph.D. Degree at Anna University, Chennai. He is currently working as Professor, Department of CSE, E.G.S. Pillay Engineering College, Nagapattinam, Tamilnadu, India. His field of research interest is CAD for VLSI, Networking and Security. He served as academic bodies like Board of Studies, Academic Council in the premier institutions at various capacities. He is currently looking the Controller of Examinations at E.G.S. Pillay Engineering College (Autonomous). He has written books and publishing various journals regularly in the research areas. So far He produced 11 PhD Scholars in the different fields of research activities under the guidance from Anna University, Chennai.

Jyoti Kaushal is an Assistant Professor in the Department of Computer Science & Engineering in Geeta Institute of Technical Studies, Udaipur. She holds B.E. and M.Tech. degrees in the field of Computer Science & Engineering. She has published various research papers in National and International journals. She has around 14 Years of teaching experience. Her main areas of research interest are Internet of things, Machine Learning and Cyber Security. She is an active member of various IT/CSE communities in India.

Pratima Kadam is working as an Assistant Professor in Bharati Vidyapeeth's College of Engineering, Lavale, Pune in Department of Computer Engineering. Her academic qualification is Ph.D. pursuing in (Computer Engineering), M.Tech (Computer Engineering), B.Tech (Computer Engineering). Her research area includes Machine Learning, Software Engineering, Image Processing, IOT.

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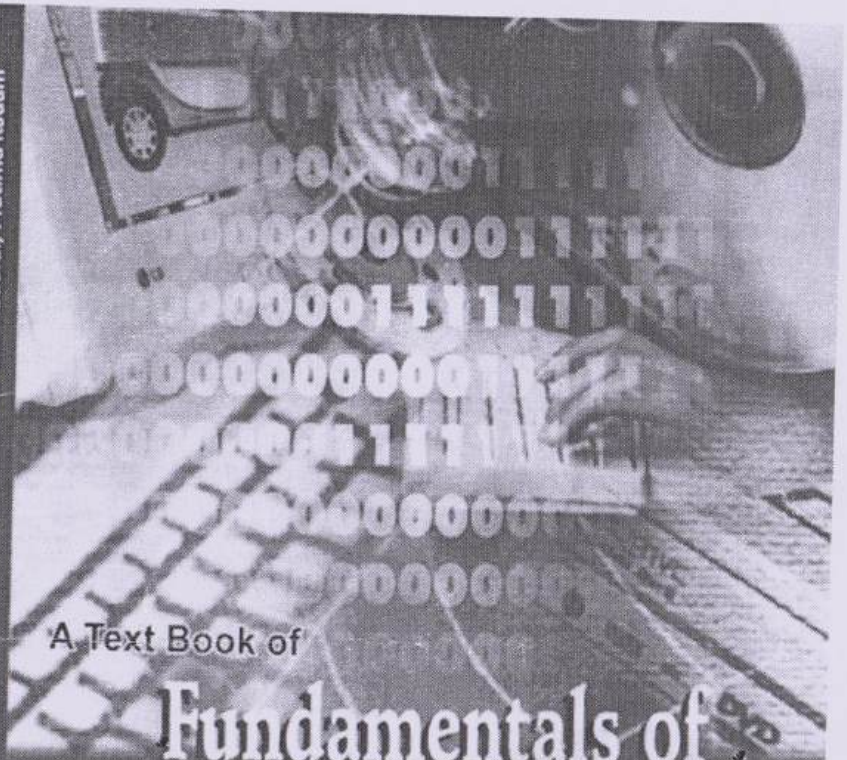

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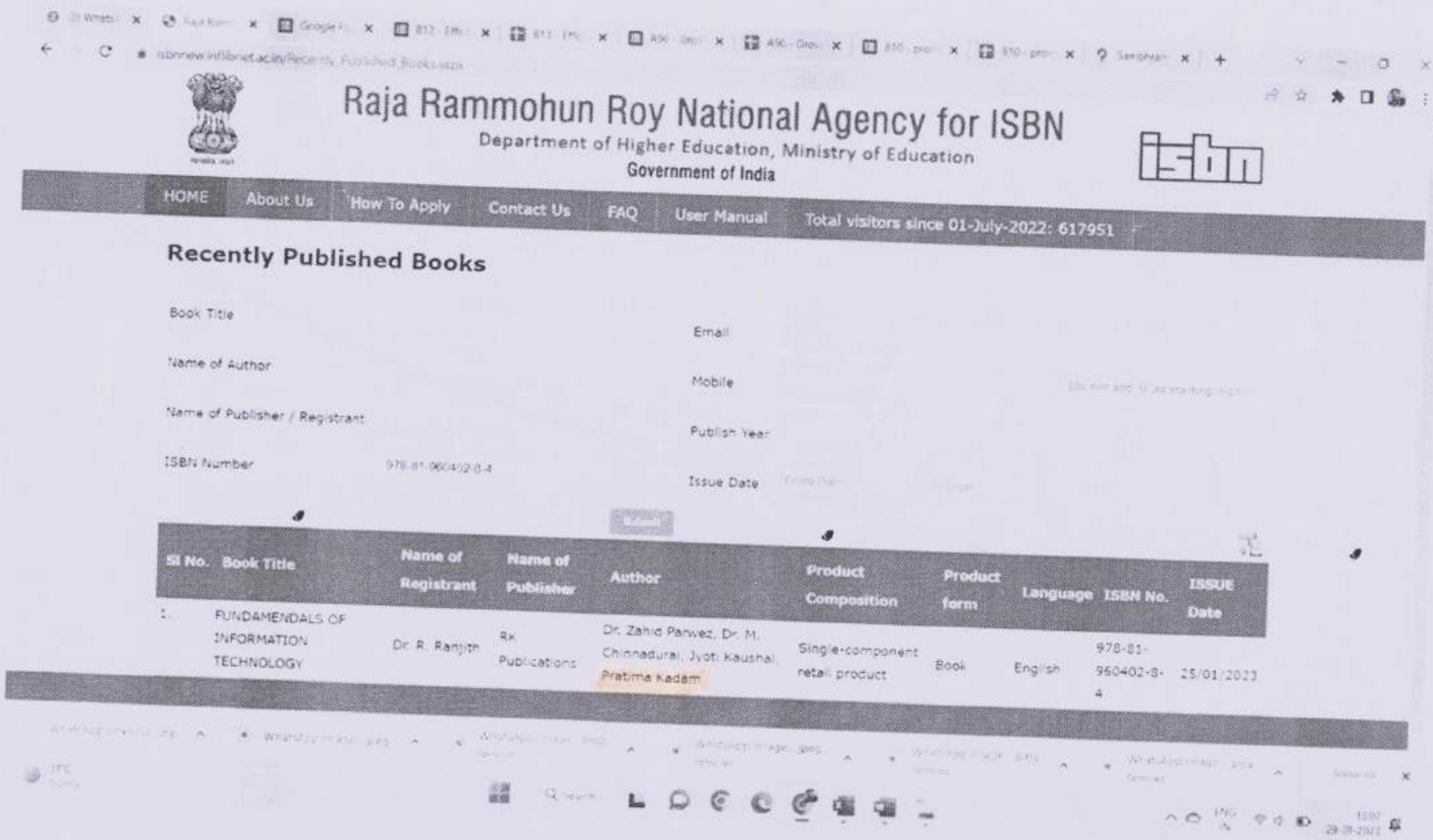

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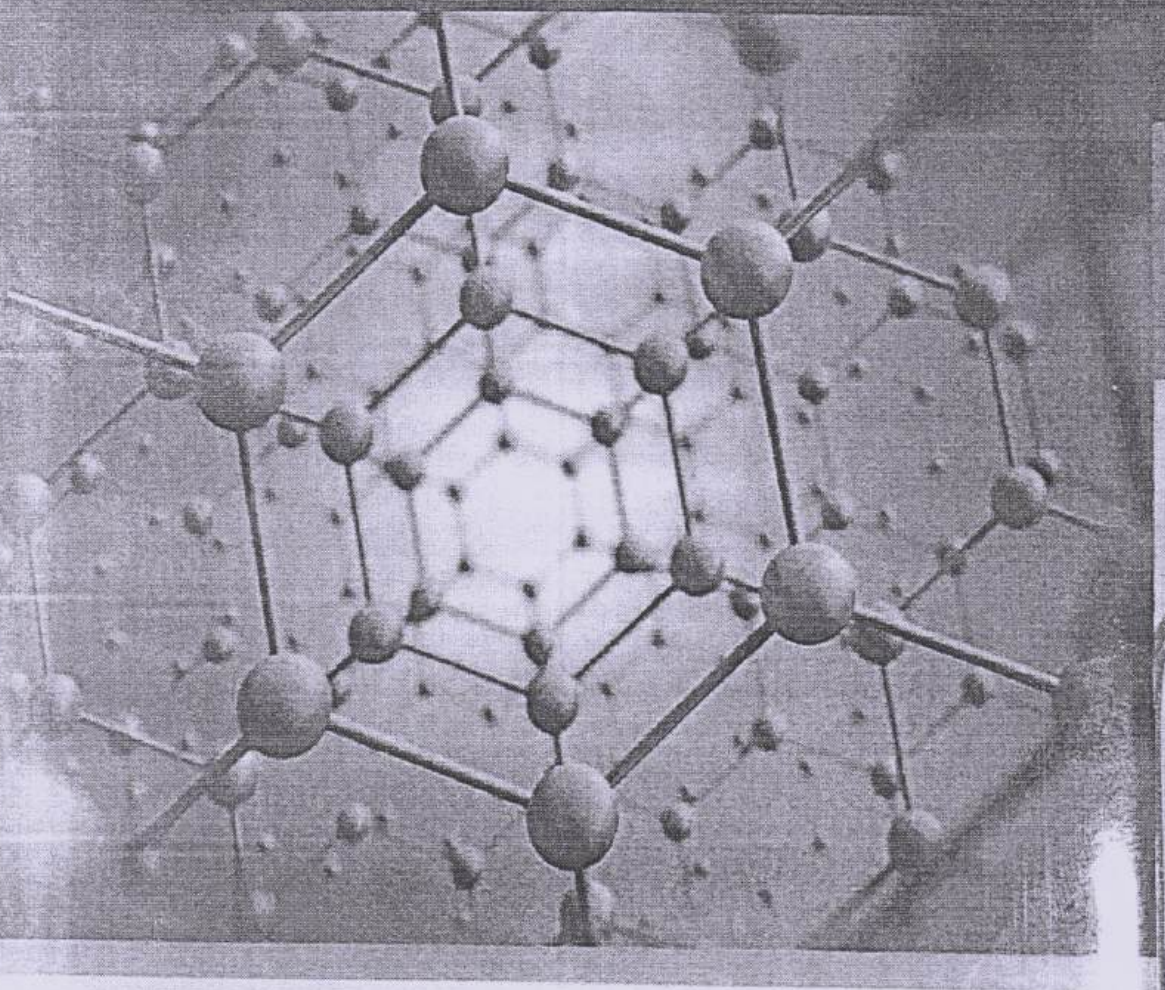

Dr. Mona Kejariwal
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This book has been specifically designed as a reference book for graduate and post graduate students in basic sciences to understand the basic concept of Nanotechnology. Nanotechnology ("nanotech") is science deals in atomic, molecular, and supramolecular scale. The first, widespread definition of nanotechnology refers to the technical goal of tricking atoms and molecules into macroscale products, now called molecular nanotechnology. Last five decades have witnessed advancement in research and technology related to this field. It is therefore common to see the plural form "nanotechnologies" as well as "nanoscale technologies" to refer to the broad range of research and applications whose common trait is size. This book will contribute to inoculate basics on this important subject in young minds who are looking forward to contribute in this arena.

Dr. Mona Kejariwal is Ph.D., FSoE and Associate Professor in RD & SH National College, Bandra, Mumbai, India. She is the recipient of Green Crusader Award, Authored three books in medicinal botany for Post graduate M.Pharma students in Pharmacognosy and published three patents recently. She has been actively guiding Ph.D. students in the field of Antioxidants, phytochemical profiling of Medicinal plants, Antimicrobial activity, plant genomics, Model Plant Systems. She is a consultant for private Herbal cosmetics company for formulation development and testing and published twenty research articles in peer reviewed reputed journals in the field of Potable Water testing, phytomedicines, Waste Water treatment, Plant Model systems, Phycology, Bioactive Nano-materials and Antioxidants. To augment undergraduate creative thinking, experimental skills and strengthen the research infrastructure in college at undergraduate and postgraduate level working diligently as Coordinator of DBT STAR College Scheme and Principal Investigator of DST FIST PG level grant. She has given lectures at international and National Conferences, presented papers and arranged International and National Conferences, Colloquium and Symposium as an organizing Secretary. She is working as President of MHRD's Institute Innovation Council (IIC), NIRF Nodal Officer, NISP Coordinator, handling Mentor-Mentee and KAPILA scheme at her institute.

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Dr. Gurusharan Kaur is currently working as a Associate Professor in the Department of Applied Sciences, Sagar Institute of Research and Technology, Bhopal. She have more than 19(B.Tech., M.Tech, M.Pharm, and M.Sc.) years of Teaching Experience in Department of Mathematics, University Institute of Technology (UIT), Barkatullah University, Bhopal (M.P) and Maulana Azad National Institute of Technology (MANIT), Bhopal (M.P). She has very much interested in research work related to Computer Science and Applied Sciences. More than 30 research articles are published in various International Journals. She has an active member of Social Services and NGOs. She is Editorial Board and Review member of many esteemed International Journals. She has also got International Prestigious Teaching and Research Excellence Award 2020 from IRDP Groups of Journals. Also granted many National and International Patents.

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Prof. Swarnava Biswas is a vibrant and dedicated professional with more than 3 years of industry and research experience in the field of Biomedical Image Processing, Artificial Intelligence, Deep Learning, Machine Learning, Terahertz Imaging, and Cancer Imaging. At present he is working as a faculty member in Department of Medical Laboratory Technology, The Neotia University, Kolkata and also engaged as Research Scientist in an Industry Sponsored Project 'An Artificial Intelligence Enabled Multi- Hypothesis based Diagnostic Approach Towards COVID- 19 Detection'. He has won several awards and scholarships one of them being the prestigious INSPIRE scholarship from DST, Government of India. In a short span of his professional life he has published numerous national and 8 international papers along with 3 international patents. Few of his research articles have been recognised by the World Health Organization (WHO) as impactful articles related to the coronavirus pandemic.

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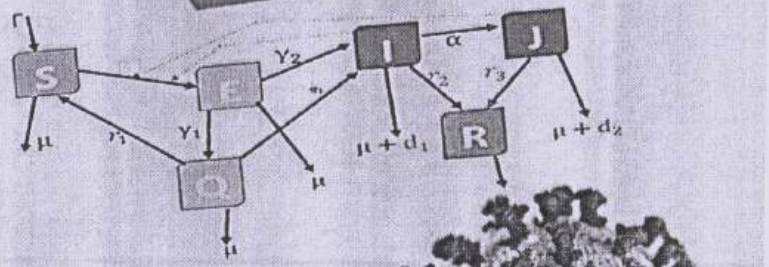

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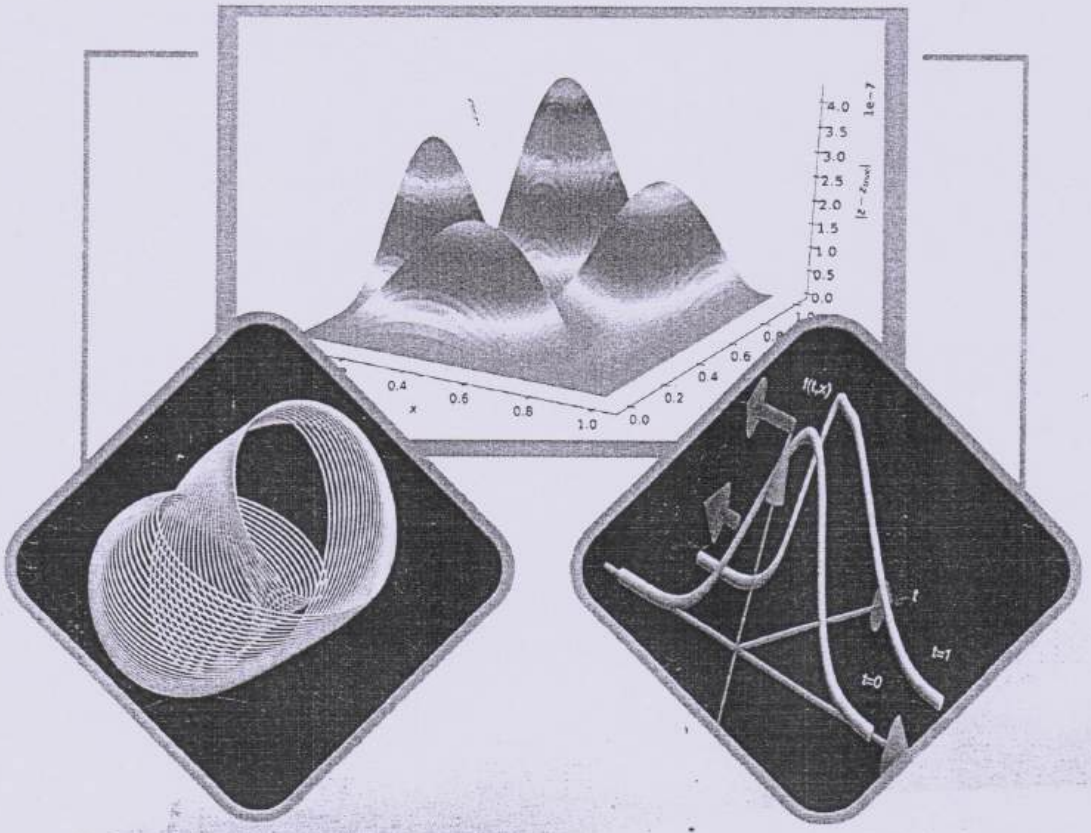

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गणिताचे स्थान

शिक्षक परिषद

सन २०२२

राष्ट्राच्या आणि मुलांच्या जडणघडणीतील गणिताचे स्थान

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डॉ. ज्योती ढाणके

Assistant Professor,
Bharati Vidyapeeth's College of Engineering.

गणित विद्यार्थ्यांना वेगवेगळ्या प्रकारे विचार करण्यास भाग पाडते. आव्हान देणाऱ्या गणिताच्या समस्या भिन्न विचारकौशल्ये तयार करण्यात मदत करतात. ही गणिताच्या परीक्षेतील क्रिएटिव्ह क्षमतेच्या बाबतीतील उदाहरण आहे.

कागद किंवा व्हाईटबोर्डऐवजी तुम्ही मोठ्या बॉलवर किंवा ग्लोबवर फक्त भूमितीच्या आकृत्या काढू शकता. बॉलवर भूमिती केल्यामुळे होणाऱ्या सर्व संभाव्य गोष्टींची यादी करा. उदाहरणार्थ, जर आपण बॉलवर सरळ रेषा काढण्यास सुरुवात केली तर शेवटी आपण जिथे सुरुवात केली तिथेच पोहोचू.

काही भौमितीय आकृत्या वेगळ्या रेखाटल्या जातील आणि अंतराचे मोजमाप वेगळे असेल. अशा पद्धतीमध्ये पायथागोरियन प्रमेय बदलेल किंवा नवीन गणितीय प्रणाली स्थापित करण्याची आवश्यकता असेल. असे घडवू शकणे हा विचार करण्याची गरज आहे.

त्याचे उत्तर सर्वांना माहिती आहे पण $(a+b)^2$ च्या सूत्राची मांडणी केली असता $(a+b)^{10}$ याची मांडणी करताना सूत्र लिहिण्याची संकल्पना स्पष्ट असावी. मग येणारे परिणाम वेगळे असू शकतात.

सर्जनशीलतेचा एक महत्त्वाचा पैलू म्हणजे विचारांच्या नेहमीच्या पद्धतींपासून मुक्त होणे (लवचिक विचार).

विद्यार्थ्यांना त्यांची प्रस्थापित मानसिकता सोडून देण्यास भाग पाडल्याने त्यांना वेगवेगळ्या दृष्टिकोनातून समस्येचे परीक्षण करण्यात आणि अधिक चांगल्या समाधानापर्यंत पोहोचण्यात मदत होते. तसेच त्यांना अभ्यासात, हेलॉकने जी विद्यार्थ्यांना प्रश्नांची मालिका दिली; ज्यामध्ये विद्यार्थ्यांना त्यांची बेरीज आणि फरक लक्षात घेऊन दोन संख्या शोधण्यास सांगितले जाते. जी विद्यार्थ्यांची मानसिकता केवळ सकारात्मक पूर्ण संख्या वापरणाऱ्या समाधानांची अपेक्षा करण्यासाठी सेट होते.

***

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सौ. भाग्यश्री चव्हाण (शिक्षिका)
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"Mathematics is the foundation of all subjects."

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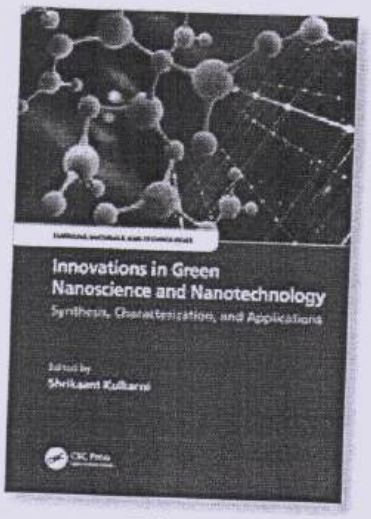

1st Edition

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Synthesis, Characterization, and Applications

Edited By Shrikaant Kulkarni

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- Advocates green nanotechnology solutions for sustainability and energy

This book is aimed at researchers and professionals in nanotechnology, green chemistry, and chemical engineering.

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Biography

Shrikaant Kulkarni, PhD, is currently an Adjunct Professor in Science & Technology department, Vishwakarma University, Pune, India. Dr. Kulkarni is an academician and researcher for 39 years Dr. Kulkarni has delivered invited lectures conducted sessions at national and international conferences as well as faculty development programs. He worked as a Professor in the Department of Civil Engineering, Padm. Dr. V. B. Kolte College of Engineering, Malkapur (M.S.), India. He has been teaching subjects such as engineering chemistry, green chemistry, nanotechnology, analytical chemistry, catalysis, chemical engineering materials, industrial organization, and management, to name a few. He has published over 100 research papers in national and international journals and conferences. He has authored 36 book chapters in CRC,

About the Book

Environment Management has been designed on the revised syllabus (2019-20) of the University of Mumbai. It has been developed with an aim to help students grasp the principle concepts of the subject clearly and easily. The book covers five major topics of environment management covering the detailed contents of syllabus viz. Introduction and significance of environment, significance of environment management for contemporary managers, career opportunities, environmental issues relevant to India, concept of sustainable development, the energy scenario along with the in depth coverage of the topics global environmental concerns, concept of ecology, scope of environment management, total quality environmental management, EMS certification and general overview of major legislations like different environment protection acts etc.

Each chapter begins with learning objectives and provides clear and sufficient knowledge on every topic. At the end of each chapter, review questions have also been included to help the student to identify the important topics and study each topic thoroughly. We hope that our endeavour will enable the student to gain the required knowledge of the subject and during their academics to move towards a better understanding of the field.

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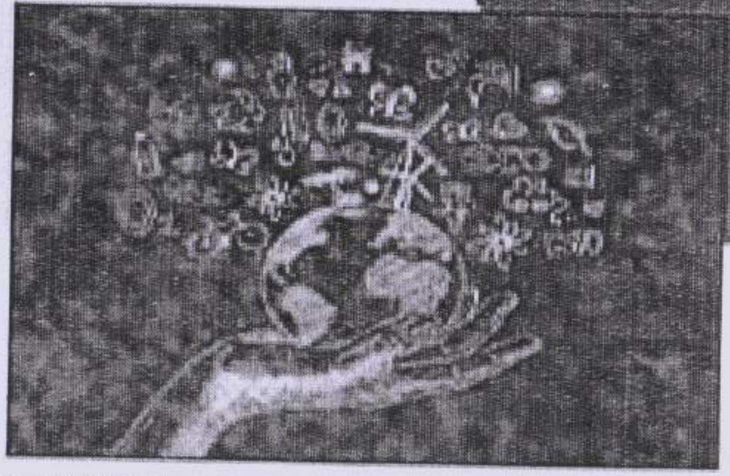

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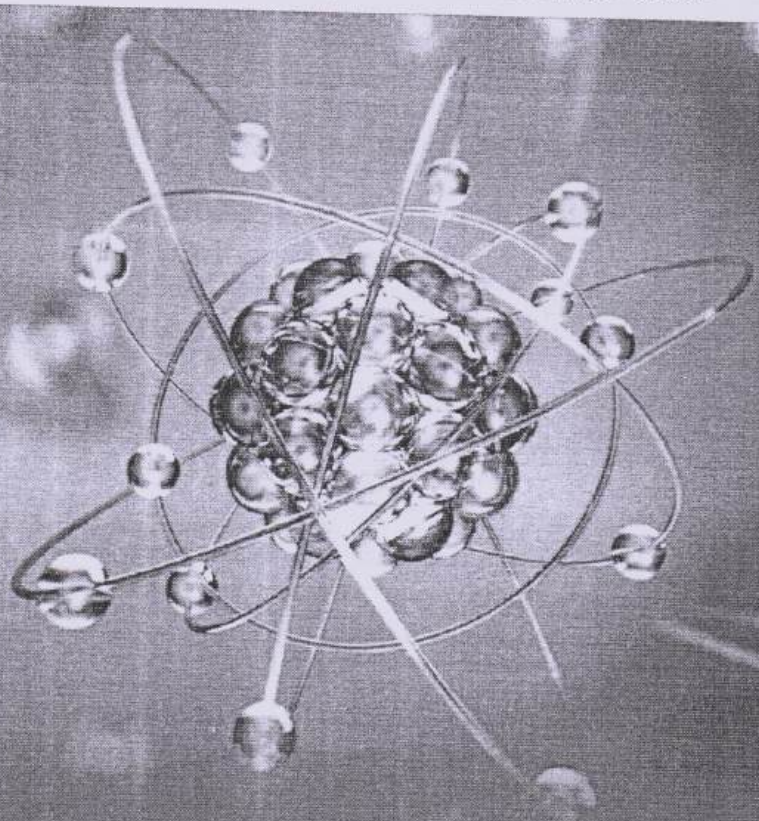

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Smart materials -A state-of-the-art-review

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Abstract

This paper focuses on smart materials which are many types. Some of the materials are aerogel, self-healing polymers, titanium foams etc. have wide applications and unique properties. Smart materials are responsive to the external stimuli. These materials are alive materials which have lot of similarity in the functioning of the human body.The paper focus on three different types of smart materials. The first materials discussed in the paper are Aerogel, different types of aerogels, preparation conditions-construction, characterization of aerogels etc. Aerogel has ultimately unlimited potential, and applications in human life. Second material is open-pore titanium foams. The tensile strength and yield strength of the foams are discovered to span the property range between chancellors and cortex bone. And have biological implant fixation Third material is Self-healing polymers which can be repaired themselves. These materials do not need any manual interaction. The below paper presents the study of self-healing polymer and their applications as well as its advantages and disadvantages.
[

Keywords: Smart materials, aerogel, self-healing polymers, titanium foams

1. Introduction

Materials are generally as considered as dead materials but smart materials are alive as they respond to the stimuli of the environment. They are not only used for structure construction but also used as active materials The external environment and stimuli may be of several types like stress, strain, heat light etc.

Different types of the smart materials are available such as self-healing polymer, shape memory polymers piezoelectric, aerogels, Titanium Foams, magnetostrictive, optical fibers, electro rheological and magneto rheological fluids, multifunctional nano-composites. These smart materials are nicely placed in different arrangements- honeycombs, changeable-stiffness tubes, corrugated structures for providing structural stability and unique properties Smart materials implement their activities in ways they are

1. Self-actuating—these material or system takes out input from the environment than after being stimulated provides output of light, heat, and, displacement [3].
2. Self-sensing—when there is a change in the environment and also there in reaction to changes in the environment, the material or system produce electric or magnetic signals or undergo strain which actually describe the environment
3. Self-adaptive material or system could modify its geometry adapt to the environment

Smart materials working are similar to human and it is depicted in the figure 2.As human gets information from the environment in the same way smart materials obtain acquire information from the environment through sensing and produces chemical or physical effect for decision making control by brain.

2.Aerogel:

This paper focuses on aerogel which contains different types of aerogels, preparation conditions-construction;characterization of aerogels and physical properties of hydrophobic silica aerogel. The data describes utilization of aerogel as insulation materials. Aerogel is manufactured porous ultra-light material obtain from gel in which liquid form gel is exchange with a gas. It gives very low density and low thermal conductivity to Aerogel. Sol-gel is common method of preparation. Melting point of aerogel is 1200° C and thermal conductivity is almost zero it contains 99.8% air, so it is smallest density solid material. Aerogel has ultimately unlimited potential, believing that they have many applications in human life. Using aerogel as insulating material is best choice because it completely blocks the heat transfer by convection, radiation and conduction. This is due to air does not circulate in its structure. If we use carbon based gel then it offers high resistance to radiation transfer Therefore, silica aerogel with carbon as nanostructure material is mostly used for thermal insulation. Due to its high price makes it less usable. But in future aerogel will becomes one of the most preferable and attractive smart material [1] [2].

2.1 Aerogel as a material:-

Aerogel is large concept which shows group of materials that have been used in space travel from 1960's, but now days it is use in wide range of industry [3]. Recently A. Eychmuler[4] defines:"Aerogel is a solid having meso- and micropores having diameter in few hundred nanometers and porosity is greater than 95% with gas dispersed phase." The special form of highly porous material having very low density (0.003-0.15kg\m^3), low thermal conductivity, large surface areas (500-1000m^2\g) and excellent transparency is known as aerogel (Silica aerogel) which can be obtained by exchanging liquid form gel with air. It is made up of nanosized particle which interconnect to form tridimensional network [4, 5].

Due to its different properties, Aerogels are use in different industries. In building construction aerogel is used as thermal and acoustic material. It also used in large range of other domain such as, absorbents, nuclear waste storage, batteries and catalyst, etc [6]

2.1.2 Aerogel preparation methods:-

Aerogel is prepared by two main technological strategies:- super critical drying and subcritical drying technology, result in bulk aerogels. Aerogels power or granules depends on preparation criteria [7]

2.1.3 Classification of aerogels:-

Aerogels are classified into five types such as silica, metal oxide organic , hybrid, carbon and composite aerogels. [8] Out of these all silica aerogel is the most useful and extensively investigated type.

2.1.3 1 Silica aerogels:-

S.S.Kistler, invented first time silica aerogel in 1931 which were made from inorganic precursors and containing SiO_2 chain with cross linked internal structure and large number of air porous [9]

Silica aerogels have wide range of applications in civil infrastructure field, with heat insulation of building, especially in those areas where optical transparency or translucency are necessary[9] and also used in solar collector and insulated building render as translucent heat insulator [10]For increasing insulating properties silica aerogel can be used in combination with other material. E.g. foam concrete reinforced SiO_2 aerogel (FC-SA) material thus, the thermal conductivity of FC-SA measured low [11]

2.1.3 2 Metal oxide aerogels:-

The aerogels which are produce from oxides of transition metals such as aluminium oxide (Al_2O_3), titanium oxide (TiO_2), vanadium oxide (V_2O_5), chromium oxide (Cr_2O_3), iron oxide (Fe_2O_3) are known as metal oxide aerogels. Metal oxide aerogels are mostly used for preparation of carbon nanotubes (CNT), as magnetic nanostructures, as energetic materials [12]

2.1.3 3 Organic and carbon aerogels:-

Monomeric or polymeric precursors e.g. melamine-formaldehyde, phenol-furfural cresol-formaldehyde, phenol melamine, etc. are used for preparation of organic aerogels. These aerogels are used for thermal and acoustic insulators, membrane for gas separation, catalyst support [13].

Carbon aerogels amorphous carbon material which are derivative of organic aerogels for this temperature should above 600^{0}C .carbon aerogels are mainly used for electricity conduction .also used as thermal acoustic insulators , adsorbent and media for capacitive deionization and catalyst supports[14].

2.1.3 4 Hybrid and composite aerogel :-

To improve mechanical and physical properties such as toughness, strength, and thermal conductivity of aerogel hybrid aerogel can be prepare. These aerogels are mostly prepared and contains organic and inorganic phases and nanoparticles in gel matrix [15].

2.3.0 Applications of aerogels:-

Building applications of aerogels: Aerogels have outstanding properties, like low thermal conductivity light weight and sound proof so, it can be used for variety of purpose. However, the cost of aerogel materials is high for many industries. So, the researchers continue to improve performance and reduce the cost of aerogel material. Granular aerogels highly used for commercial purpose, even it has low performance, because it is easy to produce cheaper Aerogel are mostly used for insulation purpose due their properties [16,17].

2.3.1 Aerogel applications in roofs, facades and windows:-

Now as we see aerogel applications in building which are widely used for daylightinggoals.Kalwallcompany who offers highly insulated light transmitting product is one of the best example of high performance translucent building system. Thus, fig.4 shows aerogel use for rapid insulation from the outside skylight (fig 3. A). Shows another application which is aerogel insulation of an old brick building. In this thin layer of aerogel at the top floor use for insulation and not ground floor. The amount of heat loss from ground floor towards the top floor can be observed in

thermographic image with thermal camera (fig .3.B).

2.3.2 Aerogel application for soundinsulation, fire delay and air purification:-
When aerogel are used as insulation plates their performance can be positively influenced by using right binding material as it depends on binder. The acoustic properties of cylindrical silica aerogel is invested by ' Gibiat et al'. The sound velocity, for low ultrasonic frequencies, and the acoustical impedance in audible range is measured by them. Which founds, the low density aerogel can show unexpected attenuation for frequency .i.e. It mostly depends on geometry of the sample Due to the chemical structure and their high melting point (1200^0C), aerogel can be used as non-flammable materials. To avoid spreading of fire from one place to another aerogel are used inside the building[18].

FIG 4 , Norway's Levanger primary school [18].

2.4.0 Future research:-
For the future, there is mainly work on reducing the manufacturing cost if aerogel, development of aerogel as thermal insulation; Increasing use of aerogel as conventional materials [19]. Even the high cost of aerogel, they can be seen in wide range of industries like textile industry [20] ,also it is used seen as thermal insulation for space launch application.If we reduced the cost, the usage of aerogel can be enhanced in our daily life in various forms.
This paper gives brief overview of aerogel as a smart material with insulation material in civil domain, which considers both economical and technical performance of aerogel. This also focuses on application of aerogel in building construction such as roof, facades and windows, for sound insulation fire retardation, air purification and also the advantages of aerogel in electronic industries The aerogel are called as smart materials because of exceptional properties of aerogel and wide spread applications in many industries [21].

3.0Titanium Foams

3.1 Mechanical Properties of Titanium Foams
The space holder method is used to create open-pore titanium foams. The mechanical characteristics of titanium foams with porosities ranging from 50 to 80 percent are investigated. The tensile strength and yield strength of the foams are discovered to span the property range between chancellors and cortex bone. The dissected foams are anisotropic because of the utilization of non-spherical space holder particles which rework during the powder blend's compaction. The significance of biologic implant fixation was recognized more than 30 years ago. Many different types of porous coatings have been created and are now widely used in clinical settings to enhance bone apposition. In any case, the utilization of a permeable covering doesn't tackle the issue of mechanical befuddle between an embed one and the bone. The generally utilized embed materials are a lot stiffer than the bone and may lead to a pressure protecting and nearby restoration of the bone. This impact can be kept away from by utilizing a material with bone-like solidness.
A recent review paper describes the manufacturing processes of porous metals for usage in biomedical application. During the previous decade, two forms of metallic foams have been developed as implant materials: tantalum foam which is created by thermal evaporation of tantalum onto an amorphous carbon skeleton, and nitinol foam [22]. which is formed by combustion synthesis of a combination of titanium and nickel powder.These handling courses incorporate dispersion holding of agglomerated wires [23] solid state frothing by super plastic expansion [24] powder metallurgy utilizing space holders [25-28], dunking of removable polymer froth into a thyrotrophic slurry[29], foaming of a polymer cover stacked with titanium particles, and directional hardening of fluid titanium with dissolved gas[30]. The titanium foam seen here was created utilizing the powder metallurgical method and a space holding material[25-31] The titanium foam's biological activity has been studied in vitro using human osteoblasts[31] and in vivo by implanting cylinders into the femurs of dogs[32]. Titanium foam is utilized in a first application as an inter body combination gadget for the human lumbar spine (Fig. 5) where the incredible natural obsession properties of this material can be completely misused.

3.2 Macroscopic Deformation Band:
As can be found in Figure 6, titanium foams experienced diverse twisting modes up to the break point. Every prevailing twisting mode in each stage changes the state of foams on the large scale and micro scale, either forever or briefly. It is realized that twisting in cell edges of the froth in the direct versatile district is the prevailing component in open permeable constructions, and it doesn't change the example's shape for all time. The struts in the current study's produced foams had an hour-glass form (figure 6), thus material was concentrated at cell nodes and

the thickness of the cell walls and edges was found to decrease from the cell node to the centre.

Furthermore, the struts were not completely dense and included micro pores left over from incomplete sintering. The lowest solid cross-sectional area, i.e., the region normal to the stress, is considered to dominate in the transmission of stress in minimum solid area (MSA) models. Mechanical models created for various foam constructions are simply customized MSA models at the moment. Properties and measurements of the struts or networks between the pores and the sintering level of the cell dividers assume a significant part in the mechanical properties since versatile and plastic disfigurement limits at those focuses.
Following the end of the linear elastic area in the current research, deformation bands perpendicular to the loading direction formed, resulting in plastic collapse of certain cells. This impact was accompanied by a rapid reduction in flow stress near the start of the plateau zone (figure 7).

3.3 Elasticity VS Porosity curve:
The modulus of elasticity of the titanium bunch tests with various porosity substance are introduced in fig 8.in the current examination, the versatile module were acquired from the inclines of the straight versatile areas subsequent to deducting the testing machine firmness. Thus, the modulus of elasticity for the first group of samples (55.9–62.9 % porosity) were 3.1–4.5 GPA, 2.6–2.8 GPA for the second group of samples (65.6–69.9 % porosity), and 1.2–1.65 GPA for the third group of samples (74.0–78.0 % porosity). With decreasing porosity, the elastic modulus normally improved, with a maximum elastic modulus of 4[34].
Similar to the change in elastic modulus VS porosity, the compressive strength (peak stress measured after the elastic zone) decreased with increasing porosity. However, the strength reduction above 60% porosity was very abrupt (fig 9). Albeit the examples in the principal bunch (55.9–62.9% porosity) had compressive qualities in the scope of cortical bone strength (100–230 MPA those in the third gathering (74.0–78.0% porosity) had qualities near that of cancellous bone 2–12 MPA [35]. In the meantime, the examples in the subsequent gathering (65.6–69.9%) showed compressive qualities between those of cortical and cancellous bone. It is obvious that by varying the porosity content, the mechanical characteristics of foams may be tuned to make them functionally more consistent with human bone[35].
The currently available bulk implant materials are stiffer than human bone, and hence fail to transmit the necessary amount of stress to the surrounding bone. Due to the restoration of the bone around the implant, this deficiency causes implant loosening. As a result, the development of implant materials with optimal combinations of compressive strength and low elastic modulus is required to minimize implant loosening, extend implant service life, and avoid surgical readjustment [32]. The modulus of elasticity human cortex is in the scope of 7–30 GPA, while that of human cancellous bone is under 5 GPA [35], and the compressive strength of human bone reaches from 2 to 230 MPA [35] The KIC (plane strain tensile strength) indices of cancellous and cortex bone have been reported to be 1.5 MN/m^3/2 and 3.5 MN/m^3/2, accordingly. As a result, the porosity composition, pore shape, and cell wall composition of the foams, as well as the intrinsic material characteristics of cell walls (i.e., purity), should be properly regulated in order to achieve tensile strength values near to the bone [35].
In the current examination, the space holder powder metallurgy method was utilized in blend with an Mg powder space holder to create biomimetic Ti frameworks with chose porosities (60%, 70%, and 80%). Each permeable framework showed a huge level of pore interconnectivity, which is positive for osseo integration and in-development of bone tissue. A porosity study also revealed that a suitable pore size range for facilitating osseo integration was obtained, as stated in earlier research Furthermore, the compressive strengths of the first group (55.9–62.9 percent porosity) and the third group (74.0–78.0 percent porosity) samples were comparable to those of the human cortex and cancellous bone. Furthermore, all of the foam materials had modulus of elasticity comparable to cancellous bone [33,34].

4.0 Self-healing Materials:
In the recent years many kinds of self- healing polymers are discovered Self- healing polymers are type of materials which can repair themselves when they are destructed. These materials do not need any manual interaction. The below paper presents study of self-healing polymer and healing agents. It will also give information on various chemical processes employed while preparation of self-healing polymer and it's advantages and disadvantages[36].
Synthetic self-healing polymers are new type of materials with have ability to self heal itself just as self-healing quality that is observed in humans and many living organisms [37-38]. It is a required property for a sustaining life; it increases the lifetime of most living organisms [39-41]. Like many of the natural materials, research in synthetic self-healing polymer points on preparation of multifunctional materials that are able to recover their self fundamental properties like conductivity, corrosion resistance, conductivity, etc after damage has been caused [42-

43].
On the basis chemistry of self-healing polymer current we can categorize these materials into two classes [44]

(1)Autonomic self-healing materials
(2)Non autonomic self-healing materials
Autonomic self-healing materials are materials in which harnessed potential is released automatically and initiates repair to damaged part. It is exactly opposite in the case of non-autonomic healing materials [44]
Most among self-healing materials the polymer nano composites have superior characteristics like strength, cost, thermal stability, and low weight. These polymers are components in many applications to improve its durability and many other aspects But here are some drawbacks where these materials lack like macroscopic damage like very small cracks, surface stratches, etc. Presently the fields of self-healingpolymer, nanocomposites is rapidly emerging and new theories are being discovered[45].

4.1 Classification of Self-healing Materials: Extrinsic and Intrinsic:
Based on healing mechanism, these materials can be divided into two types namely intrinsic and extrinsic self-healing polymers .
Extrinsic healing materials depend on external healing agent in the form of capsules or vascular networks [46]. The methods are most commonly used to prepare such materials (1) Microencapsulation and (2) Micro vascular network. The microencapsulation process has major drawbacks such as high cost of catalyst and the process occurs only once. So to overcome the drawback many other ways are being found out.
Intrinsic self-healing materials, works on non- covalent chemistries or dynamic covalent chemistry [47]. The non-covalent chemistry approach uses π-π stacking, ligand– metal bonding, hydrogen bonding, or host-guest interaction stacking among other techniques. The reformation of chemical bonds in intrinsic materials is triggered by external stimuli including pH change, light, temperature, etc. Diels-Alder (DA) reactions are most frequently used to create self-healing polymers that utilize reversible bond formation [48].

5.0 Conclusion:-
Different kind of polymer materials have been used in our day to day life due to their various properties like light weight , availability , flexibility , light weight , tailoring , etc. Some materials have numerous importance in various fields such biomedical, environment etc.such as carbon nano-tubes etc. There is low mechanical strength in them as compared to various materials. Research has shown that incorporation of nano-materials significantly affects different properties of polymers including mechanical/ physical properties. In composite materials combination of polymer and nano-materials results in product which have excellent properties. However, crack formation in the synthesized nanocomposites is among very critical problems, comparable to that seen in polymer and polymer composite systems[51-55].
To resolve these problems, both theoretical and experimental studies on self-healing of these polymer nanocomposites have been undertaken. In fact, self-healing of polymer nanocomposites has remained largely unexplored and it should provide new opportunities for development of high performance multifunctional materials. In the following section, we will discuss the different theoretical and experimental aspects of self-healing of polymer nanocomposites

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Biodegradable polymeric nanocomposite for Wound Healing Application: Synthesis and characterization

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ABSTRACT

For the utilization of different substances to wounds, it is attractive to discover a bearer material which is moderately modest in terms of medicinal behavior, which gets effectively connected to the injury, helps as a decent transporter for medicaments to be connected to the injury without disturbing its property of biodegradability . In this work biodegradable composites consist of chitosan, sodium alginate(SA) and gelatin with neem extract were synthesized. These polymeric films were characterised by FTIR,SEM and XRD analysis. The chitosan gel may likewise be acquired and utilized as a gel-like layer forthe motivations behind the present development along with other biodegradable wound-healing material for effective healing with their antimicrobial and antibacterial properties

Keywords: chitosan; sodium alginate; gelatin; nanocomposites; biodegradable, amtibacterial.

1. INTRODUCTION

Chitosan is used effectively for wound healing applications in biomedical fields .Chitosan is obtained from chitin by the expulsion of an extent of the N-acetyl bunches which is found in the hard shells of sea creatures . Its excellent dissolvable nature in numerous acids.The chitosan-containing polymeric films of the present innovation are fantastic bearers for various medicaments specially antibacterial applications(1-4).

Sodium Alginate is an extensively used polysaccharide which has significant application in drug delivery, tissue engineering , dentistry and cosmetics industry (5-6).

Gelatin is a mixture of peptides and proteins created by incomplete hydrolysis of collagen separated from the bones, tissues and skin of creatures.. It provides stable and smooth films which can be used for different applications food industry, tissue engineering , medicines etc.(7).

Azadirachta Indica which is commonly known as neem has been broadly utilized in different medicinal applications specially in Homeopathy, Ayurveda and Unani drugs. The way toward extricating neem oil includes separating the water-insoluble segments with ether, oil ether, ethyl acetic acid derivation, and weaken

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liquor. The temporary naming is Nimbin which is without sulfur crystalline and its dissolving point is at 205 °C, e), nimbinin which is with a comparative standard with its softening at 192 °C, the third one is nimbidin which is cream-shaded and contains indistinct sulfur and liquefying at 90– 100 °C. These mixes are found in a significant amounts in the Neem oil (8). Structure of Nimbin,nimbinin and nimbidin are depicted in figure 1-3 . Figure 4 shows the schematic diagram from synthesis of polymeric films to its wound healing application.

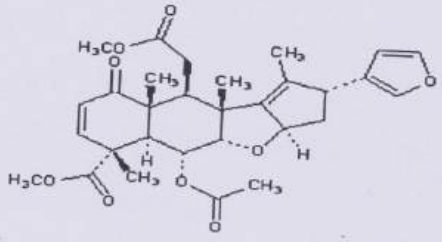

Fig.1 **Nimbin**

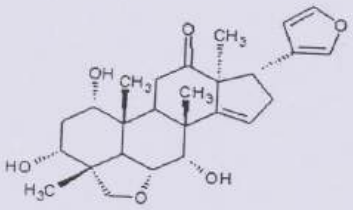

Fig. 2: **Nimbidin**

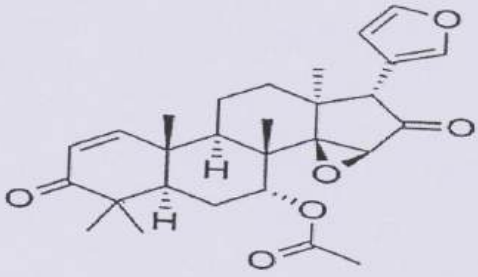

Figure 3: Nimbinin

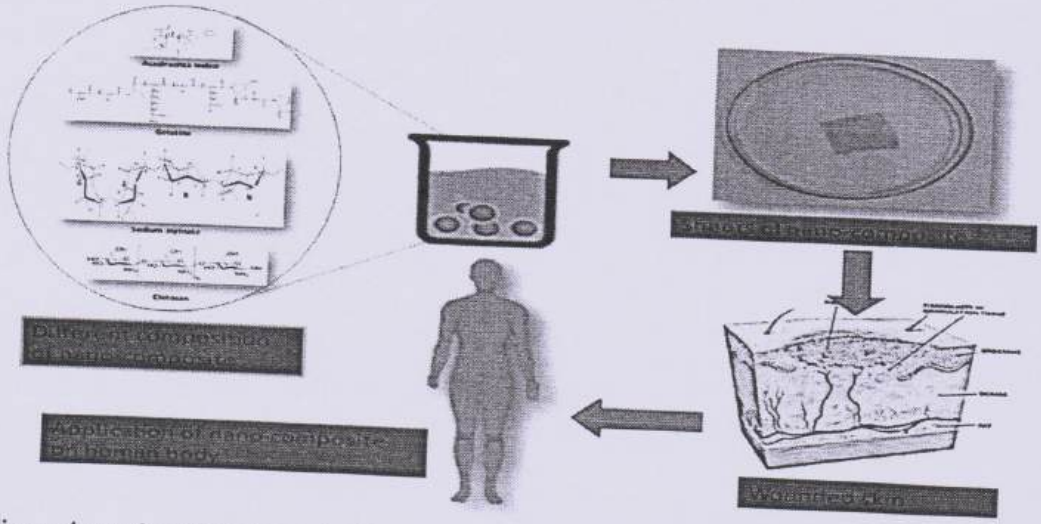

Figure 4: synthesis of polymeric film and its wound healing application

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2. **Method of preparation-** Biodegradable polymeric nanocomposite film was synthesized in two steps

2.1 **Preparation of Azadirachta Indica Extract**-In 100 ml of water heated and 10 gm of Azadirachta Indica Extract (neem) leaves were added. This mixture was heated till its volume reduced half.It was cooled at room temperature and filtered via filter paper.Final solution after filtration appears Brown in color.

2.2 **Preparation of nanocomposite film**-0.3g of Chitosan was dissolved in 5ml of 50% diluted Glacial Acetic Acid. In this solution 10 ml of Azadirachta Indica Extract in above made solution and 0.3 g gelatin were added.It was heated till 50°C and stirred by using Magnetic Stirrer for 30min. After 30min Polymeric Material was transferred to petri-dish and dried at room temperature for 12 hours. Schematic diagram is shown in figure 4and its image of dried sheet is shown in figure 5.

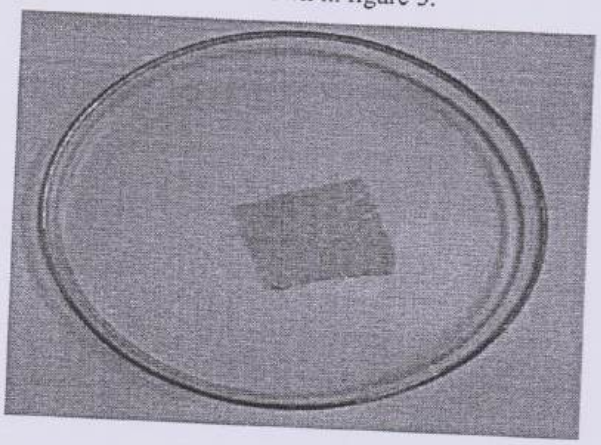

Figure 5 :Photograph of polymeric sheet

3. **Characterization-** Synthesized polymeric nanocomposite film was characterized by FIIR, SEM and XRDanalysis.

3.1 **FTIR analysis-** The FTIR spectra of azadirecta indica loaded nanocomposite is recorded at central Instrumental Facility of SPPU,Pune by using FTIR spectrophotometer (Shimadzu, 8400S) which is depicted in figure 6. This spectrum shows a peak at 2900 cm-1 which is because of stretching vibrations of the aliphatic C-H bond and a broadband at 3400 cm-1 is observed because of overlapping of O-H and N-H stretching vibrations of polysaccharides.

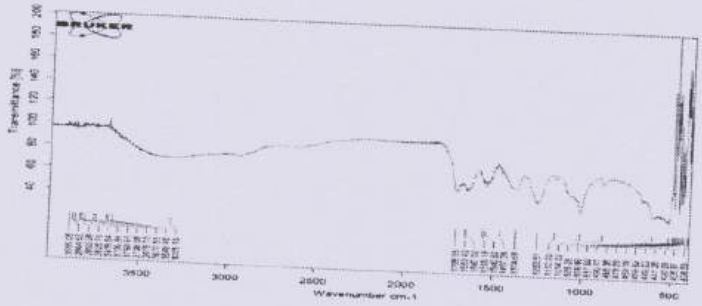

Figure 6: FTIR spectrum of polymeric sheet

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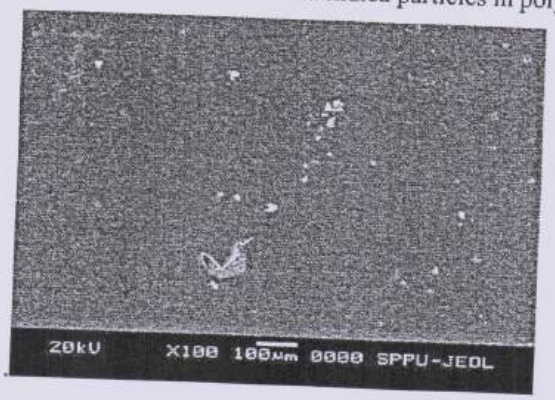
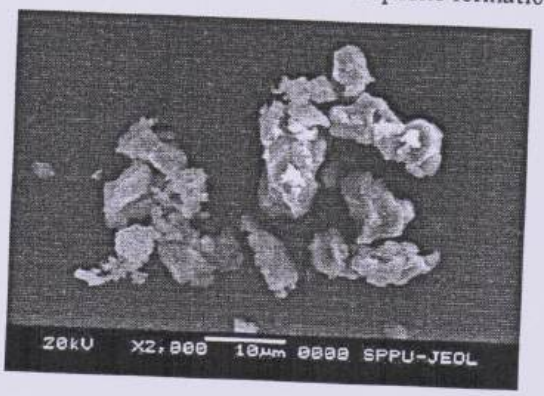
3.2 **SEM image study** surface details of azadirecta indica loaded in a polymeric nanocomposite were taken by SEM images different magnifications (from 100- 10,000× magnifications) which are shown in Fig. 7(a)–(d)

.The SEM images of the terpolymeric nanocomposite loaded with azadirecta indica clearly shows thenanoparticle of azadirecta indica particles in polymeric film which confirms nanocomposite formation

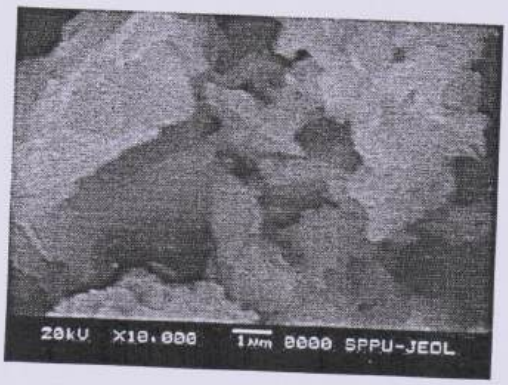


(a)



(b)

(c)



(d)

Figure 7: SEM image of Biodegradable nano polymeric Composite (a) 100X (b) 2000X (c) 3000X (d) 10000X

3.3 **XRD Analysis-** The X-Ray Diffraction of film loaded with azadirecta indica extract is shown in Fig.8which clearly shows the amorphous nature of polymeric film .

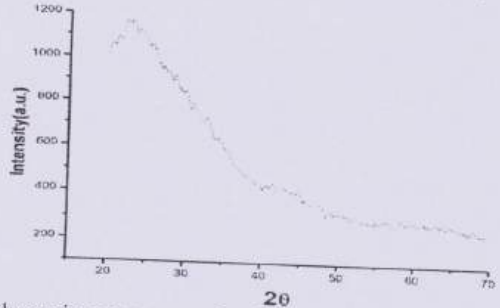


FIGURE 8: XRD of polymeric nanocomposite film

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4. CONCLUSION:

The presently disclosed invention; as described hereinabove, provides several advancements including, but that are not limited to, the realization of a mouldable scaffold for wound healing purposes, wherein the process is more effective in wound healing, can be used for a variety of infections. Overall process is cost effective and can be used for bulk production of bandages/ patches used for would healing applications.

5. ACKNOWLEDGMENT

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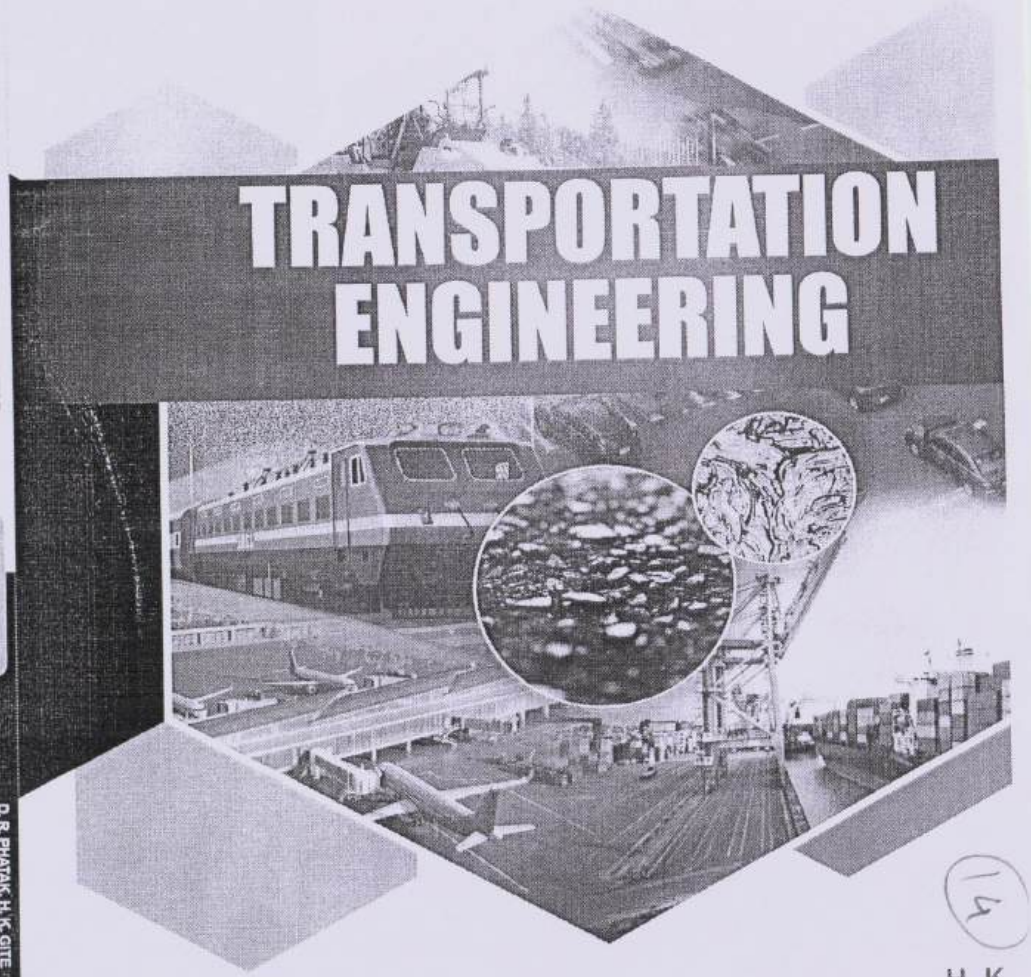

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Our special thanks to our family members, students and all those who directly or indirectly supported us in this project.

We also take this opportunity to express our sincere thanks to Shri. Dineshbhai Furia, Shri. Jignesh Furia, Mrs. Nirali Verma and entire team of Nirali Prakashan, namely Mrs. Deepali Lachake (Co-ordinator), who really have taken keen interest and untiring efforts in publishing this text.

We wish to make a special mention of the valuable contribution made by Late Shri M.P. Munde during the last two decades in reaching out to students, parents and teachers which eventually made **Nirali Prakashan, a brand of trust and quality in technical books.** Without his perseverance and zeal, successive editions would not have been possible.

The advice and suggestions of our esteemed readers to improve the text are most welcomed, and will be highly appreciated.

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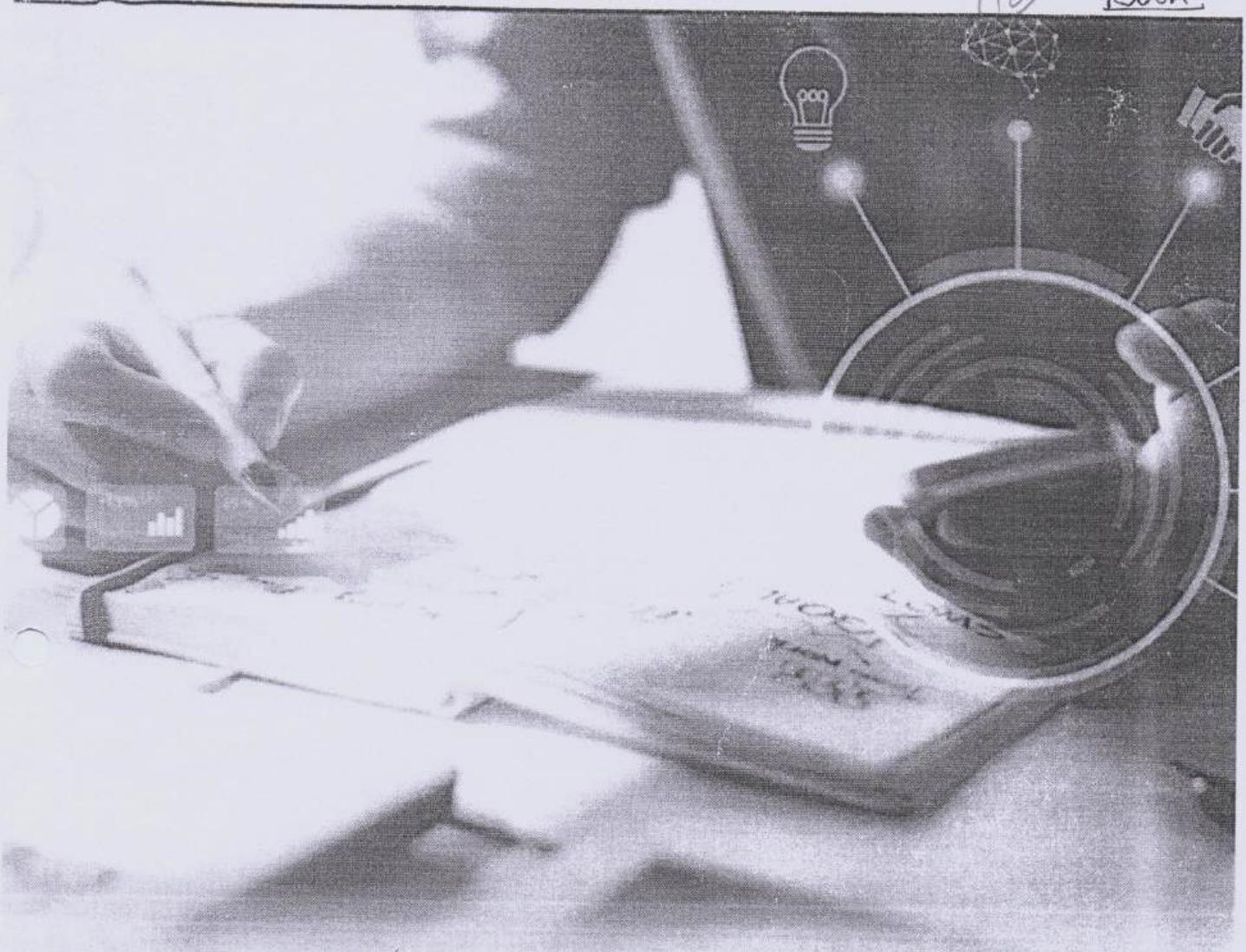

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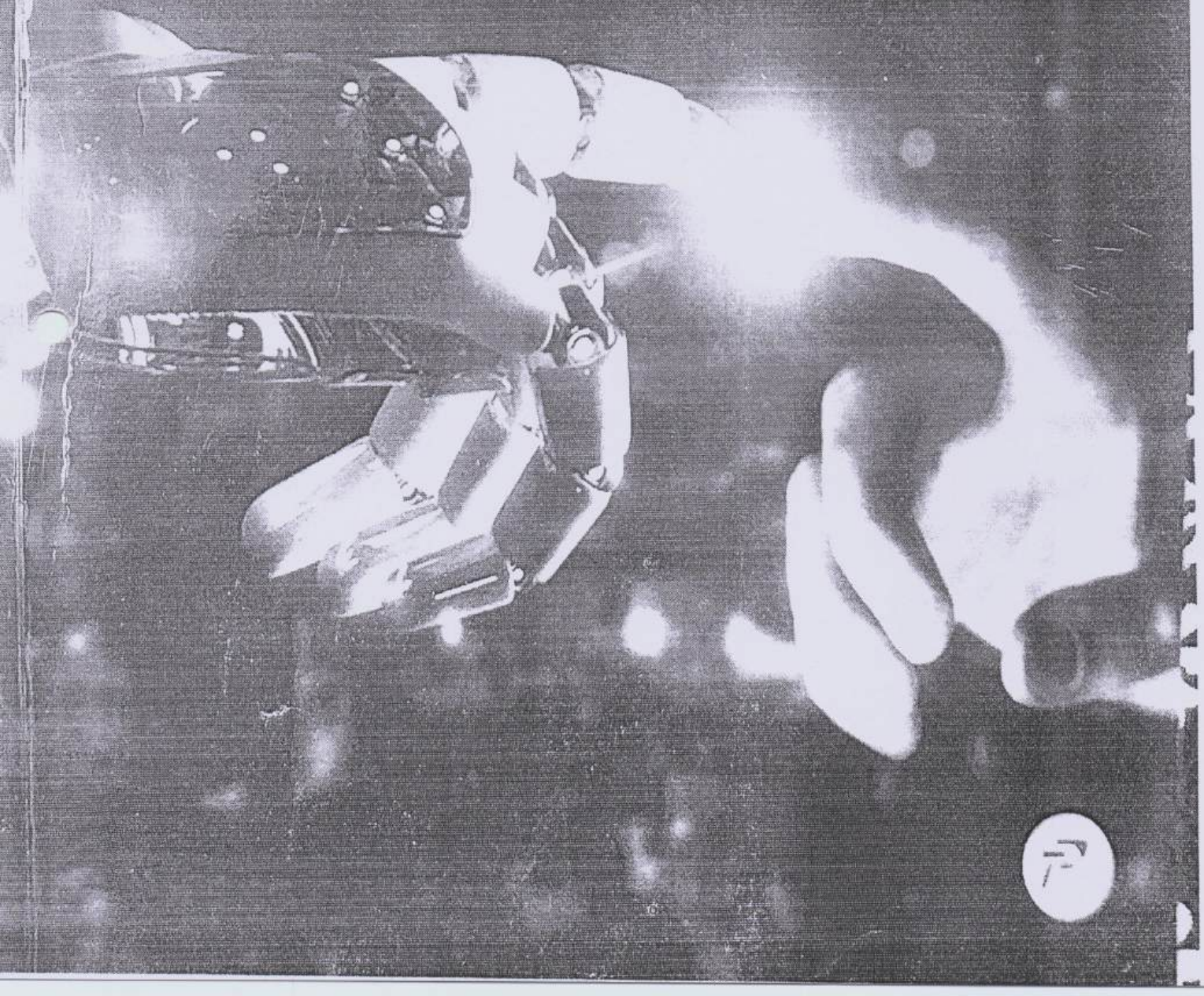

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Traffic stream may likewise be expanded by the arrangement of ongoing traffic refreshes for drivers. Frequently the neighbourhood stations have traffic reports. In any case, radio broadcasts don't have realities for the most part progressively.

Consequently, vehicles are at times caught in gridlocks preceding being educated by the radio broadcast about the case. Other than this a portion of the vehicles, in particularly those at provincial positions or heading in different ways, don't get precise traffic refreshes from neighbourhood radio broadcasts. Moreover, radio traffic reports are just for travelers going along extensions or streets and not ordinarily for explorers on more modest, nearby streets or roads in networks.

The absence of territorial insight on transportation disallows motor drivers from forestalling nearby sticks or contamination puts that the news stations don't communicate. Initially, upgraded traffic signal administration measures and subtleties on traffic to vehicles are required and needed progressively relying upon their position, and their course.

The development identifies with a framework for the observing of streetlamps whereby individual light disappointments are accounted for to a far off administration place that uses a heuristic remote correspondences organization or framework involving a majority of topographically divided or genuinely isolated hubs. The abilities of every one of the hubs incorporate closest sensor neighbor recognition and recording, programmed correspondence course assurance to a hub regulator and giving continuous status data to the hub regulator.

The hubs are fit for detecting, dissecting and executing the best accessible interchanges way to different hubs and to the hub regulator. The hub regulator itself might be a sensor with extra capacities, for example, correspondence capacity to a Management Center, commonly by remote means. The hub regulator additionally contains the essential rationale to play out the control hub capacities.

Lighting frameworks are accommodated roads, highways, spans, air terminals, oceanic ports, parking garages and government establishments for wellbeing and security purposes. The assurance of the working qualities of individual lights is normally done through a manual investigation. At the point when a light is observed to be non-working, a maintenance activity is directed on the light. Some more current lighting frameworks use light congregations that join an interior sensor to decide a light disappointment and a way to impart the disappointment condition.

For instance, the measure of energy being burned-through per unit time is a marker of a light's legitimate activity. Another methodology is simply the utilization of a photodiode that makes them genuinely take a look at hardware to decide right working with dusk or dawn. Many lighting frameworks in America don't utilize wise light gatherings that can detect and report their singular light functional status. This innovation gives a way to recognize and report a singular light's functional qualities without change to the current lighting framework electrical foundation.

The light sensor in this creation requires no alteration to the electrical framework of the current lighting framework. The light sensor searches energy from the climate to work. The sensor is precisely joined to a current light gathering to such an extent that the light radiating from the light can be observed. The light sensor itself is a hub in a heuristic

Prof (Dr.) B. K. Sarkar

Founder GEH Research

Being a guiding epitome is not what everyone can become. It comes with [illegible] unconditional zeal to make a better future for others. Dr. Sarkar has been a [illegible] Educator & Administrator with a significant experience of being a Head of [illegible] decades. Sharpening his work profile as a Director with specialization in Student Sourcing, Teachers Training & Staff Development, Teaching and Liaising with the Regulatory Accreditation bodies, he has efficiently dressed himself in the merits of a profession that through enriching educational qualifications and dynamic work experience. Emboldened with capabilities to include students in the classroom exchanges, he keeps them notched to learning and evolving into a person ready to face the world.

With compelling control abilities, he advanced positive practices among him students. His disciplinary nature merged with positive relational aptitude guarantees great understudy conduct, successful examination and work procedures and a general feeling of regard from the students.

His Post.Doc. (Singapore), PhD. (CS) (IIT), M-Tech (CS) (IIT), B-Tech (CS)degree and Early Childhood Education speaks volume about his urge and yearning for learning. Dr. Sarkar has been trying to instill the same ache in his students as well and has been doing so successfully for over 2 decades now as a Director & HOD.

Prof (Dr.) Yashpal Singh

Director, Mangalmay Institute of Engineering & Technology,
Greater Noida, Uttar Pradesh, India.

Prof (Dr) Yashpal Singh Completed his PhD (CSE) degree from Mewar University, Rajasthan in 2014, Master of Technology (CSE) from Chaudhary Devi Lal University, Haryana in 2009. He is having 18 years of Teaching and Research Experience.

Member of various professional societies like Computer Society of India, ACM, CSI, ISTE, Life time member International Society for Research & Development, Advisory board member of World Academy of research in science & Engineering, Institute of Research Engineers & Doctors, Internet Society. He holds various positions like, Head of Institute, Dean of College, M.Tech coordinator, Head of Department, CONVENER for preparation for NAAC and NBA SAR files, Public Relation Officer, Convener of the Sports Committee, Convener of Technical Activities, Co-coordinator Examination Cell. Published 10 books at National & International Level.

He is having Patents in National Level (National Patent filled 80+ and 20 is under Examination process) & International (Patent Filled 15+ Granted 08). He has published more than 80 Research Papers in National/International Journals and conferences. He supervised more than 40 students in M.Tech (CSE/CFIS/IT) dissertation. Currently two students are pursuing PhD in his supervision. He organized one international conference in 2017 and One National Conference in 2020.

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from Bharati Vidyapeeth's College of Engineering has presented a paper titled An overview of Potential Applications of Carbon Nanotubes as an Oral Presentation in the **4th International Conference on Science & Engineering of Materials** (ICSEM-2021) online conference on July 19-22, 2021

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Comparative study of physico-chemical parameters and water quality index of river

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ABSTRACT

The change in natural water quality is caused due to the diversity of human activities which is causing huge impact on the hydrologic cycle. The increasing pollution is impairing the use of the water which is creating hazards to the public health as well as the environment through toxicity and diseases. The water quality impact assessment has been undertaken to define the impact of pollution to the environment. The water quality analysis is very basic tool for determining water body condition. This study will help to analysis the water quality and better water resource management. The study is focused on the assessment of parameter of waste water affecting the quality of water and having hazardous effect. This will interprets the condition of the Mula Mutha river which can help the local authority of Pune city in taking the action and identification of sources of pollution and improving the water quality around the city. The data of 2013 to 2018 has been taken for the comparative study and Water quality index had been calculated to change caused in course of time.

Selection and peer-review under responsibility of the scientific committee of the 4th Online International Conference on Science & Engineering of Material

1. Introduction

The increasing population on the earth is leading us to the urbanization. And it is adversely affecting both the surface water and ground water . Due to urbanization, the water demand is also increasing day by day. Increased demand leads to the decreased quality of water. It is well known that the water quality is very important for the survival of human race. The water in dams contain germs and dirt which is treated by the PMC. The treatment of water makes it safe and usable. The treatment mainly involves straining, chlorination, filtration and flocculation. The study area, Pune, is bestowed by three rivers which are Mula, Mutha and Pavana. Determining o the water quality of the study area is utmost (Table 1) important [1–5].

Since the growing industrial and domestic usage increased the demand of water which leads to the severe problem of the water pollution. The sources of water pollution are nearly increasing every day.With the increasing pollution the water related diseases are also increasing. Hence the assessment of the degree of water pollution is the need of the hour for survival of humans as well as other living beings. For any water body to function satisfyingly it must have the degree of purity. Hence for the increasing demand for water the concept of management of the quality of the water is becoming very important [6,7].

According to the uses of water from the water body we have 'Designated best use' developed by the Central Pollution Control Board (CPCB). In which the highest quality is known as its designated best value. The common quality attributes includes the Physical, biological, and chemical parameters. The water quality managers and the planners set water quality targets and design suitable restoration programs for different water bodies. For drinking water source without conventional treatments after disinfection the pH value should be in between 6.5 and 8.5, dissolved oxygen value should be 6 mg/l or more. The total coliforms organism MPN/100 ml shall be 500 or less and biological oxygen demand 5 days 20° C, 2 mg/l or less. For defining the quality of water WQI (water quality Index) is used [8–10].

2. Results

2.1. Study area of the review papers

Various location of the Pune city has been selected and data collections of the last five years has been done. The collected data has

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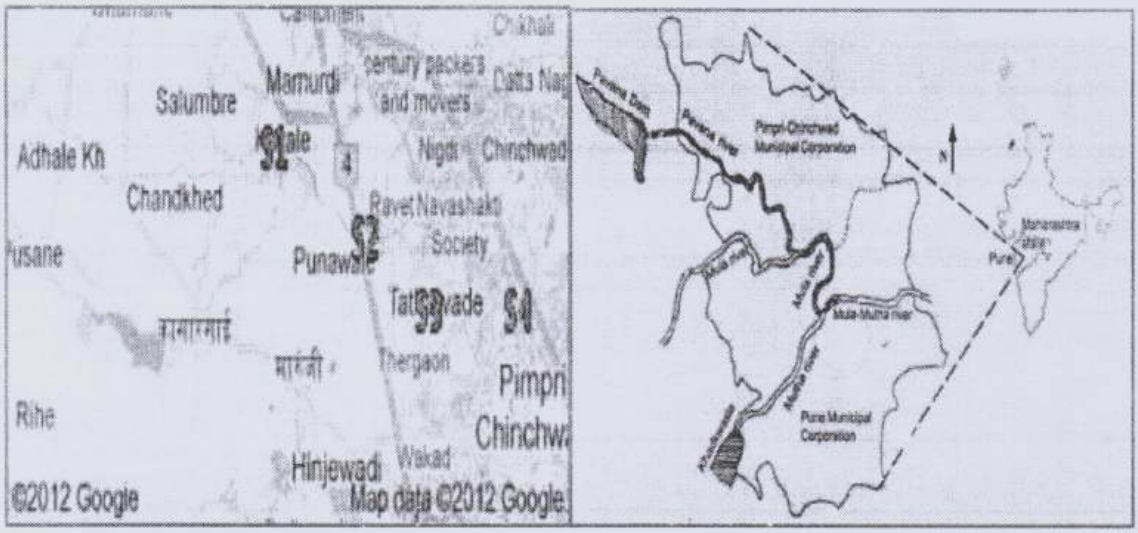

Fig. 2. (a)Showing map of Pavna river study area and Pimpari chinchwad, Pune. (b) Map of sampling locations. (c) All Sampling Locations.

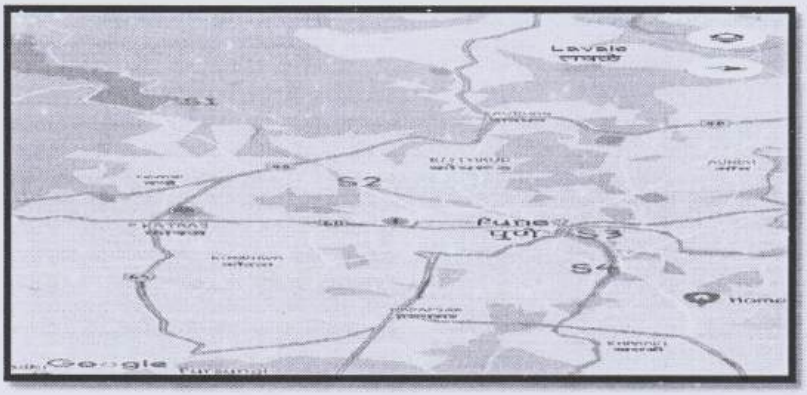

Fig. 2 (*continued*)

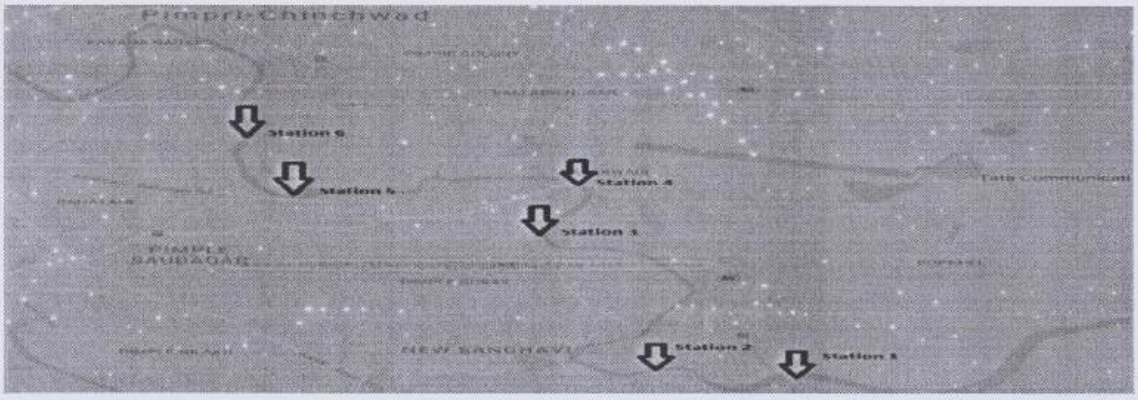

Fig. 2 (*continued*)

Table 5
The data of 2013 to 2015 has been compiled in table 5.

Parameters	PH	DO	BOD	COD	Hardness	Turbidity
			2013			
S1	7.34	2.63	5.62	74	356	121
S2	7.82	3.03	6.22	81	90	20
S3	7.75	4.6	6.25	70	261.2	100
S4	7.56	3.2	2.81	64	183.2	90
Min	7.34	2.63	2.81	64	90	27
Max	7.82	13.46	6.25	81	890.4	200
Average	7.6175	3.365	5.225	72.25	222.6	161
Parameters	PH	DO	BOD	COD	Hardness	Turbidity
S1	8.4	2.3	9.5	44	30.12	3
S2	6.71	0.8	28	39	83.96	21
S3	7.71	0.4	31	42	112.64	11
S4	6.48	0.4	51	58	77.76	9
Min	6.48	0.4	9.5	39	30.12	3
Max	8.4	2.3	51	58	112.64	21
Avg	7.325	0.975	29.875	45.75	76.12	11
Parameters	PH	DO	BOD	COD	Hardness	Turbidity
S1	8.4	2.3	9.51	44	33.12	5
S2	6.78	0.8	31	87	88.91	11
S3	7.73	0.7	32	89	113.32	21
S4	6.47	0.8	53	96	86.23	13
S5	6.21	0.8	53	102	189	20
Min	6.21	0.7	9.51	44	33.12	4
Max	8.4	2.3	53	102	189	18
Avg	7.118	1.08	35.702	83.6	102.116	
Parameters	PH	DO	BOD	COD	Hardness	Turbidity
			2018			
S1	7.2	6.56	2.13	3.2	32	0.05
S2	7	6.24	2.32	5.6	72	0.3
S3	7	6.13	2.41	4	44	0.4
S4	7.2	6.05	2.25	3.2	40	0.5
S5	7.5	5.43	2.93	5.6	36	0.3
S6	7.6	5.04	2.71	1.6	48	0.5
S7	7.4	5.61	2.41	0.8	44	0.2
S8	7.8	4.51	3.42	5.6	292	0.1
S9	7.2	4.32	3.61	4.8	25	0.9
Min	7	4.32	2.13	0.8	25	0.05
Max	7.8	6.56	3.61	5.6	292	0.9
avg	7.322222	5.543333	2.687778	3.822222	76	0.361111

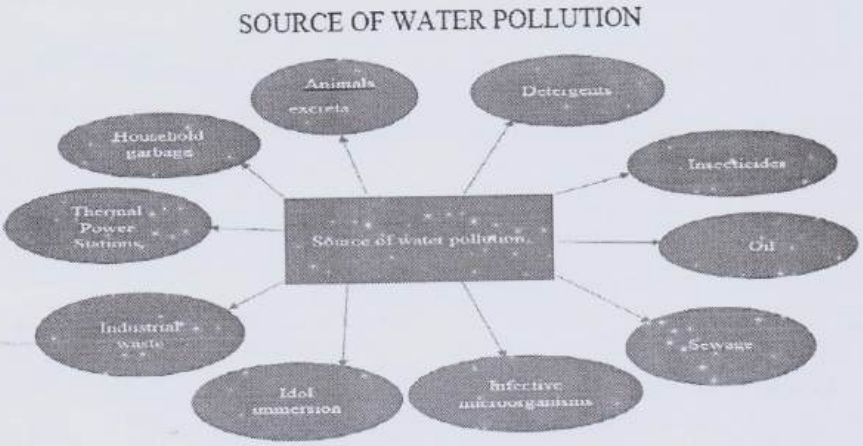

Fig. 3. Sources of water is illustrated in the figure [17].

is responsible for lowering the value of dissolved oxygen The increased value of dissolved oxygen can impart good aesthetic taste to drinking water. Depletion of dissolved oxygen in water supplies can persuade the microbial reduction of nitrate to nitrite and sulphate to sulphide resulting in foul smell. It can also cause an enlarge in the concentration of ferrous iron in solution, with consequent discoloration at the tap when the water is aerated [27].The given Fig. 6 shows DO value for various years.

4.8. COD

Chemical oxygen demand (COD) is defined as the amount of oxygen necessary by organic substances in water to oxidize them by use of the strong chemical oxidant. The analysis of COD values are extremely important for knowing the quality of water. In case of the BOD values determination is difficult due to the presence of toxins and micro-organisms. It was generally observed that, COD is

Table 7
Water Quality Index2013.

YEAR 2013									
BIS Standards (Sn)	1/Sn	∑(1/Sn)	K=1/∑(1/Sn)	Wn=K/Sn	IDEAL VALUE(Vo)	MEAN CONC. VALUE (Vn)	Vn/Sn	Vn/Sn*100=Qn	WnQn
8.5	0.117647	0.3416471	2.926997245	0.3443526	7	7.6175	0.8825	88.25	30.38912
20	0.05	0.3416471	2.926997245	0.1463499	0	5.225	0.26125	26.125	3.82339
250	0.004	0.3416471	2.926997245	0.011708	0	72.25	0.289	28.9	0.338361
6	0.166667	0.3416471	2.926997245	0.4878329	7	3.635	2.365	236.5	115.3725
300	0.003333	0.3416471	2.926997245	0.0097567	0	222.6	0.742	74.2	0.723944
	0.341647			1					150.6473

WATER QUALITY INDEX = ∑WnQn/∑Wn
WATER QUALITY INDEX = 150.6472882

Table 8
Water Quality Index 2015.

YEAR 2015									
Parameters	BIS Standards (Sn)	1/SN	∑(1/Sn)	K=1/∑(1/∑Sn)	Wn=K/Sn	Ideal Value (Vo)	Mean Conc. Value(Vn)	Vn/Sn	Qn=Vn/Sn*100	WnQn
pH	8.5	0.117647	0.541647059	1.846220678	0.217202433	7	7.325	1.175	117.5	25.52129
DO	6	0.166667	0.541647059	1.846220678	0.307703446	7	0.975	5.025	502.5	154.621
BOD	20	0.05	0.541647059	1.846220678	0.092311034	0	29.875	1.49375	149.375	13.78896
COD	250	0.004	0.541647059	1.846220678	0.007384883	0	45.75	0.183	18.3	0.135143
HARDNESS	300	0.003333	0.541647059	1.846220678	0.006154069	0	76.12	0.253733	25.37333333	0.156149
TURBIDITY	5	0.2	0.541647059	1.846220678	0.369244136	0	11	2.2	220	81.23371
		0.541647			1					275.4562

WATER QUALITY INDEX = ∑WnQn/∑Wn
WATER QUALITY INDEX = 275.4562307

Table 9
Water Quality Index 2017.

YEAR 2017									
PARAMETERS	BIS Standards (Sn)	1/Sn	∑(1/Sn)	K=1/∑(1/Sn)	Wn=K/Sn	IDEAL VALUE(Vo)	MEAN CONC. VALUE (Vn)	Vn/Sn	Vn/Sn*100=Qn	WnQn
pH	8.5	0.117647	0.345647059	2.893124575	0.340367597	7	7.118	1.382	138.2	47.0388
DO	6	0.166667	0.345647059	2.893124575	0.482187429	7	1.08	4.92	492	237.2362
BOD	20	0.05	0.345647059	2.893124575	0.144656229	0	35.702	1.7851	178.51	25.82258
COD	250	0.004	0.345647059	2.893124575	0.011572498	0	83.6	0.3344	33.44	0.386984
CHLORIDE	250	0.004	0.345647059	2.893124575	0.011572498	0	169.6	0.6784	67.84	0.785078
HARDNESS	300	0.003333	0.345647059	2.893124575	0.009643749	0	102.116	0.34038667	34.03866667	0.32826
		0.345647			1					311.5979

WATER QUALITY INDEX = ∑WnQn/∑Wn

WATER QUALITY INDEX = 311.5979234

4.9. Total hardness

Total hardness of water samples were generally analyzed by using titration method with EDTA solution. Hardness of the water is defined as the property by which lathering of soap can be estimated. Hard water does not form good lather with soap. Hard water is not suitable even for industry as it creates major boiler problem. Permissible limit of Hardness for drinking water is given as 300 mg/l (IS:10500). Water is considered soft if the value of the TDS should have TDS 0–60 mg/l, it become moderately hard if it TDS lies in the range of 60–120 mg/l, hardness increase if the TDS lies in the range of 120–180 mg/l and water is defined as very hard if TDS lies between value of 180 mg/l and above. Comparative studies of data 2013 to 2018 have been done to know the quality of water in the study area. Maximum hardness we found in the year 2013 water samples and later on the hardness value start decreasing. The hardness of water have a major impact on the quality of ground water (Figs. 8 and 9) [31–34]. This has been compiled.

4.10. Water quality index

Water quality index (WQI) provide valuable information about the quality of water, this tool is helpful in determining and monitoring the quality of surface as well as ground water. WQI provide the value ranging from zero to hundred. Six parameters have been selected for developing the water quality index (Fig. 10) [35–40].

In the present study area the Water quality index has been calculated with the help of three steps. In the very first step, each of the Six parameters (PH, DO, COD. BOD, Hardness and turbidity) has been taken to know overall quality of water (Tables 6–10).

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Improved K-Means Clustering Algorithm with Wireless Networks to Increase the Production in the Automobile Industry

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***Abstract*—One of the major technological developments that are employed in many various applications for gathering, analyzing, and disseminating a wide variety of data is the wireless sensor network. It develops into a fundamental core technology for a variety of applications involving the sense of the surrounding environment. To create several WSN models that would later be optimized by genetic algorithms, a two-dimensional WSN scheme was used in this study. The occurrence of a repetitive number of cluster members is shown by the inclusion of two clusters - heads that are near to one another and whose distance is within the sensing range in such optimized WSN models. By once again using the clustering of every sensor detected in the WSN model, this issue was overcome. This maximum distance was utilized to identify problems that had been resolved, and K-means grouping was employed to redistribute detectors around the new cluster head. The outcome, which rearranged the dispersal of sensing in the discovering location using a conservative approach of a few cluster heads that recognize the relationship for all sensors nearby and may be highly advised for heavy industry, was incredibly promising.**

Keywords— Wireless sensor network, genetic algorithm, K-means clustering, cluster head

I. Introduction

A WSN system is made up of three other elements: a CPU, a transceiver, and a power supply. Wireless sensor networks (WSNs) rely on the cooperation of several tiny sensors to function [1-3]. Such a WSN system's purpose is to sense the environment and gather data about it. Sensors gather information about the environment, which is subsequently sent to the processor, which transforms the analog data into digital form. Then, the transceiver instantly transmits this modified data into the gateways or uses intermediary detectors to do so [4]. The WSN system device must be a low-cost, low-power, and integrated multi-function device. Previous decades have seen a substantial increase in the field of integrated devices, where active WSNs research is being created. A wide range of businesses, including the medical, safety, defense, and sectors of agriculture, employ WSN applications to monitor the atmosphere.

It is also utilized in a growing number of applications, particularly those connected to cutting-edge ideas like the internet of things, such as monitoring air pollution to find the concentrations of hazardous substances. High sensor range and low sensor range detectors are the two categories into which the sensors that participated in this model are divided [5-6]. To reduce the number of communication lines and the amount of power used, various architectures of WSNs based on clustering are now being sought [7]. The grouping has a reputation for being effective in locating or locating important information more rapidly. Of the various clustering algorithms that currently exist, the K-means approach is undeniably well-liked because of its aptitude and efficacy in grouping data [8].

II. Related Works

A non-hierarchical data clustering technique called K-means seeks to divide existing data into one or more clusters while increasing clustering centroids to produce ideal clustering centers. The findings of the studies demonstrated that the only shortcoming of the K-means method was its dependence on the starting data; quick convergence with qualitative clustering is achieved with good initial data [9].

Additionally, numerous evolutionary computation issues have been successfully solved using heuristic approaches like GA, which could be readily applied to the implementation of a scheduling scheme for WSNs. Whereas the improvement of WSNs may be broadly categorized as a single- or multi-objective improvement problem [10]. A variety of different GA-based application explicit approaches in WSN design have been improved as a result of the usage of GA in several successful applications with single or multi-objective modes of sensor network design [11]. Ad hoc WSNs duration optimization was addressed using GA, where the calculated value over a conveyed sensor node was lowered to lower the total energy usage of the broadcasting. The positioning of CH and network sensors over the fault-tolerant network was described using GA to ensure that they were as close to each other as feasible.

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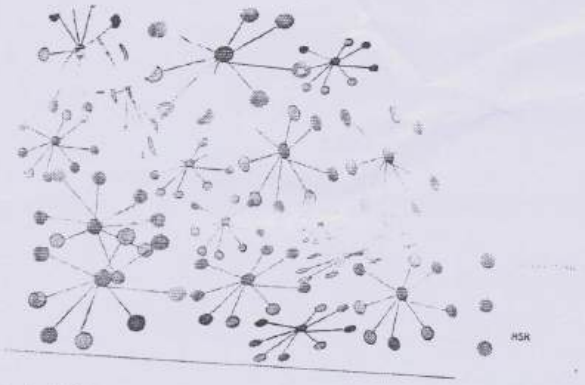

Fig. 1. WSN model

These estimated values of the 4 optimization methods used to gauge the calibre of the WSN design depicted in Fig.1 are shown in Table I. It is obvious from looking at the values of these four optimization algorithms that their measurements diverge from one another. In order to ensure that no one function has a greater effect on the outcomes than the others, it is required to calibrate their deliverables within the range (0–1) by separating them by the highest value that each feature has ever attained. The third column displays the calculated maximum values of these variables, and the fourth column displays the attained normalised values of these features [21].

TABLE. I. OBJECTIVE FUNCTIONS VALUES OF WSN MODEL

Objection Function	Computed Value	Highest Value	Normalized Value
OE	5.681	6.751	0.873
CE	9.568	26.657	0.363
SCE	0.017	0.741	0.019
SORE	88	109	0.806

A. WSN models

Its applied proposed methodology is dependent on GN, which oversees the community of the first iteration of WSNs and addresses that audience. To create 100 new individuals from the population of the following generation, 50 randomly selected pairs of population members are crossed over [22].

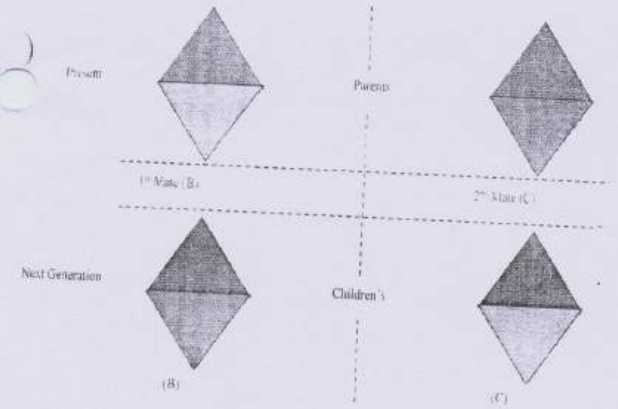

Fig. 2. Crossover of individual pairs to produce four children in the next generation

Fig. 2 illustrates the crossing procedure as a single swap of one half parent with the other half of the second parent. Additionally, the mechanism of genetic mutation, which results in a tiny percentage of the sensors—no more than 0.05—being converted to a different type from their type as illustrated in Fig. 3—occurs sometimes with a 0.001 likelihood of occurrence. The optimization algorithm is used to choose the individuals who will produce the later generations; those with the lowest F are the candidates. The creation of new descendants proceeds until it reaches the optimal solution, which has two components: either 10,000 multiple generations are reached or there is no discernible modification in the fitness value as further descendants are produced.

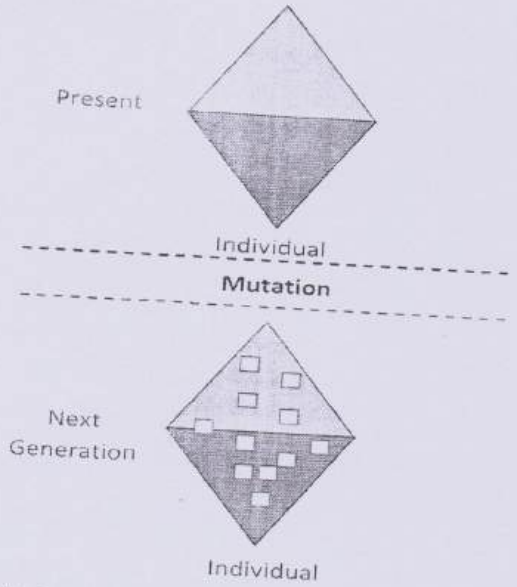

Fig. 3. Mutation of one individual to produce new one in the next generation

B. WSN clustering

In order to keep the amount of cluster - head in the WSN models as low as possible, the clustering process may be used to create the best WSN models from the optimal ones. Naturally, this results in less power generation and consumed energy, therefore reduces the objective functions for each WSN models to the lowest level possible [23].The clustering process is used to communicate the sensing devices nearby and then within permitted ranges by trying to compensate each pair of cluster members that are close to each other at a point is equal to or less than the detection range of the LSR detector. This is done by applying the cluster analysis to each optimal WSN model separately. To do this, find any two cluster heads in the ideal WSN to which the aforementioned scenario applies. Substitute them with a single cluster head. Finding these situations and handling them in accordance with the accepted hypothesis is straightforward because the number of cluster - head and associated locations in the ideal WSN model are already known. Inside the scenario depicted in Fig. 4, the first cluster head is related to the detectors whereas the subsequent cluster head is linked to the detectors, and their separation from one another, d, is smaller than the sensing range.

Whenever these 2 cluster heads are swapped out for one, they are removed from the list of cluster heads for that WSN model and a new cluster head that is situated halfway between them is produced in their place. Then, since the CH

into one cluster head.With the use of a few cost-effective cluster formations that are connected to all of the nearby sensors, this technology showed highly impressive outcomes in reordering the placement of sensors inside the sensing region.

VI. Conclusions

Undependable patterns are produced by WSN generated at randomly, and accessibility to obtaining an optimum design or increasing their effectiveness by dispersing them in accordance with GA was prohibited. The percentage of cluster heads has been decreased to the lowest valuation that assures the communication allocation for all detectors, and the value of the consumption authority was lesser, that also demonstrates a low cost for constructing such structures. The sensors distribution of wealth by k-means decided to apply on GA based did result WSN frameworks had given good outcomes.

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Conference on Fractional Calculus : Analysis & Applications

(August 20 – 21, 2021)

(In honour of Prof. Varsha Gejji on her Superannuation)

CERTIFICATE

This is to certify that Jyoti Atul Dhanke attended Conference on Fractional Calculus: Analy
Applications and presented a paper titled Numerical Simulation of Cell Population and Form
of Necrotic Regions in Tumor Growth during August 20 – 21, 2021.

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Applications of Artificial Intelligence in Real World

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Prof (Dr.) B.K. Sarkar
Prof. (Dr.) Yashpal Singh
Mr. Basavaraj Hadapad
Prof. P.K. Bharti

PREFACE

Over the past two and half years, I've had the opportunity to invest much of my time in machine learning (ML), and artificial intelligence (AI). I recount having prior to learning about the work, techniques, jargon, and tooling in ML and AI.

Artificial Intelligence is a technique for building systems that mimic human behavior or decision-making. Machine Learning is a subset of AI that uses data to solve tasks. These solvers are trained models of data that learn based on the information provided to them. This information is derived from probability theory and linear algebra.

Artificial Intelligence: Foundations of Computational Agents is a book about the science of artificial intelligence (AI). AI is the study of the design of intelligent computational agents. The book is structured as a contributors chapters but it is designed to be accessible to a wide audience.

The book can be used as an introductory text on artificial intelligence for advanced undergraduate or graduate students in computer science or related disciplines such as computer engineering, philosophy, cognitive science, or psychology. It will appeal more to the technically minded; parts are technically challenging, focusing on learning by doing: designing, building, and implementing systems. Any curious scientifically oriented reader will benefit from studying the book. Previous experience with computational systems is desirable, but prior study of the foundations upon which we build, including logic, probability, calculus, and control theory, is not necessary, because we develop the concepts as required.

The book forewarns you of what is to come, instructs you on how to prepare for it, and offers advice on how to deal with unexpected events. It discusses which tools are most useful and why, but the main goal is always to navigate the path- applications of Artificial intelligence and Machine learning process- intelligently, efficiently, and successfully, in order to arrive at practical solutions to real world data-centric problems and mimic human behavior or decision-making.

This book is primarily intended for use in an undergraduate course or course sequence. It can also be used in a graduate-level course (perhaps with the addition of some of the primary sources suggested in the bibliographical notes). Because of its comprehensive coverage and the large number of detailed algorithms, it is useful as a primary reference volume for AI graduate students and professionals wishing to branch out beyond their own subfield.

TABLE OF CONTENTS

CHAPTER ID 01

EMOTION DETECTOR USING AI

Neeraj Milind Shahane
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ABSTRACT

Our Invention "Emotion Detector using AI" Work fulfillment of every worker is fundamental as it straightforwardly influences their functionality. The work fulfillment file is straightforwardly relative to their joy, which relies more upon their home climate. On the off chance that a worker is glad at home and happy with his work profile, his functionality will give magnificent outcomes. These days, each industry is utilizing the biometric participation of a representative. The new model of biometric machines with a bliss file is planned. While doing biometry, his looks noted and chose a worker's satisfaction. A worker can join his work when his joy list surpasses the limited esteem. In any case, he really wants to seek some guidance or be given some an ideal opportunity to get ready. This methodology works on a representative's functionality and further develops work culture, increment worker usefulness, and increment maintenance, contribute positive outcomes towards reference programs, lower intentional turnover, decrease non-attendance, and a lot more things.

FIELD

Our Invention is related to Emotion Detector using AI.

BACKGROUND

The absolute quickest applications include gathering information about indications of feeling accessible to, and occupied with humans making decisions about someone else and who needs to make them all the more precisely or impartially. The traditional model lies in location. Enhancing human execution in that space is a difficult task.

There are regions, be that as it may, where expansion is a genuine chance. Two models can be effortlessly recognized. In the first place, some clinical determinations rely upon

distinguishing vocal indications of feeling, like the analysis of smoothed effect in schizophrenia, which is a sign of helpless visualization and possible hospitalization.

Depending on therapists' independent judgment in that space may not be ideal, since they are not really picked for the affectability of their ears. Henceforth it's a good idea to enhance their abstract impressions with applicable objective measures, and there is by all appearances proof that the innovation for acquiring pertinent measures is reachable. Second, suppliers of video chatting are keen on-screen shows conveying data about members' passionate states to misfortunes of affectability that outcome from unnaturalness of the medium.

As organizations look for better approaches to further develop execution, a few chiefs have started focusing on improvements in feeling detecting advances (ESTs) and programming filled the by the counterfeit capacity to appreciate people on a deeper level. In spite of the fact that we are as yet in the good 'all days, research shows that these innovations, which read such things as eye developments, looks, and skin conductance, can assist representatives with settling on better choices, further develop focus, and reduce pressure. While significant protection issues should be tended to, the chances are critical.

Consider the innovation created by Koninklijke Philips Electronics N.V. furthermore ABN AMRO Bank N.V., both situated in Amsterdam, to diminish exchanging hazard monetary business sectors. Research has shown that merchants in increased passionate states will overpay for resources and make lighhazardsazard, a condition known as "closeout fever" or "offering free for all."

To resolve this issue, the organizations mutually fostered an instrument considered the Rationalizer that has two parts: an arm band joined to the broker's wrist that actions feelings by means of electro dermal action (like the manner in which an untruth indicator works) and a showcase showing the strength of the individual's feelings utilizing light examples and tones. Specialists have observed that when clients become mindful of their elevated passionate states, they are bound to reconsider their choices.

As well as assisting people with further developing execution, the amassed information from such settings can assist directors with seeing how inner and outer ecological variables impact the dangers taken by gatherings.

Be delicate to representative worries. Set up your association for utilizing ESTs through training and straightforwardness. Clarify how the instruments can help representatives by decreasing pressure and dangers of burnout. One possibly helpful methodology, known as BYOD, includes welcoming representatives to carry their own gadgets to work. Under this situation, people keep a feeling of responsibility for arrangement of ESTs and the information they are gathering.

Foster information administration arrangements. Workers ought to have sole command over their own enthusiastic information and have the option to specify what kinds of utilization are allowed (for instance, information can be utilized distinctly on a total level, and nobody can dive into individual information marks).

Also, guarantee representatives in composed arrangements that passionate information will be utilized distinctly for explicit business objectives. For advances that depend on overgeneralized term measures, for example, webcam-based feeling recognition, information social affair and examination ought to be coordinated toward exceptionally explicit and obvious results.

However long associations work mindfully, we accept representatives will continuously become OK with the social event and investigation of physiological, conduct, and enthusiastic information. Albeit this will not occur all of a sudden, a few patterns recommend that trust can be worked over the long haul. A huge number of people as of now utilize shrewd watches and wellness gadgets like Apple Watches and Fitbits, and many individuals share their exercise and nourishment information straightforwardly via online media.

Online media itself has adapted us to acknowledge and even hug new degrees of individual straightforwardness. The test will be to bring new gadgets and measures into working environments such that engages execution, mitigates protection concerns, and for the most part consoles representatives that the advantages are common.

OBJECTIVES

1. The objective of the invention is to provide a "Improving the workability of an employee with an emotion detector" Work fulfillment of every worker is fundamental as it straightforwardly influences their functionality.
2. The other objective of the invention is to provide a work fulfillment file is straightforwardly relative to their joy, which relies more upon their home climate.
3. The other objective of the invention is to provide a the on/off chance that a worker is glad at home and happy with his work profile, his functionality will give magnificent outcomes.
4. The other objective of the invention is to provide each industry is utilizing the biometric participation of a representative.
5. The objective of the invention is to provide a new model of biometric machines with a bliss file is planned. While doing biometry, his looks noted and chose a worker's satisfaction.
6. The other objective of the invention is to provide a worker can join his work just when his joy list surpasses the limit esteem. In any case, he really wants to seek some guidance or be given some an ideal opportunity to get ready.
7. The other objective of the invention is to provide a methodology works on a representative's functionality and further develops work culture, increment worker usefulness, increment maintenance, contribute positive outcomes towards reference programs, lower intentional turnover, decrease non-attendance, and a lot more things.

SUMMARY

Economically, the principal significant use of feeling related innovation likely could be in diversion and game projects which react to the client's state. There is likely a huge market for pets, companions, and dolls which react even roughly to the proprietor's state of mind. A considerable lot of those applications could be tended to in a piecemeal manner.

It appears to be probable, nonetheless, that really fulfilling arrangements will rely upon a strong hypothetical base. The fundamental worry of this article is with the improvement of that sort of base. It is significant for both hypothesis and application to perceive that the expression "feeling" has a wide and a tight sense.

The thin sense alludes to what in particular may be called all out feeling, where feeling is (briefly) the predominant aspect of mental life—it seizes customary consideration and coordinates individuals unequivocally towards a game-plan driven by the feeling. The expansive sense covers what may be called basic feeling, which colors an individual's considerations and activities to a more noteworthy or lesser degree without essentially holding onto control.

To stay away from disarray, we utilize the expression "enthusiastic state" to portray any psychological state where feeling—all out or fundamental—may sensibly be considered to assume a focal part. The expression "influence" has a comparable degree, however will in general be utilized in clinical settings.

This article thinks about feeling in the expansive sense. Individuals here and there object to that because "feeling" rigorously implies out and out feeling. That sort of contention is doubtlessly unessential to choosing how data innovation should respect hidden feeling. Its needs are down to earth, as in it needs to manage feeling as it happens in genuine settings.

In that specific circumstance, it would be hard to legitimize an arrangement of disregarding fundamental feeling. For example, it is a significant impediment on the off chance that an alarming or coaching framework is oblivious in regards to indications of feelings like fatigue or outrage until they become all out.

DIAGRAM

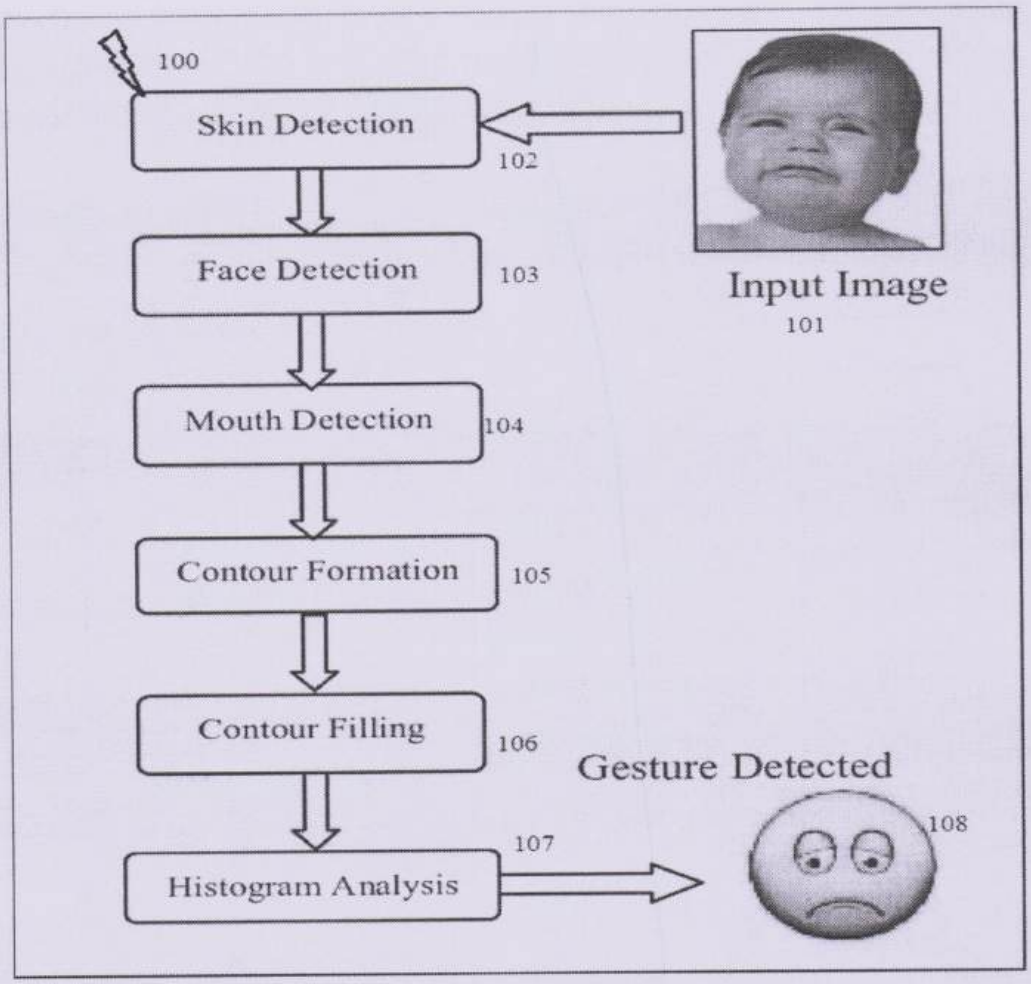

FIG.1: Improving the workability of an employee with an emotion detector, Flow chart.

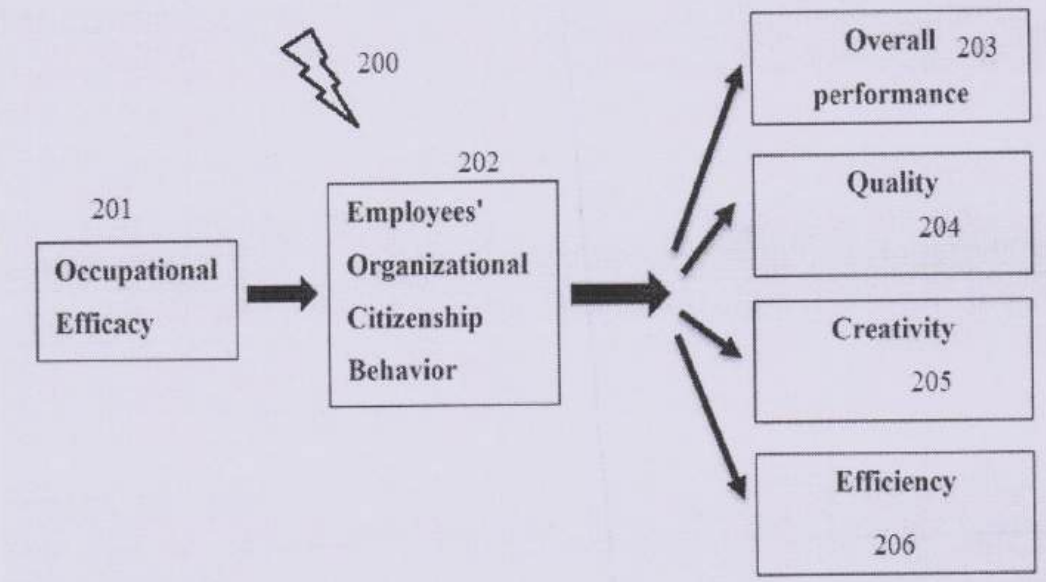

FIG.2: Improving the workability of an employee with an emotion detector, Block Diagram.

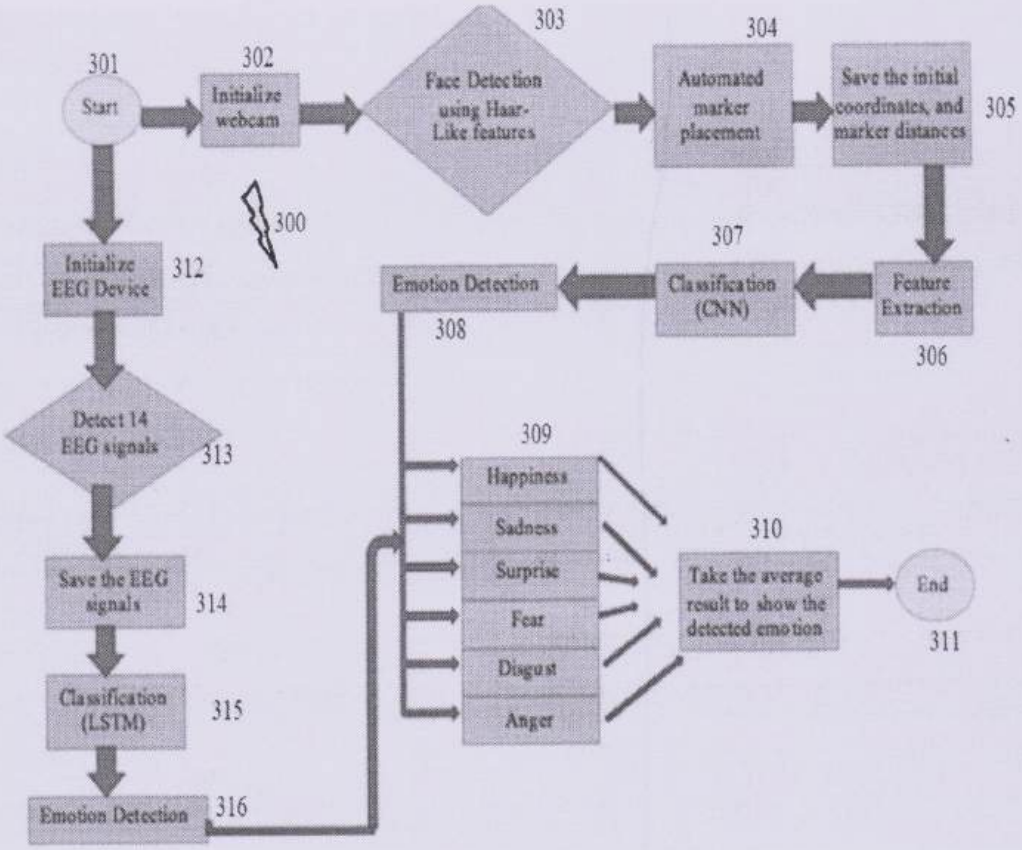

FIG.3: Improving the workability of an employee with an emotion detector.

DESCRIPTION

Building a programmed feeling recognizer relies upon a feeling of what feeling is. A great many people have a casual agreement, however there is a proper exploration custom which has tested the idea of feeling methodically. It has been molded by significant figures in a few disciplines—reasoning (Rene Descartes), science (Charles Darwin), and brain research (William James)— yet it is helpful to consider it the mental practice.

Here we consider how thoughts drawn from that custom can be utilized. With regards to programmed feeling acknowledgment, understanding the idea of feeling isn't an end in itself. It is important predominantly in light of the fact that thoughts regarding the idea of feeling shape the manner in which enthusiastic states are portrayed. They infer that specific elements and connections are pertinent to depicting a passionate state, recognizing it from others, and deciding if it qualifies as an enthusiastic state by any means.

A graphic structure typifies decisions regarding what those highlights and connections are, and a good one permits data about them to be set out in a precise, manageable way.

Show Rules: Ekman and Friesen focused on the all-inclusive underpinnings of look, yet additionally the manner in which socially characterized show rules are utilized to "deal with the presence of specific feelings specifically circumstances".

Intemperate articulations of outrage or pain are unequivocally debilitating in many societies and might be supplanted by an endeavored grin rather than an impartial articulation; distinguishing those feelings relies upon perceiving signs other than the all-around perceived model articulations.

Trickiness: There is a scarce difference between show rules and duplicity. Purposely distorting enthusiastic states is obviously important for public activity, and hence, identifying misdirection has been a vital application for the mental custom. It is one more realistic choice on how fake feeling recognizers should move toward double dealing.

Attempting to distinguish it puts a premium on utilizing pointers that people don't (e.g., physiological). Our primary interest is attempting to match the things that people can do, and that implies tolerating that the framework will be hoodwinked as people are.

Deliberate Ambiguity: Signs which are applicable to feeling may likewise have elective implications. Clearly, brought down eyebrows might mean fixation just as outrage. Less clearly, there are solid similitudes between the prosodic qualities related with sorrow and those related with helpless perusing. The methodical equivocalness of individual signs is a difficult issue for any useful application.

It focuses on organizing data from various modalities; this is the reason later segments think about both discourse and look. A second gathering of issues identifies with the construction of data sources. An enormous extent of exploration has managed sources that can be considered as subjective focuses on—a grin, a particular sort of contribute shape discourse, etc.

There are viable explanations behind that accentuation, especially in research without admittance to high innovation: subjective targets are nearly simple to recognize or control. It has slowly become certain that primarily various sorts of sources should be thought of. A few sources work as motions, which are reached out on schedule: for example, decisions about a grin rely upon its time course just as its last shape. Different signs seem to lie in the way of an activity, for example, the manner in which verbally expressed words are anxious.

Bunches that esteem variety focus harder on the alternate points of view individuals bring, the exceptional data they hold and the potential commitments they make.

Research has shown that assorted gatherings regularly perform better, settle on savvier choices and develop greater Diversity likewise drives market growth. In expansion, variety might be a significant enrolling instrument in landing top ability. In a new Glassdoor overview, 66% individuals surveyed detailed that variety is imperative to them when assessing organizations and bids for employment.

To limit oblivious predispositions and their hindering impacts, organizations should expand mindfulness. Google, The Motley Fool and different associations have started preparing in oblivious inclinations. Google's preparation can be seen at its re: Work site. Google has found that representatives who have finished the program are altogether more mindful of predisposition, have a more prominent comprehension of inclination and are more spurred to defeat inclination.

Only one month in the wake of going to the studio, members were bound to see Google's way of life as reasonable, objective and receptive to variety than those in the benchmark group. At Google, workers are prepared to get down on any assertions or activities that might be unknowingly one-sided to assist individuals with keeping away from them.

Significant work is a major need that persuades we all and has become U.S. workers' main longing in a task. Doing what helps other people matters to us. Significant work builds inspiration, social conduct and execution. An investigation of social help representatives observed the individuals who detailed more significance in their work were bound to flourish.

Significant work energizes self-awareness, work commitment and prosperity. A more prominent feeling of direction produces good feelings like satisfaction and rise and mentalities like work fulfillment. Having a feeling of direction may likewise lead people to be more mindful and receptive to others in taking care of their responsibilities

RESEARCH CLAIMS

1) Our Invention "Improving the workability of an employee with an emotion detector" Work fulfillment of every worker is fundamental as it straightforwardly influences their functionality. The work fulfillment file is straightforwardly relative to their joy, which relies more upon their home climate. On the off chance that a worker is glad at home and happy with his work profile, his functionality will give magnificent outcomes. These days, each industry is utilizing the biometric participation of a representative. The new model of biometric machines with a bliss file is planned. While doing biometry, his looks noted and chose a worker's satisfaction. A worker can join his work just when his joy list surpasses the limit esteem. In any case, he really wants to seek some guidance or be given some an ideal opportunity to get ready. This methodology works on a representative's functionality and further develops work culture, increment worker usefulness, increment maintenance, contribute positive outcomes towards reference programs, lower intentional turnover, decrease non-attendance, and a lot more things.

2) According to claim1# the invention is a "Improving the workability of an employee with an emotion detector" Work fulfillment of every worker is fundamental as it straightforwardly influences their functionality.
3) According to claim1,2# the invention is a work fulfillment file is straightforwardly relative to their joy, which relies more upon their home climate. On the off chance that a worker is glad at home and happy with his work profile, his functionality will give magnificent outcomes.
4) According to claim1,2,3# the invention is each industry is utilizing the biometric participation. The new model of biometric machines with a bliss file is planned. While doing biometry, his looks noted and chose a worker's satisfaction.
5) According to claim1,2,3,4# the invention is a worker can join his work just when his joy list surpasses the limit esteem. In any case, he really wants to seek some guidance or be given some an ideal opportunity to get ready.
6) According to claim1,2,3# the invention is a methodology that works on a representative's functionality and further develops work culture, increment worker usefulness, increment maintenance, contribute positive outcomes towards reference programs, lower intentional turnover, decrease non-attendance, and a lot more things.

National Council of Educational Research and Training
Regional Institute of Education, Bhopal

9th National Conference on Mathematics Education

20th to 22nd December 2020

Certificate of Participation

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Mrs. Jyoti A. Dhanke

Assistant Professor, Bharati Vidyapeeth's College of Engineering, Lavale, Pune

has participated in the 9th National Conference on Mathematics Education organized by National Council of Educational Research and Training, Regional Institute of Education, Bhopal through online mode.

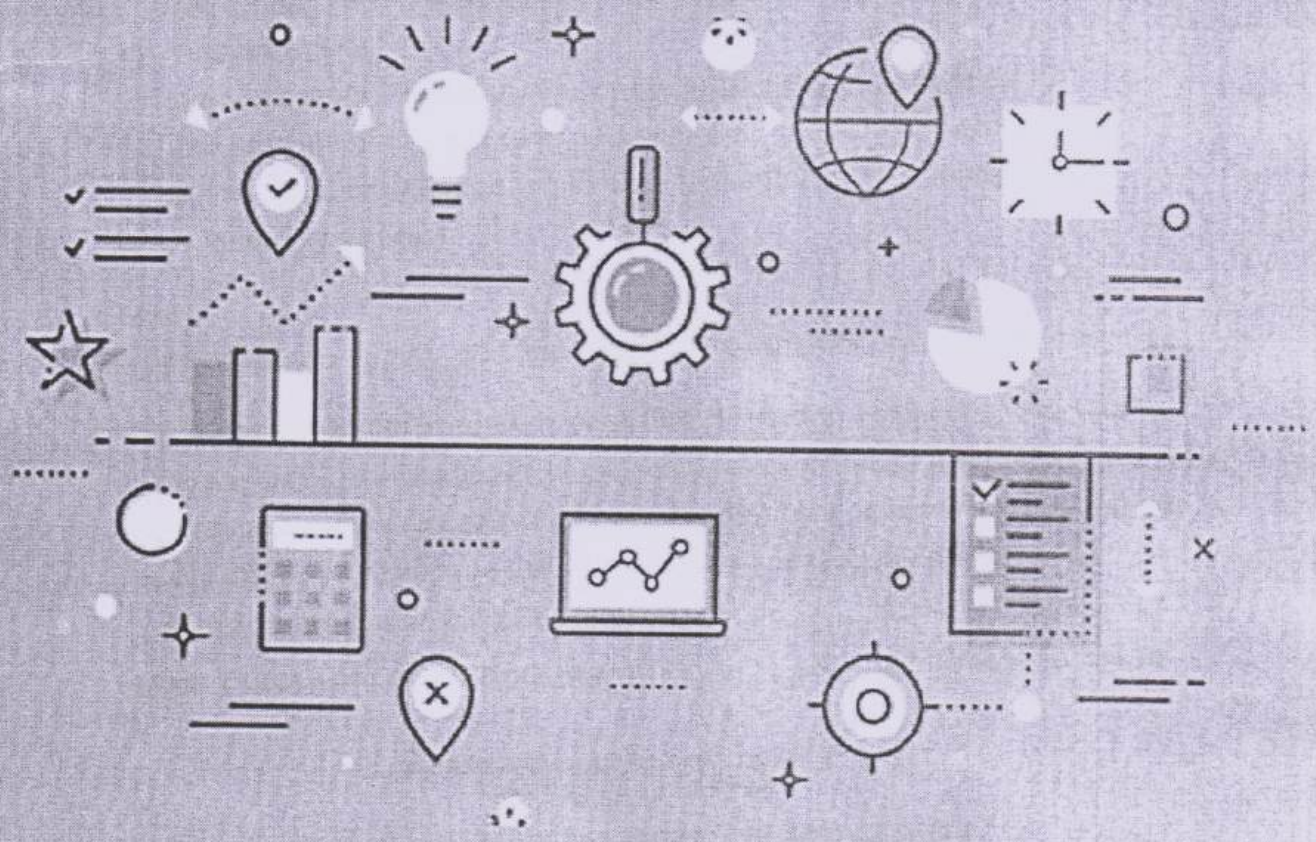
Program Coordinator | Program Coordinator | Principal

(23) (14)

RESEARCH METHODOLOGY

VOLUME - 3

Dr.R.Balu
Dr.M.Balasubramanian and
Dr.Nagaraja Suryadevara



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Content

Chapter - 1
Reaction Diffusion Model and Numerical Study During Tumor Development

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Mrs. DHANKE JYOTI ATUL

Assistant Professor

Bharati Vidyapeeth's College of Engineering, Lavale, Pune

Has presented a paper entitled "**A novel paradigm of numerical approach for reaction-diffusion during Tumor growth using finite difference method**" in the "International Web Conference on Mathematics for Materials Science, Signals, Images and Structured Data" [ICMMSIS'20] organised by Department of Mathematics, Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu, India from 23 to 24 July 2020.

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This is to certify that

Totappa Hasarmani, Rajesh Holmukhe, Abhishek Gandhar and Shikha Bhardwaj

presented a paper entitled,

Optimum Sizing and Performance Assessment of Solar PV-DG Hybrid System for Energy Self Sufficiency of Jaggery Making Units

at the IEEE Bangalore Humanitarian Technology Conference (B-HTC) 2020, which was held virtually during October 08-10, 2020.

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VGCCTM-2021

This is to certify that Dhanke Jyoti Atul,Assistant Professor,Bharati Vidyapeeth's College of Engineering, Lavale, Pune presented the paper entitled "Change in number of tumor cells during simulation" in "Virtual Global Conference on Current Trends in Mathematics" organized by Mathematical Society, Brahmanand College, Kanpur, Uttar Pradesh, India on Feb 01-02, 2021.

Secretary, Maths Soc.

A L Pathak

HOD Maths Department

Principal

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Department of Chemistry and Biosciences, School of Basic Sciences, Manipal University Jaipur

January 11-12, 2021.

Dr. Lalita Ledwani	Dr. Rahul Shrivastava	Dr. Veena Dhayal	Dr. Abhijeet Singh
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GCS

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Performance Analysis of Grid Interfaced Photovoltaic Systems for Reliable Agri-Microgrids using PVsyst

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Abstract

Today most of the countries are fulfilling their energy need from fossil fuel resources, which are vastly depleting and era of fossil fuel is gradually ending. Power generation using fossil fuel is creating harmful effect on environment, leading to global warming which has become matter of great concern. Massive use of these fuels, release large amount of waste heat, causing thermal pollution in surrounding area, leading to destroy of various types of plant and animal life. In case of nuclear power plants, disposal of radioactive wastes and release of radioactivity during accident creates long term sever problems. Therefore every country is now embarking on search of alternative sources of energy, specifically, solar energy, which is inexhaustible source of energy and freely available in almost all parts of the world.

Our research team suggested solar PV plant of 10 Kwp for Shree Samarth Agro-Tech Foundation, Which is a small scale Agricultural based business enterprise operated by farmer's self-help group, located in Solapur District of Maharashtra State, India. Thus, our research team, tried to provide technology up gradation to these conventional diesel generator powered jaggery making units that helps in reducing green house gas (GHG) emission. Detailed performance analysis of the proposed system will be carried out using PVsyst simulation tool.

Keywords: Jaggery units, Solar PV System, PVsyst, Performance ratio, yield forecasting

I. INTRODUCTION

Jaggery is one of the most popular sweetener used worldwide, and is produced by removal of water from sugarcane juice using various conventional pan-furnace heating systems [1, 2]. However, India is the main supplier of jaggery to entire world, most of these agricultural based businesses located in remote rural areas, facing perennial problem of frequent electricity outages. Therefore, these food-processing units make use of diesel generators to bridge the gap between demand and supply of electricity, causing severe environmental issues. In addition, the price of the diesel is always on the rise, thereby increasing the overall cost of per unit power generation in the long term and raises the issues of energy security.

However, geographical location of India is bestowed with radiation of tremendous solar energy, receiving an average solar radiation of 4-7 Kwh/m2/day, almost throughout the year. Therefore, India has tremendous scope for generating electricity using solar energy technology. Thus, electricity generation using solar energy is gaining ground in India, which has set target of generating 175 GW power using solar energy technology until 2022.

This research paper presents survey and selection of jaggery unit for case study in section II. Detailed technical design of solar PV system proposed for selected unit using PVsyst software tool will be presented in section III. Performance analysis of proposed solar PV System is discussed in section IV followed by conclusion and acknowledgement in Section V.

II. SURVEY OF JAGGERY UNITS

Before design of Solar PV System, our research team surveyed various jaggery units situated at different geographical locations in India as reported in following table 1.

TABLE I. SURVEY OF JAGGERY UNITS

Project Site	Geographical Location			Load (KW)
	Latitude	*Longitude*	*Altitude*	
Bhama Organic Pune India	18.76° N	73.85° E	520 m	120
Shreekant Agro-Tech Karad, India	17.28° N	74.0° N	568m	105
Shiv-Samarth Agro-Tech , Maindargi India	17.46° N	76.30° E	461 m	8.0

First two units are semiautomatic units, located near Pune, India. These units are operated by bagasse-fired boilers that feed process steam to pans in which final jaggery is prepared. Because of involvement of heavy machineries at different stages like, milling section, boiler section and boiler housing section, total connected load of such semiautomatic site goes beyond 100KW. However, third site, Shiv-Samarth Agro-Tech, Maindargi, India is a modified energy efficient jaggery unit supported by open pan-furnace heating system. At this site, traditional bagasse-fired heating system is replaced by modified open pan furnace system, which is designed based on mass energy balances of the jaggery plant [3, 4].

Hence third site, was found out to be technically upgraded, that leads to saving of huge amount of bagasse, which provides additional income to farmers. Furthermore, optimum design of solar PV system for this site is easily possible. Therefore, our research team selected, Shiv-Samarth Agro-Tech, Maindargi India, for case study that will not only make this unit energy independent but also strengthen existing grid capacity. Thus, the proposed method offers economic, environmental and strategic advantages.

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III. GRID CONNECTGED PV SYSTEM: USING PV SYST

A. PVsyst: PhotoVoltaic systems software

PVsyst is simulation software highly useful for preliminary and detailed Solar PV project design. Features of PVsyst simulation softwares are shown in fig.1 and are discussed as below.

1) Preliminary Design Section: This is a pre-sizing step of a project, mainly used for first evaluation of various system configurations like grid connected, stand alone and water pumping system.

2) Project Design Section: By using this section, full featured study and analysis of proposed project can be done easily. This section provides, detailed hourly simulation parameters, those can be use for computing accurate system yield. Similarly, different simulation variants can be preformed. Moreover, detailed system loss analysis and financial evaluation of the project can be performed easily.

3) Databases Section: This section manages meteo and system component databases. Meteo database mainly provides information about geographical site location (latitude, longitude, altitude and time zone) and monthly meteo like daily solar radiation, atmospheric pressure, Wind speed, air and earth temperature. Data base section is supported by web applications like Meteonorm, NASA-SSE. Component section provides detailed information about PV modules, Inverters, Batteries and other balance of plants (Generators, pumps and controllers).

4) Tools Section: Solar toolbox is didactic and informative tool, mainly used for determination of solar geometry, orientation and optimization. Similarly, variation of electrical parameters of PV arrays with respect to change in shadings, system mismatch, cell hot spots can be thoroughly studied. It also facilitates for study of effect of transposition factor, plane orientation optimization, quickly meteo calculations and operating voltage optimization etc. we can also import custom hourly files from real systems and perform simulation and comparison of these imported values [5, 6].

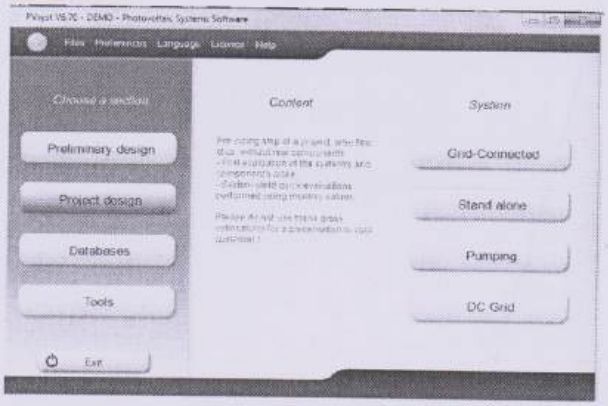

Fig. 1. Features of PVsyst

B. Global System configuration:

Proposed Solar PV system is designed for Shiv-Samarth Agro-Tech Foundation, farmer's producer group, located at Maindargi; Solapur, (MH) India. Latitude of site location is 17.46° N, whereas longitude is 76.30° E. Monthly meteo values such as horizontal global irradiation, horizontal diffused irradiation, extraterrestrial irradiation, clearness Index, ambient temperature and wind velocity of the proposed geographical site are shown in Fig.2 Sun Path diagram of the proposed site, which is mainly used for determination of sun at any time of the day, and year is shown in Fig.3.

Geographical Site: Maindargi — Country: India

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Situation: Latitude 17.46° N, Longitude 76.30° E; Time defined as: Legal Time, Time zone UT+5.5; Altitude 446 m

Monthly Meteo Values — Source: Meteonorm 7.2 (1994-2013), Sat=100%

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year	
Hor. global	148.7	157.1	196.2	196.9	204.0	158.2	138.9	142.5	148.3	159.8	139.6	142.7	1926.8	kWh/m²,m
Hor. diffuse	40.5	54.4	69.1	78.2	79.6	88.1	86.9	90.9	74.1	63.5	50.2	40.1	836.5	kWh/m²,m
Extraterrestrial	244.5	248.7	305.4	317.9	335.3	324.8	324.4	329.3	303.1	285.1	244.4	234.4	3506.5	kWh/m²,m
Clearness Index	0.608	0.632	0.623	0.618	0.608	0.487	0.415	0.433	0.489	0.561	0.571	0.609	0.549	
Amb. temper.	24.5	27.3	30.5	32.7	32.8	28.5	27.7	26.0	26.5	27.0	25.3	23.9	27.8	°C
Wind velocity	0.8	0.8	0.8	1.0	1.3	1.3	1.2	1.1	0.8	0.6	0.7	0.6	0.9	m/s

Fig. 2. Monthly Meteo Values of Geographical site: Maindargi, India

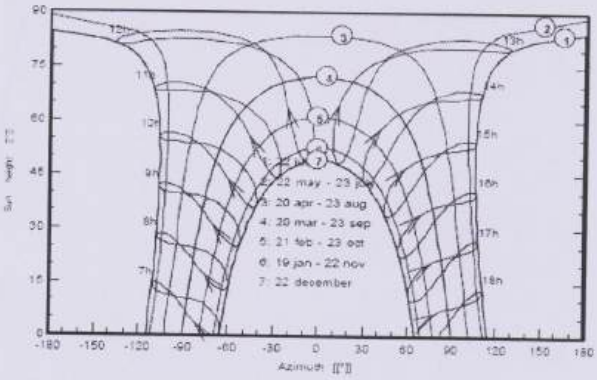

Fig. 3. Sun Path Diagram of Geographical Site:Maindargi, (MH), India

Model of grid tied solar PV system designed for "Shiv-Samarth Agro-Tech Foundation" is shown in Fig.4. In this case, PV arrays in string topology are connected to grid tied inverters that converts DC power in to AC power. End user uses output of Inverter and surplus power is fed to grid with bilateral net meter.

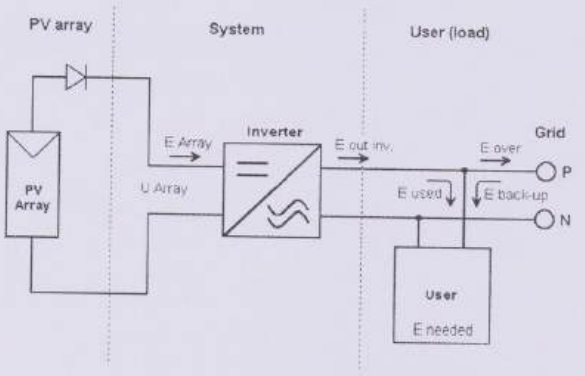

Fig. 4. Model of Grid tied Solar PV system

C. System specifications:

Extensive research work has been carried out to transform existing DG set operated conventional jaggery plant into Solar PV powered energy efficient unit, designed as per mass energy balance theory. The total connected load of the plant is just 8KW (AC capacity), unbelievably lesser than other semiautomatic plants of same crushing capacity. Considering future expansion of the plant, it is always recommended to install PV plant of at least 25 % greater than the peak-connected load. Thus, Solar PV plant of 10 Kwp, with fixed tilt angle of 18°, latitude of site location is considered for final design [7]. Major elements of proposed Solar PV system are classified as below:

1) Solar PV Panels

Database of PVsyst provides detailed technical specification of PV panels, Grid Inverters, and other system components like batteries, charge controllers, Generators and Solar powered pumps, supplied by leading manufacturers and retailers. In this project, solar PV panel, Model Number, "CS6K - 300MB-FG" of "Canadian Solar", the most trusted brand all over the world, is used. Detailed technical specifications of panel are described in table II.

TABLE II. SPECIFICATION OF SOLAR PV PANEL

Solar Panel Model	CS6K - 300MB-FG
Nominal Power of Panel(Pnom)	300 Wp
Open Circuit Voltage (Voc)	39.7 V
Short Circuit Current (Isc)	9.83 A
Max. Power point voltage	32.5 V
Max. Power point Current	9.24 A
Maximum Power	300.3 W
Number of Cells/Panel	60

PV panel "CS6K - 300MB-FG", highly efficient panel of monocrystalline technology, having efficiency/module area of 18.3% at standard test condition (STC: T=25 °C, G=1000 W/m2, AM=1.5) is selected.

2) Solar Inverters

For this proposed system, grid connected inverter of "Fronious International" make, Model- IG.TL 5.0 one of the leading solar inverter brand, is used. In this study, two inverters of 3 phase, 50 Hz, with Unit Nominal Power, Pnom-5.0 KW ac, and operating voltage range of 350-7000V, connected in parallel are used. Specifications of proposed PV plant are mentioned in table III.

TABLE III. SPECIFICATIONS OF PROPOSED PV PLANT

Solar PV Panels and Inverters			
No. of Panels	32	No.Inverters	2
No of strings	2	Inverters/ string	1
Panels / string	16	Array global power	9.6 Kwp

IV. SIMULATION RESULTS

A. Performance Evaluation of solar PV system

Simulation of the solar plant of 10 Kwp proposed for energy efficient jaggery unit is carried out using PVsyst V 6.83. Performance of solar PV plant depends on numerous factors such as site selection, accuracy of system yield computation, shading effects, optimum selection of tilt angle, optimum sizing of system components etc. Major system parameters, such as Energy injected into the grid, various performance indexes, solar fraction, performance ratio and various system losses of proposed PV system are described as below.

1) Daily Input/Outputs of solar PV plant

Energy generated by solar plant is directly proportional to global incident in collector plane. Daily Input-Output diagram of PV system shows variation of energy injected into the grid (Kwh/day) with respect to variation global incident in collector plane over the year as shown in Fig.5. From the diagram, it is clear that most of dots are concentrated above 50 KWh Energy injected into the grid/day. Hence, the proposed PV plant is capable of injecting at least 50 Kwh energy to grid during maximum number of days in a year.

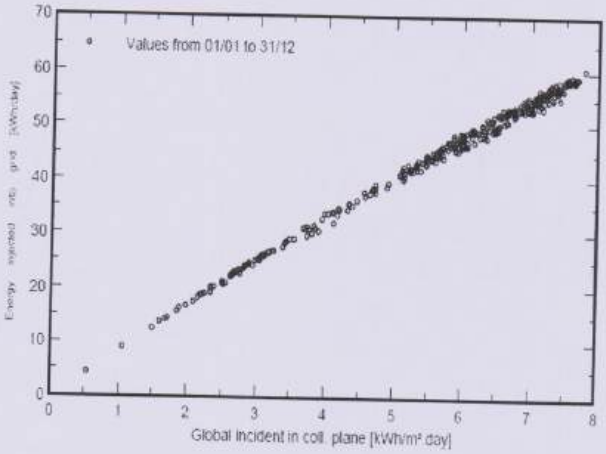

Fig. 5. Daily input/ out puts of the PV system

2) Performance Indexes of the PV system

Performance indexes of the proposed plant are shown in Fig.6 and are described in detail as below:

- PV-array loss or Collection loss (L_c): These losses are mainly classified into thermal capture loss and miscellaneous losses. Thermal losses are caused due rise in cell temperature beyond 25°C. Miscellaneous losses are caused due to wiring, module quality, mismatching, partial shadows, errors in MPPT and dust. PV-array loss of the proposed plant is 0.88 Kwh/Kwp/day.
- System Losses (L_s): These losses are caused due to inverters, inefficient battery systems and passive circuit elements. System losses of the proposed system are 0.15 Kwh/Kwp/day.
- Final yield (Y_f): It is defined as the system useful AC output energy referred to the nominal power of PV array, measured at standard test condition of 1000 W/m^2 solar irradiance and 25°C cell temperature. Its unit is Kwh/Kwp/day. Final yield of the proposed system is 4.59 Kwh/Kwp/day.

- Capacity Utilization Factor (CUF): It is defined as real output of the plant compared to theoretical maximum output of the plant.

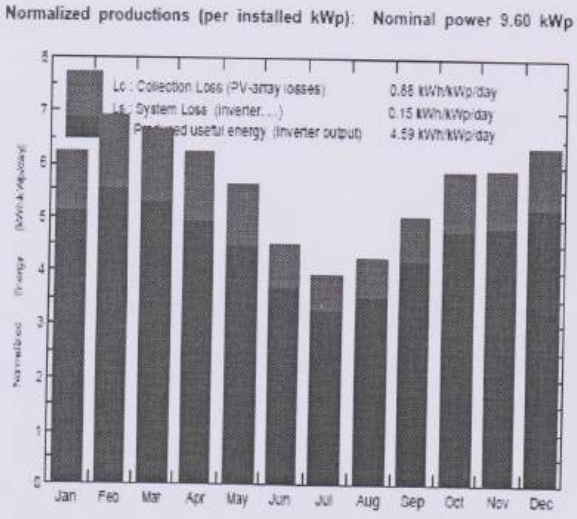

Fig. 6. Performance Indexes of the proposed PV plant

3) Performance ratio (PR)

It is one of the key parameter for performance evaluation of a PV plant. It is the ratio of final yield to reference yield. Thus, performance ratio is an indication of overall effect of losses on a PV array's normal power output. Hence, performance ratio is an indication of how closely actual performance of solar PV system approaches the ideal performance and facilitates comparison of PV systems independent of location, tilt angle, orientation and nominal rated power. For the proposed system, the highest value of PR was found 84.0% consecutively from July to September whereas lowest value was 78.0% consecutively from March to May. Average annual Performance ratio of the proposed system is 81.7% as shown in Fig.7.

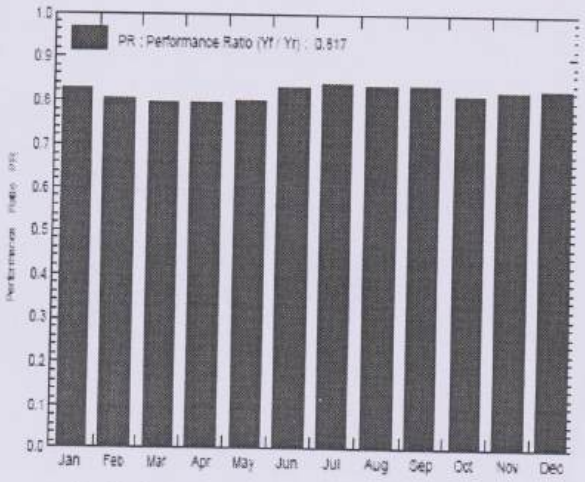

Fig. 7. Performance ratio of the proposed PV plant

4) Loss diagram

Solar PV system converts solar irradiation striking on PV cells into electrical energy that is ultimately injected into grid after passing through various stages of power conversion. Power loss occurs at different stages of PV system through various sources. Major losses among these are losses due to irradiance level, array soiling loss, module quality loss, array mismatch loss, AC, DC ohmic losses, and small amount of inverter and transformer losses. Power flow diagram of the proposed PV system over the whole year is shown in fig. 8.

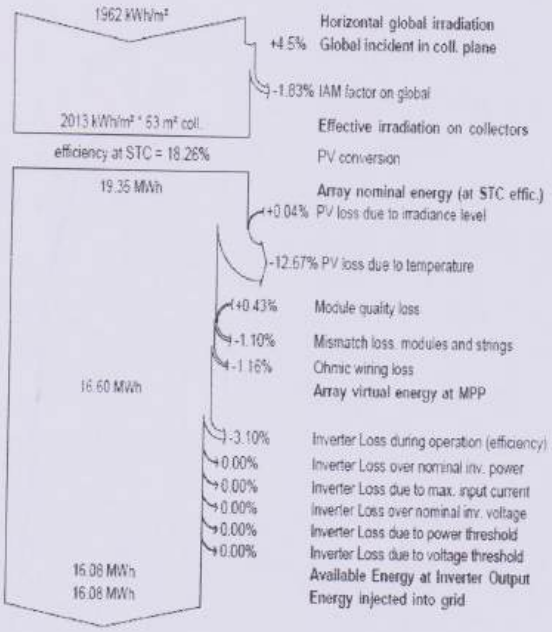

Fig. 8. Loss diagram over the whole year

The global horizontal irradiation of the system is 1962 Kwh/m2. The effective irradiance on the collector plane is 2013 Kwh/m2. After the PV conversion, array nominal energy is 19.35 MWh. The PV conversion efficiency at standard test condition (STC) is as high as 18.26 %. Array virtual energy at maximum power point (MPP) is 16.60 MWh. After the inverter losses, energy available at the inverter output is 16.08 MWh that is finally injected to grid. Balances and main results of the PV system is shown in Fig.9 [9, 10]

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR
January	150.9	52.59	24.54	194.2	191.6	1.583	1.535	0.823
February	161.1	60.43	27.29	192.9	190.1	1.540	1.494	0.807
March	194.7	68.25	30.54	206.1	202.7	1.623	1.575	0.796
April	198.9	73.23	32.73	187.5	183.9	1.473	1.428	0.753
May	203.6	83.84	32.75	174.4	170.1	1.386	1.343	0.702
June	161.4	69.28	28.50	135.1	131.4	1.116	1.080	0.732
July	141.3	91.16	27.72	121.6	116.2	1.015	0.981	0.840
August	144.1	51.56	26.79	131.7	126.8	1.093	1.056	0.835
September	151.8	83.08	26.60	151.4	148.3	1.252	1.212	0.834
October	163.6	66.24	27.02	182.2	179.3	1.471	1.426	0.815
November	142.9	54.66	25.28	178.1	175.7	1.451	1.407	0.823
December	146.4	44.55	23.93	195.7	193.2	1.595	1.547	0.823
Year	1961.9	838.97	27.80	2050.8	2013.3	16.598	16.064	0.817

Fig. 9. Balances and main results of the proposed PV plant

From the results, it can be observed that, the maximum energy of 1.575 MWh is injected to the grid in the month of March while the least amount of 0.981 MWh

is injected in July. This variation occurs mainly because of seasonal tilt of solar panels and amount of solar irradiation received during specific period. Average annual energy injection to the grid is 16.084 MWh.

B. Green House Gas Balances of PV plant

Electricity generated by solar PV system will save the exact amount of electricity either generated by fossil fuels like diesel generator set. The green house gas (GHG) emission of diesel generator (DG) set is tremendously higher compared to emission of renewable energy sources like solar PV systems.

Hence, the total GHG balance of a solar PV system is the difference between produced and saved GHG emissions. GHG emission balance of the proposed solar PV system of 10 Kwp is shown in Fig.10. Before technological up gradation, jaggery unit was operated by 15 KVA DG set that was emitting GHG 16.6 tCO2. GHG emission of solar PV system is almost zero. Therefore, after replacement of DG set by solar PV system, gross annual GHG emission reduction of 16.6 tCO2 is achieved.

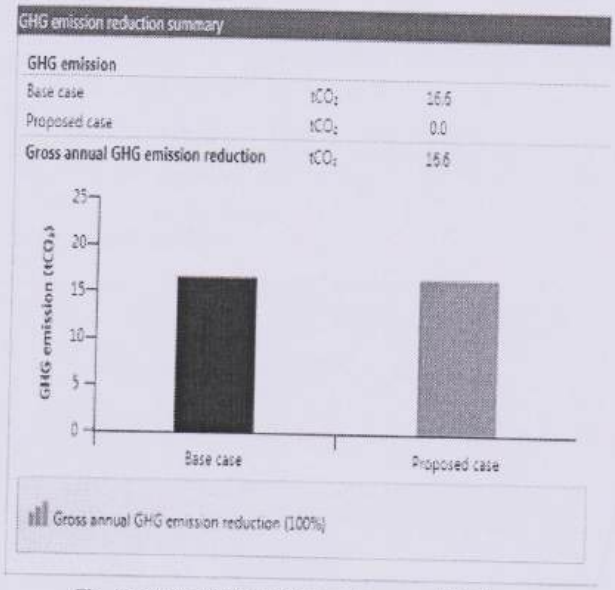

Fig. 10. GHG emission balances of proposed PV plant

V. CONCLUSION

India has continued economic growth that is placing tremendous demand on its energy resources. However, India is bestowed with tremendous solar energy potential, receiving about 5,000 trillion kWh per year solar energy over its land area. From an energy security point of view, solar energy is the most secure of all sources, since it is abundantly available.

Grid connected solar PV technologies can economically and effectively be adopted as an alternative source of energy to agriculture based food processing industries like conventional jaggery units those are generally located in remote village area. Thus, solar energy plays major role in reducing greenhouse gas emissions.

In this research paper, energy modelling of grid tied solar PV system proposed for Shiv-Samarth Agro-Tech Foundation, Maindargi, India has been successfully simulated. Mathematical model of proposed plant using PVsyst was used to generate forecasted values of parameters. The total installed capacity of the plant is 10Kwp. Annual electricity generated by the plant is 16.08 MWh. Its normalised production is 4.59KWh/Kwp/day. By proper design and optimum selection of tilt angle, plant achieved Performance ratio of 81.7%. The cost of produced energy is 2.46INR/KWh, which is the lowest among all type of power generation technologies. Further, simulation results can be used to develop tracking system for optimization and improvement of system efficiency.

ACKNOWLEDGEMENT

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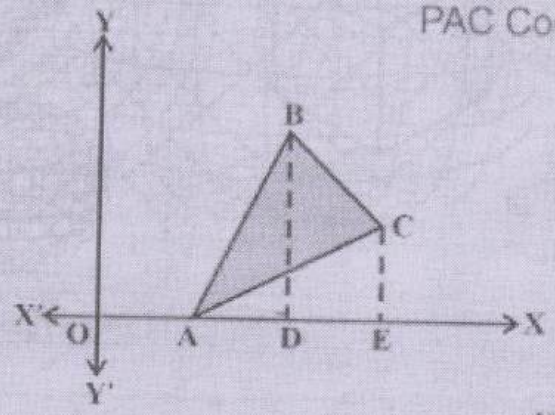

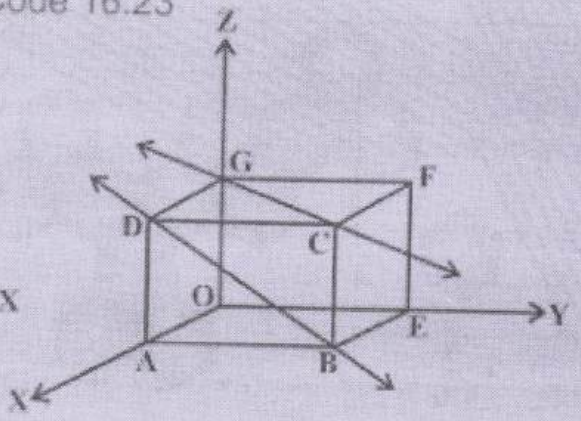

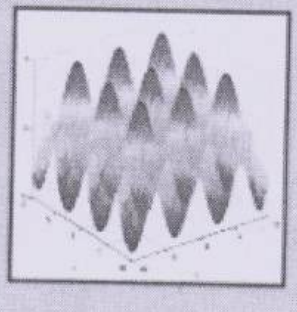

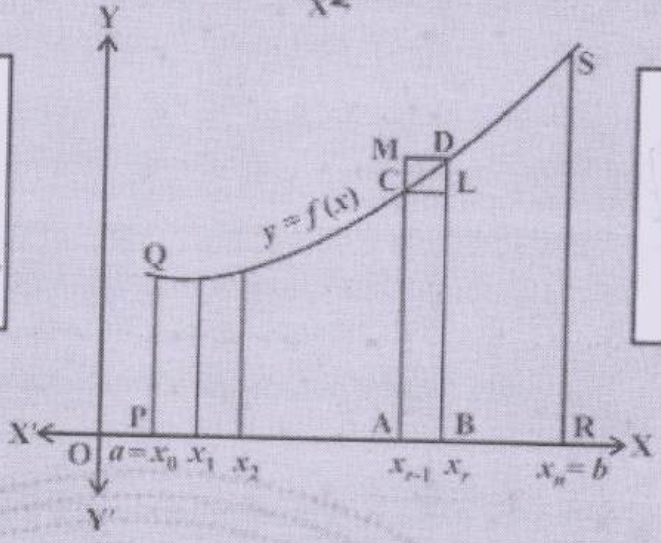

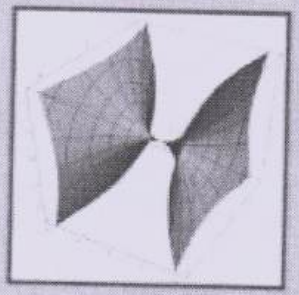

Mr. Aji Thomas & Dr. Ashwani Kumar Garg

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PREFACE

With the event of computer and sophisticated Mathematics software, it has become inevitable to do without it. In older days calculations were done with hands but in this 21st century it is the need for the hour a student should have is the computational and analytical skill. A key aspect of learning Mathematics is visualization. There are many mathematical software which in no time would do any calculations and give a graphical visualization which makes the analysis of a problem easier. The only price a learner has to pay is to devote a certain amount of time to get acquainted with the software by learning a few syntaxes but the reward is enormous. The present manual is intended as a supplementary text for Practical in Mathematics for the student of B.Sc B.Ed course. The manual not only allows us to solve a mathematics problem but also helps them to analyse and classify the concept themselves. It also provides a sequence of example which will help the learner to grasp the subject and enhance their problem-solving skill. The Objectives of the Manuals are as follows.

Learners

- will be acquainted with different Mathematical software.
- will able to learn the practical aspects of Mathematics.
- will able to integrate Mathematics with other science subjects.
- will enhance their problem-solving skill.
- will able to solve a real-life Mathematical Problem.

Keeping in view the above objectives Manual has been divided into different chapters based on the Mathematics syllabus. And each chapter is further divided into subunits comprising of a concept covered in the chapters, suggested software to use, different practical problems depending on the identified aim and exercises at the end of each chapter.

Our Thanks to the National Council of Educational Research and Training (NCERT) for approving the programme, for providing Financial Support for this Project. We want to convey our heartfelt gratitude to Prof Nityananda Pradhan, Principal RIE Bhopal for his continuous support and guidance. We are thankful to Prof Praveen Kulshreshta, Head DEE, RIE Bhopal for his continuous help in conducting the workshops in three Phases. Special thanks to Dr. Dhirendra Kumar Shukla, Assistant Professor, RIE, Bhopal who was one of the resource persons and helped in editing related work. Our appreciation goes to Dr. Jyoti Nema, Assistant Professor RIE, Bhopal, Dr. Jyoti Atul Dhanke, Assistant Professor, Bharti Vidhyapeeth College, Pune, Dr. J. P. Jaiswal ,Assistant Professor, NIT Bhopal, Dr. Amit Kumar, Assistant Professor, Brahmanand College, Kanpur, Dr. Anuradha Singh, Assistant Professor, IIIT, Nagpur, Dr. Namrata Tripathi, Assistant Professor, Govt. P.G. College Rajgarh, Dr. Arvind Kumar, Assistant Professor, Dyal Singh College, University of Delhi, Mr. Jayanta Biswas, Assistant professor Shri Vishwakarma Skill University, Palwal, Mr. Jay Kishore Sahni, Assistant professor Ram Vilas Ganga Ram College, Siwan who were the resource Persons in the programme.

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Oral: CSO03

Numerical Study of Effect of Nutrient and Oxygen Concentration on Tumor Cell Growth and Proliferation

Presenting Author: Dhanke Jyoti Atul
Assistant Professor, SPPU, BVCOE, Lavale, Pune – 412115, India

Mumbai Conf.

Predicting tumor cell growth and proliferation can be modelled by mathematical formulation. Proliferation is an important part of tumor development and progression. Low oxygen levels in tumor cells may be a basic cause of uncontrollable tumor growth in some cancers. In this study a coupled approach for the development of tumor involving the effects of oxygen and nutrient concentration together is analyzed using continuous and discrete models. Numerical study is a process by which a real world problem is described by a mathematical formulation. Mathematical modelling and simulation has very important role in predicting tumor cell growth and proliferation. The model is solved numerically using finite difference method and simulated using MATLAB. The effect of varying the magnitudes of parameters is analyzed. The obtained results were compared with an experimental result and the convergence is observed.

EXTRACELLULAR MATRIX FIBRONECTIN PRODUTION BY MIGRATION OF ENDOTHELIAL CELLS IN TUMOR VASCULATURE GROWTH

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ABSTRACT

We develop a hybrid multiscale model that integrates extracellular matrix fibronectin production of tumor growth to investigate angiogenesis. The aim of this paper is to give an integrative view of production of extracellular matrix fibronectin by migrating endothelial cells in tumor vasculature growth. Endothelial cell migration is essential for angiogenesis, new blood vessel formation, and endothelialization. As angiogenesis proceeds by haptotactic and further involves degradation of the extracellular matrix to enable progression of the migrating cells.

***Keywords**: Extracellular matrix, Fibronectin, Angiogenesis, Numerical Simulation, Endothelial Cell Migration*

P6

Numerical study of effect of oxygen concentration on tumor cell growth

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Numerical study is a process by which a real world problem is described by a mathematical formulation. Mathematical modelling can play a very important role in predicting tumor cell growth. Low oxygen levels in tumor cells may be a basic cause of uncontrollable tumor growth in some cancers. In this study a coupled approach for the development of tumor involving the effects of

oxygen concentration together is analyzed on a mathematical model. The effect of varying the magnitudes of parameters is analyzed. The model is solved numerically using finite difference method implemented on MATLAB. The equations describe the growth, movement and death of tumor cells, complemented by a supply of oxygen. This mathematical model be determined by on a number of parameter values as well as rate functions.

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DR. JAKE M. LAGUADOR
Editor-in-Chief

Lyceum of the Philippines University, Batangas City, Philippines

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35

Analysis and Examination of Heart distress from ECG signal using Artificial Intelligence.

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Abstract: Health data analysis is usually based on a comparison of derived health measures to predefined thresholds. Symptoms can be observed if a value is above or below a threshold. Early detection of signs of heart failure allows the prediction of strokes of heart failure and can therefore prevent these. So identifying "accurate" criteria is the most important task. The accuracy of an experiment depends strongly on the accuracy of the criteria used. Congestive heart failure (CHF) occurs when the heart can not pump sufficient blood for a stable physiological condition. CHF usually occurs when the coronary artery blockage causes the heart tissue to become acidic. The data used to analyze data such as Linear Regression, Missing Enrollment Data, Search Signal, Clinical Data Protection Programs, and Early Adaptive Alarm. The proposed system involves models including server and data warehouse processing, pre-processing, extraction classification characterization in this paper. Classification of heart defects and prediction of heart failure by using applied classifier for hybridization, guideline for treating patients as a gym, level of stress management. In this article, the program tracks the heart disease patients, predicts atrial fibrillation and ventricular fibrillation, and alerts patients when the critical condition occurs.

1 Introduction

According to the World Health Organization (World Health Organization, 2016), chronic diseases such as coronary heart disease, cancer, chronic obstructive pulmonary disease and type 2 diabetes mellitus are the world's leading cause of death, accounting for around 60% of all deaths. Chronic diseases are due mainly to heart failure, currently the leading cause of death in most western countries. The American Heart Heart Association (AHA) 2016 Heart Disease and Stroke Statistics update estimated that 15.5 million people in the United States suffer from cardiovascular disease, a prevalence that is growing with age for both men and women [1]. Throughout Europe, the predominance of individuals describing heart problems for both sexes was 9.2 per cent over the last year [2]. Cardiovascular diseases are the main cause of death in Italy in particular, accounting for 44 per cent of all deaths. Cardiovascular disease passages in India grew from 1.3 million in each of 1990 to 2.8 million in 2016, and most of the passages were caused by heart disease.

Social insurance is a pending problem with worldwide difficulties[3]. The acute socio-economic situation confronting a significant portion of developed countries is generating greater pressure to find more cost-effective solutions to health and social care delivery. In addition, healthcare systems in developing countries face serious difficulties in providing care and assistance, primarily due to a lack of staff and resources.Over the last few years a few proposals have emerged as a part of the new period of human services. Drug 2.0, Wellness 2.0/3.0, ePatient, and eDoctor are usually dispersed examples of such terms, among other commonly established words such as eHealth, telehealth, or telemedicine. Likewise, frameworks might be utilized in a pervasive way and give consistent observing abilities.One of the major disadvantages of the up-to-date portable health monitoring tools from a technical perspective is the processing and storage capacities. Checking gadgets consist regularly of many sensors which measure physiological sizes and convert them into discernible machine data [4]. While some of these devices contain dedicated resources for processing the information, they are very sparse and limited. Although some of these devices contain dedicated information processing tools, they are very sparse and minimal. On the other hand, mobile devices are the perfect way to collect data from health monitoring systems, provide local processing capabilities or even provide access to cloud services (high-performance computing, large capacity storage, and data analytics) [5] . Through this, not only the data collected from the patient could be taken into account for their health assessment and treatment, but also the records of hundreds, thousands or even millions of patients, which might share similar needs and conditions [6].

Atrial fibrillation (AF) has been depicted by doctors as the commonest heart arrhythmia in clinical everyday

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practice, with an expected predominance of 1.5%–2% of the overall public in the created world [7]. In excess of 6,000,000 individuals in Europe and 3,000,000 individuals in the USA experience the ill effects of this arrhythmia [7]. It is additionally expected that its predominance will twofold in the following 50 years [8] . Today, three distinct sorts of AF are clinically stratified relying upon the scene length. The arrhythmia would then be able to be grouped into paroxysmal AF (PAF), persevering or long-standing tenacious AF and, at long last, perpetual AF . Indeed, the nearness of AF is related with a five-crease danger of stroke and a three-overlay frequency of congestive cardiovascular breakdown, accordingly inciting that AF patients have double the danger of death than sound individuals of a similar age [7] . Inside this specific situation, an early discovery of AF may help with decreasing that hazard by reestablishing typical heart mood or by improving the blood stream with antithrombotic treatment. This early finding may likewise include prominent advantages for social insurance benefits the world over, in light of the fact that the high hospitalization paces of AF, just as its extensive weight on wellbeing assets could be fundamentally restricted . Cardiovascular sign from both surface and intracardiac accounts have been generally utilized in AF thinks about planning to comprehend the atrial electrical conduct to improve adequacy of interventional removal treatment, however the nearness of ventricular movement (VA) on these sign has hampered the investigation with probability of mutilated outcomes. It is imperative to think about atrial action (AA) without the impact of the VA to improve comprehension of AF beginning and support [9].

Ventricular fibrillation is the quick, disarranged, and offbeat withdrawal of ventricular muscle. Hoffa and Ludwig recommended in 1850 that the inconsistency of these developments is on the grounds that the individual anatomical components lose their interrelationship and quit contracting as one. In 1887, MacWilliam depicted "a condition of fibrillar compression comprised by a quick progression of in facilitated peristaltic constrictions, and in 1914, utilized the term ventricular fibrillation to portray what he thought about the reason for unexpected passing. Superficially electrocardiogram, ventricular fibrillation is portrayed by the nonappearance of unmistakably characterized QRS edifices. It frequently happens in patients with auxiliary heart variations from the norm. Be that as it may, in certain patients, show coronary illness is missing, and the reason for the arrhythmia can't be distinguished or must be learned by broad assessment (e.g., hereditary investigation). Incredible consideration has been given to ventricular fibrillation since it speaks to the last basic pathway for death in many patients who experience out-of-clinic heart failure, and its pace of repeat is about 30% in the primary year in effectively revived patients. Since the particular reasons for ventricular fibrillation are examined in different sections, this section gives a progressively broad outline of the clinical issue and its administration. Ventricular fibrillation (VF) is a significant reason for dismalness and abrupt passing (SD), yet it is one of the most troublesome arrhythmias to viably treat. The implantable cardioverter defibrillator (ICD) offers delayed endurance by ensuring against death because of arrhythmia and is the best quality level treatment for essential and auxiliary anticipation for in danger patients. Be that as it may, gadget implantation doesn't influence the fundamental substrate. Moreover, up to 20% of patients with an ICD experience repetitive scenes of VF or electrical tempests, bringing about numerous gadget treatments, which fall apart the nature of life1 as well as increment related mortality. Antiarrhythmic medications, for example, amiodarone, β-blockers, and lidocaine have been utilized forever undermining arrhythmias, including VF, yet their adequacy has not yet been exhibited on an enormous scale. In addition, they are related with different symptoms, which frequently exceed the questionable prognostic advantage.

2 Objectives of the Study

1. To develop system for individuals tormented by chronic diseases that modify the gathering, sharing and exchange of physiological knowledge, like pressure level, heart and respiration rate and cardiogram signals.
2. To predict heart disease strokes by police investigation connected symptoms.
3. To give notice the specialist and therefore the patient once a heart disease stroke has been foreseen.
4. To work out mechanically and update thresholds in keeping with recorded historical knowledge.
5. To test rules and compare the value to predefined threshold of each derived health indicator.
6. Updating threshold values according to requirement.
7. To do the review and save the original files, which can be accessed and sent to the medical specialist whenever the user wants.

3 Approach of the study

3.1 Quantitative approach

- Constant Mathematical Model: The consistent work could be a work whose esteem is the same for each input esteem.
- Step Function Mathematical Model: The constant perform may be a perform whose price is that the same for each input price.
- Average and Confidence Level Mathematical Model: A simple method to update thresholds that comes back to adding the average of p past data values to the confidence level of this average.
- Moving Average (MA): MA is one of the widely known technical indicators used for time series analysis. During its development, many variations and implementations

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have been proposed by researchers. Basic type of moving average is the Simple Moving Average (SMA).

3.2 Qualitative approach

- Allow physiological data, such as blood pressure, heart and respiration rate and ECG signals, to be recorded, transmitted, and exchanged.
- The audit report and the original files are saved, can be accessed and sent to the medical specialist whenever the user wants them to.

4 Architecture

In this design, the limit esteems are consequently processed by utilizing factual methodologies. The produced edges rely upon the patient state and his/her authentic estimations. The thought comprises of recognizing cardiovascular breakdown manifestations and thusly foreseeing basic circumstances (i.e.,strokes).

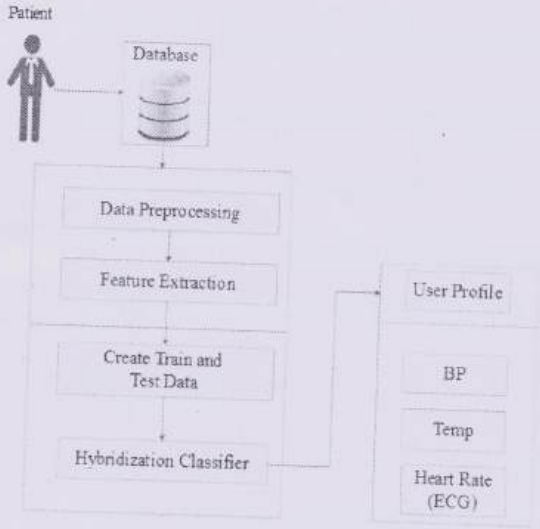

Fig. 1. Proposed System Architecture

1) Dataset: In this architectural study, the MIMIC II waveform database can be used. This is in line with the subgroup from the Psionet Benchmark, which is available online, and is collected from bed patient monitors in the adult and neonatal ICU (intensive care units).
2) First, the device stores data, such as CSV files, in a database. So, patient history is established.
3) Data is preprocessed in the preprocessing stage and the replacement values with threshold values or None are lackinga.
4) The machine performs the extraction process of the element once the preprocessing is completed. The values of the data function are determined using methods of main component analysis. The PCA's goal is to cut down on data and rate columns with a high impact point. This eliminated characteristics from this column after choosing heavily impacted columns such as weight, blood pressure, body temperature.
5) Then build the training and test files using extracted features and use implemented hybridization classifiers to perform classification. The system detects Ventricular Fibrillation and Atrial Fibrillation.
6) Finally, this program suggests care for patients such as Gym, the control of stress levels.

5 Scope

The program can be used to predict strokes that cause heart failure. By frequent monitoring along with support and suggestions it can be helpful for CHF patients. Patients with cardiovascular system disorders may measure their weight, blood pressure, activity, and other factors related to the health.

6 Advantages

1) Patients with heart disease are tracked by the machine.
2) Predicts ventricular and atrial fibrillation.
3) Warns patients when the situation is serious.
4) Automatically calculates and updates thresholds based on historical data collected.

7 Conclusion

Develop system for people suffering from chronic diseases. Rules are based on discussion with cardiologist and comparing extracted parameters with threshold. Feature values of data are calculated using the principal component analysis (PCA) techniques. Rules are based on discussion with cardiologist and comparing extracted parameters with threshold. This technique can be used to the prediction of Atrial Fibrillation and Ventricular Fibrillation.

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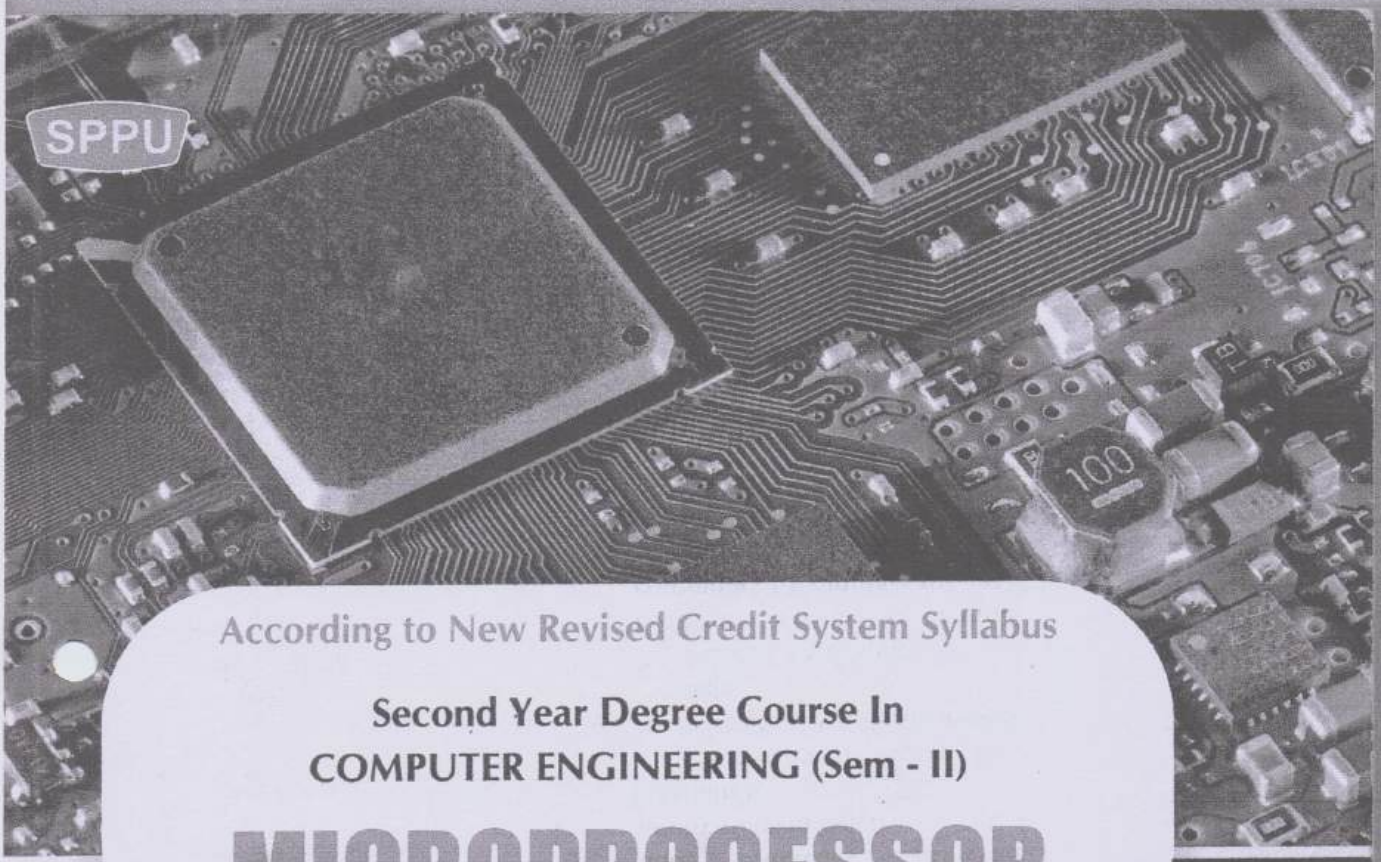

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The advice and suggestions of our esteemed readers to improve the text are most welcomed, and will be highly appreciated.

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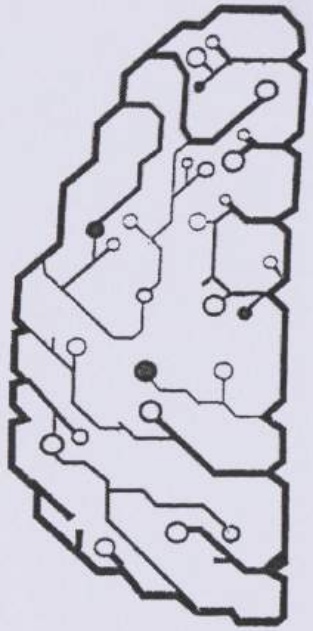

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EXPERIMENTAL STUDY ON EFFECT OF FILLING RATIO AND INCLINATION ANGLE ON PERFORMANCE OF THERMOSYPHON USING BINARY MIXTURE WORKING FLUID

Mr. Faddas Nikhil Ashok*[1] & Mr. Subhash Y. Nagwase[2]

*[1]Assistant Professor, Mechanical Department, KJ's Trinity Academy of Engineering, Pune, Maharashtra, India

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ABSTRACT

In this study performance of thermosyphonwas investigated experimentally. The objective of this study is to investigate combine effect of filling ratio and inclination angle on thermal performance of thermosyphon. Thermosyphon was manufactured by using a copper tube of 1000 mm length with inside and outside diameter of 24 mm and 26 mm respectively. Working fluid used in the thermosyphon is binary mixture of ethanol and methanol. Experiments were carried out on the filling ratio 10% to 70% with inclination angle 50° to 90°. ΔT vs heat load graphs were drawn for each filing ratio and inclination angle at various heat loads. The result shows thatmaximum ΔT found at 22°C which was higher at 40% and 60% filling ratio with 70°, 80° and 90° inclination angle. Binary mixture shows better thermal conductance of the thermosyphon heat pipe.

Keywords: *Filling ratio, Inclination angle, Heat load, Binary mixture.*

I. INTRODUCTION

Energy is an important part of most aspects of daily life as well as in heat transfer applications. Due to the human need for energy, a more efficient way of using it is a major challenge in the scientific community. The heat pipe and the thermosyphon specially designed for transferring heat from a distance. The thermal performance of thermosyphon is one the most important part of these types of investigation in the field of heat transfer.

Natural convection refers to the process wherein heat, transferred to a fluid, raises its temperature and reduces its density, giving rise to buoyant forces that lift the fluid and transport the absorbed heat to some other location where it can be removed. Natural convection occurs in a similar manner in two-phase systems. Here, the application of the liquid phase produces a low-density vapour that is free to rise though the liquid and condense at some other location. In either case, continuous circulation of the heat transfer fluid is maintained.

History of Thermosyphon

The Perkins tube, a two-phase flow device, is attributed to Ludlow Patton Perkins in the mid nineteenth century. Schematic of perkins boiler is shown in Fig 1.

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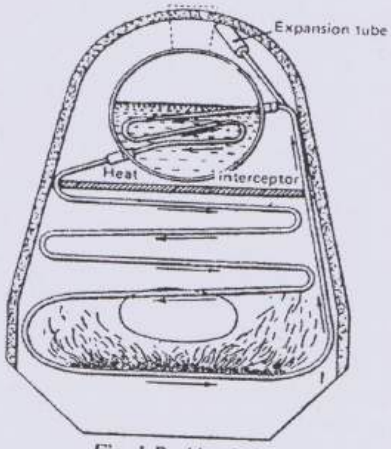

Fig. 1 Perkins boiler

The Perkins tube, which was actually a single-phase, closed-loop thermosyphon, was used to transfer heat from the furnace to the evaporator of a steam boiler. Early applications of the Perkins tube include steam generation, domestic heating, warming greenhouses, preventing window fogging, removing heat from dairy products, cooling car engines, and in heat exchangers. In 1944, Gaugler proposed a two-phase closed thermosyphon tube incorporating a wick or porous matrix for capillary liquid return. In 1963, Grover studied this phase heat transfer device and named it "heat pipe". Tremendous effort has since been invested in thermosyphon and heat pipe research, resulting in broad applications. The heat pipe differs from the thermosyphon by virtue of its ability to transport heat against gravity by an evaporation-condensation cycle.

Thermosyphon heat pipes utilized in heat transfer related applications for many years. Heat pipes can operate over a wide range of temperature with a high heat removal capability. Thermosyphon heat pipes have being found to be useful in a number of technologies such as electronic cooling, spacecraft thermal control, transportation systems, automotive industry, permafrost stabilization, bio related applications, solar system and manufacturing. Heat pipe constitute an efficient, compact tool to dissipate substantial amount of heat.

Working Principle of thermosyphon

Thermosyphon is a property of physics and refers to a method of passive heat exchange based on natural convection which circulates a substance (liquid, or gas such as air) without the necessity of a mechanical pump. Thermosyphon is used for circulation of liquids and volatile gases in heating and cooling applications, such as heat pumps, water heaters, boilers, furnaces and solar chimney. This circulation can either be open-loop, as when the substance in a holding tank is passed in one direction via a heated transfer tube mounted at the bottom of the tank to a distribution point and it can be a vertical closed-loop circuit with return to the original container. Its purpose is to simplify the transfer of liquid or gas while avoiding the cost and complexity of a conventional pump. The thermosyphon is similar in some respects to the heat pipe. The thermosyphon is shown in Fig. 2. A small quantity of water is placed in a tube from which the air is then evacuated and the tube sealed. The lower end of the tube is heated causing the liquid to vaporise and the vapour to move to the cold end of the tube where it is condensed. The condensate is returned to the hot end by gravity. Since the latent heat of evaporation is large, considerable quantities of heat can be transported with a very small temperature difference from end to end. Thus, the structure will also have a high effective thermal conductance. The thermosyphon has been used for many years and various working fluids have been employed.

The basic heat pipe differs from the thermosyphon in that a wick, constructed for example from a few layers of fine gauze, is fixed to the inside surface and capillary forces return the condensate to the evaporator. In the heat pipe the evaporator position is not restricted and it may be used in any orientation. If, of course, the heat pipe evaporator happens to be in the lowest position, gravitational forces will assist the capillary forces. The term 'heat pipe' is also

used to describe high thermal conductance devices in which the condensate return is achieved by other means, for example centripetal force, osmosis or electro hydrodynamics.

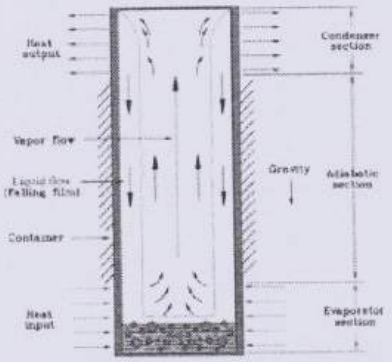

Fig. 2Thermosyphon

Thermosyphon are enclosed, wickless passive two phase heat transfer devices. They make use of the highly efficient heat transport process of evaporation and condensation to maximize the thermal conductance between a heat source and a heat sink. They are often referred to as thermal superconductors because they can transfer large amounts of heat over relatively large distances with small temperature differences between the heat source and heat sink. The amount of heat that can be transported by these devices is normally several orders of magnitude greater than pure conduction through a solid metal. They are proven to be very effective, low cost and reliable heat transfer devices for applications in many thermal management and heat recovery systems. They are used in many applications like passive ground/road anti-freezing, baking ovens, heat exchangers in waste heat recovery applications, water heaters and solar energy systems. It shows some remarkable high-performance in electronics devices which is widely used nowdays.

II. HEAT TRANSFER LIMITATIONS OF THERMOSYPHON

The rate of heat transport though a thermosyphon is subjected to a number of operating limits. The physical phenomenon for each limit is briefly discussed below:

Sonic limit

The rate at which vapours travels from evaporator to condenser known as sonic limit. The evaporator and condenser sections of a thermosyphon represent a vapour flow channel with mass addition and extraction due to the evaporation and condensation, respectively. The vapour velocity increases along the evaporator and reaches a maximum at the end of the evaporator section. The limitation of such a flow system is similar to that of a converging-diverging nozzle with a constant mass flow rate, where the evaporator exit corresponds to the throat of the nozzle. Therefore, one expects that the vapour velocity at that point cannot exceed the local speed of sound. This choked flow condition is called the sonic limitation. The sonic limit usually occurs either during heat pipe start up or during steady state operation when the heat transfer coefficient at the condenser is high.

Boiling limit

The rate at which the working fluid vaporizes from the added heat known as boiling limit. If the radial heat flux in the evaporator section becomes too high, the liquid in the evaporator section boils and the wall temperature becomes excessively high. The vapour bubbles that form near the pipe wall prevent the liquid from wetting the pipe wall, which causes hot spots, resulting in the rapid increase in evaporator wall temperature, which is defined as the boiling limit. However, under a low or moderate radial heat flux, low intensity stable boiling is possible without causing dry out. It should be noted that the boiling limitation is a radial heat flux limitation as compared to an axial heat flux

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limitation for the other heat pipe limits. However, since they are related though the evaporator surface area, the maximum radial heat flux limitation also specifies the maximum axial heat transport.

Entrainment limit

This limit occurs due to the friction between working fluid and vapour which travel in opposite directions. A shear force exists at the liquid-vapour interface since the vapour and liquid move in opposite directions. At high relative velocities, droplets of liquid entrained into the vapour flowing toward the condenser section. If the entrainment becomes too great, the evaporator will dry out. The heat transfer rate at which this occurs is called the entrainment limit. Entrainment can be detected by the sounds made by droplets striking the condenser end of the heat pipe. The entrainment limit is often associated with low or moderate temperature heat pipes with small diameters, or high temperature heat pipes when the heat input at the evaporator is high.

Vapour pressure limit

Vapour pressure limit is also known asviscous limit. Viscous forces may be dominant for the vapour moving flow down the heat pipe at low operating temperatures. For a long liquid-metal heat pipe, the vapour pressure at the condenser end may reduce to zero. The heat transport of the heat pipe may be limited under this condition. The vapour pressure limit is encountered when a heat pipe operates at temperatures below its normal operating range, such as during start up from the frozen state. In this case, the vapour pressure is very small, with the condenser end cap pressure nearly zero.

Flooding limit

This limit occurs due to the instability of the liquid film generated by a high value of interfacial shear, which is a result of the large vapour velocities induced by high axial heat fluxes. The vapour shear hold-up prevents the condensate from returning to the evaporator and leads to a flooding condition in the condenser section. This causes a partial dry out of the evaporator, which results in wall temperature excursions or in limiting the operation of the system. The flooding limit is the most common concern for long thermosyphon with large liquid fill ratio, large axial heat flux and small radial heat flux.

III. DETAILING OF WORKING FLUID

Various research has been done on various working fluid solutions like water, distilled water, butanol, ethanol, refrigerant like R-12, R-22, R-134a, FC-72, FC-77, FC-84, and nanoparticles such as Al_2O_3, Ag_2O_3 and Fe_2O_3, etc. In many investigation it was seen that, water as a working fluid has a better performance than other solutions. But because of its high boiling point it cannot be used for cold temperature regions. By using other solutions as a working fluid does not get better thermal performance than water. So it is need of time to use binary mixture of various solutions to get better thermodynamic property for using working fluid in thermosyphon heat pipe.

Ethanol-Methanol mixture

As far as selection of working fluid for thermosyphon is concerned, first go through various thermodynamic properties of ethanol and methanol. These thermodynamic properties are useful for the thermosyphon as a working fluid in 0°C to 100°C temperature applications. Hence ethanol-methanol mixture was selected for the experimental assessment of the thermosyphon as a working fluid.

Table 1.Properties of ethanol and methanol

Property	Methanol (CH_3OH)	Ethanol (C_2H_5OH)
Molecular Weight	32	46
Boiling point (°C)	65	78
Melting point (°C)	-98	-144

Latent heat of vaporization (kJ/kg)	1100	846
Useful temperature range (°C)	10 to 130	0 to 130
Thermal Conductivity at 300K (W/m-K)	0.202	0.171

In this experiment, ethanol and methanol ratio 60:40 (by volume) was used because at this ratio these two solutions are completely soluble with each other.

Table 2. Properties of ethanol-methanol mixture

Property	Ethanol-Methanol mixture
Boiling point (°C)	72.8
Melting point (°C)	-125.6
Useful temperature range (°C)	0 to 100
Thermal conductivity at 300 K (W/m-K)	0.1834
Latent heat of vaporization (kJ/kg)	947.6

IV. FACTORS FOR EXPERIMENTAL STUDY

Filling ratio

It is one of the important parameter for calculating thermal performance. Filling ratio considered for this experimentation 10% to 70%.Filling ratio has two opposite effects on the rate of evaporation. First, at higher fill ratio it is possible to have more heat transfer from the evaporator wall to the working fluid, as more evaporator's wall surface is in contact with the working fluid. This can increase the evaporation rate and consequent thermosyphon performance. From experimentation it is proved that 10% to 60% filling ratio, increases thermosyphon performance.

However higher height of working fluid has a negative effect of large bubbles or film formation in the lower parts of the evaporator. This has direct effect on heat transfer rate to the evaporator and can decrease the thermosyphon performance. From experimentation, onwards 70% filling ratio decreases thermal performance of thermosyphon.

Inclination angle

It is also important factor which affect thermal performance of thermosyphon to great extent. The lower end of the thermosyphon tube was heated causing the liquid to vaporise and the vapour to move to the cold end of the tube where it is condensed. The condensate is returned to the hot end by gravity. This is why thermosyphon is kept vertical i.e, 90° with horizontal. Experimentation also includes study at various inclination angles 90°to 50°with the horizontal to evaluate thermal performance. At various inclination angles and at various heat loads thermal performance is varying. So after experimentation we got best configuration factor of inclination angle and heat load which is responsible for higher thermal performance.

Heat Load

Heat load is given to the evaporator section of the thermosyphon. After applying heat, working fluid get vaporize in the evaporator. But heat load is dependent on working fluid. It defines boiling limit of the working fluid. If the boiling point of the working fluid is higher near about 100°C, then heat load can be applied from 100°C to the point where maximum fluid will evaporate. In this experimental model, we have used binary mixture of ethanol-methanol as a working fluid. Thermodynamic properties of ethanol and methanol are shown in Table 2. Ethanol and methanol has lower boiling points than water and under vacuum mixture gain low boiling point. So for experimentation we have selected heat load range of 25 W to 200 W.

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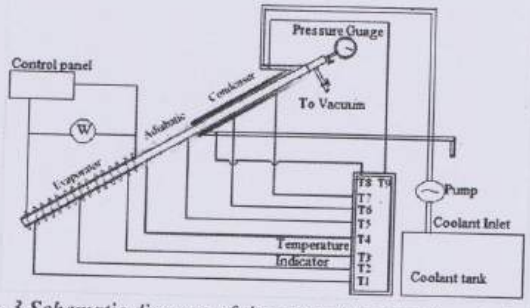

Fig. 3 Schematic diagram of thermosyphon experimental setup

Above figure shows schematic view of thermosyphon experimental setup showing all the components necessary for the experimentation to evaluate thermal performance.

Table 3. Experimental setup description

Component	Specification
Working fluid	Ethanol-Methanol mixture
Tube material	Copper
Internal diameter (mm)	24
External diameter (mm)	26
Total length (mm)	1000
Evaporator length (mm)	300
Condenser length (mm)	450
Adiabatic length (mm)	250
Aspect ratio (L/D ratio of evaporator section)	11.53

Experimentation Parameters

Experimentation was carried on the thermosyphon heat pipe. Working fluid is important parameter in the experimentation. Ethanol-Methanol binary mixture was used as a working fluid. Other parameters and its description as follows:

Table 4. Experimentation parameters

Parameter	Description
Filling ratio	10%, 20%, 30%, 40%, 50%, 60% and 70%
Inclination angle with horizontal axis	90°(Vertical), 80°, 70°, 60°and 50°
Heat load (W)	25, 50, 75 100, 125, 150, 175 and 200
Coolant flow rate (Kg/hr)	3.6
Aspect ratio	11.53

The performance of the thermosyphon was evaluated by knowing factors affecting the thermal performance of the thermosyphon. For that purpose calculate heat input, heat output and heat transfer efficiency at all filling ratio, inclination angle and heat load. Then ΔTvs heat load graphs were drawn. Graphs were analyzed, discussed and find out best possible factors affecting thermal performance of thermosyphon heat pipe

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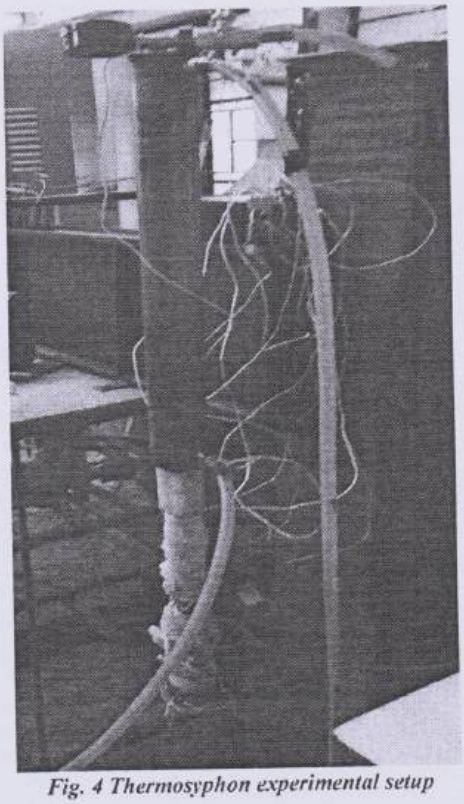

Fig. 4 Thermosyphon experimental setup

V. RESULT & DISCUSSION

Effect of filling ratio

Filling ratio was varied in the range of 10%, 20%, 30%, 40%, 50%, 60% and 70%. Thermosyphon heat transfer performance increases from 20% filling ratio to 60% filling ratio. However its performance deceases from 70% filling ratio.

This is because in the bottom section of the evaporator, the generated thick layers of vapour are stuck to the wall. Because of a low thermal conductivity of vapour, these thick vapour layers can cause a significant thermal resistance and consequently decrease the overall heat transfer. However, in upper region of evaporator the vapour layers become smaller. In addition, close to the evaporator liquid surface the bubbles moves toward the middle regions of the liquid pool for escaping from liquid surface. Fig. 5 to Fig. 11 shows graphs of ΔT vs heat load at each filling ratio and at all inclination angle.

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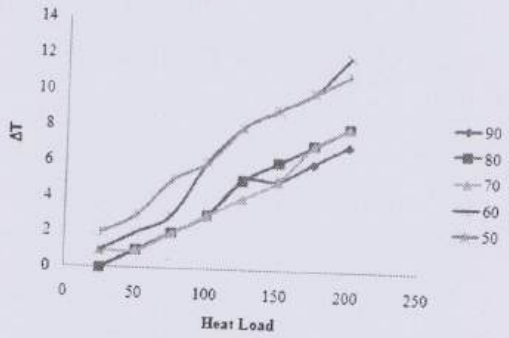

Fig. 5ΔT vs Heat load at 10% filling ratio and at all inclination angles

At 60° inclination angle shows maximum ΔT which is 12°C. This shows that for 10% filling ratio, 60° inclination shows maximum thermal performance. This graph shows linear curves of ΔT due to large axial heat flux.

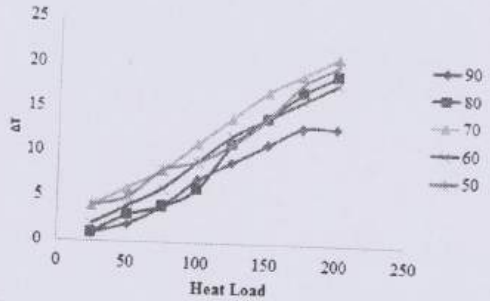

Fig. 6ΔT vsHeat load at 20% filling ratio and at all inclination angles

Above fig shows that at 70° inclination gets maximum ΔT which is 21°C. Now evaporator wall surface contact with working fluid is increasing which increases evaporation rate. Due to which ΔT gets increases. This shows that for 20% filling ratio maximum thermal performance gets at 70° inclination angle.

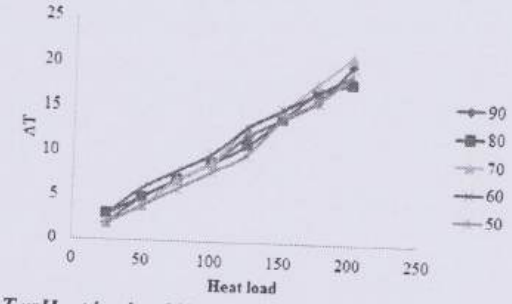

Fig. 7ΔT vsHeat load at 30% filling ratio and at all inclination angles

In this graph maximum ΔT gets at 70° inclination which is 21°C. . It is concluded that for 30% filling ratio, 70° inclination angle shows maximum thermal performance.

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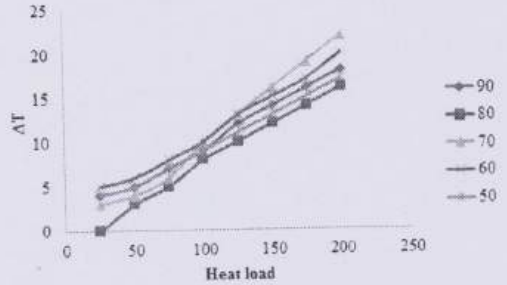

Fig. 8ΔT vsHeat load at 40% filling ratio and at all inclination angles

Maximum ΔT is 22°C gets at 70° inclination angle. Again evaporator wall surface contact with working fluid is increasing which leads to higher evaporation rate as compared to below 30% filling ratio.

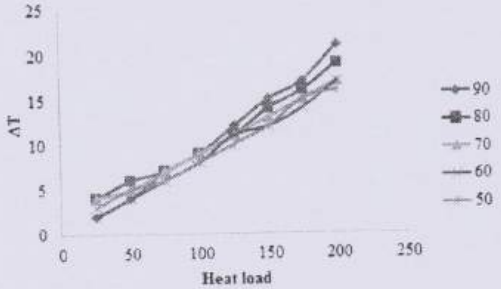

Fig. 9ΔT vsHeat load at 50% filling ratio and at all inclination angles

At 90° inclination angle, maximum ΔT shows 21°C. As filling ratio increases, evaporation rate also increases which shows thermal performance is also increasing.

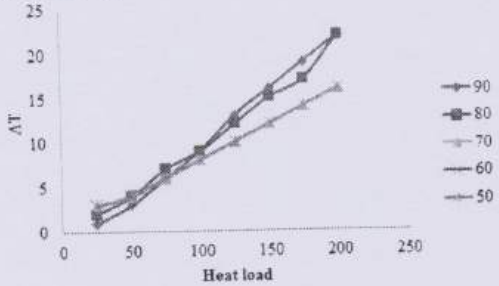

Fig. 10ΔT vsHeat load at 60% filling ratio and at all inclination angles

From fig it is seen that at 90° and 80° inclination angle gets maximum ΔT which is 22°C. Because of maximum surface contact with working fluid, evaporation rate is higher as compared to other filling ratios.

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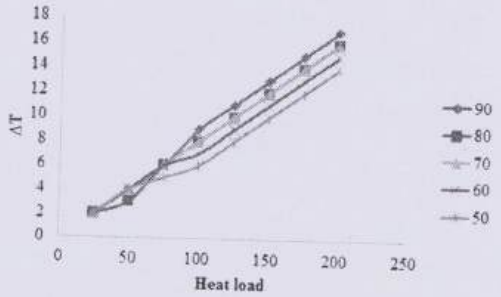

Fig. 11ΔT vsHeat load at 70% filling ratio and at all inclination angles

In this fig, maximum ΔT is 17°C at 90° inclination angle which shows that evaporation rate is decreasing. This shows formation of large bubbles or liquid film in the evaporator region causing less heat transfer. From this filling ratio flooding limit and entrainment limit starts to appear due to this reason thermal performance gets decreases.

From above discussion it is cleared that, from 10% to 60% filling ratio, heat transfer rate gets increases and from 70% filling ratio heat transfer start to decreases.

Inclination angle

Thermosyphon shows various performancesat various inclination angles. Inclination angle was varied in the range of 90°, 80°, 70°, 60° and 50°. From the experimentation it is found that, inclination angle at 90°with 60% filling ratio, at 80°inclination angle with 60% filling ratio and at 70°inclination angle with 40% filling ratio shows better result.

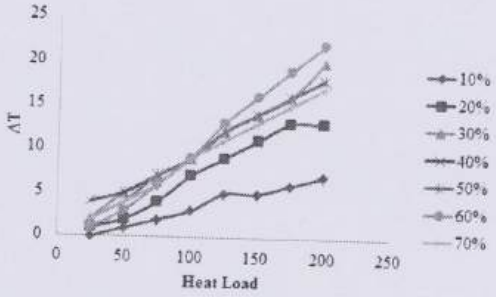

Fig. 12 ΔT vs heat load at 90° inclination angle and at all filling ratios

Above fig shows maximum ΔT as 22°C at 60% filling ratio. Because of maximum surface contact with working fluid, evaporation rate is higher which shows maximum thermal performance as compared to other.

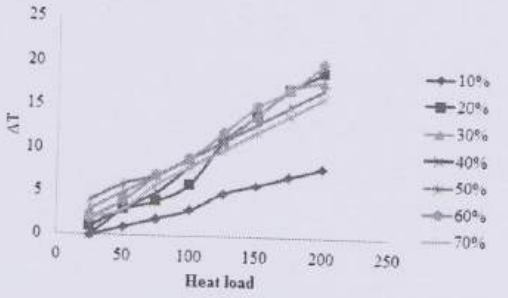

Fig. 13 ΔT vs heat load at 80° inclination angle and at all filling ratios

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DESIGN AND FABRICATION OF FLEXIBLE LAY FLAT PIPE REELING MACHINE

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ABSTRACT

Pipes are used to convey water. Lay flat hose is flexible type of pipe which gets flat when it is not in use. Polyethylene tubes are the most widely known as lay flat hoses. These pipes are mostly used for agricultural irrigation. Depending on their diameter they weigh between 8.5kg (65mm dia.) to 16kg (100mm dia.) per 100m and require little storage space. Using this pipes farmers can irrigate higher level lands which is not possible in clay canals and flood irrigation. Serve use of the polyethylene lay flat hoses is their short life. Sometime these pipes survive one irrigation season only, because exposure sunlight and storing of water when they are not in use make them brittle. They are easily puncture on rough surface due to pulling and rubbing while manual hand reeling. To overcome this difficulties and challenges the new and improved design is proposed in this research paper. The design of model allows user to reel various flexible pipe/hoses into coiled shape. The fabricated working model can work as per specifications and result into reduce work and time required for reeling of hose, promote their use, increase their life span and reduce their maintenance.

Keywords: *- Pipe, Lay Flat Hose, Reeling method, Reeling device design, Fabrication, Result et.*

I. INTRODUCTION

The pipes are the basic component of agricultural irrigation system. There is various type of pipe available in many pressure ratings and sizes (diameters). Rigid PVC Pipes, Polyethylene Pipes (Semi Flexible) and Lay Flat Hose (Fully Flexible) these are the types of pipes in used in agricultural irrigation system.

Fig.1 Lay Flat pipe

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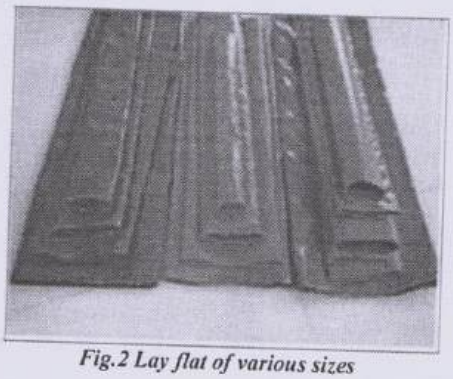

Fig.2 Lay flat of various sizes

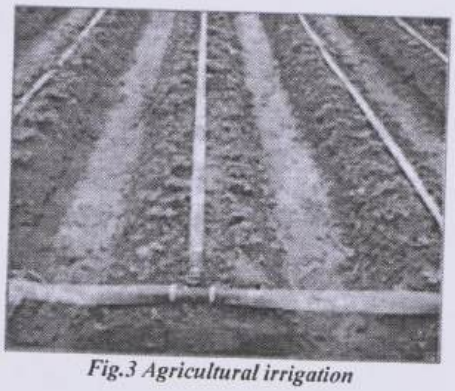

Fig.3 Agricultural irrigation

Lay flat hoses are mostly used for conveying water over long distance. Lay flat hoses are flexible, lightweight, and available in various sizes (mm or inch) from 1-6 inches and for working pressures of 4.0–5.5 bars. They are manufactured with plain ends and supplied in 25, 50 and 100 m length coil shape. Soft Polyethylene hose are the most widely sold as lay flat hoses. Depending on their diameter they weigh between 8.5kg (65mm diameter) to 16kg (100mm diameter) per 100m. For irrigation application lay flat pipes are made of soft polyethylene and LDPE plastics based on required pressure rating and environmental conditions. In recent years, hoses can also be manufactured from various special grades of polyethylene. To avoid buckling of lay flat hose at high pressure over long distance soft PVC reinforcement with interwoven polyester yarn is provided.

II. LITRATURE REVIEW

The review from this literature was used for developing the new design. The different innovations are invented by the inventors for reeling of various flexible hoses except agricultural lay flat hose. Overall in this chapter all the research issued about the various reeling devices is presented as follows.

Gary L. Ghio [1] In this patent author invented a device which only use for reeling of fire hose. A hose reel cart includes a reeling disk mounted at certain height from ground on one side of tubular wheeled cart. Tapered guide pins extending perpendicularly outwardly from one face of the reeling disk to hold end portion coupling of a fire hose. A hand crank provides selective rotary drive to the reeling disk via a chain and sprocket mechanism to flatten, drain, and coil a fire hose in overlying condition on reeling disk. The tubular frame includes a forwardly extending hose support guide bar which serves to align, drain, and flatten the hose and also functions as to support the cart. The ergonomic design of the cart allows a user to coil and remove a hose from the reel without stopping, and without the use of tools.

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Robert Stein [2]The author invent and patent a device which is suitable for reeling of smaller diameter flexible hoses such as garden hose and air hose. The device is designed to increase durability and stability while maintain weight for increased hose capacity. To avoid tipping of hose reel cart while removing hose from hose reel cart readily irrespective the location of user the hose reel is pivoted about an axis perpendicular to the horizontal hose reel rotary axis. This pivoting ability of the hose reel also permits the hose to be wound onto the hose reel evenly irrespective of the location of the hose without repositioning of the hose reel cart and also enables the use of a wider hose reel which increases the capacity of the length of hose carried on the reel. Crank is provided for winding of hose reel.

Terry N. Nelson [3] In this patent inventor patented improved garden hose reel caddy which includes a light weight, synthetic resin frame, a pair of front mounted transport wheels that are placed in no contacting relationship with the ground when the caddy is at rest, a woundable hose reel, an elevated hand crank for manually rotating the hose reel, and a gear drive mechanism coupling the hand crank to the hose reel. The hose reel rotate mounted on the support frame only a few inches above the ground so as to provide the hose reel caddy with a low centre of gravity, while the gear drive mechanism enables placement of the hand crank at an elevated position to allow a user to rotate the hose reel without stooping to the ground level.

Pierce A. Ryiott [4] In this patent author invented an apparatus for winding fire hose. Objective of author to make an satisfactory apparatus for winding fire hose having interlocking coupling on opposite ends. One object of the invention is to provide novel apparatus for winding fire hose and to provide less expensive, simpler and more satisfactory apparatus for accomplishing the ends of automatically winding fire hose. An important feature of this invention is the provision of Spaced tines, adapted to receive one of the interlocking coupling members of a length of hose, being eccentrically positioned with respect to a rotational axis extending through the center of gravity of a plate carrying the tines, thereby to position the center of gravity of the coupling member on the rotational axis of the plate.

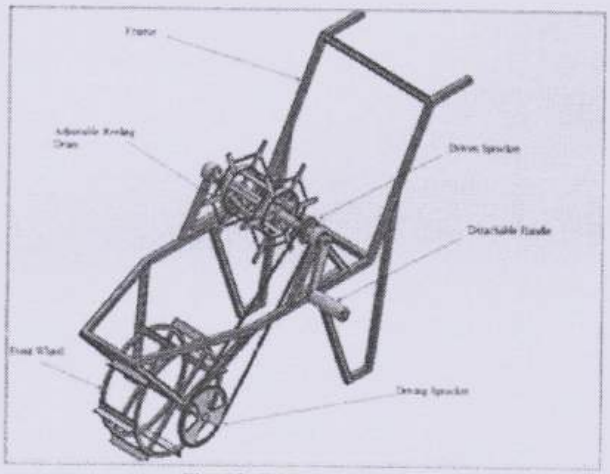

Fig.4 Solid Works CAD Model

III. DESIGNS CALCULATIONS

3.1 Design of Chain Drive

Major assumption made while designing chain drive mechanism is the distance covered by operator is equal to reeled pipe on reeling drum.

To make this possible forward moving velocity and pipe reeling velocity is equal i.e. V=0.5m/sec

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Fabricated front wheel diameter (D1) = 330mm
Front wheel speed or Input speed
(N_1) = 28.93rpm
Number of teeth on driving sprocket
(Z_1) = 44 teeth
Number of teeth on driven sprocket
(Z_2) = 18 teeth
Center distance between two sprocket
(a) = 500mm
Reeling drum speed to maintain same pipe reeling velocity of pipe on it,

From eqn. $V = \frac{1}{600}$ 00

$i = Z_2/Z_1 = N_1/N_2$

Reeling drum speed or driven sprocket speed (N_2) = 70.71 rpm
Selected chain specifications

ISO chain number	Pitch 'p' mm	Roller diameter 'Dr' mm	Width 'b' mm	Breaking load N
081	12.7	7.75	3.30	8000

The number of chain links,

$$L_n = 2\left(\frac{a}{p}\right) + \left(\frac{Z1 + Z2}{2}\right) + \left(\frac{Z2 - Z1}{2\pi}\right)^2 \times \left(\frac{p}{a}\right)$$

L_n = 111.175 links

The corrected centre distance,

$$X = \left[L_n - \left(\frac{Z1 + Z2}{2}\right)\right] = \left[111 - \left(\frac{44 + 18}{2}\right)\right] = 80$$

$$a = \frac{p}{4}\left[X + \sqrt{X^2 - 8\left(\frac{Z2 - Z1}{2\pi}\right)^2}\right] = 505.2669\text{mm}$$

Length of chain,
L = Ln × p = 111× 12.7 = 1409.7 mm

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IV. RESULT & DISCUSSION

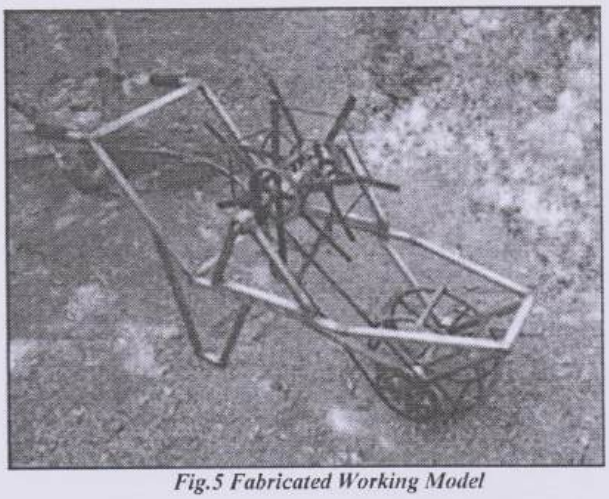

Fig.5 Fabricated Working Model

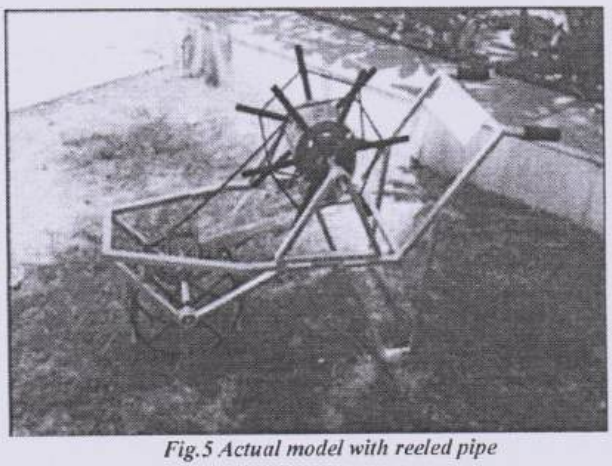

Fig.5 Actual model with reeled pipe

The design of model allows user to reel various type of pipes like agricultural lay flat pipe, Garden hose pipes. There is special arrangement has provided on reeling drum to reel various sizes of agricultural lay flat pipe. It is done by shifting movable reeling drum ring side ring to one side by unscrewing bolts. There is two modes has provided for reeling of pipe,

- Follow the pipeline with model and pipe get reeled on reeling drum by getting rotary motion from front wheel through chain and sprocket mechanism.
- Stand in one position and reel the pipe by providing rotary motion to reeling drum though handle.

V. CONCLUSION

From above we can conclude that the working model is suitable for small farmers. It makes the reeling of lay flat pipe, drip irrigation tubes and flexible garden hose easy. Use of this device avoids the rubbing of lay flat hose with ground or sharp surfaces while reeling results into increase in life span of lay flat hose. Use of this machine or device promotes use of lay flat hose instead of PVC pipes and small open water clay canals to transporting water over long distance to irrigate the crops on agricultural farm. This device removes the water pockets in pipe if the

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pipe is filled with water during reeling, which is not possible in hand reeling. The device can reel up to 30m of pipe in single run. Use of this device result into reduction in time and work saving.

VI. ACKNOWLEDGEMENT

We glad to express our sincere thanks to project guide Prof. A.M. Pasarkar and all staff of mechanical department BVCOE, Lavale, Pune who offered valuable guidance for Bachelor of Engineering project work.

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REVIEW ON SHAPE MEMORY ALLOY ON BIOMEDICAL APPLICATIONS

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ABSTRACT

Shape memory alloys (SMA) have the ability to return to a former shape when subjected to heating. Shape memory properties gives a very attractive insight into materials science, opening unexplored horizons and giving access to unconventional functions in every material class. Shape memory alloys (SMAs) use new insights in biomedical engineering with the unique properties they exhibit, in applications such as cardiovascular stents, guide wires and organ frame retractors. The biomedical field, forever in search of materials that display unconventional properties able to satisfy the severe specifications required by their implantation, is now showing great interest in shape memory materials. Biocompatibility, particularly for long-term and permanent applications, has not yet been fully recognized and is therefore the object of controversy. This paper a detailed reviews of applications of SMA to the biomedical field have been successful because of their functional qualities, enhancing both the possibility and the execution of less invasive surgeries and this paper will consider just why the main properties of shape memory alloys hold so many opportunities for medical devices and will review a selection of current applications.

Keywords: *shape memory, biocompatibility, and biomedical applications.*

I. INTRODUCTION

Shape memory alloys (SMA) have the ability to return to a former shape when subjected to heating. Shape memory materialis a lightweight, solid-state alternative to conventional actuators such as hydraulic, pneumatic, and motor-based systems in robotics and automotive, aerospace and biomedical industries.

The two main types of shape-memory alloys are copper-aluminium-nickel, and nickel-titanium (NiTi) alloys but SMAs can also be created by alloying zinc, copper, gold and iron. Although iron-based and copper-based SMAs, such as Fe-Mn-Si, Cu-Zn-Al and Cu-Al-Ni, are commercially available and cheaper than NiTi, NiTi based SMAs are preferable for most applications due to their stability, practicability and superior thermo-mechanic performance. e two most prevalent shape-memory alloys are copper-aluminium-nickel, and nickel-titanium (NiTi) alloys but SMAs can also be created by alloying zinc, copper, gold and iron. Although iron-based and copper-based SMAs, such as Fe-Mn-Si, Cu-Zn-Al and Cu-Al-Ni, are commercially available and cheaper than NiTi, NiTi based SMAs are preferable for most applications due to their stability, practicability[1][2][3] and superior thermo-mechanic performance.[4] SMAs can exist in two different phases, with three different crystal structures (i.e. twinned martensite, detwinned martensite and austenite) and six possible transformations.

NiTi alloys change from austenite to martensite upon cooling; M_f is the temperature at which the transition to martensite completes upon cooling. Accordingly, during heating A_s and A_f are the temperatures at which the transformation from martensite to austenite starts and finishes. Repeated use of the shape-memory effect may lead to a shift of the characteristic transformation temperatures (this effect is known as functional fatigue, as it is closely related with a change of microstructural and functional properties of the material). The maximum temperature at which SMAs can no longer be stress induced is called M_d, where the SMAs are permanently deformed.

The transition from the martensite phase to the austenite phase is only dependent on temperature and stress, not time, as most phase changes are, as there is no diffusion involved. Similarly, the austenite structure receives its name from steel alloys of a similar structure. It is the reversible diffusion less transition between these two phases that

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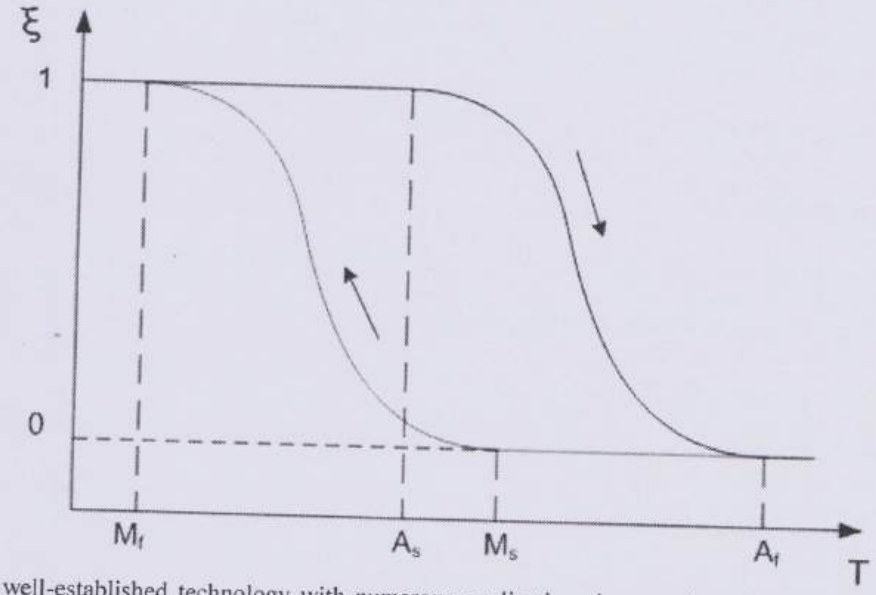
results in special properties. While martensite can be formed from austenite by rapidly cooling carbon-steel, this process is not reversible, so steel does not have shape-memory properties.

II. SHAPE MEMORY EFFECT

The shape memory effect reflects the unique properties of the austenite and martensite phases and their capability for reversible transformation. Initial shape memorization occurs in the parent phase, in which the predetermined structure is fixed in the atomically ordered austenite state. Transformation to the martensite phase, when the crystalline structure permits a high degree of strain with minimal stress, allows for deformation of the material. With heating and reverse transformation, the material returns to the atomically ordered structure of the parent phase, with recovery of the predetermined shape. Therefore, the overall shape memory effect is attributable to the material's ability to easily deform in the secondary phase and then recover a "memorized" shape upon reversal to the parent phase.



SMA is also a well-established technology with numerous applications in several markets since the discovery of SMA effect in NiTi alloys in the Naval Ordnance Laboratory. Most remarkable applications can be found in the field of actuators for deployable structures and in aerospace mechanisms. Other extended applications of SMA make use of their superelastic properties (also in combination with their biocompatibility). Herein a selection of applications is offered:

Temperature control systems: as it changes shape, it can open or close a valve, activate a switch or a variable resistor to control the temperature.

Demonstration model heat engines have been built which use SMA to produce mechanical energy from hot and cold heat sources.

Aeronautical market: design of adaptive structures to control flaps or the chevron shape during taking off and landing phases.

Actuators for automotive industry, such as latch mechanisms for doors and appendixes, air valves, adaptive structures, etc.

Actuators for autofocus mechanisms in cameras.

Triggering actuators for aerospace applications, especially in hold-down and release mechanisms in charge of deploying structures and appendixes in satellites.

Healthcare: active implants, valves, catheters.

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III. SUPERELASTICITY

SMAs also display super elasticity, which is characterized by the recovery of relatively large strains with some , however, dissipation. In addition to temperature-induced phase transformations, martensite and austenite phases can be induced in response to mechanical stress. When SMAs are loaded in the austenite phase (i.e. above a certain temperature), the material will begin to transform into the (twinned) martensite phase when a critical stress is reached. Upon continued loading and assuming isothermal conditions, the (twinned) martensite will begin to detwin, allowing the material to undergo plastic deformation. If the unloading happens before plasticity, the martensite transforms back to austenite, and the material recovers its original shape by developing a hysteresis. For example, these materials can reversibly deform to very high strains – up to 7 percent. A more thorough discussion of the pseudoelastic behavior is presented by the experimental work of Shaw & Kyriakides, and more recently by Ma et al.

IV. HISTORY OF SMA DEVELOPMENT

In the 1990's, the term shape memory technology (SMT) was introduced into the SMM community. SMA application design has changed in many ways since then and has found commercial application in a broad range of industries including automotive, aerospace, robotics and biomedical. Currently, SMA actuators have been successfully applied in low frequency vibration and actuation applications. Therefore, much systematic and intensive research work is still needed to enhance the performance of SMAs, especially to increase their bandwidth, fatigue life and stability.

Recently, many researchers have taken an experimental approach to enhance the attributes of SMAs, by improving the material compositions (quantifying the SMA phase transition temperature) to achieve a wider operating temperature range, and better material stability, as well as to improve the material response and stroke with better mechanical design (or approach), controller systems and fabrication processes. Research into alternative SMMs, forms or shapes, such as MSMA, HTSMA, SMP, shape memory ceramic, SMM thin film or a combination of them (i.e. hybrid or composite SMMs), are also intensively being conducted, and the number of commercial applications is growing each year More details of recent applications and development of SMA are described in the subsequent sections.

V. CRYSTAL STRUCTURES

Many metals have several different crystal structures at the same composition, but most metals do not show this shape-memory effect. The special property that allows shape-memory alloys to revert to their original shape after heating is that their crystal transformation is fully reversible. In most crystal transformations, the atoms in the structure will travel through the metal by diffusion, changing the composition locally, even though the metal as a whole is made of the same atoms. A reversible transformation does not involve this diffusion of atoms, instead all the atoms shift at the same time to form a new structure, much in the way a parallelogram can be made out of a square by pushing on two opposing sides. At different temperatures, different structures are preferred and when the structure is cooled through the transition temperature, the martensitic structure forms from the austenitic phase.

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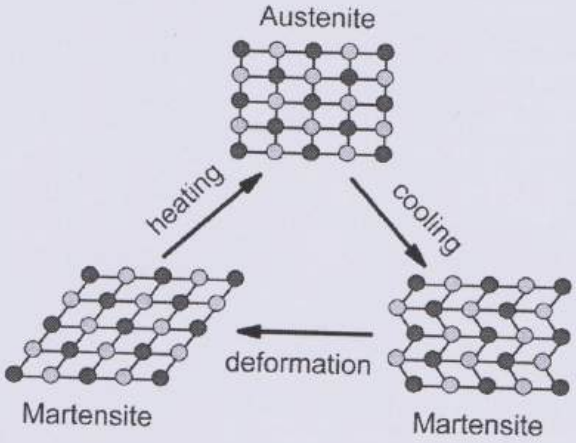

VI. BIO MEDICAL APPLICATIONS OF SHAPE MEMORY ALLOY

After the discovery of the SME in nitinol by Buehler et al. in 1962, they proposed to use this material for implants in dentistry, and a few years later, the first superelastic braces made from a NiTi alloy were introduced by Andreasen in 1971. SMA made a significant breakthrough into biomedical domain after its introduction in minimally invasive surgery (MIS), and more biomedical applications are developed and introduced into the market after the approval of the Mitek surgical product (i.e. Mitek Anchor) for orthopaedic surgery by US Food and Drug Administration (FDA) in September 1989. Although NiTi alloys are significantly more expensive than stainless steels, SMAs have exhibited excellent behaviour for biomedical applications such as high corrosion resistance, bio-compatible, non-magnetic, the unique physical properties, which replicate those of human tissues and bones, and can be manufactured to respond and change at the temperature of the human body.

Orthopedic applications

Shape memory alloys are a group of metallic materials with some unusual properties such as one-way and two-way shape memory effects, super elastic effect, high damping property and rubber-like effect. These characteristics make the material suitable for different orthopedic applications such as load-bearings, plates for bone fracture repair, internal fixators for long bone shafts, spinal correctors, vertebral spacers and bone distraction devices. Some of these applications are explained in the following subsections.

A) Spinal vertebral spacer

The spinal vertebral spacer is one of the applications of this material in orthopedics. The insertion of the spacer (disc) between two vertebrae provides the local reinforcement of the spinal column, avoiding any traumatic motion during the healing process. The employ of a shape memory spacer enables the use of a constant load regardless of the patient position with some degree of motion. This device is used to treat scoliosis. Figurepresents spinal vertebrae spacer in the in the original shape (right) and martensitic state (left).

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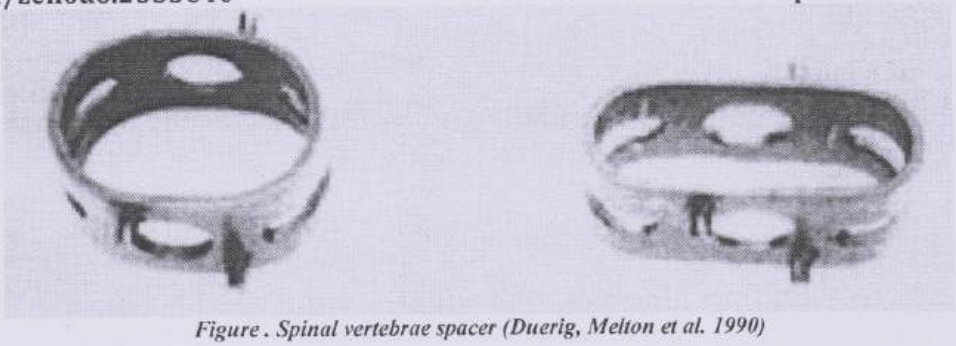

Figure . Spinal vertebrae spacer (Duerig, Melton et al. 1990)

B) Plates for fractured bone
Shape memory plates also have been used to heal and recover the fractured bones, in the injured area where it is not possible to apply cast such as facial areas, nose, jaw, and eye socket. They are inserted to the fracture and fixed with intermediate screws This maintains the original alignment of the bone and enables cellular regeneration. When these plates are heated, they tend to recover their previous shape (because of the shape memory effect) and exert a constant and uniform force on the two broken sections, which causes to join separated parts of fractures and helps in the healing process

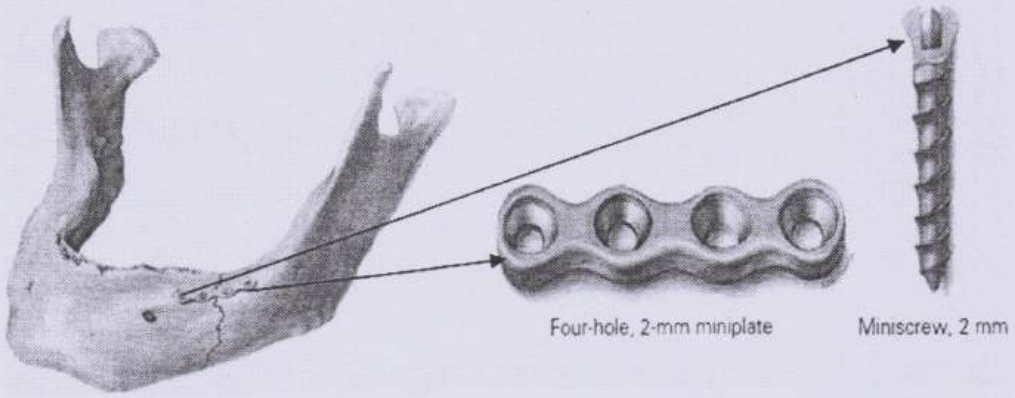

Figure. SMA plate for fractured human jaw bone and details of the plate and the screw (Machado and Savi 2003)

Dentistry and orthodontics applications
An artificial tooth root can, after application in a deformed shape, return to its required shape after reaching body temperature and, so, will be tightened in the mandible. Figure shows the single wing-type shapememory implant; part of the apex opens Bucco-linguallyafter insertion into the jaw bone. The advantages of the shape memory implants are that they have a good initialfixation in the jaw bone, are easily installed in a simpleoperation and have a good stress distribution to the surrounding bone compared with the ordinary non-opening blade-type implant

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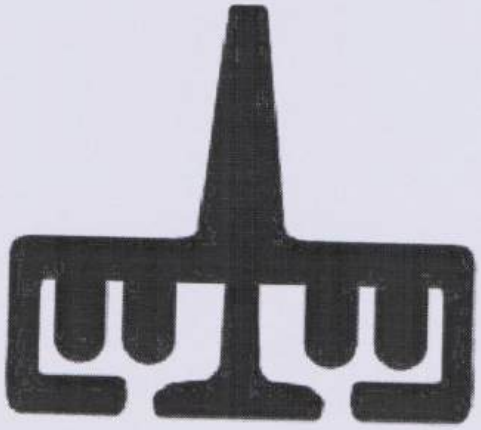

Fig. Shape memory oral implant design

Applications to surgical instruments

In recent years, medicine and the medical industry have focused on the concept of less invasive surgical procedures. Following this tendency, shape memory surgical instruments have been created and are becoming noticeable. Among the advantages of these tools, one can emphasize their flexibility as well as their possibility to recover their former shape when heated. The SMA basket is used to remove kidney, bladder and bile duct stones . This basket is inserted into the human body in the same way as the Simon filter. presents a sequence of pictures related to the basket opening as it is heated. The intra-aortic balloon pump is used to unblock blood vessels during angioplasty. The device has an SMA tube whose diameter is reduced compared to polymer materials due to its pseudoelastic effect. Moreover, it also allows greater flexibility and torsion resistance when compared to the same tube made of stainless steel. Laparoscopy is another procedure where SMA have been employed. Figure shows some surgical tools where the actions of grippers, scissors, tongs and other mechanisms are performed by SMA. These devices allow smooth movements tending to mimic the continuous movement of muscles. Moreover, these devices facilitate access to intricate regions.

Figure. Intra-aortic balloon pump

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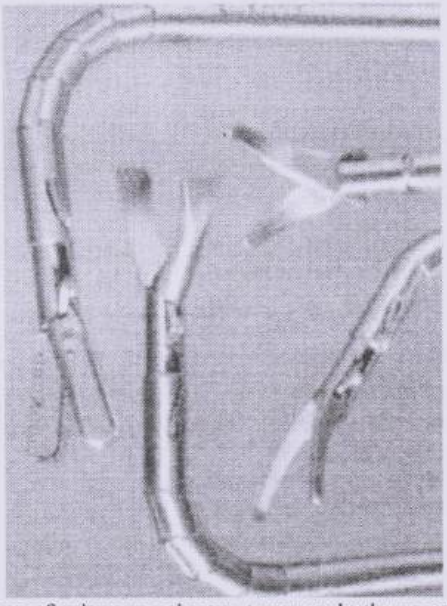

Figure. Laparoscopy tools. The actions of grippers, scissors, tongs and other mechanisms are performed by SMA.

Less invasive surgery - Guidewires

In the interventional radiology the different imaging techniques, including X-ray fluoroscopy and magnetic resonance imaging (MRI), are employed to guide the instruments and carry out advanced medical procedures. Such are, for example, re-establishing blood flow in blocked arteries or implantation of filters to prevent pulmonary emboli (blood clots) reaching the lungs. With Ni-Ti guide wires the catheters for a radiopaque contrast medium can be inserted through an artery into the required position and this medium reveals the possible blockages of the blood circulation in x-ray imaging. The route from the insertion point to the target (for example the heart or brain) can involve very small and wavy vessels and the strains required may result in permanent deformation and kinking of the guidewire. The localized strain peaks can be distributed uniformly and kinking can be prevented due to the recoverable strains of approximately 8 % in the Ni-Ti-wires. As the Ni-Ti wires do not deform or kink to large extent, their steerability and torque ability is good which in practice means that the problems associated with the accurate positioning disappear.

Artificial Muscles – case: function as the sphincter muscles

Shape memory alloys can also be applied as actuating muscles. In addition to the heart valve there are some other possible applications, too. One of them is a solution to a common old age problem, incontinence. This artificial urethra valve consists of four nitinol plates and is able to control the opening and closing of the urethra artificially, i.e. it substitutes the function of the sphincter muscles around the urethra.

VII. LITERATURE REVIEW

Mr F J Gil et al. (1998) reviews shape memory alloys for medical applications and describe that the most important alloy used in biomedical applications is NiTi and also reviewed the different properties of shape memory, super elasticity, two-way shape memory, rubber-like behaviour and a high damping capacity. He describe some applications proposed in recent years and classified according to different medical fields.

Mr Diego Mantovani (2000) present a review on Shape Memory Alloys: Properties and Biomedical Applications and describes the applications of shape memory alloys such as Orthopedic Applications, dental applications, cardiovascular applications, Other applications like gynecological and surgical instruments etc.

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Mr Fatiha El Feninat et al. (2002) presented a review on Shape Memory Materials for Biomedical Applications and this paper will first review the most common biomedical applications of shape memory alloys and SMPs and address their critical biocompatibility.

Mr L.G. Machado et al. (2003) present a review on Medical applications of shape memory alloys . The purpose of this review article is to present a brief discussion of the thermomechanical behaviour of SMA and to describe their most promising applications in the biomedical area. These include cardiovascular and orthopaedic uses, and surgical instruments.

Takashi Maeshima1 et al. (2004) present a review Shape Memory Properties of Biomedical Ti-Mo-Ag and Ti-Mo-Sn Alloys and in this Ti-Mo-Ag and Ti-Mo-Sn alloys for biomedical applications are developed and their shape memory properties are investigated.

Mr S.-P. Hannula et al. (2006) present a review paper on Shape Memory Alloys for Biomedical Applications and reviews the biomedical applications of shape memory alloys consist of quite a broad field starting from the dental and less-invasive surgery where they are mostly used today. The orthopaedic applications were previously expected to become more numerous, but the development of the new materials such as polymers resembling the human bone has narrowed their field of use.

Mr Daniela Tarniţa et al. (2009) presented a review on Properties and medical applications of shape memory alloys and in this paper a detailed reviews of applications of SMA to the biomedical field have been successful because of their functional qualities, enhancing both the possibility and the execution of less invasive surgeries and this paper will consider just why the main properties of shape memory alloys hold so many opportunities for medical devices and will review a selection of current applications.

Mr C. E. Wen et al. (2010) presented a review on Porous shape memory alloy scaffolds for biomedical applications and this paper reviews current state-of-the art on the processing, porous characteristics and mechanical properties of porous SMAs for biomedical applications, with special focus on the most widely used SMA nickel–titanium (NiTi), including (a) microstructural features, mechanical and functional properties of NiTi SMAs; (b) main processing methods for the fabrication of porous NiTi SMAs and their mechanical properties and (c) new-generation Ni-free, biocompatible porous SMA scaffolds.

Mrs Lorenza Petriniand et al. (2011) presented a review article on Biomedical Applications of Shape Memory Alloys and in this paper a detailed review of the main applications of NiTi alloys in dental, orthopaedics, vascular, neurological, and surgical fields is presented. In particular for each device the main characteristics and the advantages of using SMA are discussed. Moreover, the paper underlines the opportunities and the room for new ideas able to enlarge the range of SMA applications.

Mr Maria C. Serrano et al. (2012) presented a review on recent Insights into the Biomedical Applications of Shape-memory Polymers and discussed advances in the design of shape memory alloy with emphasis on materials investigated for medical applications. Future directions necessary to bring SMP closer to their clinical application are also highlighted.

Mr Gupta, Parbin K et al. (2012) present a review article on studies on shape memory alloys and this paper on "shape memory alloys" carries out simplified study of the crystallographic structures/ transformation of SMAs, general characteristics, working principles, commonly used alloys, and applications and describe many uses and applications of shape memory alloys have ensured a bright future for these metals. Main advantages of shape memory alloys may be summarised as - Bio-compatibility, Diverse Fields of Application, and Good Mechanical Properties (strong, corrosion resistant).

Marjan Bahraminasab et.al (2013) presented a review on NiTi Shape Memory Alloys, Promising Materials in Orthopedic Applications and describes Shape memory alloys (SMA) have provided new insights into biomedical

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area for cardiovascular, orthopedic and dental applications, and for making advanced surgical instruments. Among many SMAs, NiTi alloy is considered to be the best because of its superb characteristics. NiTi alloy possesses most of the necessities for orthopedic implantation and is used in a large number of applications.

Mr JaronieMohd Jani et al. (2014) presenta review of shape memory alloy research, applications and opportunities and This work provides a timely review of recent SMA research and commercial applications, with over 100 state-of-the-art patents; which are categorised against relevant commercial domains and rated according to design objectives of relevance to these domains (biomedical and other).

Mr Ferdinando Auricchio et al. (2015) presented a review on shape memory alloy biomedical applications and describe Shape memory alloys (SMAs) are a group of metallic materials that exhibit unique properties. The most used SMA in the biomedical field is Nitinol (NiTi), which is discussed.

Mr Benjamin Qi Yu Chan et al. (2016) presented a review on Recent Advances in Shape Memory Soft Materials for Biomedical Applications and discuss the design considerations critical to the successful integration of SMPs for use in vivo, also highlight recent work on three classes of SMPs: shape memory polymers and blends, shape memory polymer composites, and shape memory hydrogels.

Mr Aniket Kolekar et al. (2017) studied recent Advancement in Shape Memory Alloy and describes the attributes of SMAs that make them ideally suited to actuators in various applications such as biomedical and addresses their associated limitations to clarify the design challenges faced by SMA developer. This work presents an extensive review of SMAs, other categories of SMMs are also discussed; including a historical overview, summary of recent advances and new application opportunities.

Mr Chunsheng Wen et al. (2018) presented a review on Mechanical behaviours and biomedical applications of shape memory materials and in this review, he provides an overview of mechanisms and biomedical applications of some common SMAs and SMOS, experimental evidences on their mechanical biocompatibility and some aspects of computational modelling., also challenges and progress in developing new shape memory materials for biomedical applications are also presented.

Mr VybhaviShivakumaret al.(2018)) presented a review on studies on biocompatibility of shape memory alloys and the paper is a review of biocompatibility of shape memory alloys. Based on the literature review, research objectives were defined and also the future frame work for the synthesis and evaluation of biocompatibility of Cu-Al-Mn shape memory alloy for bio-medical applications

VIII. SUMMARY OF LITERATURE SURVEY

From the literature review, it was observed that the biomedical applications of shape memory alloys consist of quite a broad field starting from the dental and less-invasive surgery where they are mostly used today. The orthopaedic applications were previously expected to become more numerous, but the development of the new materials such as polymers resembling the human bone has narrowed their field of use. The most applied biomedical shape memory alloy is Ni-Ti (nitinol) and some of the possible problems connected to its use can be overcome with different types of surface modifications and coatings. Applications of SMA to the biomedical field have been successful because of their functional qualities, enhancing both the possibility and the execution of less invasive surgeries. Also studied properties and biomedical applications. The biomedical applications of shape memory alloys are Orthopaedic applications, dental applications, cardiovascular applications, Other applications like gynaecological and surgical instruments etc

IX. FUTURE SCOPE

In the coming years, a true revolution will occur in some medical specialties. The revolutionary advancements in endovascular surgery have already injected new challenges in the traditional vascular surgery. New horizons have

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been opened, and clinicians, scientists, and industrialists are starting to work together to master the complexity of a problem through a multidisciplinary approach.In the near future, more medical devices will be engineered with smart materials because of their inherent sensing and actuating capabilities, which allow for sophisticated functionality over otherwise passive conventional materials. Development of new or improved SMAs, combination of the functional properties of SMAs with the structural properties of other materials (e.g. hybrid or composite SMMs) search for new markets. SMP present significant advantages when compared to traditional shape-memory alloys, including lower density, lightweight, lower cost of raw materials, lower cost of fabrication and processing, and easy tailoring. Furthermore, the resulting materials have higher versatility in shapes, higher recovery strains (>300%) and lower recovery stresses (1–10 MPa).

Shape memory hydro gels, on the other hand, have weak mechanical properties that may pose challenges with regard to potential biomedical applications. Concentration of cross-links and the collective strength of various inter chain interactions are important factors to be considered in the design shape memory hydro gel systems due to the interdependence between shape memory behaviour and mechanical properties. Apart from the types of stimuli mentioned above, shape memory hydro gels can also be triggered by stimuli such as pH, ion concentration, a redox reactions or ultra sound.

In recent years, medicine and the medical industry have focused on the concept of less invasive surgical procedures. Following this tendency, shape memory surgical instruments have been created and are becoming noticeable. Among the advantages of these tools, one can emphasize their flexibility as well as their possibility to recover their former shape when heated. The SMA basket is used to remove kidney, bladder and bile duct stones. This basket is inserted into the human body in the same way as the Simon filter.

The needs of biocompatibility represent a constraint that is not insurmountable but one that cannot be circumvented for the use of SMA in the field of medicine. Today, the advance of biomedical applications of SMA is important even though the level of knowledge in regard to its biocompatibility remains stagnant.

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES
"DESIGN, ANALYSIS & OPTIMIZATION ON SHOCK ABSORBER SPRING"

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ABSTRACT

A Shock absorbers are a critical part of a suspension system, connecting the vehicle to its wheels. The main function of vehicle suspension system is to separate the vehicle body and passengers from the oscillation created by the irregularities and to provide continuous contact of vehicle's wheel from the road surface. A suspension system or shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. The shock absorbers duty is to absorb or dissipate energy. In a vehicle, it reduces the effect of traveling over rough ground, leading to improved ride quality, and increase in comfort due to substantially reduced amplitude of disturbances. In this project, we are going to design a spring in such a way that it can be of different materials we have used three materials for spring namely stainless steel, titanium alloy and copper alloy. The spring is divided in three parts vertically and the sequence of arrangement of materials is changed and results are calculated in analysis software at last the best result is optimized and best solution of arrangement of materials is found out.

Keywords: Finite Element Analysis, Shock Absorber, Solid Modelling, Suspension.

I. INTRODUCTION

A suspension system or shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy .In this project a shock absorber is designed and a 3D model is created using Pro/Engineer. The model is also changed by changing the thickness of the spring. Structural analysis and modal analysis are done on the shock absorber by varying material for spring, Spring Steel and Beryllium Copper. The analysis is done by considering loads, bike weight, single person and 2 persons. Structural analysis is done to validate the strength and modal analysis is done to determine the displacements for different frequencies for number of modes. Comparison is done for two materials to verify best material for spring in Shock absorber. Modeling is done in Pro/ENGINEER and analysis is done in ANSYS. Pro/ENGINEER is the standard in 3D product design, featuring industry-leading productivity tools that promote best practices in design. ANSYS is general-purpose finite element analysis (FEA) software package. Finite Element Analysis is a numerical method of deconstructing a complex system into very small pieces (of user-designated size) called elements.

[1] A shock absorber or damper is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. Pneumatic and hydraulic shock absorbers commonly take the form of a cylinder with a sliding piston inside. The cylinder is filled with a fluid (such as hydraulic fluid) or air. This fluidfilled piston/cylinder combination is a dashpot.[1]

[2] A shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate energy. The shock absorbers duty is to absorb or dissipate energy. In a vehicle, it reduces the effect of travelling over rough ground, leading to improved quality, and increase in comfort due to substantially reduced amplitude of disturbances.[2]

[3] The mechanical device which is designed to absorb, smooth out the shock impulse during running of a vehicle is called as shock absorber. In a motor vehicle, shock absorber reduces the effect of traveling over rough ground, tends to increase the running condition, and increase in comfortness, reduced the frequency of disturbances. A sliding piston inside a cylinder which is filled with a fluid (such as hydraulic fluid) or air called as hydraulic or pneumatic shock absorbers respectively. The shock absorbers is mainly for absorb or dissipate energy. For an automobile suspensions, aircraft landing gear, and the supports of many industrial machines, the shock absorbers are very

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important.. The structures from earthquake damage and resonance, shock absorbers plays vital role. Without shock absorbers, the vehicle would have a bouncing ride, as energy is stored in the spring and then released to the bike, depends on the allowed range of suspension movement. Control of excessive suspension movement or over load without shock absorption requires strong (higher rate) springs, which would in turn give a harsh ride. Shock absorbers accept the use of soft (lower rate) springs against the controlling rate of suspension movement in response to bumping. [3].

[4] The current world-wide production of shock absorbers, is difficult to estimate with accuracy, but is probably around 50– 100 million units per annum with a retail value well in excess of one billion dollars per annum. A typical European country has a demand for over 5 million units per year on new cars and over 1 million replacement units. The US market is several times that and India is not behind these countries for demand and consumption of shock absorbers. If all is well, these shock absorbers do their work quietly and without fail. Drivers and passengers simply want the dampers to be trouble free. In contrast, for the designer they are a constant interest and challenge. The need for dampers arises because of the roll and pitches associated with vehicle/bike maneuvering and from the roughness of roads. In India, road quality is generally below average and poor for smaller towns. As there is growing demand for quality shock absorbers in India, design and construction of shock absorbers are demanding tasks that require advanced calculations and theoretical knowledge [4].

[5] A shock absorber or damper is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. Pneumatic and hydraulic shock absorbers commonly take the form of a cylinder with a sliding piston inside. The cylinder is filled with a fluid (such as hydraulic fluid) or air. This fluid-filled piston/cylinder combination is a dashpot. The shock absorbers duty is to absorb or dissipate energy. These are an important part of automobile suspensions, aircraft landing gear, and the supports for many industrial machines. Large shock absorbers have also been used in structural engineering to reduce the susceptibility of structures to earthquake damage and resonance. A transverse mounted shock absorber, called a yaw damper, helps keep railcars from swaying excessively from side to side and are important in commuter railroads and rapid transit systems because they prevent railcars from damage station platforms. In a vehicle, it reduces the effect of traveling over rough ground, leading to improved ride quality, and increase comfort due to substantially reduced amplitude of disturbances.[5]

II. METHOD & MATERIAL

Method

Solid Modelling:-

1. Design of Top Rod
   Making the first part of the design lets take top plane and draw the circle with required dimension then exit from the sketch andextrude it. Again select the top plane then draw the circle with 10mm diameter and then extrudeit up to 70 mm. Now select the back face and draw a circle with diameter 24mm and extrude it 28mm.select the edge and apply fillet with 6mm radius. Cutting the sections by leaving the 15 mm gap. Take the cutting surface and draw circlewith 8 and 18mm diameter and extrude by applying convert entities. The part is completed.

2. Design of Piston Rod:-
   The designing procedure of piston rod using solidworks design tool. Select a top plane, draw a circle with 24mm diameter and extrude it 108.93mm. Select a edge and fillet it to 3mm.Again cut the section as like in the first part. Take the another edge and draw a circle with 27mm diameter and extrude it up to 80.93mm.Again select the down surface and draw a circle then do a extruded cut up to 70mm length. Do the threading up to 50mm using helix command

3. Design of spring
   The designing procedure of spring using solidworks design tool. Select a front plane and draw a line in downward direction and then give dimension. Again select a front plane draw a circle with diameter 7.25mm

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and put 15mm distance from the line. Exit from the sketch go to feature and select swept boss. Then the required spring will be obtained.

4. Design of screw:-
The designing procedure of screw using solidworks design tool. Select top plane sketch a circles with 52mm outer diameter and 24mm inner diameter. Extrude it with9mm.Draw a circle with 29mm diameter and again extrude it with 1mm.Select top face ,draw center lines and draw a circle with 2 mm radius. Draw the lines from circle to outer circle the angle between the lines is 60 degrees and then trim the circle. Now apply the polar array then apply extrude cut. Then the required screw is obtained.

5. Assembling of PSD shock absorber using solid works
Select top plane sketch a circles with 52mm outer diameter and 24mm inner diameter. Extrude it with9mm.Draw a circle with 29mm diameter and again extrude it with 1mm.Select top face ,draw center lines and draw a circle with 2 mm radius. Draw the lines from circle to outer circle the angle between the lines is 60 degrees and then trim the circle. Now apply the polar array then apply extrude cut. Then the required screw is obtained

Finite Element Analysis

1. Importing the Model
The assembled model was imported. The contacts between the surfaces are automatically detected in Ansys.

2 Assigning Materials
The material properties of the spring, upper and lower mounts were defined. Stainless Steel was selected as the material of choice for the lower and upper mounts, and a variety of materials were chosen one at a time for the spring. The essential material properties defined were the modulus of elasticity, density and Poisson"s ratio.

Raw Material

Spring Steel:-
Spring steels are generally low-alloy manganese, medium-carbon steel or high-carbon steel with a very high yield strength. This allows objects made of spring steel to return to their original shape despite significant deflection or twisting. Material Properties of spring steel as follow.

Young's Modulus :- 202000 (N/mm^2)
Density:-7820 (Kg/mm^3)
Poisson's Ratio:- 0.292

Copper Alloy:-
The copper is high strength with non-magnetic and non-sparking qualities. It has excellent metalworking, forming and machining properties.

Young's Modulus :- 130000 (N/mm^2)
Density:-8100 (Kg/mm^3)
Poisson's Ratio:- 0.285

Titanium Alloy
Titanium alloys are metals that contain a mixture of titanium and other chemical elements. Such alloys have very high tensile strength and toughness (even at extreme temperatures). They are light in weight, have extraordinary corrosion resistance and the ability to withstand extreme temperatures. However, the high cost of both raw materials.

Young's Modulus :- 102000 (N/mm^2)

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Density:-4850 (Kg/mm^3)
Poisson's Ratio:- 0.3

Table.1: Types of material

Material	Elastic modulus	Poisson's Ratio	Mass density
Stainless steel	290075470.53psi	0.28	1167905.8psi
Titanium alloy Ti-6Al-25n-2Zr-2Mo-2Cr-0.25Si(SS)	17839641.88psi	0.33	168243.78psi
Berrylium Copper UNS,C17000	16679339.83psi	0.3	7251886.88psi

III. RESULT & DISCUSSION

Design Calculations for Helical springs for Shock absorbers
Material: Steel(modulus of rigidity) G = 41000
Mean diameter of a coil D=62mm
Diameter of wire d = 8mm
Total no of coils n1= 18
Height h = 220mm
Outer diameter of spring coil D0 = D +d =70mm
No of active turns n= 14
Weight of bike = 125kgs
Let weight of 1 person = 75Kgs
Weight of 2 persons = 75×2=150Kgs
Weight of bike + persons = 275Kgs
Rear suspension = 65% 65% of 275 = 165Kgs
Considering dynamic loads it will be double W = 330Kgs = 3234N
For single shock absorber weight = w/2= 1617N = W
We Know that, compression of spring (δ) = C = spring index = 7.75 = 8 (δ) = × × × /× = 282.698 Solid length, Ls=n1×d=18×8=144
Free length of spring, Lf = solid length + maximum compression + clearance between adjustable coils = 0.15 = 144 + 282.698 + 0.15 × 282.698 = 469.102
Spring rate, K = 5.719
Pitch of coil P = 26
Stresses in helical springs: maximum shear stress induced in the wire τ = 0.97
Values of buckling factor KB= 7.5 K = 0.05 (for hinged and spring)
The buckling factor for the hinged end and built-in end spring Wcr=5.719×0.05×469.102=134.139N

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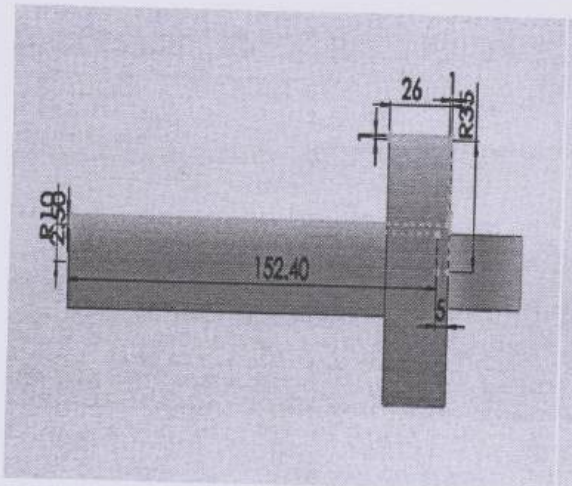
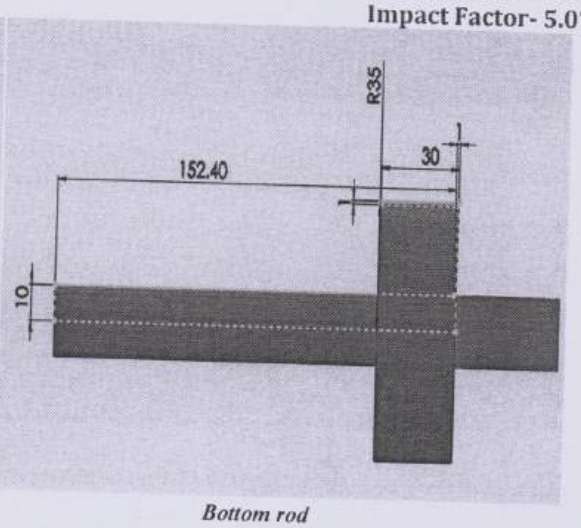
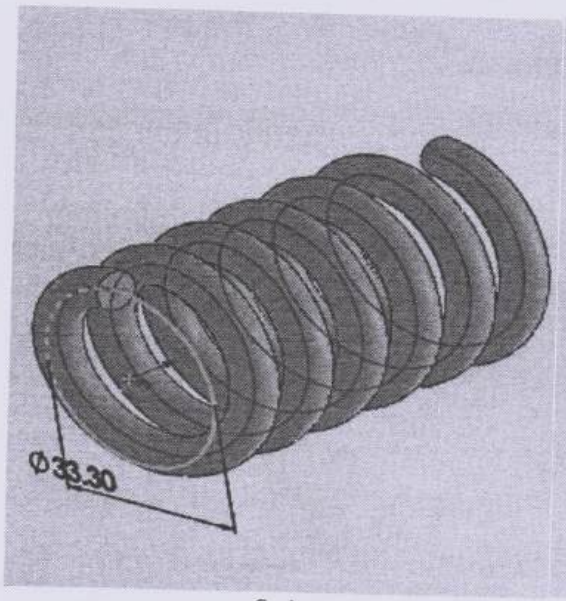


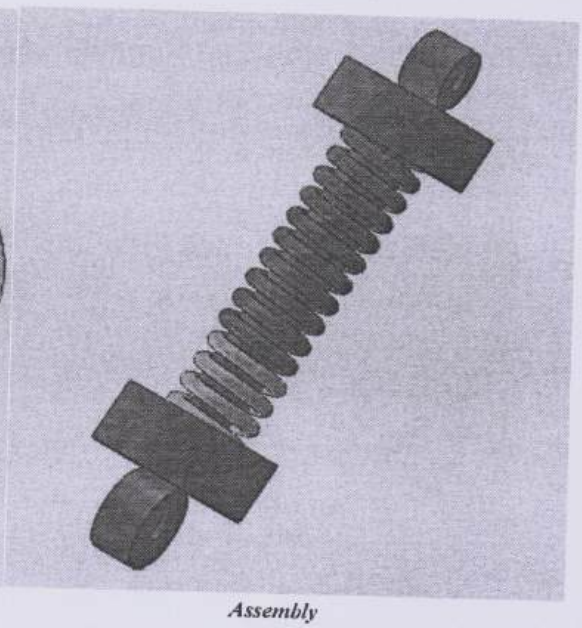
Top rod



Bottom rod



Spring



Assembly

Obtaining results after applying loads.
CST (Copper Steel Titanium)

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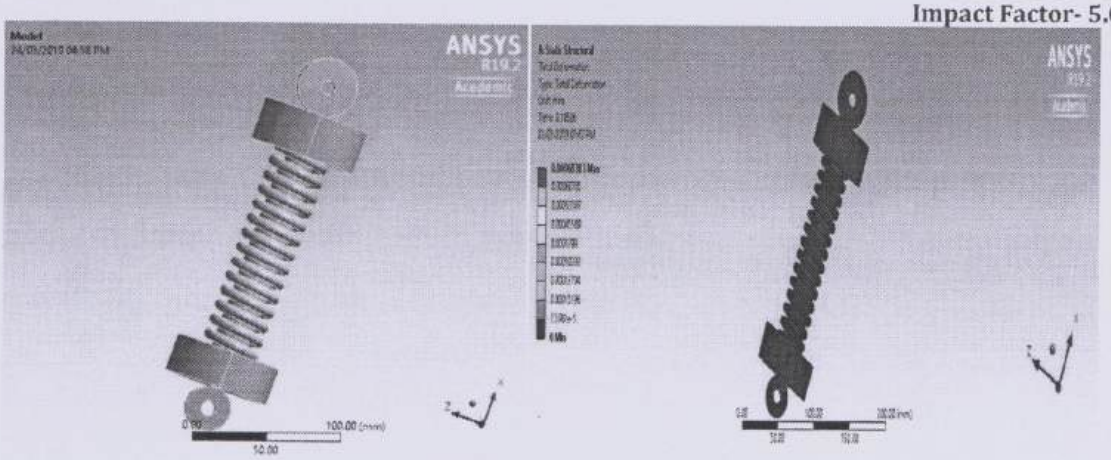
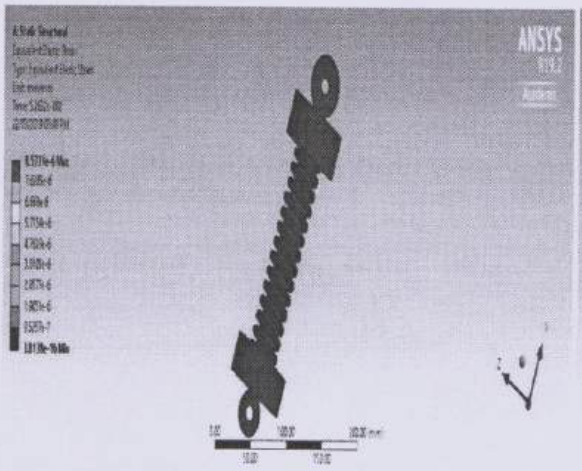
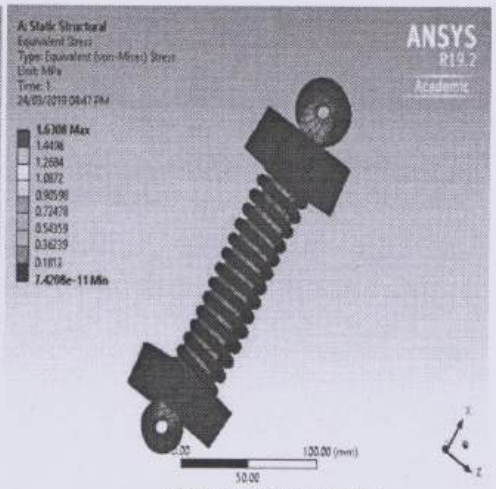


CST Total deformation



CST Equivalent Elastic Strain



CST Equivalent Stress

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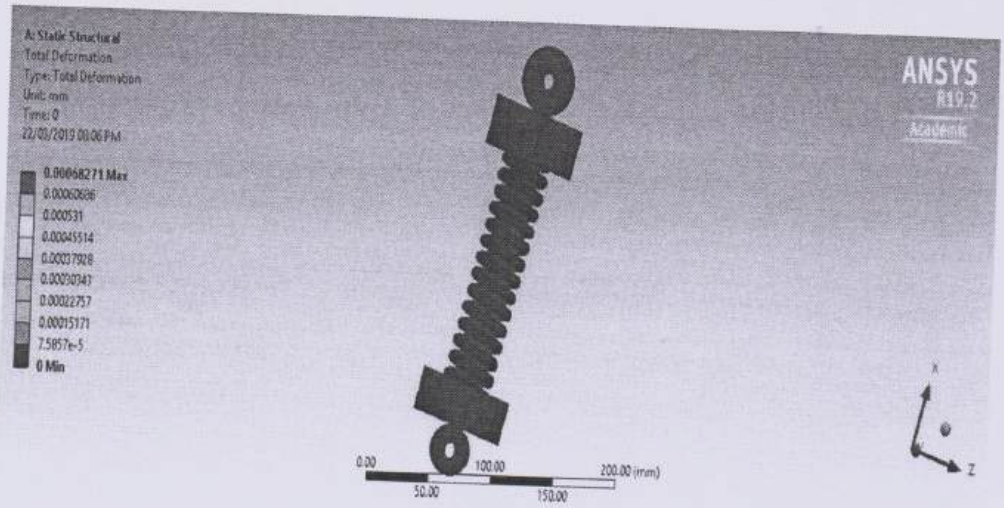
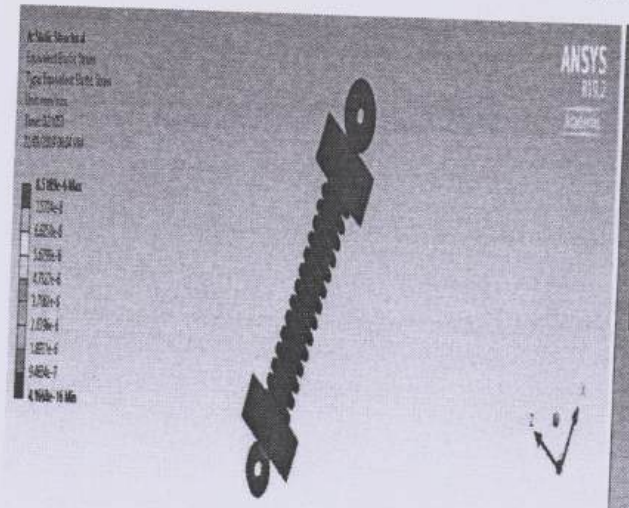
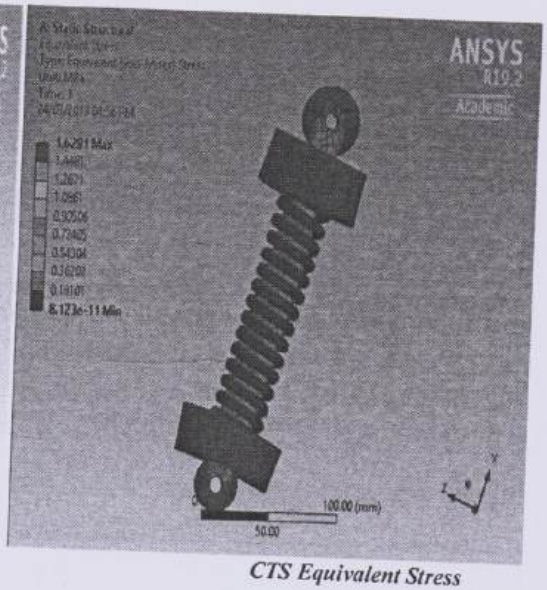


CTS Total deformation



CTS Equivalent Elastic Strain



CTS Equivalent Stress

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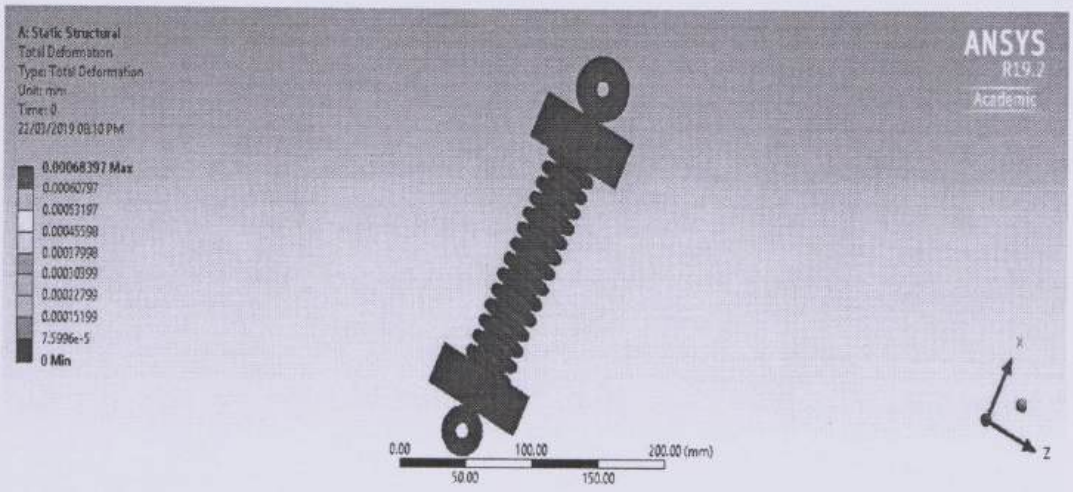
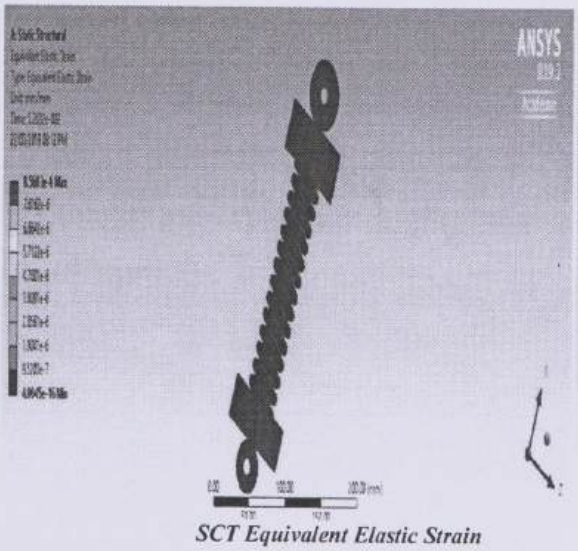
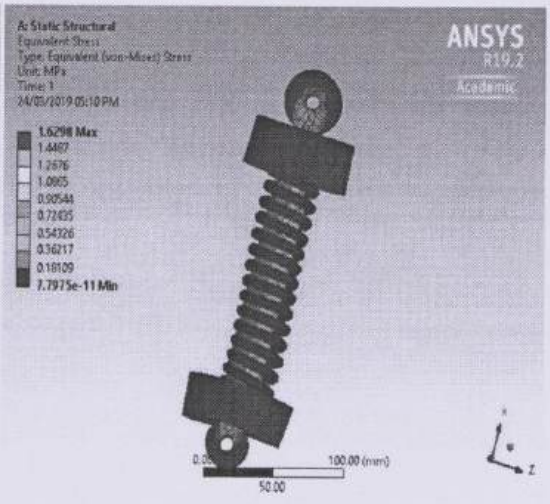


SCT Total deformation



SCT Equivalent Elastic Strain



SCT Equivalent Stress

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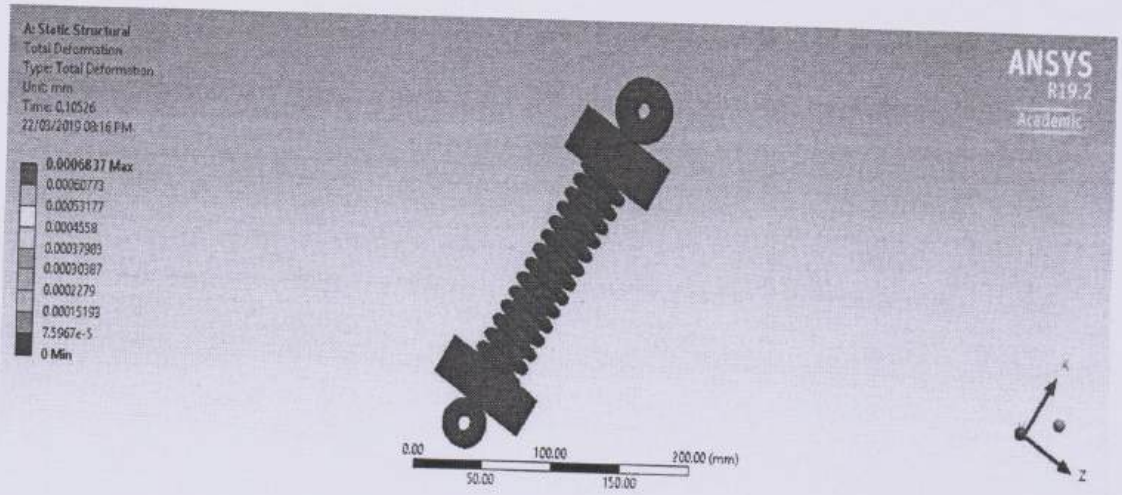
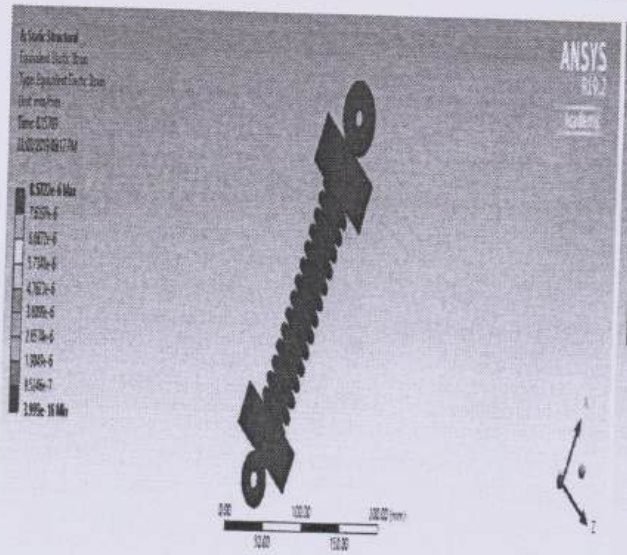
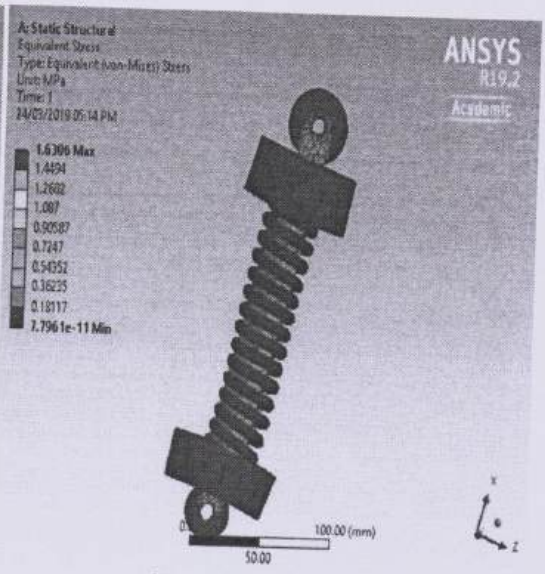


STC Total deformation



STC Equivalent Elastic Strain



STC Equivalent Stress

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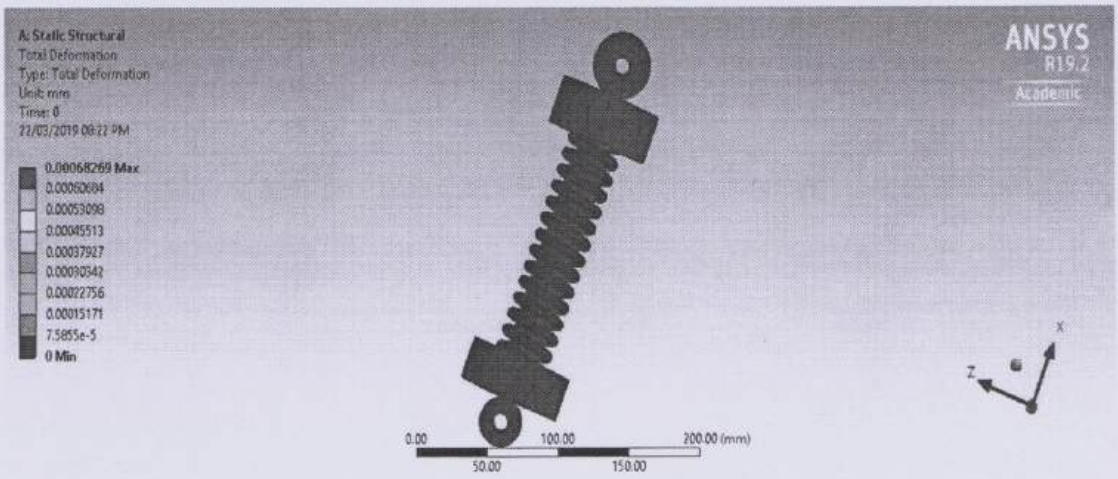
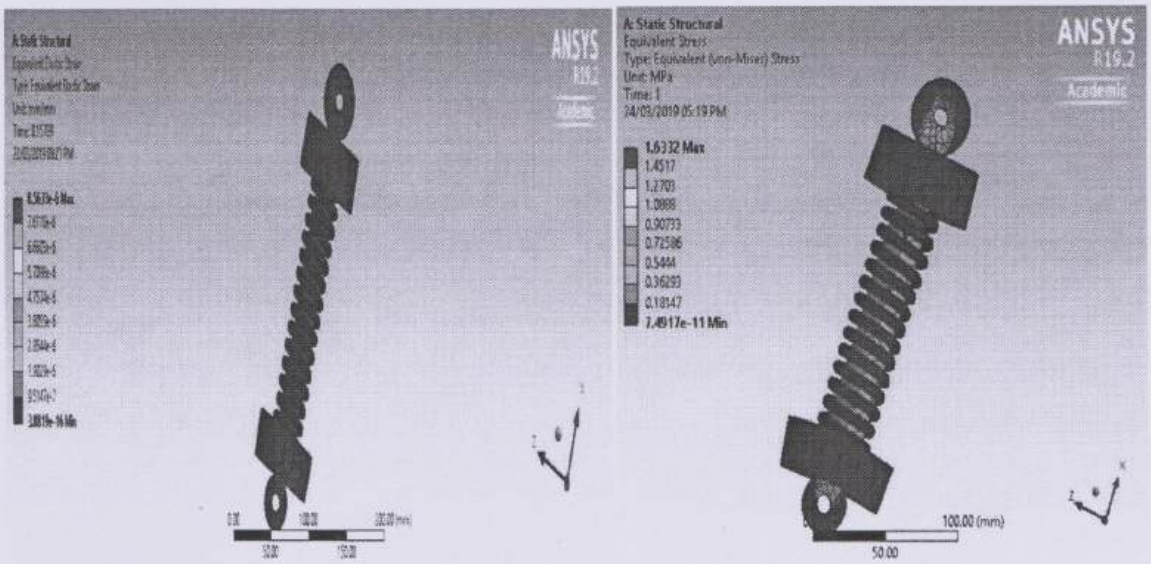
TCS (Titanium Copper Steel)



TCS Total deformation



TCS Equivalent Elastic Strain

TCS Equivalent Stress

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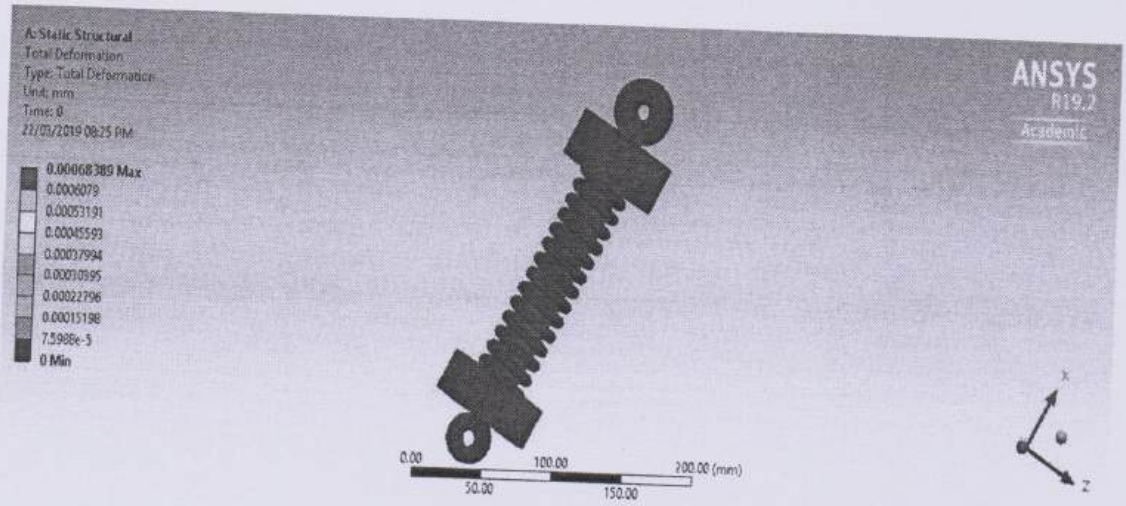
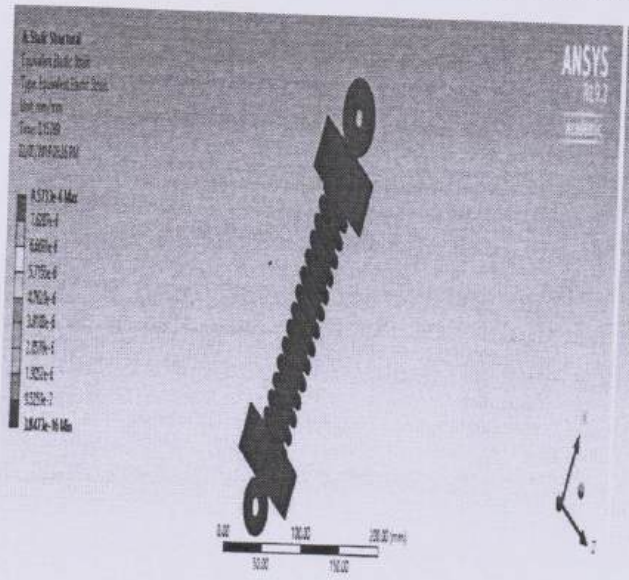
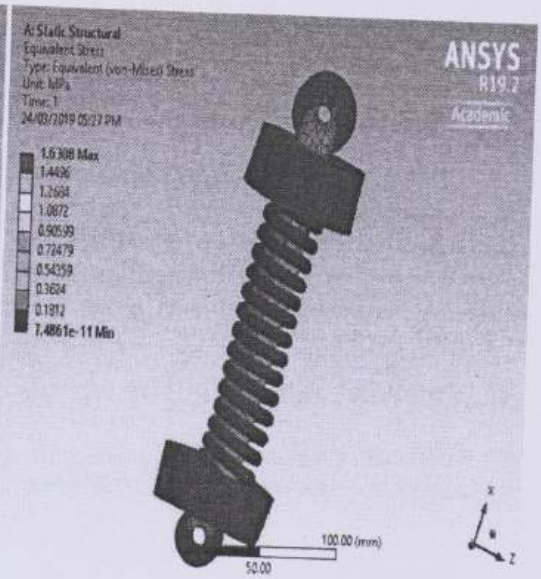


TSC Total deformation



TSC Equivalent Elastic Strain



TCS Equivalent Stress

Stress and Deflections with different materials as Shock Absorber Spring:

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Table.2: Types of Stress and Deflections

Materials	Von-mises stresses (Mpa)		Deformation (mm)
	Max	Min	Max
CST (Copper Steel Titanium)	**1.6308**	**7.4208e**	**0.00068383**
CTS (Copper Titanium Steel)	**1.6291**	**8.123e**	**0.00068271**
SCT (Steel Copper Titanium)	**1.6298**	**7.7975e**	**0.00068397**
STC (Steel Titanium Copper)	**1.6306**	**7.7961e**	**0.0006837**
TCS (Titanium Copper Steel)	**1.6332**	**7.4917e**	**0.00068269**
TSC (Steel Titanium Copper)	**136208**	**7.4861e**	**0.00068389**

IV. CONCLUSION

As of now, we have compared the properties, availability and cost of various materials of spring. Based on these parameters, we have selected steel spring (ASTM A228), Phosphor Bronze, Titanium Alloy as an optimum alternative to spring shock absorber.

V. FUTURE SCOPE OF THE STUDY

After the successful validation of this spring we can use this spring where more loads are to be used especially in modern bikes also we can implement this in industrial shock absorbers

VI. ACKNOWLEDGEMENTS

The success of our project was not due to our project work alone, but also due to interest help and able guidance offered to us by the staff members of Mechanical Engineering Department.

It is our duty to acknowledge with gratitude the help rendered to us by these individuals, without whom we would not been able to carry out project to best of our ability and to the satisfaction of our superior.

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GHEE (CLARIFIED BUTTER) MAKING MACHINE

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ABSTRACT

ABSTRACTGhee (Sanskrit: Ghṛta), is a class of clarified butter that originated in India. It is commonly used in Middle Eastern cuisine, cuisine of the Indian subcontinent, Southeast Asian cuisine, traditional medicine, and religious rituals. The market size of ghee in India is 10,000 cores 11 or US$1.5 Billion as of 2016. India is the world's largest producer of buffalo and cow milk and consequently also the largest producer and consumer of ghee.Ayurveda considers pure ghee to be sāttvik or sattva-guṇi (in the "mode of goodness"), when used as food. It is the main ingredient in some of the Ayurvedic medicines, and is included under catuh mahā sneha (the four main oils: ghṛta, taila, vasā, and majjā) along with sesame oil, muscle fat, and bone marrow. Ghee industry is one of the biggest industry and we try to make a small scale ghee making machine so that people can have pure ghee and women in villages of Indian can make ghee and be self employed.

Keywords: *Ghee, Market, machine*

I. INTRODUCTION

Ghee(Clarified Butter) is a fat rich dairy product, widely used in India since time immemorial. It has been a part of our culture. It is mainly used as food ingredient and as flavouring agent. However, even today in organized sector, ghee is manufacture in steam jacketed kettles which inherently suffers from several disadvantages like low heat transfer coefficient, unsanitary operation etc. Mechanization of ghee making overcomes many of the problems associated with conventional method but it incorporates large surface area and large amount of manufacturing cost to build machine.

Considering the above stated problem, we decided to design a mechanism which produces same quality of product, utilizing least amount of capital so that it can usable for Domestic household purpose. It is an automatic machine which uses fresh Curd (Yogurt) as it's raw material, giving us the product as Ghee.It reduces the man effort by replacing domestic Ghee making process with new automatic process.One of the main advantage is that the waste from the process is nothing but Butter milk which can served as Beverage.

II. METHOD & MATERIAL

Curing of Butter

Curing of Butter is the most important process in making ghee. Boil milk up to optimum temperature using heating coil, after boiling milk add a teaspoon of curd and keep it undistributed for whole night \ for 8 hours. Now milk will be convert in crud, then add cold water into it and blend it for 10-15 min using curing device (madhani) and butter will be separated for the butter milk. Butter milk is refreshing drink and health comparing to the bottle cold drink which are carbonated water.

Boiling of butter

Butter obtain by from curing of curd is heated up to optimum temperature, which may lie somewhere between 90 degree to 120 degree should be gradually increased. The heating is done by heating coil which is connected to temperature control. Slowly the butter will be turning in to ghee (Clarified butter). Butter obtained from different type curd will produce different amount of ghee.

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Materials

To give optimum weight to the machine ply is used to make the structure and base foundation to support structure. The dimension of ply is 29inch X 24 inch, it is consist 8 small holes of 2mm and square piece is removed of dimension 7.5inch X 7 inch.

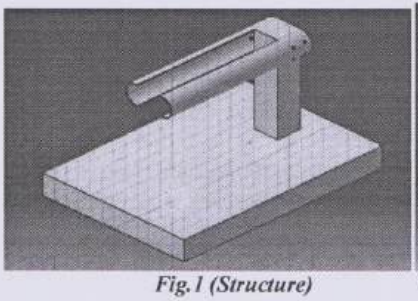

Fig.1 (Structure)

Fig.2 (Curing Machine)

A telescopic mechanism is mounted on the base. The mechanisms is made by using ply, it is consist of a hollow rectangle of dimension 12inch X 7inch and solid rectangle which will go up and down to maintain the height, L shape joint is given to the solid part of the mechanisms which is made by PVC pipe,motor is connected to the PVC at the end to the pipe and otheris fixed on the solid rectangle piece.

Heating coil is used for heating, heating coil is of 110 Watt. Temperature controller TC – 608 is used to control the temperatures which connected to a relay.

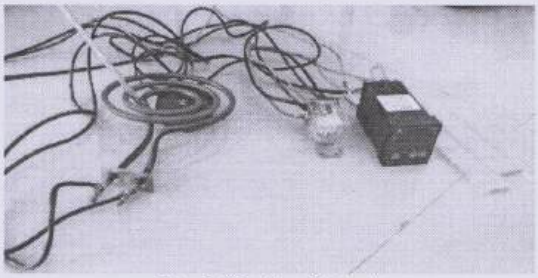

Fig .3 (Heating System)

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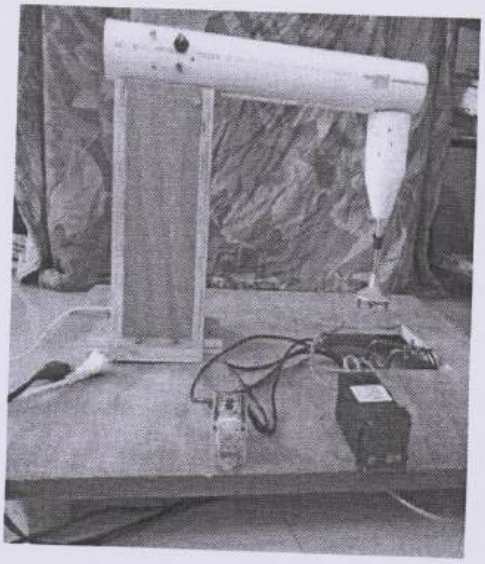

Fig. 4 Working Model

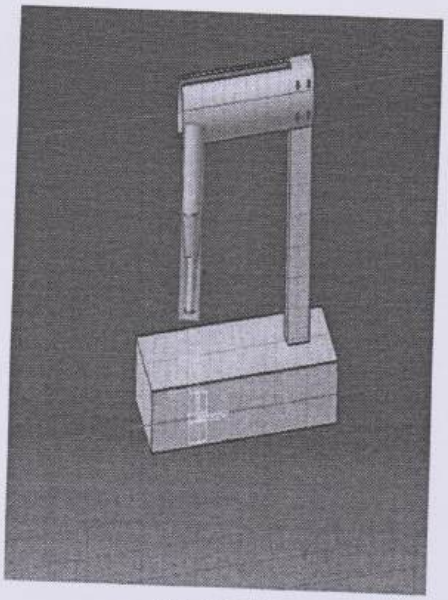

Fig. 5 Model

III. RESULT & DISCUSSION

The process of obtaining ghee or clarified butter is complicated and varies with milk. The milk of different animals have different quantity to fats and other vitamin and minerals.

Result Table:-

Name company or Milk Dairy	Curd Amount (gram)	Animal	Ghee (gram)
Maharashtra Dairy	1000	Buffalo	60
Katraj Dairy	700	Cow	10
Local provider	1000	Buffalo	65

IV. CONCLUSION

10 - 15 kg ghee making machine for women in rural areas. It is usually seen that ghee making machines are of larger quantities and rural women do not have the capability to buy large machines. So we would like to empower them by giving access to small machines to churn ghee and support the economic conditions of their families.

This machine is base on the old process of ghee making and each and every step is carried out in one machine, this reduces the effort and time consummation.

V. ACKNOWLEDGEMENTS

I would like to express my sincere gratitude towards my guide **Prof. Avinash A. Datarkar**, Department of Mechanical Engineering, Bharati Vidyapeeth's Groups of Institute & College of Engineering, Lavale for giving me his precious time and constant guidance with ample of knowledge. I would like to thank **Prof. S. S. Tambade** and **Prof S.R Patil**, H.O.D, Department of Mechanical Engineering, Bharati Vidyapeeth's Groups of Institute & College

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of Engineering, Lavale for giving me such a precious opportunity to work on this seminar. Without their assistance, this paper work would not have been done smoothly.

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

HYBRID DUAL AXIS SOLAR TRACKING (ALL WEATHER ENERGY GENERATION) SYSTEM

Asst. Prof S.N Kadam Suraj Sheikh[1], Pratik Bholane[2], Shubham Kamble[3] & Sudip Karmakar[4]
Mechanical Engineering Department Bvcoel Pune

ABSTRACT

Solar energy is the viable source of renewable energy over the last two-three decades. It is now used in variety of fields such as industries, domestic purpose. Solar energy tracking system is designed to collect maximum power from sun and to convert into electrical power. Another form of energy is Vibration energy which can be converted into electric energy by piezoelectric effect. To implement the project more efficiently, the concept of piezoelectricity has been introduced. In this paper, piezoelectric-based energy-harvesting technology is applied to generate electricity from vibration along with Dual Axis Solar Tracking System Thus Making it an all-weather Energy Generation System.

Keywords: *Dual Axis, Piezoelectric, LDR & Moisture sensor, linear actuation, Arduino Uno*

I. INTRODUCTION

Solar Tracking systems is the most viable source of energy generation. These have undergone many changes in terms of its size, shape and degree of freedom and movement. Even though lots of evolution have occurred in the Solar tracking system but the limitation of using it during sunlight remains unchanged. The construction of Hybrid Dual Axis solar tracking system includes LDR sensor for generation of energy by solar radiation whereas piezoelectric sensor is used to convert the vibration and impact of rain on the solar panel into energy.

The problem in a system is that it can generate energy only by using sunrays whereas during rainy season or cloudy weather condition it cannot produced electricity. However, by combining these two intermittent sources and incorporating maximum power point tracking (MPPT) algorithm, the system's power transfer efficiency and reliability can be improved significantly. When a source is insufficient, the load demands some other energy sources to compensate for the difference. So we are presenting a Hybrid Dual axis (All weather) solar tracking system that can be used in different weather condition throughout the year.

A. Objectives

Our Hybrid Dual Axis solar tracking system is designed such that it can generate energy throughout the year i.e. summer as well as rainy season.

It uses solar energy in summer by using LDR sensor and in rainy season it uses piezoelectric sensor (impact or vibration caused by rain) for energy generation.

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In this method we are using a Dual Axis Solar Tracking system to track the trajectory of sun using LDR sensors which sense the intensity of the incident light and the comparator compares the intensity among the LDR sensors and microcontroller gives the input to servo motor to rotate along the axis so as to obtain the maximum power generation.

Solar panels cannot generate electricity efficiently in case of rainy season. Piezoelectric sensors are used to sense the vibration caused in the system by impact of raindrops on the piezoelectric panel.

Hence by combining both measures of electricity generation, we increase the As stated before, the main aim of the system is the performance of dual axis solar tracking system by motor control methodIt consists of Piezoelectric sensors which are mounted on the back side of the solar PV panel for generation of electricity during rainy season by impact of rainfall for converting vibrational energy (impact of rainfall on Photo voltaic panel) for generation of electricity and LDR sensor for tracking and obtaining optimum solar intensity.

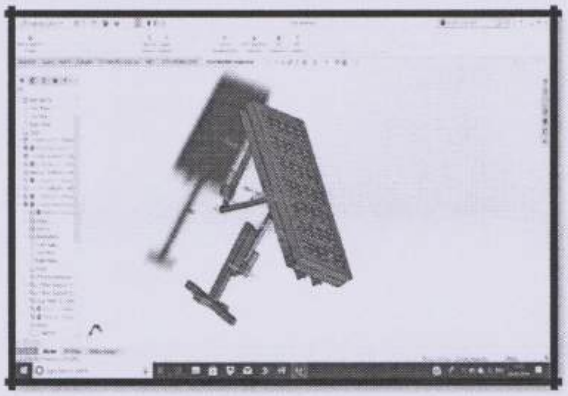

Fig. 2: Assembly of Hybrid Dual Axis Solar Tracking System

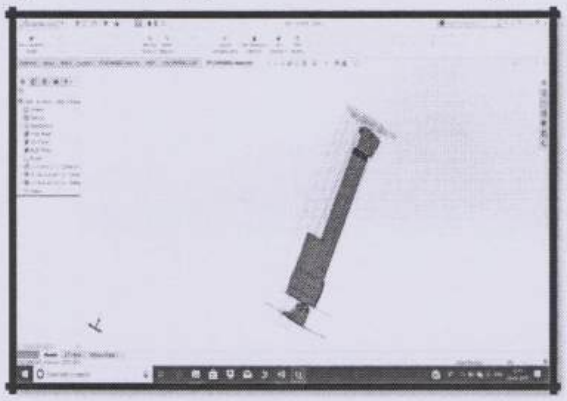

Fig. 3: Linear Actuations

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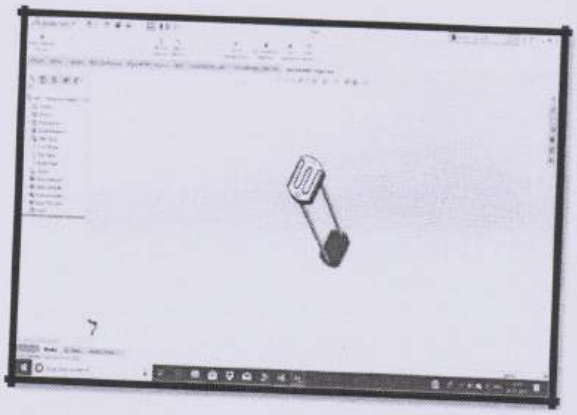

Fig. 4: LDR Sensors for Solar Tracking

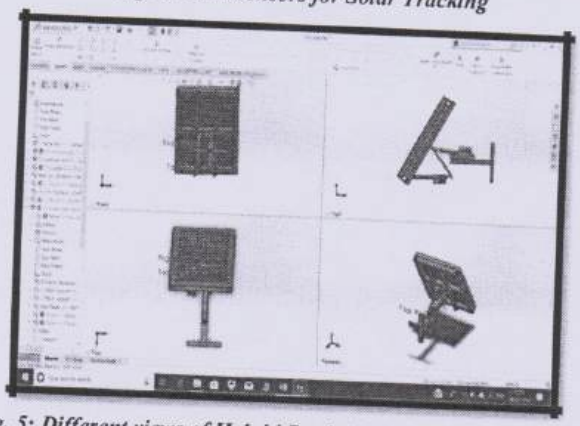

Fig. 5: Different views of Hybrid Dual Axis Solar Tracking System

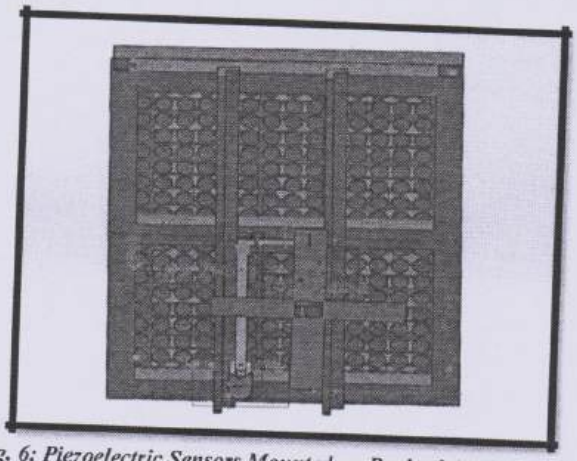

Fig. 6: Piezoelectric Sensors Mounted on Back of the Solar Panel

Piezoelectric Sensors are mounted on the back side of the Solar Panel for utilizing vibrational energy cause by solar panel during rainy season.

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V. WORKING

Sunlight sensing for maximum illumination, providing initial position and delays of photovoltaic (PV) panel, design of an adequate control unit for minimal consuming servo motors are the main challenges of solar tracking systems. That is the objective of this paper to design and implement an automatic control for directing maximum solar illumination to a PV panel. The proposed prototype Hybrid dual axis solar tracker panel is used to optimize the conversion of solar energy into electricity by orienting the panel toward the real position of the sun, at a cost of mechanical complexity and maintenance need, for the best efficiency.

In hardware development, two geared DC servo motors are pulse width modulation (PWM) controlled by a drive unit moving the panel using four light dependant resistors (LDR) to provide analogue signals processed by a simple and low energy ATMEGA168P microcontroller with Arduino. For the software part, after data processing, a C++ programming controls two DC servo motors to position light sensors in the most favourable direction, where solar panel and sensors will be perpendicular to the sunlight. Similarly, during rainy season vibration of rainfall on the solar panel can be converted by using piezoelectric sensors for generating electricity.

VI. CONCLUSION

This paper comes up with an idea of using vibration and solar energy together for generating electricity for our future needs. Hybrid vibration and solar power generation system is one of its kind which is low maintenance and also economy to use. And this system is also efficient. By using different sensor like LDR, Piezoelectric and Moisture sensor we can increase the efficiency of Hybrid Dual Axis Solar Tracking System

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

PLASTIC RECYCLING PLANT

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ABSTRACT

The main purpose of our study is to design and fabricate cost effective plastic recycling machine for granule products for plastic industries. As these plastic industries were based on export and imports as well as they wear having financial barriers to install highly sophisticated and advance recycling machine. The main aim of the project is to make a portable and eco-friendly environment by recycling of waste plastic. To implement this concept of machine is introduced. Machine works on combination of three processes to fulfill requirement. First step is to separation of waste plastics according to classification of plastic. In second step separated plastic feed to shredder in which plastic granules are formed. In third and last step the Shredded plastic is feed into the compression machine and then it is heated at a certain temperature in the oven, where the plastic is melted and by applying force through the screw jack the molten plastic takes the shape of the mould.

Keywords: *Plastic, Hopper, Shredder, Compression moulding, Screwjack, Recycling.*

I. INTRODUCTION

Plastic is a material consisting of wide range of synthetic or semi-synthetic organic compounds that are malleable and can be molded into solid objects. Mainly it is classified into two types are as follows.

1) Thermoplastic
2) Thermosetting plastic

Thermoplastic is highly recyclable plastic also called a thermo-softening plastic. It further classified into a seven types and denoted by various symbols. PET, HDPE, LDPE, PP, PS, PVC, & OTHER. Analysis of data shows a rising consumption in plastic. 13 million metric tones of plastic wasted every year in INDIA and every next year increased by 9mn. To overcome this recycling is the best option to reduce waste plastic. In INDIA recycling rate of plastic is 60% per year.

We have created two machines to recycle plastic the machine are desigh based on traditional industrial concept. The underlying principle behind the machine is same except the shredder. The machines apply heat to the plastic, plastic melts, gets pressed in to the mould and it is finally cooled to regain its solid state. Thats all the magic behind recycling.

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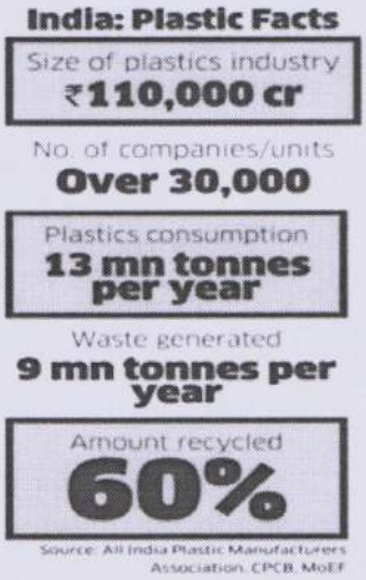

II. METHOD & MATERIAL

Collecting:
It is essential to always have enough plastic waiting to be sorted, shredded and worked with in order to run the workspace effectively. Plastic at this stage is still mixed and dirty. Workspaces have one collection bag (with appropriate signage) outside of the space for people to drop plastic and one inside to be sorted in different types- this cycle enables a continuous process. When the collection bag outside is full the team should bring it inside and replace it with another empty collection bag. Once inside the bag has to be emptied from the plastic and sorted as soon as possible. When the bag outside is full again the process is repeated. This cycle should run at all time to ensure a smooth operation of the workspace.

Sorting:
The sorting system is a crucial element for all recycling activities. A thorough and precise sorting effort guarantees smoother processes, better products and easier maintenance. An efficient sorting system allows the team to know exactly what plastic type is being used, which is crucial in order to figure out its melting temperature and set the machines correctly to run the workspace efficiently.

Shredding:
Once the plastic is sorted by their specific plastic type it's time to shred it. At this stage,bigger plastic objects are chopped into small granulate to reduce its size, enable washing, store more efficiently and be used with the other machines. It is good practice at this stage to separate plastic by colour

Washing:
Plastic needs to be clean before undergoing recycling processes. We always recommend people the bring plastic clean. Dust, dirt and impurities will cause problems to Precious Plastic machines and processes. Dirty plastic can result in extra maintenance, breakdowns, problematic productions and low-quality products.

Storing:
Once the plastic is dry it can be stored in the provided buckets. Ideally, buckets should be stackable, strong and transparent so you can see the colour and nature of the plastic.

Figure:

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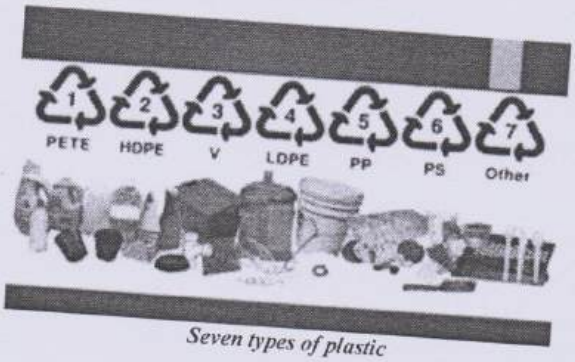
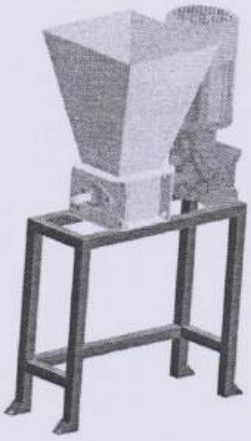
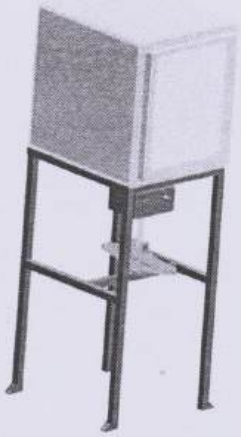


Seven types of plastic



Shredder



Compression moulding

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III. LITERATURE SURVEY

We took the references from a website and research paper published by a organization called as preciousplastic.com the website suggest the various methods to design and create a plastic recycling machine and how to use the waste plastic to create various parts and shapes

Research paper published by the university of Cambridge suggesting that the use of plastic recycling plants and the need for recycling of plastics and how they are affecting the environment

The Indian plastic industry is among the fastest growing ones. According to a 2017 knowledge paper by FICCI, a business and industry lobby, Indian plastic processing industry saw compounded annual growth rate of 10% between 2010 and 2015. Annual plastic consumption is expected to increase from 12 million tonnes to 20 million tonnes by 2020.

There has been an effort to encourage the alternative uses for plastic waste. The use of 10 to 15 % of plastics in road construction is one such use. Recycling, reuse, or alternative use of plastic waste can help reduce the amount of virgin plastic produced.

However, this is not enough to address the planet's plastic pollution problem.

IV. RESULT & DISCUSSION

Shredder required 2HP motor and 1440 Rpm
Given data

Power (P)=2HP
2HP=1500 watt
P=1500 watt
Given material
EN8
Syt=550Mpa

Factor of safety (FOS) = 2

SOLUTION: -
Torque from motor :- 9940Nmm
Force required to rotate blade

$T = r \times F$ r= Radius of Blade.
$9940 = 60 \times F$ T=Motor Torque.
$F = 165N$ F= Force required to rotate the shaft.

Actual Torque required
$T = r \times F$

$= 60 \times 165$
$T = 6300 N.m$

The allowable shear stress for shaft
$\tau(max) < 0.3$ syt
$\tau(max) < 0.3 \times 550$
$\tau(max) < 165$ mpa

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

SCRUTINY OF ANTIMATTER, AN UNFATHOMABLE SOURCE OF ENERGY

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ABSTRACT

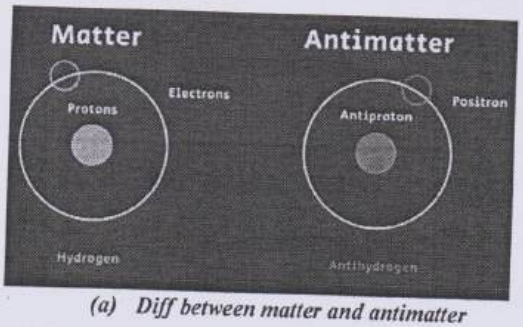
'Antimatter', as the name suggests its meaning, antimatter is the antithesis to matter; it is similar to matter having same mass as well as structural specifications but completely reversed in terms of charges. It suggests that as ordinary matter consists of electrons an antimatter atom would consist of 'positron' in place of electron. This dissimilarity between the charges of these subatomic particles yields an utterly beneficial property of Annihilation. Annihilation is nothing but a vanishing act which is one of the most unexplained mysteries of the universe. When an antimatter particle touches its counterpart it destroys it in a pyrotechnic flash, an explosive release of all the energy that has been locked within. This energy is released in the form of gamma rays. The energy so released is in so large amount that if harnessed in a proper way would cater to the increasingly high energy demands of the future

Keywords: *Antimatter, positron, annihilation, pyrotechnic flash, gamma rays.*

I. INTRODUCTION

It is extremely easy to say antimatter as the one 'opposite' to matter, but what actually is opposite about it. If we ever come across a substance made up of antimatter it would be immensely troublesome to distinguish between the two. The most basic reason for that is the excessive structural similarity as well as the similarity in the mass of the atoms of these counterparts. So what makes them both different?

The answer to this lies in the outermost orbit of the atoms of these elements. As we know about ordinary matter it consists of the three basic elements viz. protons, neutrons and electrons, but in case of antimatter instead of having an electron in the outermost orbit, it consists of a 'positron' and an 'antiproton'. As the name suggests, it has positive electric charge. So we can formulate antimatter as the oppositely charged form of ordinary matter.



(a) Diff between matter and antimatter

This differing charges result into a vanishing act known as Annihilation when these two elements combine or even come in contact with each other. Both these elements disappear releasing no mass but only the packets of energy. This phenomenon will be studied further in the article.

Due to its annihilation property it is exceedingly difficult to find antimatter in natural environment, as it would vanish in an instant to release energy in the form of gamma rays. But some laboratories like CERN have succeeded in creating antimatter by artificial methods. The method employed for the same is particle collision. But the amount that has been made is in extremely low quantities almost nearing to a few nano-grams which is quite insufficient for any practical applications of the substance.

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Another question arising is the storage of this so created 'antimatter', as it destroys all the matter it comes in contact with, so there is need of specialized containers for the safe and sound storage of this material. These topics will be further covered in the article.

Antimatter may also exist naturally in outer space far-far away from us, and as it carries structural properties similar to ordinary matter it would be difficult for us to distinguish. There are possibilities of existence of wholesome galaxies made out of this mysterious stuff. It goes as far as our imagination goes in this way. The existence of this extra terrestrial antimatter has been in search ever since an event occurred in Russia in 1908. As the article goes a farmer in the region reported a blast soo bright that it even made sun appear to be dark. The explosion was soo powerful that it almost evaporated everything below the blast epicenter. The trees were instantly sent to oblivion. The interesting fact about this explosion was that no debris was found after the blast, so it ruled out possible asteroid strike and weapons in that age were not soo developed to create such a blast of this intensity. So one conclusion that comes out is the possible antimatter strike from the e outer space which may have occurred. Similar events were observed around the globe ever since.

II. RELATION TO COSMOS

Big-Bang explosion:-
Over the yearsScientists have predicted the effects of the big-bang explosion. According to the research there was a void and extremely big amount of space with almost nothing, and as the theory goes all of a sudden there was an explosion resulting into release of energy. This energy later coagulated to form matter and antimatter. According to natures wonderful law of equilibrium matter and antimatter should have been formed into equal amounts. And as we know he fascinating property of annihilation they both would have annihilated in an instant and there would be nothing present at all after that. But due to a slight misalignment, matter was formed in more number of parts than its counterpart and all the universe that we see today is the courtesy of the matter that remained and later led to the formation of the universe.

Presence of antimatter in our own universe!

This may look to be a completely contradictory statement but antimatter is closer to us than we think. Positron can be found in the heart of our very own sun, where there are many electrons. Due to these electrons positron gets annihilated in an instant and turned into gamma rays. These gamma rays try to rush away from the center at the speed of light but are constantly intercepted by electrically charged particles. Due to this interception these gamma rays are constantly absorbed and released further with even less energy by these electrically charged particles. In doing so the gamma rays loose lots of their energy and it takes hundreds to thousands of years for them to reach the surface of the star. In this process the nature of the gamma rays changes from X-rays to ultra-violet and lastly into the rainbow of colors that we see naturally every day. Thus the daylight is the result of antimatter being produced in the center of the sun and its annihilation.

Cosmic rays:-
Antimatter also reaches earth in the form of cosmic rays in very small amount. These cosmic rays originate somewhere in deep space and finally reach earth's surface in the form of energized particles creating showers of secondary particles.

III. ANIHILATION

As discussed before annihilation is the process of release of all the atoms energy locked up within in an instant. The energy that can be obtained is given by Einstein's most famous equation $E=mc^2$
Where E= energy released
m= mass being annihilated
c= speed of light

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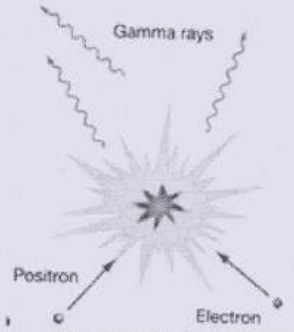
So even if we are to annihilate 1 gm of antimatter with 1 gm of matter the energy released would be around 90 terajoules. This is the potential of antimatter energy. We can obtain enormous amount of energy just from a small fraction of the fuel being utilized.



(b) Annihilation process

IV. PRODUCTION, STORAGE AND APPLICATIONS:-

Production:-
There are natural as well as artificial ways of antimatter production:-

1. Natural Production:-Antimatter particles or the positrons are naturally produced by theß decay of radioactive elements. They are also present in the cosmic rays. One more fascinating source of antimatter is Bananas. They contain potassium-40, a naturally occurring isotope of potassium in very small amount. These isotopes of potassium release positrons in a very small amount. Scientists also believe that positrons are released during thunderstorms. Further studies are going on in the matter of artificial sources of antimatter.

2. Artificial Production:-Positrons have been artificially produced in the laboratories like CERN and DESY (in Germany). The method implied for the production in these high tech labs is of particle collision. In these labs long beams of protons are accelerated to a speed approaching speed of light and are made to collide. Two separate beams are forced in opposite directions in a circular particle collider known as LHC (Large Hadron Collider). In the LHC 800 millions of collisions are happening per second and new particles are being formed every instant, so the scientists need to keep a sharp eye on the particles being produced. Positrons have been produced in these labs in similar way. But the amount that has been made is negligible so it can't be utilized for any practical applications.

Storage:-
Storage is one of the most concerning issues in the antimatter world as we know about the destructive behavior of antimatter that it annihilate all the matter it touches, so storage of these antimatter particles isn't possible in ordinary containers. Specialized containers are required just for the storage of these particles. They are known as penning traps. These penning traps use magnetic and electric fields to keep the particles confined to the center of the traps thereby not getting it to interact with the walls of the containers. The only issue with penning traps is that it can be used to store only the charged particles and no uncharged particles can be stored as they won't be interacting with the electric and magnetic fields.

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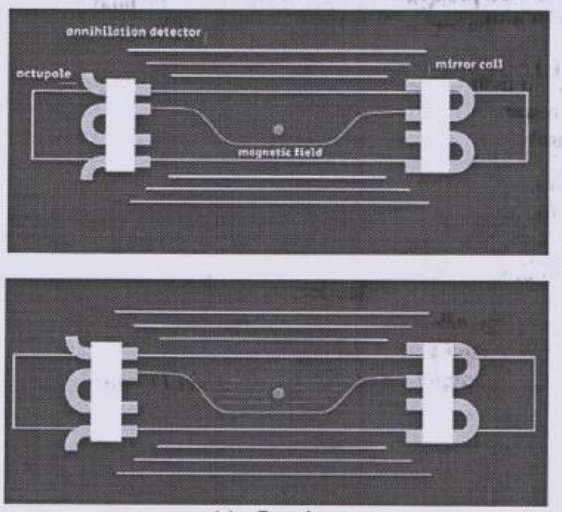

(c) Penning traps

Applications:-

1. Medical: - Positrons find a very important application in the field of medical sciences. They are used in PET scans (Positron Emission Topography). PET scans are done to observe the metabolic processes happening in the body. In these scans gamma rays are being injected in the body. Then three dimensional images of the tracer concentration are constructed by computer analysis. These antimatter particles are also used in curing tumors and cancer cells within the body. These particles are focused and directed to these cancer creating cells. They annihilate these cancer causing cells or the tumor cells thereby curing the disease right from its roots.

2. Interstellar travel:- With the fascinating amount of energy released after annihilating the atoms, antimatter can be seen as a probable and most efficient fuel for interstellar travel. If we somehow manage to harness and concentrate the energy released by annihilating the antimatter we can use it as a fuel source for long distance interstellar travel. For this there is need of specialized rockets which annihilate the fuel as and when required and controlling its annihilation. Now-a-days research is going on for the production of thee type of rockets by various companies one of which includes 'Positron Dynamics'.

3. Weapons: The energy so released after the annihilation naturally lures one into using it as a probable weapon source. Antimatter bomb is no longer just a term of science fiction. With the amount of research going into the topic it is vastly possible that one day we will see the creation of antimatter bomb by one of the superpowers of the world. The fact that 1 gm of antimatter creates 90 terajoules of energy almost double the energy released during the Nagasaki explosion, certainly gives it an edge over the conventional weapons. Certain countries had already started the research on creating these weapons but currently no one knows about the status of their research as it cannot be made public.

V. LIMITATIONS IN HARNESSING THE ENERGY

The limitations faced in harnessing the energy are

1. High production cost:- the first and foremost hurdle in production is its high cost. It is estimates that a gram of antimatter costs 62.5 trillion $, which is one high of an amount for any good energy source.
2. High amount of energy for production:- the energy required to produce antimatter is way more than the energy obtained by annihilating it. So till date no efficient way has been found of creating antimatter which would be beneficial

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3. Storage issues:- As discussed before storage is one of the most concerning issues in the antimatter world. The penning traps have their own limitations, and till date no other way have been found for the storage.
4. No natural evidence on earth:- Unlike conventional fuels we cannot gather antimatter from our earth, as it can't be present in our environment. So the unavailability of any natural source on earth is one of the limiting factors in harnessing this energy.

VI. CONCLUSION

Antimatter can easily be said as the strangest substances found till date but it has a very high potential of replacing the conventional energy resources and the conventional fuels. There needs to be further research into the topic. There are innumerable possibilities of the applications of the substance. We could even use antimatter fueled cars if proper research is done into the topic. It should be used for the betterment and welfare of the society, but should be used with responsibility and proper care as one wrong step could create an explosion that would destroy our planet. It has the potential of being the most important research and product in near future.

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

AN AERODYNAMIC STUDY OF AIR FLOW OVER A TRAIN TO SPECIFY THE MAXIMUM AIR INLET

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ABSTRACT

This paper consists of an aerodynamic study of air flow over a train to understand flow pattern and maximum air inlet for another project work. This research work identified a major source of vibration and energy loss associated with flow separation and vortex formation in the gap between the engine and coach next to it in a train. This study gives idea to identify efficient running in the train in terms of fuel consumption, stability of the train and passenger comfort during motion. There are several solutions related to the drag occurring in the train but the most efficient solution to the problem is flexible polymeric sheets may be connected at the gap between engine and the coach. In this review, we also specify the maximum air inlet and flow pattern at the surrounding of the bogie. In this paper CFD analysis is studied thoroughly.

Keywords: *Aerodynamic Study, Flow Separation, CFD analysis.*

I. INTRODUCTION

This paper considers the aerodynamic forces acting on container trains. It provides a reappraisal of some key test results that have been the basis of much analysis. The aerodynamic drag is approximately proportional to the square of (relative) wind speed. An aerodynamic optimization procedure using a genetic algorithm is presented.

This multi-purpose procedure is first applied to drag minimization. In a preliminary phase, the feasibility of the method is assessed on two-dimensional profiles. In addition to specific features of the genetic algorithm, the implementation of automatic mesh generation and flow calculation is investigated. First three-dimensional results are discussed, where the shape generation process is automated.

The moving train shifts the air with it and deforms the moving-through environment. If the train advances with the constant speed on open track, i.e. without presence of other trains or objects to cause interaction with the train being observed, the form of flow is independent of time and the phenomenon are stationary.

When the train moves with non-constant speed or when its immediate environment has been modified by the presence of other passing train or any other obstacle along the railway such as the pedestrian, vehicle, bridge, building, tunnel, etc., the flow of air varies with time and the phenomenon are non-stationary.

Non-stationary aerodynamics studies the effects of the pressure waves occurring when the train moves in the vicinity of single fixed installation, such as wall, bridge or other infrastructure, when passing through the tunnel or passing other train on open track or within the tunnel. In such case, the interaction between the train and its environment shall be determined as well as the safety and comfort limits shall be defined.

II. METHODOLOGY

There are different ways to obtain the velocities and pressures around a moving body. These include full-scale measurements, physical modeling, analytical Solutions and computational fluid dynamics. The analytical solution is possible only for very simplified two dimensional laminar cases, which are not of engineering interest. For many cases the full-scale measurements are difficult and/or expensive to perform. Although physical modeling is feasible for many engineering cases it also suffers from many drawbacks, which include scaling problems and measurement constraints. For instance, measuring the entire three-dimensional velocity field around a moving body is impossible

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because data can only be obtained from a limited number of points. The alternative is to use the computational fluid dynamics techniques, in which the full three-dimensional velocity and pressure field can be obtained in an affordable way. Fluid flow around moving bodies is normally turbulent, in which the velocity and pressure fields are fluctuating in both time and space. There is no analytical solution for the governing equations of turbulent flows, instead one needs to simplify these equations to be able to solve them numerically. Computational fluid dynamics (CFD) is a technique to solve the governing equations of the fluid flow using complex numerical algorithms.

The equations governing the fluid motion are the Navier-Stokes equations. These equations are derived from first principles of conservation of mass (continuity equation), momentum and energy. The continuity equation takes the form:

$$\frac{\partial \rho}{\partial t} + \frac{\partial (\rho u_i)}{\partial x_i} = 0, (1)$$

where $\rho, t, ui$are the density, time and velocity components in the$i$ direction,respectively.
In Equation (1), the density ρ is not constant but depends on the pressure andtemperature.
The momentum equations take the following tensor form:

$$\frac{\partial (\rho u_i)}{\partial t} + \frac{\partial (u_j \rho u_i)}{\partial x_j} + \frac{\partial \rho}{\partial x_i} - \frac{\partial \tau_{ij}}{\partial x_j} = 0, (2)$$

Here$\tau_{ij}$is the shear stress tensor.
The conservation of energy yields the following differential equation:

$$\frac{\partial (\rho E)}{\partial t} + \frac{\partial (u_j \rho E)}{\partial x_j} - \frac{\partial}{\partial x_i}\left(k \frac{\partial T}{\partial x_i}\right) + \frac{\partial (u_j p)}{\partial x_j} + \frac{\partial (\tau_{ij} u_j)}{\partial x_j} = 0, \quad (3)$$

where T is the temperature,τ_{ij} is the shear stress and E is the total energy.

In a turbulent flow, the variables fluctuate randomly in both time and space and statistical approaches can be used to describe the flow. The flow variables can be decomposed into mean and fluctuating a component, which is the basis of the Reynolds decomposition, Flow variables in the present work can be expressed as:

$$u = \bar{u} + u' \quad (4)$$
$$p = \bar{p} + p' \quad (5)$$
$$T = \bar{T} + T' \quad (6)$$

In many cases it is easier to analyze the time-averaged quantities. Thus the Reynolds decomposition is applied into the governing equations to obtain what is called the Reynolds Averaged Navier Stokes (RANS) equations. These equations take the form:

$$\frac{\partial \rho}{\partial t} + \frac{\partial (\rho \overline{u_i})}{\partial x_i} = 0, (7)$$

$$\frac{\partial (\rho \overline{u_i})}{\partial t} + \rho \overline{u_j} \frac{\partial \overline{u_i}}{\partial x_j} = -\frac{\partial \bar{p}}{\partial x_i} + \frac{\partial}{\partial x_j}\left(\rho \nu \frac{\partial \overline{u_i}}{\partial x_j} - \rho \overline{u_i' u_j'}\right), and \quad (8)$$

$$\frac{\partial \bar{T}}{\partial t} + \frac{\partial \bar{T} \overline{u_j}}{\partial x_j} = \frac{\partial}{\partial x_j}\left[\frac{\nu}{Pr}\frac{\partial \bar{T}}{\partial x_j} - \left(\overline{T u_j} - \bar{T}\overline{u_j}\right)\right] (9)$$

for the continuity, momentum and energy equations, respectively. The last term in the momentum equations, $\rho uiuj$are the Reynolds stresses, which are unknown andneed modeling.

The model used to approximate the Reynolds stresses in the present work was the Shear Stress Transport k-ω (SST k-ω) model—for more information about the model please see. The commercial CFD package Ansys-CFX has been used together with the sliding mesh technique to solve for the continuity and momentum equation for compressible flow.

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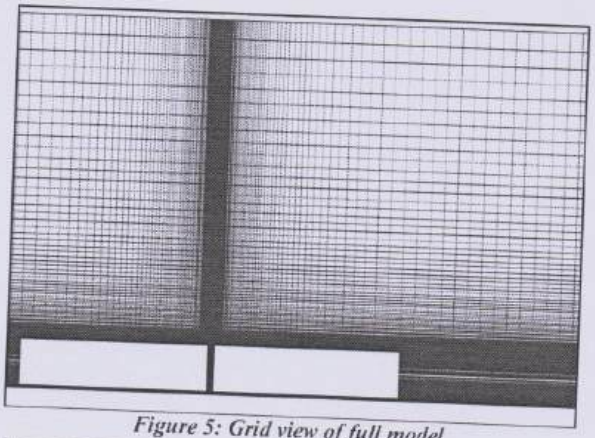

Figure 5: Grid view of full model

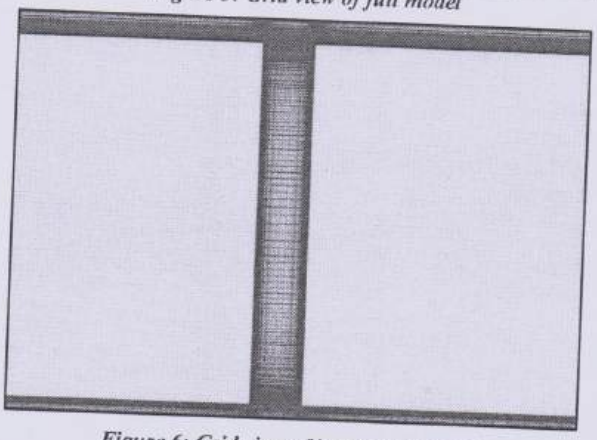

Figure 6: Grid view of inter-car gap area

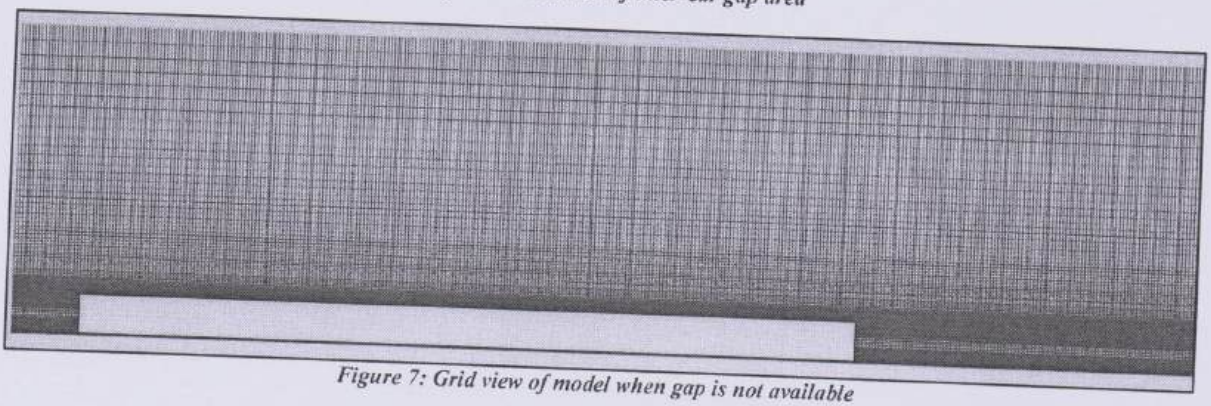

Figure 7: Grid view of model when gap is not available

VI. CONCLUSION

In the study, the aerodynamic drag reduces computationally in the inter-car gap of trains by using the flat plate over the portion of cavity. The size of inter-car gap in the train is 0.75 meter. The study is carried for the ambient condition in which the velocity of train is 20 m/s, due to which the Reynolds number increases, higher Reynolds number is responsible for the turbulence. This turbulence is defined by the k-s standard turbulence model, for this model intensity and length scale has been discussed above.

By studying this we come to the conclusion that the maximum air inlet in a train is on the over head or roof portion. So, the ideal space to mount the intake converging nozzle is at top side of the train. Secondary space to mount the intake converging nozzle is between the space between to wagon i.e. 0.75m.

A detailed flow has been presented with and without the gap in train. According to the results, in the gaped area the wake flow generates due to which vortex is formed, this can be reduced by filling the gap by some plate or by air bags. The result with continued train is good which shows the reduction of aerodynamic drag over the walls of train. Analysis and mathematical calculation shows that, by using the filler in the gap the aerodynamic loss reduces up to 3- 4 % for a gap between two coaches. If a locomotive having 20 bogies moving with the higher speed for a long journey then the aerodynamic loss can be reduced on very big scale.

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

STUDY ON MEXICANA BIODIESEL & ITS BLENDS ON SINGLE CYLINDER C I ENGINE. – A REVIEW

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ABSTRACT

This report explores the feasibility of biodiesel production from a weed plant *Argemone Mexicana* seed oil and an efficient catalyst crystalline manganese carbonate. To the best of the authors' knowledge, this is the first study making use of pure, crystalline, ash colored manganese carbonate as a heterogeneous catalyst for the production of methyl esters as fuel from *Argemone Mexicana* seed oil. The optimum process conditions for the conversion of *Argemone Mexicana* oil to its methyl ester by transesterification required 1% manganese carbonate as catalyst with alcohol to oil ratio 5:1 at 600C to yield biodiesel of 99.99% purity.

Keywords: *biodiesel, Mexicana, transesterification, biodiesel, diesel, blends.*

I. INTRODUCTION

The vegetable oil was used as a fuel around 100 years ago by the inventor of diesel engine Rudolph Diesel. Rudolph Diesel used peanut oil in his CI engine. After exploration of fossil fuels they were continued to be major conventional energy source. The fossil fuel demand is continuously increasing world over resulting in rapid depletion of fossil fuel deposits. In several studies, it has been experimentally investigated that the human health hazards are associated with exposure to diesel exhaust emissions. Therefore, limited fossil fuels and intensified environment pollution, it has become a global issue to develop such clean fuel, which is technically feasible, domestically available and environmentally acceptable.

The selection of biodiesel is mainly because of an oxygenated, renewable, biodegradable and environmental friendly with similar flow performance and low emission profile. It is also due to the attractive characteristics of biodiesel which are higher cetane number, absence of Sulphur and aromatic compounds, excellent lubricity etc. The use of vegetable oils directly in an engine is considered impractical because these oils contain free fatty acids (FFA), phospholipids, sterols and other impurities. This vegetable oil is converted into biodiesel by the process of esterification. Esterification is a reaction involving FFA and alcohol which yields fatty acid alkyl ester and water.

This paper investigates the production and properties of *Argemone Mexicana* biodiesel and their comparison with diesel fuel. The use of *Argemone Mexicana* as a engine fuel has a potential to reduce exhaust emission since Mexicana oil has less than half of carbon dioxide emission than customary diesel. Experimental tests are conducted on the single cylinder four stroke compression ignition engine. The performance of the engine using blends of *Argemone Mexicana*biodiesel were evaluated and compared with the performance obtained with diesel. The main purpose of the present study is to determine the suitability of using MB6, MB12, MB18, MB24, MB30 and MB36 on CI engine without any major hardware modification and to compare the results of these blend fuels with diesel fuel. And performance of engine was recorded at 0%, 20%, 40% 60%, 80%, 100% and overload conditions. The significant performance parameters of C.I. engine were selected as Specific fuel consumption, brake power, brake thermal efficiency, mechanical efficiency, indicated power and torque

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II. LITERATURE REVIEW

[1] Optimization of Bio-Oil extraction process from Beauty Leaf (Calophyllum inophyllum) Oil seed as second generation bio diesel source, Jahirul M.I. Brown J.R, ETAL.
Beauty Leaf (Calophyllum inophyllum) oil seed is a potential source of non-edible vegetable oil, for its future production of bio-diesel because of its ability to grow in wide range of climatic conditions, easy cultivation, high fruit production range and high oil content in the seed. Chemical extraction was found to be very effective method for oil extraction because of its consistency in performance and high oil production rate. Chemical Extraction using Hexane as a solvent was found to be very effective but due to lack of availability of hexane and lack of hexane recovery system it was not possible to take full advantage of the effectiveness of the product.

[2]. Study on Emissions of a DI Diesel Engine Fueled withPistacia Chinensis Bunge Seed Biodiesel-Diesel Blends, Ma Zhihao, ETAL

This paper deals with the emissions of an YTR3105 direct injection diesel engine fuelled with pistacia chinensisbunge seed biodiesel-diesel blends. The results of the study show that CO, HC and exhaust smoke emissions decreasewith the increase of the proportions of biodiesel in the blends. The NOx emissions are reduced as the engineoperating with B10 and B20, but slightly increased with B30. HC emissions and exhaust smoke of the engine fueled with biodiesel-diesel blends are lower than that. Over the load range NOx emissions of B10 and B20are slightly lower than that of diesel, and B30 is almost equivalent to diesel. Exhaust smoke decreaseswith the increasing the proportions of biodiesel fuel in the blends.

[3]. Experimental investigations of ignition delay period and performance of a diesel engine operated with Jatropha oil biodiesel, Mohammed EL-Kasaby, ETAL.

Jatropha-curcas as a non-edible methyl ester biodiesel fuel source is used to run single cylinder, variable compression ratio, and four-stroke diesel engine. Combustion characteristics as well as engine performance are measured for different biodiesel– diesel blends. It has been shown that B50 (50% of biodiesel in a mixture of biodiesel and diesel fuel) gives the highest peak pressure at 1750rpm, while B10 gives the highest peak pressure at low speed, 1000rpm.B50 shows upper brake torque, while B0 shows the highest volumetric efficiency.B50 shows also, the highest BSFC by about(12.5–25%) compared with diesel fuel. B10 gives the highest brake thermal efficiency.B50 to B30 show nearly the lowest CO concentration, besides CO concentration is the highest at both idle and high running speeds. Exhaust temperature and NOx are maximum for B50.Delayperiodis measured and correlated for different blends. Peak pressure of B50 is higher at low and high engine speed, while that of B10 and B20 are optimum at economic engine speed (medium speed). Higher percentage of NOx in case of biodiesel compared with that of diesel is attributed to the higher combustion temperature of oxygenated biodiesel resulted from advanced injection.

[4]. An Experimental Evaluation of Performance and Emission Characteristics for Modified Diesel Engine Using Mixed Biofuel, Yogendra Rathore, ETAL..

To reduce emissions produced by on-road vehicles. Biodiesel is a renewable fuel that has been shown to reduce many exhaust emissions, except oxides of nitrogen (NOx), in diesel engine cars. This is of special concern in inner urban areas that are subject to strict environmental regulations, such as EURO norms. Also, the use of pure biodiesel (B100) is inhibited because of its higher NOx emissions compared to petroleum diesel fuel. It is observed that for the biodiesel blends of 10% and 20% the density, fire point, flash point and calorific value were very close to that of diesel, which makes them suitable for using them as an alternative for diesel. The mixed Karanja and Coconut shows higher biodiesel yield of 72.5%.The mixed biodiesel blend B10 shows the higher brake thermal efficiency which is slightly less than that of diesel. The specific fuel consumption of mixed biodiesel blends B10 and B20 shows value closer to diesel. Mixed Karanja and Coconut biodiesel blends B10 and B20 can be used as alternative fuel in diesel engine.

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ANALYSIS & OPTIMIZATION OF AUTOMOTIVE BUMPER BEAM WITH COMPOSITE MATERIALS USING FEA

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ABSTRACT

The fundamental motivation behind this paper is to enhance the crash worthiness, reduce the weight and improve the cost of the bumper. Designing a heavy vehicle bomber and sequential analysis on how it influences the parameters, for example, shape, thickness and material will help in increment the quality and lessening in weight. This additionally gives a method for utilizing materials that are recyclable and biodegradable which helps in controlling natural contamination. The bumper beam of the heavy vehicle is modelled and analyzed with the steel material and then the design is modified and improvised by using a shape optimization tool in the FEA. In light of the shape enhancement comes about the state of the model is adjusted and replaced with aluminum and composites. shape of the bumper are premeditated for the analysis on an automotive bumper to enhance the properties of the beam particularly to stand against the impact forces of crash, ranging from medium speed to high speed impact collisions. From this work it is recommended that S2 glass epoxy is performing extremely all around contrasted with the current bumper material. The stress is diminished by 45.14% and the deformation is decreased by 55.25%.

Key words: *Bumper, Analysis, Composite material, FEA.*

I. INTRODUCTION

An automobile's bumper is the front-most or rear-most part, ostensibly designed to allow the car to sustain an impact without damage to the vehicle's safety systems. They are not capable of reducing injury to vehicle occupants in high-speed impacts, but are increasingly being designed to mitigate injury to pedestrians struck by cars. Front and rear bumpers became standard equipment on all cars in 1925. What were then simple metal beams attached to the front and rear of a car have evolved into complex, engineered components that are Integral to the protection of the vehicle in low-speed collisions. Today's plastic auto bumpers and fascia systems are aesthetically pleasing, while offering advantages to both designers and drivers. The majority of modern plastic car bumper system fascia's are made of thermoplastic olefins (TPOs), polycarbonates, polyesters, polypropylene, polyurethanes, polyamides, or blends of these with, for instance, glass fibers, for strength and structural rigidity.[1]

II. PROBLEM FORMULATION

1. To determine the Deformation and Impact force for various materials used for bumper like Structural Steel, Aluminum alloy, PVC Foam, SAN Foam, Resin Epoxy, Carbon Epoxy and S2 Glass Epoxy by using FEA software.
2. Comparing the result to identify the best suited material for the bumper.
3. To analyze mechanical properties focus on stress analysis.
4. Modeling the car bumper with actual dimension into the solid modeling software and analyze by using FEA software (Analysis).

III. OBJECTIVES

The motivation behind this task is to build up a natural fiber reinforced thermoplastic composite as a bumper material and to explore the mechanical and reusing properties. In the outline and investigation the bumper particulars were taken from the standard vehicle, at that point the displaying of the bumper is finished by the solid modelling software and afterward the effect stacking was connected utilizing FEA programming to break down.

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To analyze the mechanical properties on front part (fascia) of car bumper

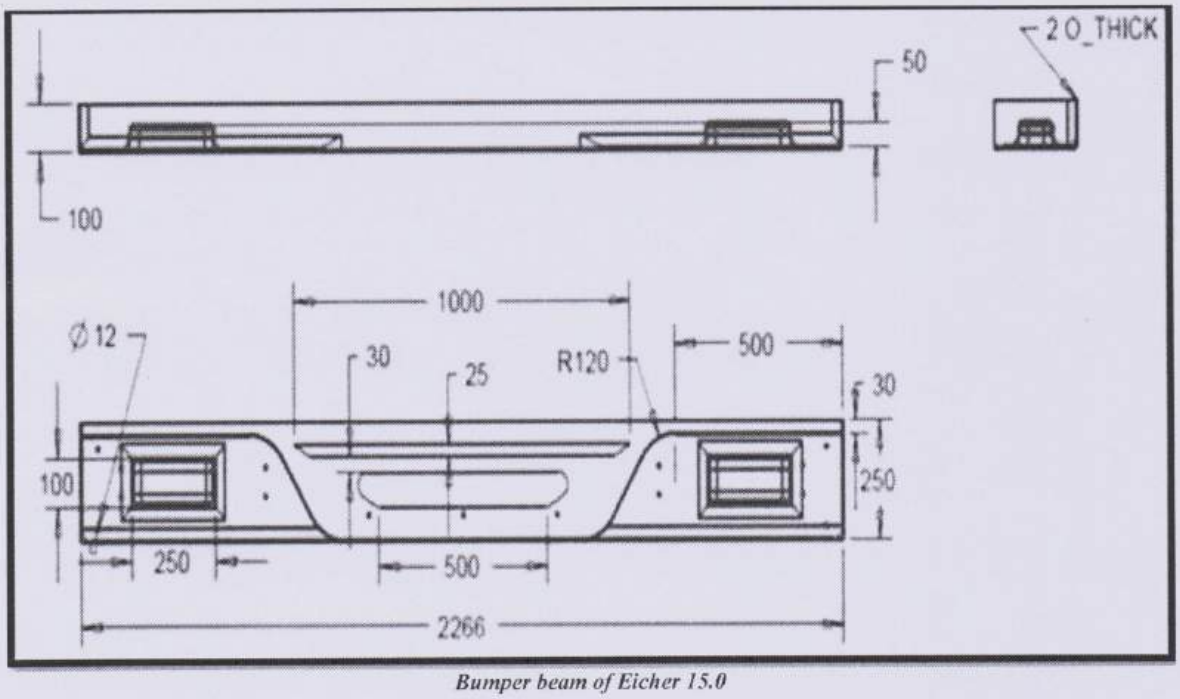
- To analyze on mechanical properties focus on stress analysis
- To modeling the actual dimension of the car bumper into the solid modeling software and analyze by using FEA software (Analysis).
- To investigate polymer composite material bumper based on their geometry and other parameters that influence the compatibility of car bumper.

To evaluate failure mechanism of the car bumper:

- To study the load distribution on the bumper either it is uniformly distributes to all the part during the analysis.

IV. MODELLING AND ANALYSIS

The bumper beam is demonstrated and investigated. The displaying is done in solid modelling software. [2] It is investigated in FEA programming. The parameters which impacts the execution of the bumper is thickness, speed, materials and shape of the object. The thickness of the bumper is 2mm.The heavy vehicle bumper beam is modeled and drawing specification of the Eicher 15.0 bumper is shown in Fig



Bumper beam of Eicher 15.0

V. ANALYSIS & OPTIMIZATION USING DIFFERENT MATERIALS

Mass of the car with bumper =4255 kg
Speed of the car = 2.5kmph
Assume this car is hitting at another identical one and it will stop in 0.1seconds
Force acted during collision = m*a=4255*7 = 29785 N
m= mass of car in kg,
a = acceleration of car in m/s2

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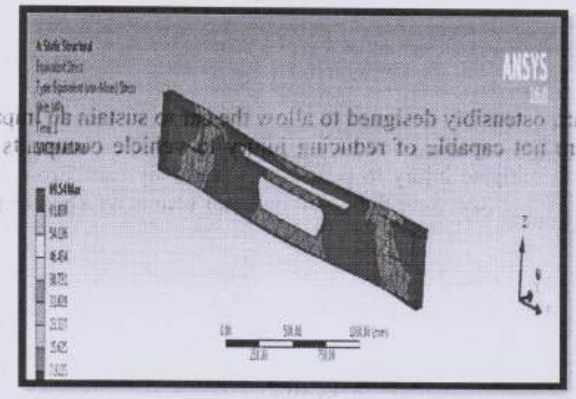
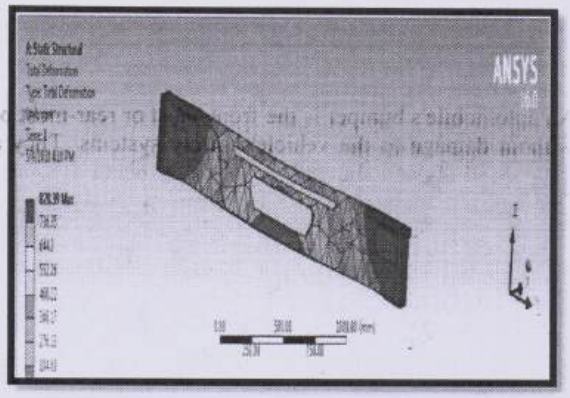
3. PVC Foam Bumper

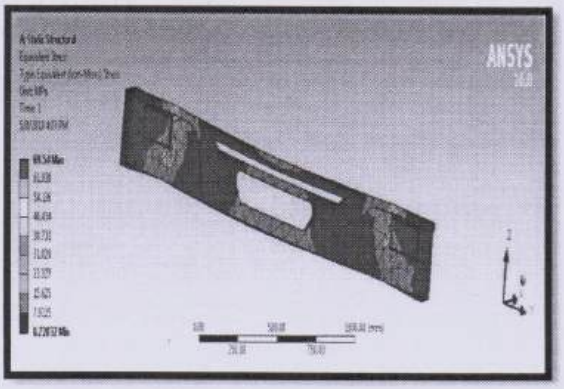


Stress distribution of bumper beam in statics

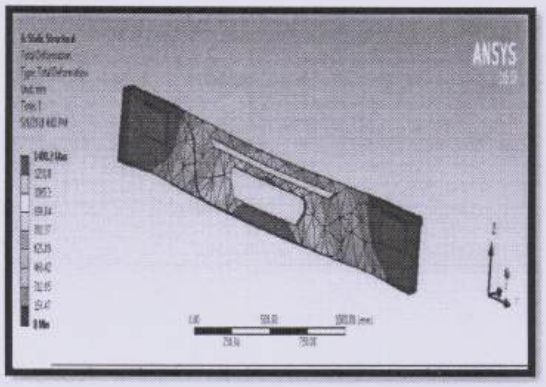


Deformation of bumper in statics

4. SAN Foam Bumper

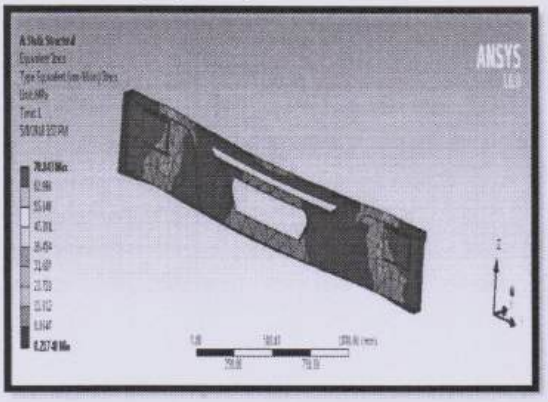


Stress distribution of bumper beam in statics

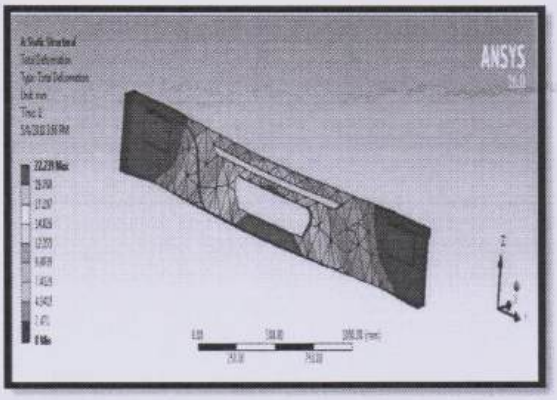


Deformation of bumper in statics

5. Resin Epoxy Bumper



Stress distribution of bumper beam in statics



Deformation of bumper in statics

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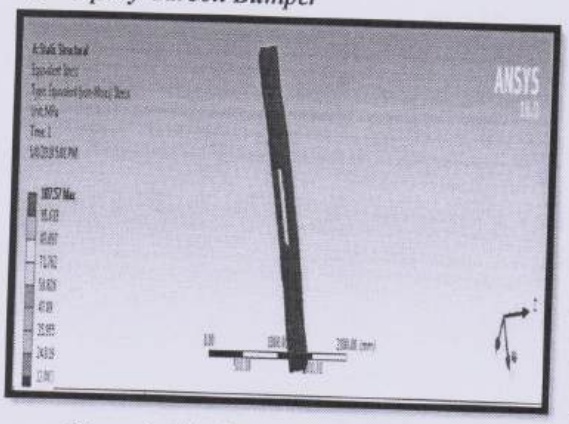
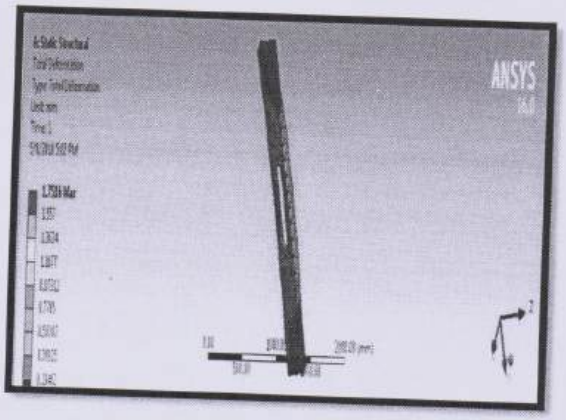
6. Epoxy Carbon Bumper

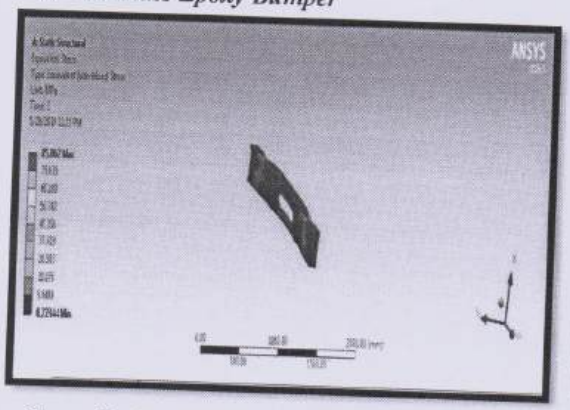


Stress distribution of bumper beam in statics

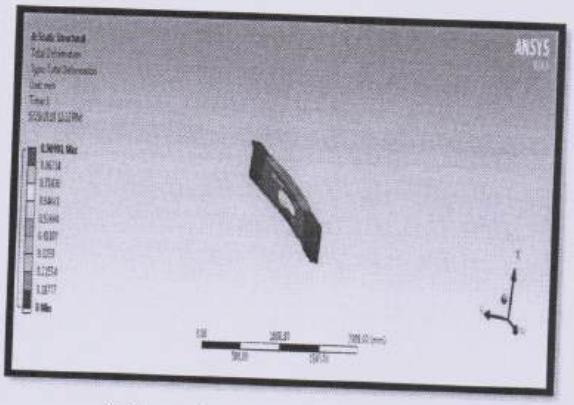


Deformation of bumper in statics

7. S2 Glass Epoxy Bumper



Stress distribution of bumper beam in statics



Deformation of bumper in statics

VI. RESULT & DISCUSSION

The following results are obtained from the impact analysis of Eicher 15.1 bumper using existing & other composite materials.

In this study seven materials were considered based on their properties, they are structural Steel, Aluminum, PVC Foam, SAN Foam, Resin Epoxy, Carbon Epoxy and S2 Glass Epoxy. Analysis of bumper beam with different material under impact load of 2.5 Kmph is done. Structural steel is used in making of existing bumper. From the result stress developed in this bumper is 85.062 Mpa and total deformation is 0.96991 mm, the yield strength of S2 Glass Epoxy 480 Mpa. It is cleared that the bumper beam is withstanding 2.5 Kmph impact and the deformation is also within the range.

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Result table

Velocity Kmph	Material	Impact Stress (von misses stress)Mpa	Deformation in mm
2.5	Structural steel	88.325	0.492
2.5	Aluminum	89.417	1.3833
2.5	PVC Foam	69.54	828.39
2.5	SAN Foam	69.54	1408.3
2.5	Resin Epoxy	70.843	22.239
2.5	Epoxy Carbon	107.57	1.7516
2.5	S2 Glass Epoxy	85.062	0.96991

VII. CONCLUSION

In the design of bumper beam the deflection of bumper beam should be below the critical value. According to Indian standard, the bumper beam should not show any yielding when it is impacted at a speed of 2.5 Kmph. Here the material used is steel. The yield stress of the structural steel of grade 55 is 380 N/mm2. The ultimate strength of steel is 480 N/mm2.

The S2 glass epoxy material has shown better stress and deflection result incorporative to structural Steel. In order to achieve highest stability, cost effective and manufacturability of product, the S2 glass epoxy that could replace the Steel based on the strength and deformation criteria. The deformation and stress suitable for bumper is shown by S2 glass epoxy and epoxy carbon. The analysis is done at a speed of 2.5 Kmph.

From the result stress developed in this bumper is 85.062 Mpa and total deformation is 0.96991 mm, the yield strength of S2 Glass Epoxy 180 Mpa. It is cleared that the bumper beam is withstanding 2.5 Kmph impact and the deformation is also within the range.

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ADVANCED TECHNIQUES IN BLADELESS WIND MILL POWER GENERATION

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ABSTRACT

Bladeless Wind Power Generation uses a radically new approach to capturing wind energy. The device captures the energy of vorticity, an aerodynamic effect that has plagued structural engineers and architects for ages (vortex shedding effect). As the wind bypasses a fixed structure, it's flow changes and generates a cyclical pattern of vortices. Once these forces are strong enough, the fixed structure starts oscillating. Instead of avoiding these aerodynamic instabilities our design maximizes the resulting oscillation and captures that energy. Naturally, the design of such device is completely different from a traditional turbine. Instead of the usual tower, nacelle and blades, the device has a fixed mast, a power generator and a hollow, lightweight and semi rigid fiberglass cylinder on top. This puts the technology at the very low range of capital intensity for such projects, it also makes it highly competitive not only against generations of alternative or renewable energy, but even compared to conventional technologies.

Key Words: *Bladeless windmill, Vortex, Spring, Polypropylene sheet, Birds*

I. INTRODUCTION

The Bladeless Windmill is such a concept which works on the phenomenon of vortex shedding to capture the energy produced. Generally, structures are designed to minimize vortex induced vibrations in order to minimize mechanical failures. But here, we try to increase the vibrations in order to convert vortex induced vibrations into electricity. The paper studies the scope and feasibility of the bladeless windmill. This study focuses on identifying the effect of governing parameters on the energy extraction efficiency by VIV. The parameters investigated were the mass ratio, the mechanical damping coefficient, and the Reynolds number. Wind power has become a legitimate source of energy over the past few decades as larger, more efficient turbine designs have produced ever-increasing amounts ofpower. But even though the industry saw a record 6,730 billion global investment in 2014, turbine growth may be reaching its limits. Bladeless turbines will generate electricity for 40 percent lesser in cost compared with conventional wind turbines. In conventional wind power generation transportation is increasingly challenging because of the size of the components: individual blades and tower sections often require specialized trucks and straight, wide roads. Today's wind turbines are also incredibly top heavy. Generators and gearboxes sitting on support towers 100 meters off the ground can weigh more than 100 tons. As the weight and height of turbines increase, the materials costs of wider, stronger support towers, as well as the cost of maintaining components housed so far from the ground, are cutting into the efficiency benefits of larger turbines.

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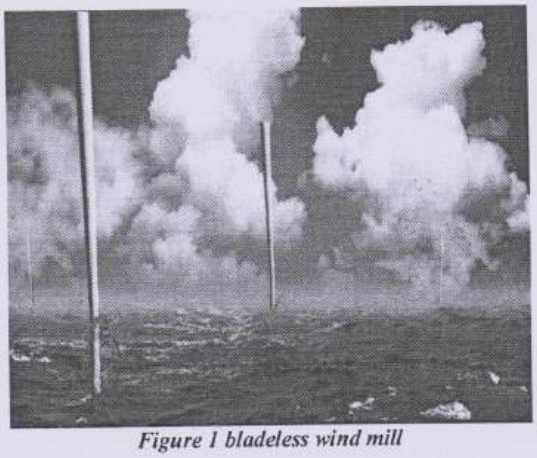

Figure 1 bladeless wind mill

II. HISTORY OF BLADELESS POWER GENERATION

The Vortex Street effect was first described and mathematically formalized by Theodore von Kármán, the genius of aeronautics, in 1911. This effect is produced by lateral forces of the wind on any fixed object immersed in a laminar flow. The wind flow bypasses the object, generating a cyclical pattern of vortices, which can become an engineering challenge for any vertical cylindrical structures, such as towers, masts and chimneys. The issue is that they may start vibrating, enter into resonance with the lateral forces of the wind, and ultimately, collapse. One of suchexamples is the collapse of three cooling towers of the power station Ferrybridge in 1965. However, it is possible that the same forces can be captured to produce energy - the idea behind Vortex.

In this project we are going to design and develop the working model of a sovenious type of vertical axis bladeless wind turbine for the power generation from wind energy. We are going to design the vortex tube for drag force. The static analysis of turbine blades will be done. The power generation will be demonstrated with the help of stepper motor in place of dynamo.

III. CONSTRUCTION

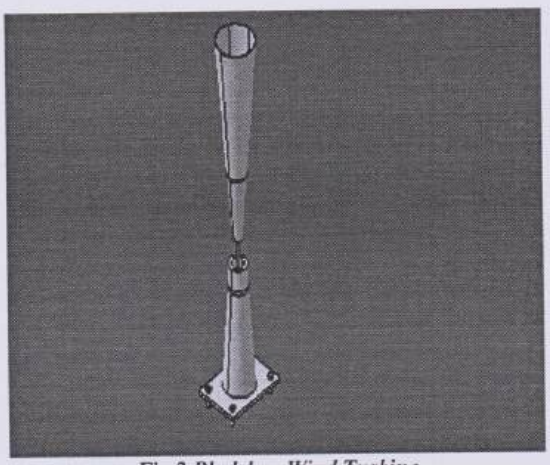

Fig.2 Bladeless Wind Turbine

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Parts - mast

It's a light circular sectic structure made of fiber glass & carbon fiber. Mast act as wind breaker that generates the oscillatory movement.

- **ROD**

Made of carbon fiber. The rod gives strength & flexibility to the movement.

- **Generation system**

Kinetic enegy from the wind is converted into electricity from the piezo sensors.

- **Tunning passive system**

A Magnetic confinement provides movement stability & extend operating hours.

- **Foundation**

Reduce significantly because of the vortex lightness.

Material: fiber glass

Fiberglass is a composite material of glass cloth and polyester resin (Fiberglass). When using this material the fabrication process involves the construction of a foam replica figure, the formation of a basic mold around the replica, and finally the application of the resin and glass cloth to produce the desired shape. Constructing a cylindrical airfoil out of fiberglass is an intriguing option because of its low density and ease with which to fabricate. As the weight of the airfoil directly correlates to the force required to induce movement, fiberglass would require less lift force, allowing for the airfoil to reach natural frequency oscillation at lower flow velocities. Additionally, fiberglass is reasonably affordable, does not require specialized machinery to work with, and can be molded to replicate most geometric shapes, contributing to its feasibility as an airfoil material.

Though fiberglass has generally favorable material characteristics for the fabrication of an airfoil for this device, it fails to satisfy one important criterion; surface finish. After the application of the resin and glass cloth, the fiberglass must be left to set in place. The resin is viscous; however it does settle around the glass cloth strands forming an uneven surface finish (Fiberglass). The material surface finish is an important characteristic to consider for fluid flow applications. In laminar flow conditions, airfoil surface roughness can contribute to a transition to more turbulent flow should the degree of surface inconsistencies be great enough. In turbulent flow conditions, airfoil surface roughness plays a far more important role; Additional surface roughness on the airfoil will compound the inconsistencies found in turbulent flow, causing an increase in Reynolds Number and greater flow turbulence. In the WPI wind tunnel flow conditions are nearly laminar, diminishing any significant effects of surface roughness on aerodynamic performance. Conversely, in outdoor applications wind flow will be turbulent, and a smooth airfoil surface finish will be required to facilitate proper aerodynamic performance. If left with the unfinished surface, the airfoil may not be aerodynamically efficient and achieving lock-in conditions may be considerably more difficult. Commonly fiberglass components are sanded down to a smooth surface and then finished with a glossy resin. This process is rather labor intensive and requires some basic craftsmanship to achieve a truly uniform finish. Should the finishing process not daunting, fiberglass is an appropriate choice for an airfoil assembly material.

Carbon fiber

Carbon fiber is a much more ambitious material to use for the cylindrical airfoil than the aforementioned options. In general, carbon fiber is one of the lightest and strongest fabrication materials currently available. It is formed by weaving miniscule strands of carbon together to form a woven 'sheet'. These strands have a diameter of approximately 5-8 micrometers, and millions are required to form even a small piece of woven carbon fiber (What). As one may conclude, the assembly process for such a material requires specialized machinery and is far more expensive than the other two options listed here. Because of this, the viability of carbon fiber as a fabrication material for the cylindrical airfoil is low. Despite its relative cost, carbon fiber remains a necessary consideration for this purpose because of its significant durability and commercial implications. A carbon fiber airfoil would require minimal lift force to achieve natural frequency oscillation, withstand all but the most extreme weather elements, and remain intact without required maintenance for a longer duration than either of the other two materials. This material longevity and reliability is crucial for the commercial mass production of any product, especially one which is located outside and would undergo immense normal and shear stresses. Though it is not the most feasible, a carbon fiber cylindrical airfoil would undoubtedly be an effective airfoil for this application.

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Working

Our project works on principle of vibration. In which electricity is generated by WIND energy. The wind strike on the mast , it begin to oscillate. When the frequency of air is equal to the natural frequency of mast , the resonance is created. Due to which vibration is created. This vibration is transferred to the rod made of fiber glass due to which rod also start to vibration. This vibratory motion is further transmitted to the base. The base containpiezo sensors, due to vibratory motion of rod electricity is generated in that alternator.

IV. PROBLEM STATEMENT

The utilization of wind energy with the help of conventional windmills is very costly. To find the answer to the above question survey of established literature was done. The problems related to conventional windmills were studied.

- It was found that huge investment is the most significant problem for erection of windmills.
- Conventional windmill requires places where wind speed is more. Such places are limited. Hence windmills working on lesser wind speeds are need of the hour.
- The cost of manufacturing different parts of windmill is very high. A typical windmill will cost $3000-$8000 per kilowatt.
- So also, the transportation of such huge parts is very costly and risky. If during transportation components get damaged then again cost increases.
- Designing of windmill blades is also a big task.
- The size of the assembled windmill is also very large. The conventional windmills occupy lots of space. The commercial turbines can be 160m high.
- Area of installation is 60 acres per megawatt of capacity of wind farms.
- Also they prove fatal to birds.
- They produce low frequency sound which is not good for human health
- To develop unconventional wind turbine which have less moving parts and which is cheap is cost.

Objectives

The main objectives of this project is as follows,

- To increase the efficiency of wind power generation.
- To produce clean energy to meet the increasing demands.
- To make the wind energy economical and efficient.
- Rural electrification.
- To reduce pollution and global warming.
- Development of the project so that it can be used on domestic purposes.
- To reduce the manufacturing cost of the turbine.
- It aims to be a 'Greener' Wind alternative leaving less carbon footprint on theenvironment.

V. ANALYTICAL APPROACH

Vortex Induced Vibration

Let's consider a structure called Tapered Oscillation Cylinder.

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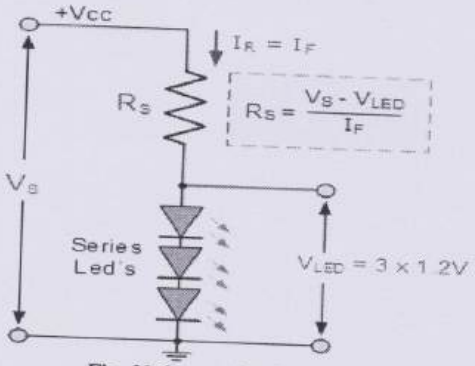

Fig. 21 Connecting LED Series

Although the LED series chain has the same current flowing through it, the series voltage drop across them needs to be considered when calculating the required resistance of the current limiting resistor, Rs. If we assume that each LED has a voltage drop across it when illuminated of 1.2 volts, then the voltage drops across all three will be 3 x 1.2v = 3.6 volts.

If we also assume that the three LEDs are to be illuminated from the same 5-volt logic device or supply with a forward current of about 10mA, the same as above. Then the voltage drops across the resistor, Rs and its resistance value will be calculated as:

$$V_{LED} = 3 \times 1.2\text{volts} = 3 \times 1.2\text{v} = 3.6\text{v}$$

$$R_S = V_S - V_{LED} = 5 - 3.6 = 1.4\text{volts}$$

$$\therefore R_S = \frac{1.4\text{v}}{10\text{mA}} = 140\Omega$$

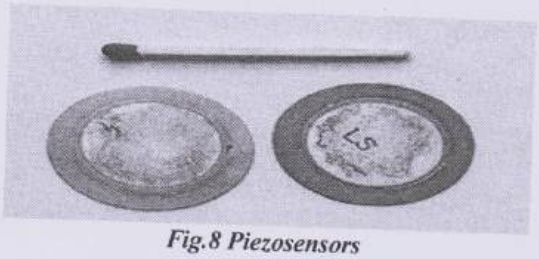

Fig.8 Piezosensors

VI. CONCLUSIONS

In summary, the generation of electricity is made possible by the small structure of bladeless turbine. Efficient power is generated. This project will satisfy the need of continuous generation of electricity. The overall project uses less space area hence highly economical for the rural electrification of India.

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ADVANCED DRIVER ASSISTANCE WITH AUTOMATIC CAR IGNITION KILL SWITCH AND TRACKING.

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ADVANCED DRIVER ASSISTANCE WITH AUTOMATIC CAR IGNITION KILL SWITCH AND TRACKING

Prof. Leena B.Chaudhari*[1], Prof. S.G.Gawhale[2] & Prof P.A.Yadav[3]
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ABSTRACT

One of the most common reasons for deadly road accidents around the world is the driver fatigue.These accidents are amongst the worst because drowsy drivers often fail to take any evasive actions such as braking or cause to change the direction abruptly. This shows that in the shipping industry especially, whenever a driver of a heavy vehicle is often exposed to hours of working leads to a monotonous driving which causes fatigue without recurrent rest period. Drowsy driving cause severe multi-car crashes, primarily when a fatigued driver fails to control when approaching a traffic jam or when a driver falls asleep and crosses the contour or median strip into oncoming traffic. Due to the recurrent incidence of driver fatigue, this has become an area of great socio economic concern. Therefore, road accidents prevention systems by detecting driver's drowsiness, which measures the level of driver inattentiveness and provide a warning when a potential vulnerability exists, have received a great deal of consideration as a measure to prevent accidents caused by driver inattention. In this paper awell-organized driver's drowsiness recognition system is designed using yawn detection considering the eye detection and mouth detection simultaneously so that road accidents can be evaded easily.

Key words: *GSM, Sensors, Microcontroller.*

I. INTRODUCTION

Street mishaps and crashes happen regularly. Consistently 40 individuals younger than 25 pass on in street mishaps. The vast majority of the city mishaps are because of lack of regard of driver yet outside the city, mishaps happen because of smashed driving as it were. Because of wellbeing condition mishap may happen, that is on the off chance that there is a less heartbeat level, at that point individual may prompt oblivious stage. Loss of individual is for the most part because of heart assault, plastered driving just so this can be diminished by utilizing distinctive strategies. Liquor recognition strategy, Heart rate observing framework, Human dimension ID techniques are utilized to limit the dimension of a mishap.

Aside from this because of driver cautiousness inside a small amount of second mishap may happen. The greater part of the mishaps happen, if individual goes to a telephone call while driving. To evade this issue numerous procedure have been utilized. For Heart rate pulses are commonly communicated as pulsates every moment. Sensor is a gadget that distinguishes changes or occasions in amounts and gives a yield comparing to the info the flag for the most part is in optical or electrical flag. Sensors comply with certain condition and guidelines. It is touchy to the deliberate property as it were. It is unfeeling to some other property likely in its application. An individual PIR sensor identifies changes in the measure of infrared radiation. Their esteem changes on the temperature and surface attributes of the items before the sensor. The sensor changes over the following change in the upcoming infrared radiation into an adjustment in the yield voltage, and this triggers the location. For tallying the eye flicker and identifying the sluggishness level by utilization of IR sensor. Consistently about 1.4 million individuals have been murdered in view of the remote clients. There is a very effective programmed framework for early location of approaching and active call. Identifying the causes, for example, liquor utilization, go beat level, individual and sluggishness level recognizable proof, burglary recognition and security frameworks are dealt with in the half breed driver wellbeing mindfulness strategy.

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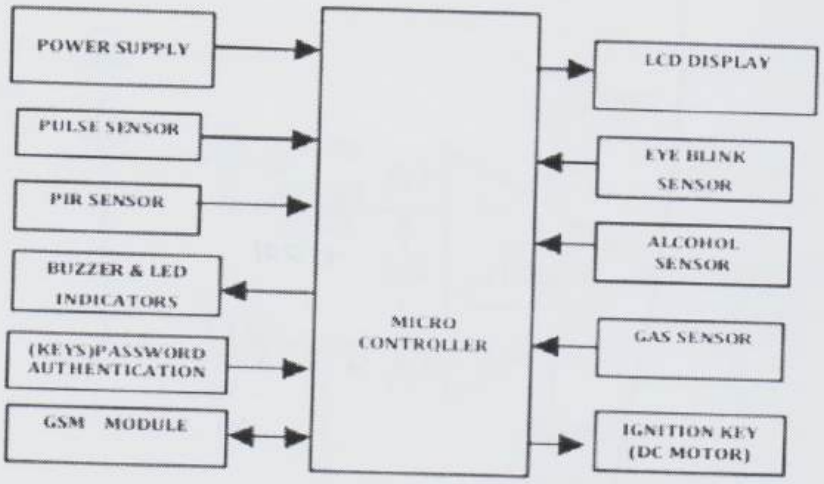
II. HARDWARE SYSTEM



The primary goal of the proposed framework is to maintain a strategic distance from mishap event because of driver anomalous conduct. At the season of vehicle begin liquor sensor will identifies the liquor utilization of the driver if the driver liquor utilization is above 30mg methods access for client is precluded by locking from securing start. Also, if liquor devoured is restricted methods the vehicle will run and next the driver may meet mishap because of languor so eye flicker sensor screens the eye squint status of the driver if for specific term driver doesn't flicker his eyes implies the vehicle is halted. Heart strokes might be another purpose behind mishap so the pulse of patient is estimated through PULSE sensor in the event that the pulse identified is past edge esteem, at that point alongside vehicle stop condition the status will be educated to enrolled number.

III. METHODOLOGY

Micro controller:
This section frames the mechanism of the whole undertaking. This segment mainly consists of a Microcontroller with its additional circuitry like Crystal through capacitors, Reset circuitry, Pull up resistors (if necessary) and so on. The Microcontroller customs the core of the undertaking since it controls the gadgets being interfaced and speaks with the gadgets as per the program being composed.ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of caring innovation as well. The RISC instruction set, and related decode mechanism are much easier than those of Complex Instruction Set Computer (CISC) designs. Liquid-crystal display (LCD) is a horizontal plate display, electronic visual display that uses the light modulation properties of liquid crystals. LCDs are available to show self-assertive images or stable pictures which can be shown or enclosed up, for example, preset words, digits, and 7-portion shows as in a computerized clock.

Alcohol sensor:
Delicate material of MQ-3 gas sensor is SnO2, with lower conductivity in clean airAt the point when the objective liquor gas exist, the sensor's conductivity is higher alongside the gas fixation rising.One can use simple electro circuit, Convert change of conductivity to resemble output signal of gas concentration. MQ-3 gas sensor has high affection to Alcohol, and has great defense from irritate of fuel, smoke and vapor. The sensor could be utilized to detect liquor with various concentration; it is with low cost and suitable for various application.

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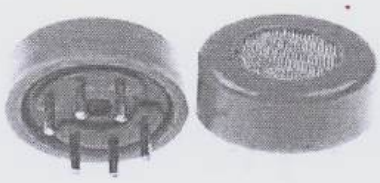

Fig 2:- Alcohol sensor

Eye Blink sensor:

Features

- EYE BLINK signal by LED
- Produces Immediate output digital signal for directly Connecting to microcontroller
- Compressed Size\
- Has Working Voltage of +5V DC
- TTL output 5V or 0V

Applications

- Used in Digital Eye Blink monitor
- For Vehicle Accident prevention.
- Also Suitable for real time driving applications.

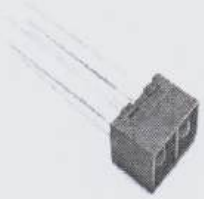

Fig 3:- Eye blink sensor

Gas sensor:

They are utilized in gas spillage identifying types of gear in family and industry, are appropriate for recognizing of LPG, I-butane, propane, methane, liquor, Hydrogen, smoke. The surface resistance of the sensor Rs is spawnedthroughcreated voltage signal output of the load resistance RL.The connection between them is portrayed.

Rs\RL = (Vc-VRL) / VRL

Fig 4:- Smoke sensor

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PIR sensor:

A Passive InfraRed sensor (PIR sensor) is an electronic gadget that estimates infrared (IR) light transmitting from articles in its field of view. PIR sensors are regularly utilized in the development of PIR-based movement identifiers (see beneath). Obvious movement is distinguished when an infrared source with one temperature, for example, a human, goes before an infrared source with another temperature, for example, a divider.

All items discharge what is known as dark body radiation. It is generally infrared radiation that is imperceptible to the human eye however can be distinguished by electronic gadgets intended for such a reason. The term uninvolved in this occasion implies that the PIR gadget does not discharge an infrared pillar but rather just latently acknowledges approaching infrared radiation. "Infra" which means beneath our capacity to distinguish it outwardly, and "Red" since this shading speaks to the most minimal vitality level that our eyes can detect before it ends up undetectable. Consequently, infrared methods beneath the vitality dimension of the shading red, and applies to numerous wellsprings of imperceptible vitality.

Fig 5:- PIR Sensor

GSM:

Global System for Mobile Communication (GSM)is a lot of ETSI measures determining the framework for a computerized cell administration.

The system is organized into various discrete segments:

- Base Station Subsystem – the base stations and their controllers clarified
- Network and Switching Subsystem –the part of the system most like a fixed system, now and again just called the "center system" .
- GPRS Core Network – the discretionary part which permits bundle based Internet associations.
- Operations support system (OSS) – network maintenance.

GSM was proposed to be a safe remote framework. It has considered the client verification utilizing a pre-shared key and test reaction, and over-the-air encryption. Be that as it may, GSM is powerless against various class of assaults, every one of them pointing an alternate piece of the system.

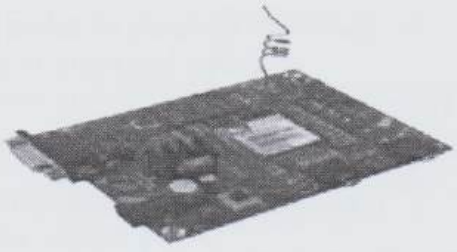

Fig 6:- GSM Module

Buzzer:

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A buzzer or beeper is a signaling device, normally electronic, regularly utilized in automobiles, household appliances such as a microwave ovens, & game shows. originates from the grating commotion that ringers made when they were electromechanical gadgets, worked from ventured down AC line voltage at 50 or 60 cycles. Different sounds generally used to demonstrate that a catch has been squeezed are a ring or a blare.

The "Piezoelectric sound parts" presented in this work operate on an inventive rule using common swaying of piezoelectric earthenware production. These buzzers are offered in lightweight reduced sizes from the littlest width of 12mm to expansive Piezo electric sounders.. Today, piezoelectric sound segments are utilized from various perspectives, for example, home apparatuses, OA hardware, sound gear phones, and so forth. What's more, they are connected generally, for instance, in alerts, speakers, phone ringers, recipients, transmitters, blare sounds, and so on.

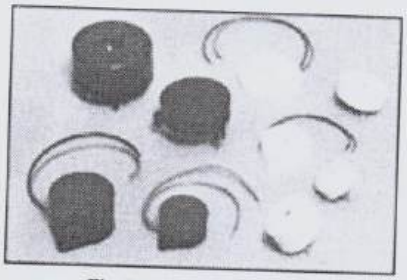

Fig 7:- Types of Buzzers

Pulse sensor:

Connect to finger and get Analog output through the sensor which is dependent on heart beat.. One can read the analog output through microcontroller ADC and then plot it or calculate readings like heart beat per minute. It is easy to utilize and precise outcomes.

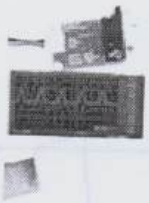

Fig 8:- pulse sensor

IV. CONCLUSION

This framework successfully affirms that the driver is not in a drunken state beforehand driving the car. By actualizing this framework it is conceivable to safe adventure by bikes just as the four wheelers. In future, this framework can be actualized with change, for example, heart beat observing framework, deterrent detecting framework additionally PIR sensor which will give total security to the driver

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

REVIEW ON ESTIMATION OF SCOURING AROUND BRIDGE PIER

Mr. U.S.Patil*[1], Mr.Mahesh Mandwade[2], Mr. Abhijeet Pawar[3], Mr.Tushar Pawar[4] & Mr.Rajat kudale[5]

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ABSTRACT

The review of past few studies on the critical shear stress near bridge pier for non-uniform sediments, the various circumstances that cause the bridges while during heavy flood range and normal flowing water. As a scour around bridge support (piers) can result in structural collapse.

Scour which the natural phenomenon caused due to the erosive action of flowing stream on alluvial beds which removes the sediment around or near structures located in flowing water. It means by the lowering of the riverbed level by water erosions such that there is a tendency to expose the foundations of a structure. This analysis is the result of the erosive action of flowing water, excavating and carrying away material from the bed and banks of streams and from around the piers and abutments of bridges. Scouring has been the main cause for failures of marine structures throughout the world.

Using the various results and their comparison this study leads to determine the changes in the shear stress around the pier with respect to time and flow of water.

Keywords: *scour, scour mechanism, bed material, bridge pier, time effect.*

I. INTRODUCTION

Scour is a natural phenomenon caused by erosive action of the flowing water on the bed and banks of alluvial channels. Scour also occurs at the coastal regions as a result of the passage of waves. It is the removal of sediment around or near structures located in flowing water. It means the lowering of the riverbed level by water erosions such that there is a tendency to expose the foundations of a bridge as a result of the erosive action of flowing water, excavating and carrying away material from the bed and banks of streams and from around the piers and abutments of bridges. Such scour around pier and pile supported structures and abutments can result in structural collapse and loss of life and property. The construction of bridges in alluvial channels causes a contraction in the waterway at the bridge site and hence gives rise to significant scour at that site. As the scour continuously progresses at the site, it undermines the foundations of the structure leading to possible failure. Many bridges failed around the world because of extreme scour around piers. Failure of bridges due to scour at their foundations, which consist of abutments and piers, is a common occurrence.

Since 1950 over 500 in USA fails due to scouring around bridge pier such scour around pier and pile supported structures and abutments can result in structural collapse and loss of life and property. An estimate of the maximum possible scour around a bridge pier is necessary for its secure design. Numerous investigations have been done since the late 1950s to understand the flow and the erosion mechanisms around bridge piers and to estimate the scour depth and critical shear stress. Scouring is local lowering of bed stream elevation which takes place around structure in flowing water. Hence for safe and economical design, scour around the bridge piers is required to be controlled The present work is concerned with the flow as it is slowed and little deflected around the bridge pier, the bed shear stress distribution, and the effects of roughness and the scour hole. A lack of understanding of the structure of the flow and erosion mechanism seems to be at least partly responsible for this state.

The basic aim of this paper is to review the available literature on scour with emphasis on the mechanism, prediction and reduction techniques of local scour around vertical piers.

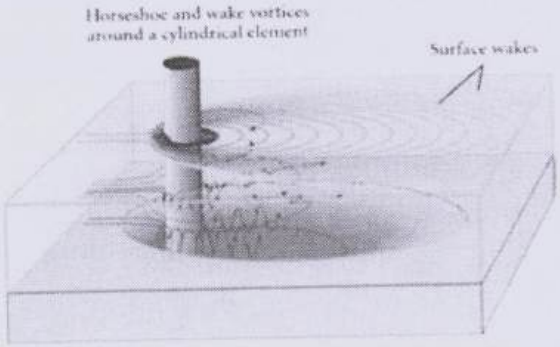

Figure1. Flow and scour pattern at a circular pier

II. REVIEW OF DIFFERENT METHODS USED FOR SCOUR COMPUTATIONS

As already discussed, scour around piers can be sub-divided into three major components, namely, general scour, constriction scour and local scour. Methods of estimation of the different components of total scour in a bridge pier are briefly discussed in the following paragraphs.

a) General Scour:-
General scour is the scour which occurs irrespective of the presence of the bridge due to the morphological behaviour of a river, namely, the processes of aggradation and degradation of river bed, meandering, braiding, cut-off formation, confluence of streams upstream of bridge sites, etc. Long-term behaviour of a river in the vicinity of a bridge must be thoroughly explored to find the likely change in river bed elevation at the proposed bridge site.

b) Constriction Scour:-
Constriction or contraction scour occurs in a bridge where the road or railway approach embankment restricts the normal waterway. It occurs also at such section where the bridge is sited at a natural contraction of a river usually selected as bridge site for reducing the cost of superstructure. Lowering of the bed occurs locally within the contracted reach (i.e. under the bridge) due to flow acceleration and increased velocity of flow. Excessive contraction of normal waterway (to reduce the cost of superstructure) increases construction cost of substructure due to excessive scour.

c) Local Scour :-
Local scour in bridge piers occur due to obstruction by pier and pier foundation and the consequent changes in the flow field around the piers. Because of variation in velocity from top to bottom of a pier, the stagnation pressure head is the highest at top and lowest at the bottom of pier, there by inducing a pressure gradient, since the potential head is highest at the top and lowest at the bottom of the pier.

III. FACTORS AFFECTING SCOUR DEPTH:-

Based on the experimental work and some theoretical analysis, it is found that various factor affect the scour depth at the bridge pier. Many researches are conducted for the depth of scour.

1) Flow condition of river
2) Structure of bridge

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3) Material of river bed
4) Frequency of flood in river
5) Velocity of flow
6) Bed slope
7) Erosion action of flowing river or stream

This factor plays vital role in scour depth formation. And due to this the critical shear stress formation occurs.

IV. AIM & OBJECTIVES

Aim of this experimental work is to determine the scouring and determine relation between various flow parameters.

- To determine the scouring depth around pier.
- To establish a relation between velocity of flow and scouring at bridge pier.
- Flow pattern around the pier.
- To estimate the maximum scour depth.
- To find out conditions for this maximum scour depth.
- Influence of the pier angle
- Maximum velocities
- Possible Armoring Effect

V. FUTURE SCOPE:

1. This analysis is useful to establish sufficient depth of foundation for bridge pier.
2. Estimation of maximum scouring is required to avoid possibility of undermining.

VI. RELATED TERMS

- Scouring - Scouring is local lowering of stream bed elevation which takes place around pier, abutment in flowing water.
- Incipient motion - The water exert tractive force on bed material in the direction of flow, this results in to particle lift from the bed and just start to moving in the direction of flow this condition is called as incipient motion.
- Bed material- It is the portion of sediment that is transported by stream that contains material derived from the bed.
- Flow velocity- It is the vector field that is used to describe fluid motion in mathematical manner.

VII. LITERATURE REVIEW

1) Local Scour Around Hydraulic Structures

Padmini Khwairakpam, ACEEE

In this paper researcher conclude that Scour has been the major concern for safety of marine and hydraulic structures. A large number of hydraulic structures failed as the local scour progresses which gradually undermines the foundations. It is important to control the local scour depth at downstream of hydraulic structures to ensure safety of these structures. In spite of numerous investigations by many researchers, the problem of scour has not been effectively resolved as yet. By adopting different techniques, scour could be reduced up to approximately 60% as per reports available in literature. Though scour depth could be approximately predicted using various available ways, full-proof protection of scour is yet to be achieved. Further studies are still required to correctly predict the scour depth and to find techniques to prevent or reduce the scour in a cost effective manner in order to save the structures from the imminent danger of failure due to scour. On the other hand, the natural phenomenon of scour may be investigated for its possible use as an alternative to expensive dredging operations in rivers and channels.

2) **Scour Reduction around Bridge Piers: A Review.**

Mubeen Beg and Salman Beg, ISSN.
In this paper, a detailed review of the up-to-date work on scour reduction around bridge piers is presented including all possible aspects, such as flow field, scouring process, parameters affecting scour depth, time variation of scour. For safe and economical design, scour around the bridge piers is required to be controlled. The performance of any scour protection/controlling device around bridge piers depends on how the device counters the scouring process. Efforts have been made to reduce the depth of scour by placing the riprap around the pier, providing an array of piles in front of the pier, a collar around the pier, submerged vanes, a delta-wing-like fin in front of the pier, a slot through the pier and partial pier-groups and tetrahedron frames placed around the pier.

3) **Critical shear stress near bridge pier for non-uniform sediments. (nctdcme-18)**

Prof. U.S. Patil Sir and Abhishek Chougule,
This paper describes the main reason of local scour are generally classified into flow condition, structure, and riverbed material used in it and to obtain the simple critical shear stress for the non-uniform sediments. Scouring is significant factor which effects on the safety of bridges. Scouring develops around the pier on the bed channel with non-uniform sediments achieve the great on scour depth prediction. In this a flume experiment has been conducted to predict the relative parameters of shear stress for various size of pier diameter and scour depth using the non-uniform sediments. From the analysis a relationship between shear stress and its scour depth may be developed.

4) **Shear Stress Variation at Scour Hole of Circular Pier (SciRes)**

Joongu Kang, And Hongkoo Yeo
The changes along the time and particles were determined in this study through real-time measurement, using various particles and the image method. The changes in the local scour along the time and the hydraulic condition of the generation of the initial scour in accordance with the size difference of the diameters of seven types of riverbed materials, and their results, were compared to the results of the past studies. Based on the data that were obtained, the changes in shear stress around the pier along the scour depth (S, S_{max}) were examined. Experimental analysis was carried out for the reduction model of the shear stress along each particle and along the influence of time on scour depth, and a trend was found for each condition. The changes in shear stress show a difference between the assumption of the research and the suggested equations, which can be attributed to the difficulty of accurately measuring and analysing the turbulent flow. An accurate measurement and analysis of the turbulent flow should be carried out in future studies on this subject. A similar study should be conducted, with a slightly modified methodology. In this study, the particles and flood phase should be analysed via the scour reduction and the reduction rate.

5) **Flow around bridge piers:**

Ferdous Amed and Nallamuthu Rajaratnam, Fellow, ASCE.
In this paper researcher conclude that the results of a laboratory study on flow past cylindrical piers placed on smooth, rough, and movable beds. Experimental results are analysed on the flow in the plane of symmetry, including the frontal down flow and the effects of bed roughness and the scour hole on it. The Clauser-type defect scheme describes the velocity profiles better than the log-law and defect law. Frontal down flows is as large as 95% of the approach flows were seen. Experimental results are also analysed on the deflection of flow and bed shear stress field. Bed roughness increased the magnitude of bed shear stress and the area over which the shear amplification was felt and also resisted.

6) **Bridge pier scour model with non-uniform sediments By Shaghayegh Pournazeri, Fariborz Haghighat**

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Pier scour is a core problem affecting the safety of bridges. For given hydraulic and geometric conditions, perfect determination of scour with non-uniform sediments is important, but this need has not been fulfilled. The purpose of this research was to develop a three-dimensional model for scour prediction and to verify the model using laboratory measurements. The model allows for selective transport of non-uniform sediments, particle hiding and bed-level change in response to scour and deposition. The development of scouring around a circular pier on a mobile channel bed with non-uniform sediments was successfully predicted and scours depth prediction agreed well with the measurements. It was found that scour patterns emerge from the lateral sides of the pier and migrate towards its upstream nose. Upstream of the pier, strong down flow and vortex motions develop and effectively remove sediments from the foot of the pier; at equilibrium, the bed-surface slope almost reaches the angle of repose of sediments.

VIII. METHODOLOGY

- **Data collection**
- **Materials and testing:** Sediments

i. Sieve analysis
ii. Specific gravity
iii. Density of sediments

- **Experimental arrangement:-**

The experiment was conducted in tilting flume of dimensions 20m length, 0.7m wide and 1m in depth. The flume is provided with baffle walls at inlet and outlet chambers. The circular shape pier was made of acrylic sheet and having thickness 12mm, length 900 mm and diameter 70 mm The pier was placed at center of section and then bed material (sieved sand) was placed around it. The flume was kept horizontal while doing the experiment and flume was provided with gate to control discharge of flow and maintain the uniformity. The depth of scour was measured with point gauge. Also velocity is measured by taking numerous readings (runs).

- **Parameters:-**

Shape of Pier – Circular pier

Velocity of Flow
1) V1
2) V2
3) V3

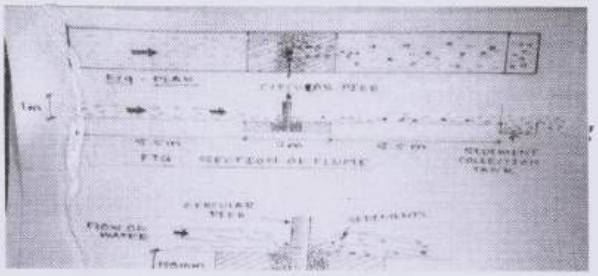

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Figure2. Arrangement of flume

- **Experimental setup:-**

The experiment was performed in tilting flume of dimensions 20m length, 0.7m wide and 1m in depth. The flume is provided with baffle walls at inlet and outlet chamber which were used to keep flow of water steady and calm. A section of 3m length and 150mm depth was prepared by using acrylic sheet. The pier was fixed at center of section and then bed material (sieved sand) was placed around it. The flume was kept horizontal while performing the experiment and flume was provided with gate to handle discharge of flow and maintain the uniformity. The depth of scour was measured with point gauge.

- **Description of bed material** :-

The bed slope material of non-uniform sediments was used for the experiment. Having σ_g =2.58, specific gravity 2.7 and size which ranges from pan to 20 mm. Bed materials was washed thoroughly with clean water to remove silt and organic material. After that the sieve analysis is done for the specific sample of sand and we get following curve (graph).

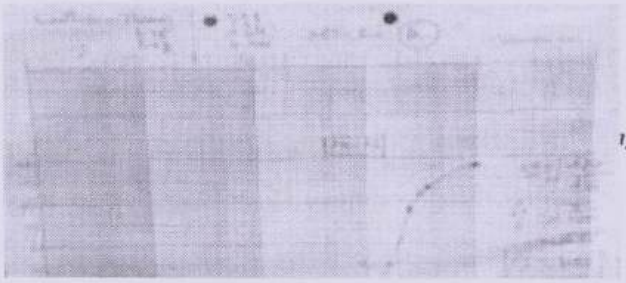

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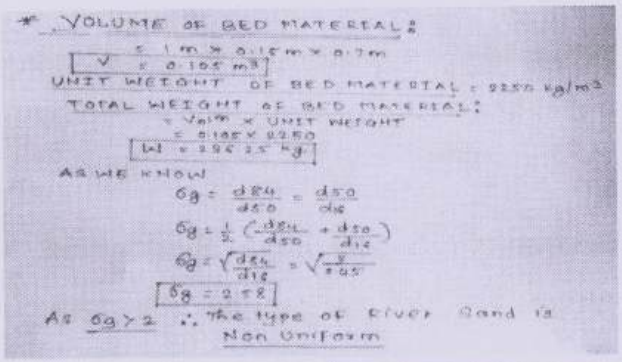
Figure3, Sieve analysis



Passing from	Retained on	Percentage Req.	Weight Of Sand
20mm	10mm	4%	9.45 kg
10mm	4.75mm	5%	11.8125 kg
4.75mm	3.28mm	7%	16.5375 kg
3.28mm	2.28mm	13%	30.7125g
2.28mm	1.20mm	33%	77.9625kg
1.20mm	0.600mm	18%	42.625kg
0.600mm	0.300mm	9%	21.2625kg
0.300mm	Pan	11%	25.9875kg
	Total=	100%	236.25kg

Figure4. Quantity of sand as per standard deviation graph

- **Experimental procedure**:-

a. Preliminary runs were carried out to calculate the Velocity of water through flume by velocity meter.
b. Section was prepared and bed material (sieved sand) was placed around pier.
c. Bed material was compacted and levelled.
d. Then the flume section was filled with water slowly, so that entrapped air was removed.
e. After that the frame is prepared with thread arrangement on it. This arrangement is used to take reading at various angles and at different positions.
f. This frame was placed over top of the flume to take angular readings of scouring.

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g. Valve was fixed at position to keep steady flow condition for a run.
h. Steady flow was maintained for few minutes and velocity was measured.
i. Scouring effect occurs and the scour hole depth was measured using point gauge.
j. Same procedure was repeated for numerous run for an interval of few times for a single set keeping the same velocity.
k. Four sets of four different velocities were taken to measure scouring at different velocities.
l. Same procedure was adopted to carry out numerous run.
m. Readings were noted down and analysed for developing relation between velocities, scour depth, pier dimensions.

- **Analogy**

To determine shear stresses we used formula given by Peggy A. Johnson and J. Sterling Jones.

$$\tau = \frac{\rho V^2}{[5.75 \log(12.27\frac{d}{Ks})]^2}$$

Where,
τ = Shear stress around pier
V = Velocity of flow
d = Depth of flow
Ks = Mean diameter of sediment

- **Reduction of scour :-**

Reduction of scour depth around foundation of hydraulic structure is important part in tackling the problems associated with scour. Controlling measures of scour at pier or piles can be divided into two group armor and flow alteration techniques.

IX. CONCLUSION

This analysis is done for to know the variable affecting local scour depth around bridge pier. Estimation of scour around bridge piers is a main purpose of this analysis, and to know the critical shear stress near bridge pier.

Several mathematical models have been developed over the years for precise estimation of general scour, constriction scour and local scour. The total scour depths estimated by the different mathematical models are nearly the same. It is, however, difficult to conclude which mathematical model gives the best result unless the results are compared with actual scour measurement in prototype at different bridge sites. Measurement of scour at site during the passage of high floods is extremely important for validation of mathematical models most of which have been developed on the basis of scour data obtained in laboratory flumes.

Another thing is that the changes along the time and particles will determine in this study through real-time measurement, using various particles and the image method. The changes in the local scour along the time and the hydraulic condition of the generation of the initial scour in accordance with the size difference of the diameters of riverbed materials, and their results, will compare to the results of the past studies. Based on the data that will obtain, the changes in shear stress around the pier along the scour depth also can examine. Experimental analysis will carried out for the reduction model of the shear stress along each particle and along the influence of time on scour depth.

In this study, the particles and flood phase should be analysed via the scour reduction and the reduction rate.

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X. ACKNOWLEDGMENT

This research is guiding by our Guide Prof. Uday S. Patil (Project Name: Estimation of Scouring and its pattern around Bridge Pier for Non-uniform sediment.)

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

DESIGN AND FABRICATION OF METAL DETECTING MECHANICAL SPIDER USING KLANN MECHANISM

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ABSTRACT

As we know wheels were discovered in year 3500 B.C. in Mesopotamia. The wheels are the main components of the transportation vehicle. Without wheels the vehicle cannot move from its stationary state. But this wheel is having few drawbacks. We know wheels can catch grip on normal roads easily. But these wheels slip on wet areas, snowy region, in muddy region and also on high elevation. So to allow vehicles to move on such areas the wheels can be replaced by the insect walking gait pattern. The best effective leg mechanisms are Joe Klann's Mechanism and Theo Jansen's Mechanism. By using Joe Klann Mechanism the wheel gets look of spider leg. The purpose of our paper is to make the wheeled vehicle to move in muddy regions, high elevation, etc by reinstating the wheels with insect gait (with insect leg). This is useful in dangerous material handlings, detecting and clearing the explosive minefields without making any harm to human troops.

Keywords: *Wheels, Joe Klann Mechanism, Theo Jansen Mechanism, Explosive Minefields, Human Troop.*

I. INTRODUCTION

Walking mechanisms are built up in such a way that they move same as the insects move. There are number of walking legged mechanisms. These mechanisms are further classified according to number of legs they include. They are classified into two, four, eight legs. As spider has eight legs so it is balanced. So using eight legs for making model is best suited.

1.1 Why Joe Klann Mechanism

There are two mechanisms namely Klann mechanism and Theo Jansen mechanism that replaces wheel. The biggest advantage of Klann mechanism robots is that it can travel into areas that are not possible for wheeled robots. By xeroxing the structure of legged animals, these robots can walk in muddy regions etc.

1.2 Advantages of Klann Mechanism

- The number of links is less in Klann mechanism as compared with Jansen mechanism.
- Weight of Klann mechanism is less as compared with Jansen mechanism.
- Klann mechanism is less complicated than Jansen mechanism.
- To allow the robot to walk in muddy, snowy or slippery surfaces.
- To give access to the places which are dangerous.

II. LITERATURE SURVEY

"Norton 2004[1] ", For legged robots, 2 DOF is minimum required to move a leg forward by lifting and swinging. It shows leg mechanism which is similar to spider leg. We chosen 6 bar mechanism because of its superior force transmission angle and bigger oscillating angle in comparison with other types such as the four bar mechanism.

"Swadhin Patnaik [2] ", conducted research on four legged walking machines. After researching on mining industries I came across some data. About fifty percent of cost is spent on roads. Haul roads cause severe wear and tear of tyres of vehicles used in transportation which then needs frequent replacement of tyres. In haul roads the weight is

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not distributed evenly which cause high stress problems. After researching I found that the legs worked good on terrain instead of wheels. After researching this mechanism I founded that it copy the motion of insects.

"Al Salameh Shamsudin [3] ",made research on movement of walking machines. He showed the overview of robot , configuration , number of DOF, analyzed the movement of leg. Biological inspired gaits of the walking robots were discussed.

" Richard Edgeworth [4] ", In 1770 he tried to construct a wooden horse. That horse constituted eight legs. It was constructed to jump over high walls. However 40 years of experimentation was unsuccessful in constructing such a mechanism.

"Frank and McGhee[5] ", made the first computer controlled walking machine. Most recently a Mechatronics Research Group from the University of Southern Queensland created pneumatically powered walking robot.

III. METHODOLOGY

As we know the major demerit of wheel that is it gives poor performance on rocky and muddy areas. To avoid such case and keep the movement robots with legs by using Joe Klann Mechanism are proved to be best. These robots can travel into areas where the wheeled vehicle cannot. The legged robot is useful in explosive materials handling, detecting the bombs without harming any troop, etc. It can be used in security firms. Purpose of our project is to help the army to detect the bomb or minefields without putting lives of troops in risk.

i. Joe Klann Mechanism

The Klann Mechanism is a Planer mechanism which is developed to simulate the walking manner of legged insect and also function as a wheel by restoring the wheel. The linkage constitute of crank, rocker arm, leg, frame all connected with pivot joints. The proportions of each of the linkages in the mechanism are optimized in such a way that the linearity of foot for one half rotation of crank. The other half rotation of crank allows the foot to be raised to determined height before arriving to its original position. The Joe Klann Mechanism provides many advantages of advanced walking robots. The robot with Klann Linkage can step over stairs, move into areas which are not safe for human lives.

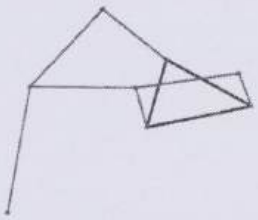

Fig.1 Klann Leg Mechanism

IV. COMPONENTS

- Spur Gear * 6
- Leg * 8
- Motor * 1
- Links * 48
- Base Plate * 1
- Top Plate * 1
- Support Plate * 2
- Shaft * 6

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V. SPECIFICATIONS

Serial Number	Component	Length (mm)	Width (mm)	Thickness (mm)	Material Used
1	Base Plate	280	205	8	Acrylic
2	Top Plate	170	42	8	Acrylic
3	Support Plate	120	70	8	Acrylic
4	Spur Gear 1	Diameter = 60	Pitch = 3	8	Plastic
5	Spur Gear 2	Diameter = 30	Pitch = 3	8	Plastic
6	Leg	164	15	4	Acrylic
7	Connecting Arm	112	15	4	Acrylic
8	Support Arm	55	20	8	Acrylic
9	Rocker Arm 1	45	15	4	Acrylic
10	Rocker Arm 2	35	15	4	Acrylic
11	Crank	36	15	4	Acrylic

VI. DEGREE OF FREEDOM (DOF)

When the mechanism is analyzed , at that time the most important part is to calculate the mobility (degrees of freedom) of the mechanism. Degrees of freedom is the number of parameters that define its configuration. Degrees of freedom number can be calculated directly from total number of links and number of joints.
General equation to calculate number of degrees of freedom of a mechanism is given by,

$$n = 3 (i - 1) - 2j$$

Where, n = Degrees of freedom
i = No. of links
j = No. of joints.

The above equation is called as Kutzbach criterion.
Now in single leg assembly of klann mechanism,
Number of links (i) = 6
Number of Joints (j) = 7

Therefore ,
By using above equation, we get,

$$n = 3 (i - 1) - 2j$$
$$= 3 (6 - 1) - 2 (7)$$
$$= 3 (5) - 14$$

Therefore, n = 1

Therefore Degrees of Freedom for single leg assembly of Klann mechanism is 1

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VII. SOLIDWORKS MODEL

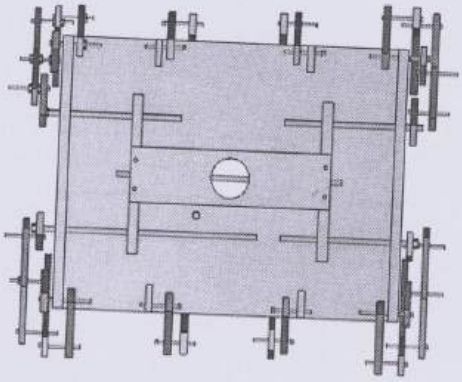

Fig.2 Top View of 8 Legged Spider Robot

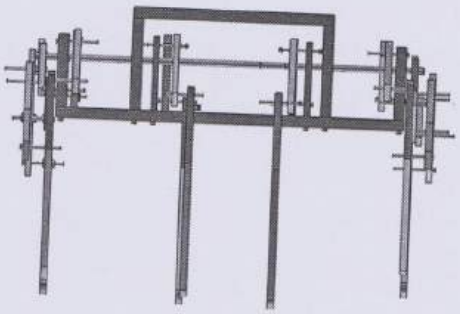

Fig.3 Front View of 8 Legged Spider Robot

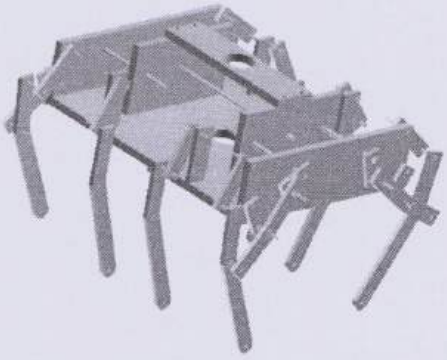

Fig.4 3D View of 8 legged Spider Robot

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VIII. ADVANTAGES OF SPIDER ROBOT

i. Contact with the ground at discrete points:
The rims of wheels have continuous contact with the ground over which they travel. Walking machines place their feet and once placed, frictional forces prevent further movement of foot. Suspension is entirely eliminated in walking machines.

ii. Elimination of Roads:
Walking machines do not require roads or other prepared surfaces to walk on . It can travel into any areas.

iii. Minimal contact area with ground:
Consider a example, in an area of land where land mines have been placed in random order. In case of wheeled vehicle there are more chances of land mines getting triggered. But in case of walking machines it touch a very small area of the land over which it travels. So there will be reduced risk of triggering mines.

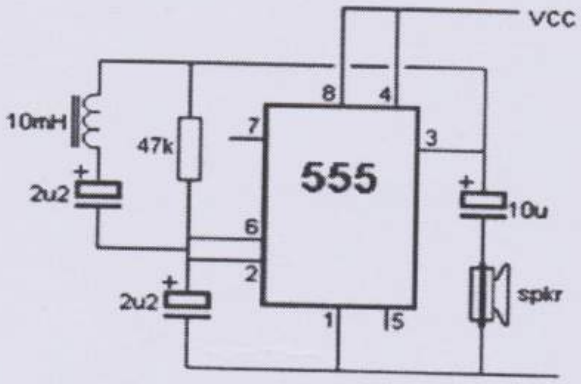
iv. Increased Traction:
Wheeled vehicles are subjected to slip condition, especially when applying high tractive effort on slippery or wet surface. A suitable walking machine with sharp leg foot increase ground pressure and hence penetration could apply more tractive effort than a wheeled vehicle.

IX. APPLICATION

There are many applications of this project but the best application that we thought is using metal detector circuit. As an application we have used metal detector circuit so as to detect metal. Our aim of using this metal detector circuit with this model is that with help of this combination of walking spider and metal detector circuit it can be used to detect mines or bombs without harming army troops.

The following are the details of the metal detector circuit that we have used in our project.
Copper coil acts as inductance. The coil is fed into IC 555. The capacitor and copper coil induces a frequency for the output signal from IC 555. In case of any metal contacts with the copper coil, its frequency changes, thus changing the output signal frequency of IC 555. This could be noticed with small amount of change in the humming sound from buzzer.

Circuit Diagram of Metal Detector circuit



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X. FUTURE SCOPE

The Klann mechanism can be made more flexible by making different modifications in geometry or dimensions of klann linkage. The metal detector can be used to improve the effectiveness of this spider robot in military applications. It can be used in detecting and clearing minefields without putting army troops lives in danger.

XI. CONCLUSION

By studying Klann mechanism, we implemented the Klann mechanism in our project by replacing the wheels of wheeled vehicles to Klann linkage. Legged robots can be used in hazardous places such as the inside of nuclear reactor, can be used in detecting and clearing minefields. The good point of Klann mechanism is that its construction is less complicated and it can be used in great applications without harming anyone.

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PRODUCTION OF BIODIESEL WITH CHICKEN FAT

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ABSTRACT

Our conceptual attribute is extracting biofuel from chicken wastages. Waste chicken fat is harmful for human health due to fat contain in the chicken. So there is large amount of chicken fat is waste so we can use that chicken fat for production of chicken fat based biofuel. Mainly animal fats and vegetable oils are used for the production of biodiesel. Several types of fuels can be derived from triacylglycerol-containing feedstock .Biodiesel which is defined as the mono-alkyl esters of vegetable oils or animal fats. Biodiesel is produced by transesterifying the oil or fat with an alcohol (methanol/ethanol) under mild conditions in the presence of a base catalyst. This paper discuses fuel production, fuel properties, of biodiesel made from chicken fat. This also describes the use of glycerol which is the by-product in esterification process along with biodiesel.In this study, it could be determined that inedible animal fat could also prove a better source for production of biodiesel.

Keywords: *biodiesel, chicken fat, transesterification, biodiesel, diesel, blends.*

I. INTRODUCTION

Our society is highly dependent on petroleum for its activities. However, petroleum is a finite source and causes several environmental problems such as rising carbon dioxide, CO2 levels in the atmosphere. About 90% is used as an energy source for transportation, heat and electricity generation, being the remaining sources used as feedstock in the chemical industry (Carlsson, 2009). High petroleum prices and the scarcity of known petroleum reserves demand the study of other sources of energy.

Biodiesel is a non-petroleum based alternative diesel fuel that consists of alkyl esters derived from renewable feedstock such as plant oils or animal fats. The fuel is made by converting the oils and fats into what are known as fatty acid alkyl esters. The conventional processes require the oils or fats be heated and mixed with a combination of methanol and sodium hydroxide as a catalyst. The conversion process is called transesterification (Nivedita Das, 2013).

Biodiesel production with high quality feedstock such as vegetable oil is relatively expensive compare to fossil diesel cost. Edible vegetables oil is a feedstock that commonly used in producing biodiesel. Production of biodiesel could be less expensive if the feedstock is from inedible food or waste. Therefore, one of the most promising less-expensive feedstock is animal fat such as chicken fat, beef tallow, etc. Besides to reduce the environmental problems caused by incomplete combustion of diesel engines, at the same time, by using low-cost feedstock such as inedible animal fat could indirectly reduce the waste that comes from the slaughterhouse.

Oils and fats are composed primarily of triglycerides. Triglycerides consist of a glycerin backbone with fatty acid radicals attached in place of the hydroxyls.

Animal fats are readily available because slaughter industries are generally well managed for product control and handling procedure. In recent, alternatively lipid residues such as waste frying oil and inedible animal fats have also receiving considerable attention from biofuel sector. To take advantage of these low cost and low quality resources, a convenient action would be to reuse residues in order to integrate sustainable energy supply and waste management in food processing facilities emissions and co-products. This also an alternate fuel in future .If

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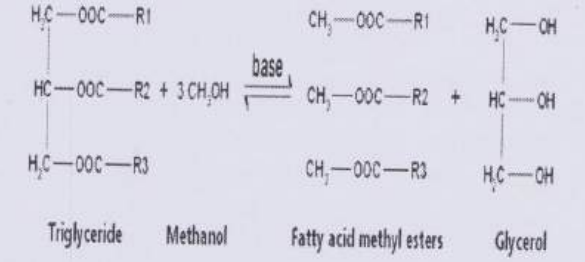
production of biodiesel is considered by our government the animal wastes which easily available in bulk can be used for producing biodiesel in a more cost effective method.

II. MATERIALS AND METHODS

The feedstock samples of Chicken Fats (CF) were provided by a local chicken supplier which has been wash thoroughly to remove foulness and bloodstain that can affect the hydrolysis process. Then, the CF is well fine-filtered to remove any unwanted part of the chicken mixed with the samples. Specific calculated amount of CF is needed to produce the desired amount of Biodiesel.

First step of the process is boiling up the CF along with distilled water - Hydrolysis process The specific calculated amount of chicken fats is measured and prepared (wash and filtered) while specific amount of volume of distilled water is poured into the tank and boiled up to 1000C. Then the chicken fats is placed in a filter and put into the hydrolysis tank. The extraction of oil occurred in duration of 30 minutes and the chicken fats will produce crude oil contains a triglyceride molecule chain attached to glycerin backbone molecule chain. Ginger is mixed into the tank for odour removal process. The extraction oil from the chicken fats is then introduced to the Transesterification Process.



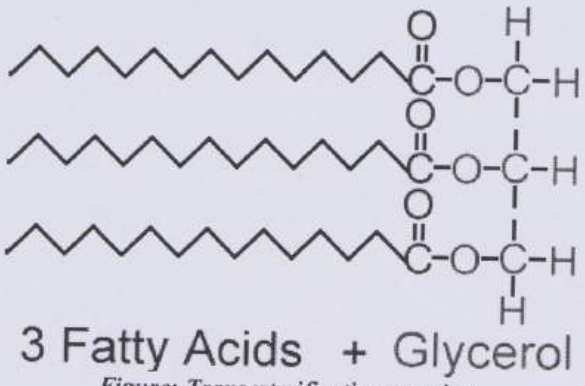


Figure: Transesterification reaction

Catalyzed process Transesterification

The chemical reaction that converts an animal fat oil, specifically chicken fats to biodiesel is call "transesterification". In this reaction, an ester and a alcohol (i.e. methanol) react to form a different ester. The three fatty acid chains - triglyceride (R1COO") connected to the glycerol backbone are broken at their ester bond and react with the alcohol to form an alkyl esters and a glycerol molecule. Figure 4 shows the transesterification reaction Biodiesel is produced from the triacylglycerol containing material by means of a transesterification reaction. In this process, alcohol (methanol/ethanol) and animal fats are mixed in the molar ratio of 6:1, heated at 60-650C for 1hr and the ambient pressure in the presence of catalyst such as NaOH/KOH. Before that, animal fat gets heated up to

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105-1100C so that it will be converted into fat oil then in the separate flat bottom flask, alcohol and NaOH/KOH (2% of fat)are mixed exothermic reaction take place. This mixer is then added to heated fat and keep it at 60-650C for 1hr. After this, it is poured into a bottle so that biodiesel and glycerol get separated as shown.

This biodiesel is used in diesel engine as a solvent in ethanol-diesel mixer for avoiding a phase separation. The increasing % of biodiesel in ethanol-diesel blends results in the increase of emissions NOx but it reduces the emissions of CO, HC, sulphur and particulate matter (PM) considerably

Biodiesel is being produced from many of vegetable oils and animal fats. If it is produced from high quality edible oil and fats, it will resulted in high prices of raw material and biodiesel is more expensive than petroleum diesel fuel also shortage of edible oil for food purpose. Biodiesel may also be produced from less expensive animal fats including inedible tallow, pork lard and yellow grease. Animal fats are highly viscous and mostly in solid form at ambient temperature because of their high content of saturated fatty acids. The high viscous fuel leads to poor atomization of the fuel and result in incomplete combustion. Transesterification and emulsification are two main solutions that have appeared as effective methods for using animal fats in diesel engine. Animal tallow generated biodiesel offers a wide range of energy, environmental and economic advantage as stated by Nelon and Schrock (10). Glycerol, which is a co-product in the biodiesel production, refining and unrefined, can be used in the manufacture of a variety of products as shown in figure given below. Glycerol obtain from biodiesel production does not require any further processing except purification.

III. PREPERATION OF BIODIESEL BLENDS WITH DIESEL

The commercial diesel oil used in the tests was obtained from a local automotive supply network and had the following features:

- Calorific value: 44.816 (KJ/kg)
- Density: 857 (kg/m3) at 25 °C
- Viscosity: 3.32 (mm2 /s) at 40 °C
- Flash Point: 69 °C
- Sulphur: 0.121 (% m/ m)

Mixtures were processed with different percentages of commercial diesel and biodiesel placed in PET containers and properly identified. The fuels were classified as 100% commercial diesel, 100% biodiesel (B100), addition of 5% biodiesel to diesel (B5), addition of 20% biodiesel to diesel (B20), and addition of 50% biodiesel to diesel (B50

IV. CONCLUSION

The use of the Chicken fat as a raw material for biodiesel production has proved to be of substantial value as compared with other choices of raw materials of various origins, such as the planting of oleaginous and the use of oils of plant seeds origin since chicken fat is available in large quantities in the community and would otherwise be dumped. Gains related to the reduction of toxic gas emissions resulting from combustion processes were remarkable considering the large reduction of CO and CO2 emissions. The studies point to a possible NOx emission reduction via improvements in the density, additives, and stoichiometric balance of biodiesel.

The technical feasibility of using biodiesel, considering the physical-chemical aspects, was presented positively and interpreted by the torque and power tests conducted, with little variability regarding the percentage of biodiesel in the mixture with diesel. Considering the specific consumption of biodiesel compared to diesel, despite having a small increase, it is passive in terms of improvement in reducing energy consumption through the use of additives, the improvement of density, and in the transesterification process. The use of Chicken fat as the base for the production of biodiesel has proven to be viable and can be seen as an alternative solution to the problem of the improper disposal of Chicken fat.

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BOUNDARIES OF CLOUD COMPUTING IN VOCATION

Authors

Pooja Gautam & Prof. Sanket. S. Pawar

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BOUNDARIES OF CLOUD COMPUTING IN VOCATION

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ABSTRACT

So far we have Addressed about the security provided by Cloud Service Provider as well as the security provided by the Customer using cloud services.

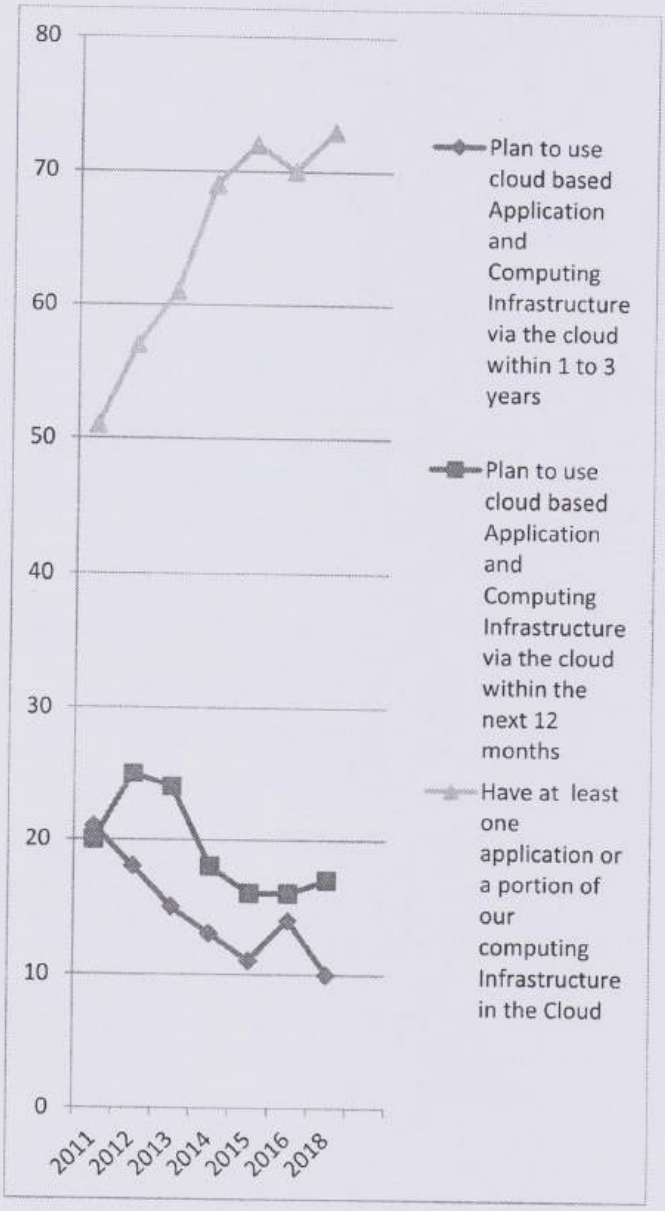
In today era Everyone wants to be so dependent ,reliable,totally strived for the total quality of service which should be totally believable and should be control of someone. So from Here, I am going to make you all understand about some of the security issue and their regarded regulatory and all current scenario that have arisen as cloud computing as most acclaimed primary distributed computing pulpit.

keywords:*Breaches,Remediation,Vulnerabilities,Pulpit,Ambiguous.*

I. INTRODUCTION

These days wherever you turn "the cloud" is being talked about. This ambiguous term appears to cover virtually everything regarding U.S.A.. While "the cloud" is just a personification for the internet, cloud computing becomes one of the topic about what people are really talking about these days. It provides higher knowledge storage, data security, flexibility, increased collaboration between employees, and changes the work flow of small businesses and large enterprises to help them make better decisions while decreasing costs.

Fig:-Cloud Computing Survey[1].



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It is clear that utilizing the cloud could be a trend that continues to grow. We have already foreseen in our business intelligence trends article the importance and implementation of the cloud in firms like Amazon, Google and Microsoft.The significance of the cloud is increasing exponentially. Gartner forecasts that the cloud services market can grow seventeen.3% in 2019 ($206.2 billion) and by a pair of 022, ninetieth of organizations are mistreatment cloud services.

II. METHOD & MATERIAL

THE CHALLANGES OF CLOUD COMPUTING:

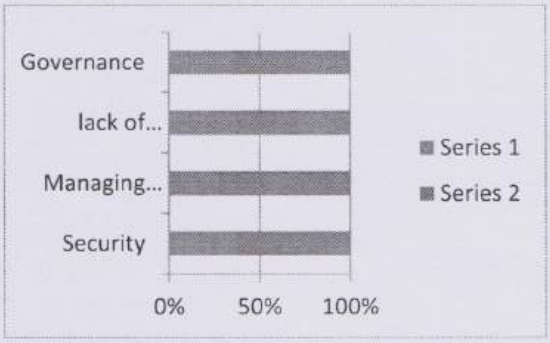


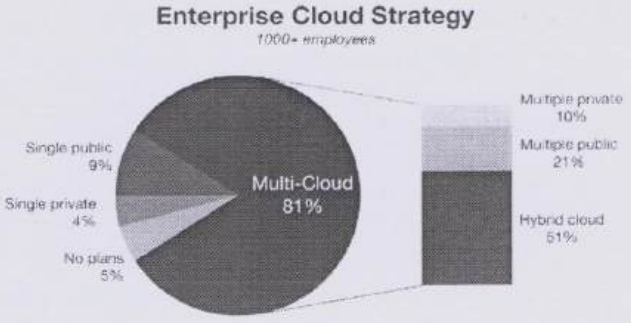
Fig:- cloud computing challenges[1].

Breaches in data Security Issue:-

Security risks of cloud computing have become the top concern in 2018 as 77% of respondents stated in the referred survey.In 2018 however, security inched ahead..security has indeed been a primary, and valid, concern from the start of cloud computing technology: developers are also unable to see the exact location where your data is stored or being processed. This increases concern about the cloud computing risks that can arise during the implementation or management of the cloud. Headlines highlighting data breaches, compromised credentials, and broken authentication, hacked interfaces and APIs, account hijacking haven't helped alleviate concerns. All of this makes trusting sensitive and proprietary data to a third party hard to stomach for some and, indeed, highlighting the challenges of cloud computing. Luckily as cloud providers and users, mature security capabilities are constantly improving. To ensure your organization's privacy and security is intact, verify the SaaS provider has secure user identity management, authentication, and access control mechanisms in place. Also, check which database privacy and security laws they are subject to.

Steering Multiple Clouds:-

The state of multi-cloud has grown exponentially in recent years. Companies are shifting or combining public and private clouds and, as mentioned earlier, tech giants like Alibaba and Amazon are leading the way.In the referred survey, 81 percent of enterprises have a multi-cloud strategy. Enterprises with a hybrid strategy (combining public and private clouds) fell from 58 percent in 2017 to 51 percent in 2018, while organizations with a strategy of multiple public clouds or multiple private clouds grew slightly 1.



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Vendor lock-in condition:-

The statement is completelly agreable that ' It is very easy to get entry in cloud computing agreement but at the same time it is very difficult to get out of it'. "vendor lock - in"happens when they need to alter the provider adversely that goes excessively expensive or just become next to impossible or It could be that the service is not that much capable or may be not of suitable standard.

Hence the use of cloud computing become the best efficient solution for many business but still it is important and can be helpful to know that in what we are getting into[1].

IDENTITY AND ACCESS MANAGEMENT(IAM):-

In a typical organization where applications are deployed within the organization's perimeter the"trust boundary" is mostly static and is monitored and controlled by the its department,but with the adoption of cloud services,the organization's trust boundary will become dynamic and will move beyond the control of IT department.With Cloud computing ,the Network,System and Application Boundary of an Organization will extend to the service provider domain.This loss of control continues to challenge the established trusted governance and control model and ,if not managed properly,will impede Cloud service adopting within an organization .

- **Improve Operational Efficiency**

Properly architectured IAM technology and process can improve efficiency by automating user on- boarding and other respective tasks (shelf service for user requsting password reset oherwise will require the intervention of system administration using a help desk ticketing system) .

- **Regulatory compliance management**

In any Organization, to protect system applications,and information from internal and external threats and to comply with various regulatory,privacy,and data protection ,requirements implements an 'IT General and Application level Control' framework derived from Industry standard framework such as ISO 27002 and Information technology Infrastructure Library.

Since IAM features Such as SSO allow applications to externalize authentication features,Business can rapidly adopt SAAS services by reducing the task completing time required to integrate with service provider.IAM Capabilities can also help a business outsource a process or service to partner with a reduced impact to the business privacy and security [2].

IAM functional architecture

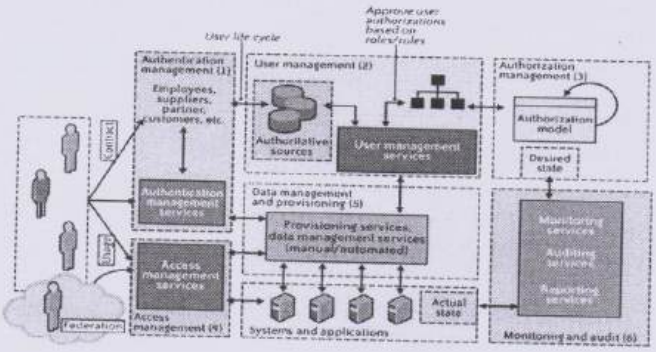

Fig:-IAM Architecture[3].

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III. RESULT & DISCUSSION

BUTT END -THE CLOUD STILL SLAY

It is no secret;that the IT industry is totally being revolutionized by the cloud computing as well as it is also shaking up the business intelligence (BI) landscape, and well, pretty everything else it touches. As the cloud adoption exponentially grows, businesses of all sizes are realizing the benefits the cloud computing becomes the most believed service provider for start-ups and small to medium-sized businesses (SMEs), that are not capable of affording costly server maintenance, but also may have to scale overnight..

Initially Organization should with start with IAM strategy and architecture and Invest in foundational technology element that support user management and federation .

- **Security Vulnerability Management**

Vulnerability management is an essential threat management element to help protect hosts,network devices,and applications from attack against Known Vulnerabilities.Mature Organizations have instituted a vulnerability management process that involves routine scanning of system connected to their network,assessing the risk of vulnerability to the Organizations ,and a remediations process to address the risks.

- **Security Patch Management**

The scope of patch management responsibility for customer will have a low -to-high relevance in order of SaaS ,PaaS, and I a a S service-that is Customer are relieved from patch management duties in a Saas Environment ,whereas they are responsible for managing patches for whole stack of software installed and operated on the Iaas platform.Customer are also responsible for patching their applications deployed on Paas platform.

By the Most financial analyst saying, they feel that the Cloud Computing will be a huge growth area in terms of IT spending and revenue stream over the next few years,but the estimates vary.

"cloud computing is assumed as a broad and diverse phenomenon .Much of the growth represent the transfer of traditional IT services to the new cloud model ,but there is also scope for creation of substantial new business and revenue streams" ." From direct purchase and payment for services to provision of services which are free at point of use and where revenue is derived from advertising provides a great shift in IT provision . Advertising supported by cloud computing are currently and will remain ,the largest component of the overall cloud services "[3].

IV. CONCLUSION

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Manuscript Title

BOUNDARIES OF CLOUD COMPUTING IN VOCATION

Authors

Pooja Gautam & Prof. Sanket. S. Pawar

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March 27, 2019

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GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

FUTURE OF COMMUNICATION -5G TECHNOLOGY

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ABSTRACT

Nowadays due to the large demand of the Cellular subscribers to arrive the billions of connected in the near future as expected in year 2020. So the large numbers of connections are heterogeneous in nature. There are many reasons for the development from first generation to the fifth generation and we are expected for meeting the degrading capacity of the cellular network. Radio technologies have evidenced a rapid and multi directional evolution with the launch of the analogue cellular systems in 1980s. After that, digital wireless communication systems are consistently on a mission to fulfill the demand of human beings (1G ,4G, or now 5G). The next major phase of mobile telecommunications standards beyond the current 4G/IMT Advanced standards is the mission of 5G (5th generation mobile networks). Speeds of 5G are faster further what the present 4G can provide. The world of telecommunication has seen a number of advancement along with improved performance with every passing day from 1G to 2.5G and from 3G to 5G.

Keywords: *5G, Heterogeneous, Radio Technology speed, performance.*

I. INTRODUCTION

According to Trai, timely deployment of 5G "is essential for achieving the objectives" envisaged in the new telecom policy — National Digital Communications Policy 2018 that was approved by the Cabinet last September.[1]

The world has seen plenty of changes in communication. Today we no more use landlines. Everyone has a mobile phone that works 24X7.our handset not keeps us connected but also a big source of entertainment. If we look back, we will find that every next decade, next generation is ruling the world. As we took example from First Generation (1G) in 1980s, Second Generation (2G) in 1990s, Third Generation (3G) in 2000s, Fourth Generation (4G) in 2010s, and now Fifth Generation (5G), we are moving towards more and more advanced and smarter technology.

What is 5G Technology?

The 5G Technology is an advanced scope of network that will have high frequency bands along with the wider spectral bandwidth per frequency channel. As of now, the earlier generations mobile technologies have proved substantial increase in peak bitrate. Then — how is 5G differs from the previous generations (especially from 4G)?

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The answer is — it is not only that increase in bitrate made 5G distinct from the 4G, but due to mentioned properties also 5G is advanced than 4G

It has high increased peak rate and data connectivity of almost 25mbps.
Larger data volume per unit area (i.e., high system spectral efficiency).
Low battery consumption

II. EVOLUTION FROM 1G TO 5G

First generation (1G)
First generation wireless technology is the original analogue (Analogue signal is a continuous signal in which time varying variable is measured by other representative of time quantity), voice-only cellular telephone standard, and developed in the 1980s.

The prominent ones among 1G system were advanced mobile phone system (AMPS), Nordic mobile telephone (NMT), and total access communication system (TACS).

Second generation (2G)
2G is short form for second-generation wireless telephone technology.2G was commercially launched on GSM basis in Finland in 1991. 2G network allows more penetration intensity than 1G. 2G technology provides various facilities as text message, picture message, MMS.

These are basically Time division multiple access (TDMA) or Code division multiple access(CDMA).TDMA allows division of signal into time slots. For communication over a multiplex physical channel CDMA allocates each user a special code. Some of TDMA technologies are GSM, PDC, iDEN, IS-136. Examples of CDMA technology is IS-95. The most admired standard of all the mobile technologies is GSM (Global system for mobile communication) .

Third generation (3G)
IMT—2000(International Mobile Telecommunications-2000), better known as 3G or 3rd Generation, is a generation of development for mobile phones and mobile telecommunications services fulfilling demands by the International Telecommunication Union. The 3G technology is also able to transmit packet switch data efficiently at better and increased bandwidth.

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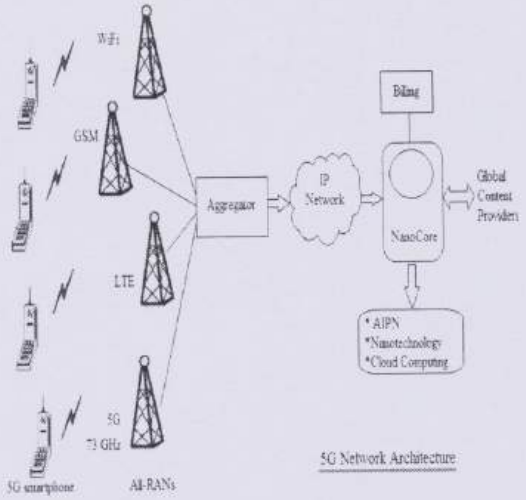

Fig. 5G Architecture [3]

The system consists of a main user terminal and a number of independent and autonomous radio access technologies. Each of the radio technologies is considered as the IP link for the outside internet world. Tto ensure sufficient control data for appropriate routing of IP packets related to a certain application connections i.e. sessions between shopper applications and servers somewhere on the net. The IP technology is designed exclusively. For accessing , routing of packets should be fixed in accordance with the given policies of the user.

IV. 5G CHALLENGES

Technological challenges

Interference of Inter-cell – One of the major technological issues that need to be solved. Due to variations in size of traditional macro cells and concurrent small cells will lead to interference.

Efficient Medium Access Control -The user throughput will be low, at a condition, where dense deployment of access points and user terminals are required, latency will be high, and to provide high throughput hotspots will not be competent to cellular technology. To optimize the technology there must be proper research.

Management of Traffic -Traditionally human to human traffic in cellular networks, a great number of Machine to Machine (M2M) devices in a cell may cause serious system challenges[4], which will cause overload and congestion i.e. radio access network (RAN) challenges.

Common challenges

Multiple Services – 5G would have a huge task to offer services to heterogeneous networks unlike other radio signal services, technologies, and devices operating in different geographic regions. For dynamic, universal, user-centric, and data-rich wireless services to fulfil the high expectation of people the challenge is of standardization.

Privacy & Security – This is one of the most important challenges that 5G needs to ensure the protection of personal data. The uncertainties associated with security threats as well as trust, privacy, cyber security, which are growing across the globe.

Cyber law Legislation – Cybercrime and other fraud may also Increase with the high speed and ubiquitous 5G technology. Therefore, legislation of the Cyber law is additionally an important issue which largely is governmental and political (national as well as international issue) in nature.

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3G mobile technologies offers more advanced services to mobile users. The spectral efficiency of 3G technology is higher & better than 2G technologies. The measurement of rate of information transfer over any communication system is Spectral efficiency.

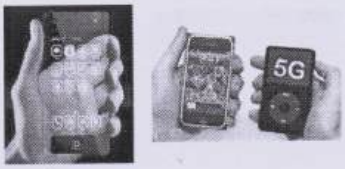
Fourth generation (4G)

4G means the fourth generation of mobile technology. It is an advanced version of 3G and 2G families of Networks. A concepturazied framework of network and a discussion point to address future needs of a high speed wireless network was main aim for the development of 4G , that can also transmit multimedia and data to and interface with wire-line backbone network perfectly just raised in 2002[2]. Theoretically promised speeds of 4G can up to 1Gbps. Some of the applications of 4G are:

- Mobile TV –A TV channel can be easily played on mobile
- Video on demand – e.g, Voot, Hotstar etc.

Fifth generation (5G)

5G Technology stands for 5th Generation Mobile technology. 5G technology completely change the meaning of cell with its high bandwidth. Such a high value technology is never experienced ever before by user. Due to all the features that 5G has will make him special and high demandable in near future. It gigantic array of innovative technology.



Technologies that are existing command phone providing a lot of power and options than a minimum of one thousand satellite modules.

To get broadband internet access , user can also hook their 5G technology cell phone with their Laptop.

III. 5G ARCHITECTURE

5G Architecture is highly advanced. A new situation can be easily affordable due to up gradation of , its network elements and various terminals. To adopt the value-added services easily service providers can implement this advance technology.

However, Cognitive radio technology that includes various significant features such as ability of devices to identify their geographical location as well as weather, temperature, etc is due to upgradeability..As shown in the image, Model of 5G is like **IP** based model and it designed for the wireless and mobile networks.

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V. CONCLUSION

In this paper we have proposed 5G mobile phone concept, which is the main contribution of the paper. A new **revolution of 5G technology** is about to begin because a tough completion to normal computer and laptops will be given by this technology whose marketplace value will be effected. Lots of improvements from 1G, 2G, 3G, and 4G to 5G in the telecommunications world . The upcoming technology is available in the market in affordable rates, high peak future and much reliability than its preceding technologies.

VI. FUTURE SCOPE

Technologists, researchers, academicians, vendors, operators, and governments discuss on this technology and Several kinds of researches are going on across the world among about the innovations, implementation, viability, and security concerns of 5G.As proposed, loaded with multiple advance features starting from the super high speed internet service to smooth ubiquitous service[5].

The purpose of 5G technology is to provide very high speed and extraordinary data capabilities, unstoppable call volumes, and mean worthy data broadcast within the latest mobile operating system. That's why, it is more intelligent technology, which will interconnect the entire world without

Limits. Like, our world would have universal and uninterrupted access to information, communication, and entertainment that will open a new dimension to our lives and will change our life style drastically. However Government can take this technology as a chance for the power tool development and might produce healthier environments, which is able to undoubtedly encourage continued investment in 5G, subsequent generation technology.

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Manuscript Title

ANDROID OPERATING SYSTEM" – MOST EMERGING OPERATING SYSTEM

Authors

Himaanshu Saraf & Prof. P.P. Salunkhe

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"ANDROID OPERATING SYSTEM" – MOST EMERGING OPERATING SYSTEM

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ABSTRACT

Android is an operating system which is used for mobile phones and was developed by GOOGLE. It is rapidly fledging in the market as there are number of mobile phones and tablets running on android. Android uses the modified version of Linux Kernel 2.6. Google developed android as a part of Open Handset Alliance, a group of technological companies which are working to open up the scope of mobile handset environment. In this paper we will look forward towards Android Platform and android based mobile application development & its security.

Keywords: Android , Version , Development , Security , Features.

I. INTRODUCTION

Android is an operating system and a software development platform which is a modified version of Linux Kernel 2.6. It allows developers to develop applications & to write managed code in the Java programming language.

Android was unveiled by GOOGLE in 2007. Google released Android code as an open-source under the Apache License. Android being open source has attracted a large number of developers & enthusiasts to use the open source code as a foundation in projects. As of 2017 stastics almost 85% share of Global Mobile Operating System Market is acquired by ANDROID with almost 2 billion active users every month. Currently there are 5000+ devices working on android.

Fig A: Evolution of Android

Till date android is improving and releasing its versions day by day until its release. These updates focus upon fixing the existing bugs and adding additional features to the operating system.

The versions which are released till date are as follows :-

- Android 1.0 (API 1)
- Android 1.1 Petit Four (API 2)
- Android 1.5 Cupcake (API 3)
- Android 1.6 Donut (API 4)
- Android 2.0 , 2.0.1 , 2.1 Eclair (API 5 , API 6 & API 7)
- Android 2.2 Froyo (API 8)
- Android 2.3 & 2.3.3 Gingerbread (API 9 & API 10)
- Android 3.0 , 3.1 & 3.2 Honeycomb (API 11 , API 12 & API 13)
- Android 4.0 & 4.0.3 Ice Cream Sandwich (API 14 & API 15)
- Android 4.1 ,4.2 & 4.3 Jelly Bean (API 16 , API 17 & API 18)
- Android 4.4 & 4.4W Kitkat (API 19 & API 20)

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- Android 5.0 & 5.1 Lollipop (API 21 & API 22)
- Android 6.0 Marshmallow (API 23)
- Android 7.0 & 7.1 Nougat (API 24 & API 25)
- Android 8.0 Donut (API 26)
- Android 8.1 Oreo (API 27)
- Android 9 Pie (API 28)
- Android 10 Q (API 29)

The above listed features are integrated with more advanced functionalities and features as per there successor releases . Currently the latest version in Android 10 Q which was released on 13 March 2019 and same day its beta version was also released.

II. ANDROID DEVELOPMENT

Android software development is the process by which we can develop new applications for the devices which are running on android platform. The founder of Android ,Google states that android apps can be written are Kotlin, Java & C++ languages using Android SDK (Software Development Kit), while using other languages is also possible whereas some programming tools also allow cross-platform app support i.e. for both android & ios. Third party tools , development environments & language support have also continued to evolve and expand since the initial SDK was released in 2008.

- Android SDK

Android SDK is a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code & tutorials. Currently the supported development platforms include computers running on LINUX ,Mac OS X 10.5.8 or later & Windows 7 or later . Software development is possible by specialized android applications.

At the end of 2014 the officially supported IDE (Integrated Development Environment) was Eclipse using Android Development Tools Plugin . In 2015 , Android Studio, made by Google and powered by IntelliJ, became the official IDE. Additionally, developers may use any text editor to edit Java & XML files then use the command line tools to create , build & debug Android applications as well as control the attached android devices like re-booting , installing software packages remotely .

Android applications are packed with the extension .apk format and are stored under /data/app folder on the Android OS , this folder is only accessible to root users and normal users cannot access this folder.

- Android SDK Platform Tools

The Android SDK Platform Tools are a separately downloadable subset of the full SDK, consisting of command-line tools such as **adb&fastboot**.

The Android Debug Bridge (adb) is a tool to run commands on a connected android device . The adb client runs in the background server to multiplex commands which are sent to devices.

The format for issuing commands is typically :-

Abd [-d|-e|-s <serialNumber>] <command>

Where –d is option for single USB-attached device.
-e is the option for single running Android Emulator.
-s for USB-attached device by its unique serial number.
if there is only one attached device or running emulator then the use of these options is not necessary.

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Fastboot is a diagnostic protocol with the SDK package used primarily to modify the flash filesystem via a USB connection from host computer.

- Android Open Accessory Development Kit

The Android 3.1 introduced Android Open Accessory support which allows the external USB hardware to interact with the android device in special "accessory" mode . In this scenario the connected accessory acts as a USB host & the android device acts as USB device.

III. FEATURES OF ANDROID OPERATING SYSTEM

1. Auto Correction &Dictionary : Android OS has an interesting feature called auto correction in which if any word is misspelled it prompts/recommends the correct words.
2. Web Browser : Web browsers in android is based on open-source Blink layout engine . The older web browsers were known as 'Android Browser' , 'AOSP browser' , 'stock browser' but from Android4.4 Kitkat the official web browser Google Chrome was launched.
3. Voice Based Features : Google search through voice based is there since the initial release whereas voice actions for calling, texting etc. were supported from Android 2.2.
4. Multi-touch : Android has native support for multi-touch which was initially made available in handsets such as HTC Hero.
5. Multi Tasking :Multi tasking of applications with unique handling of memory is available.
6. Screen Capture : Android supports capturing a screenshot by pressing the power button and home screen button at the same time whereas prior to Android 4.4 the method was through third party appplications.
7. Multi Language Support : Android supports multiple languages as per the need of the end user , the user can select a language preferred by self form the options of languages available in the Android OS to view the contents in desired language.
8. Connectivity : Android supports various connectivity technologies like GSM/EDGE, Bluetooth, Teethring, LTE, NFC, IDEN, EV-DO & WiMAX.
9. Video Calling :Android does not support native video calling, but some handsets have a customized version of the operating system that supports it, either via the UMTS network (like the Samsung Galaxy S) or over IP. Video calling through Google Talk is available in Android 2.3.4 (Gingerbread) and later. Gingerbread allows Nexus S to place Internet calls with a SIP account. This allows for enhanced VoIP dialing to other SIP accounts and even phone numbers. Skype 2.1 offers video calling in Android 2.3, including front camera support. Users with the Google+ Android app can perform video chat with other Google+ users through Hangouts.

IV. ANDROID SECURITY

Secure Socket Layers (SSL)

Secure Sockets Layer (SSL) is a networking protocol designed for securing connections between web clients and web servers over an insecure network, such as the internet. After being formally introduced in 1995, SSL made it possible for a web server to securely enable online transactions between consumers and businesses. Due to numerous protocol and implementation flaws and vulnerabilities, SSL was deprecated for use on the internet by the Internet Engineering Task Force (IETF) in 2015 and has been replaced by the Transport Layer Security (TLS) protocol.

Android Security

The open nature of android and due to its large user base have made it an very interactive as well as attractive platform that can be attacked. Google did take measures in the development of Android Kernel like the OS is sandboxed, preventing malicious software. The attempt to eliminate the infection is good and admirable in some aspects but it fails to address the infections altogether making it easy for attackers to reuse same attack vectors.

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V. APPLICATIONS

Applications also known as "apps" are developed using the Android Software Development Kit and is often done using Java programming. The Android SDK comprises of comprehensive set of tools like debugger, software libraries, documentation, sample code, and tutorials .

Android has a growing share of third party applications which can be downloaded and installed by the users across the web and also by Google Play Store. Google Play Store allows users to browse applications in various categories and according to their need and specifications but also the applications are listed up according the to the device compatibility.

According to statistics in May 2013, approximately 48 billion applications have been installed from Google Play Store and in July 2013 50 billion applications were installed. Applications on Google Play Store are also available in paid versions or in-app purchases which offers direct billing though the android device where the cost of application is added to users monthly bill cycle.

VI. FUTURE SCOPE

In the last two years, the number of mobile phone users increased day-by-day. India is the second place in the number of active mobile phone users in the world.

Android has become very popular as it is an Open-Source, Linux-based Operating System, mainly designed by Google for smart-phones and tablets. App also causes income growth that has its own secondary impact on jobs. These indirect and induced effects could result in an increase in total employment by up to 8 times during the period 2014 to 2016. At its best, the App economy could generate over 6,00,000 jobs.

The average salary for an Android Software Developer is Rs.302,100 per year. Android developers (on average and depending on location) make about $117K annually and that number has routinely increased throughout the past several years. The companies that maintain and develop mobile platforms, such as Apple, Google, and Microsoft, it's obvious that mobile app developer job will continue to be lucrative.

VII. CONCLUSION

I have learnt through my research that android is a diverse operating system than iOS and Windows Phone. Android is growing rapidly and is a diverse platform for building applications. Its becoming the most preferred OS in mobile phones as it has many releases with various companies adding their own functionalities unlike other OS which are being implemented on only handful of devices or same devices with upgraded models. Android is a platform to build various applications and widgets which attracts the developer to use and experiment with the tools present and functionalities given by the Android. I cannot compare Android OS to any other OS stating that its good or bad but yes I can definitely come to a conclusion that Android OS is a unique OS and is incomparable to other mobile phone Operating Systems.

VIII. ACKNOWLEDGEMENTS

I would like to express my gratitude and appreciation to all those who gave me the possibility to complete this paper. A special thanks to our guide Prof. P.P. Salunkhe, Prof. U.C. Patkar whose help, stimulating suggestions and encouragement, helped me to co-ordinate our research especially in writing this paper.

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ANDROID APP BASED WAR FIELD SPYING ROBOT WITH WIRELESS NIGHT VISION CAMERA

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ABSTRACT

The main objective behind developing this robot is for the surveillance of human activities in the war field or border regions in order to reduce infiltrations from the enemy side. The robot consists of night vision wireless camera which can transmit videos of the war field in order to prevent any damage and loss to human life. Military people have a huge risk on their lives while entering an unknown territory. The robot will serve as an appropriate machine for the defense sector to reduce the loss of human life and will also prevent illegal activities. Earlier the robots were controlled through wired networks but now to make robot more users friendly, they are framed to make user commanded work. Therefore to attain the requirements we can use android as a multimedia to control the user friendly robot. It will help all the military people and armed forces to know the condition of the territory before entering it.

Keywords: *Spying Robot, Android APP, military Application, multimedia.*

I. INTRODUCTION

With the aim of developing a high-tech technology that serves high speed technology, advanced capacity to control the robots and to device new methods of control theory. The realize above standards some technical improvement along with the need of high performance robot is required to create a faster, reliable, accurate and more intelligent robot which can be devised by advanced technology, robot control devices and new drivers. Earlier the robots were controlled through wired networks but now to make robot more users friendly, they are framed to make user commanded work. Therefore to attain the requirements we can use android as a multimedia to control the user friendly robot. The spying robot as its name suggests in the one used for the purpose of spying on enemy territories.

Its applications can be:

- At the time of war where it can be used to collect information from the enemy terrain and monitor that information at a far secure area, and safely devise a plan for the counter attack.
- Tracking locations of terrorist organizations and then plan attack at suitable time.
- Making a surveillance of any disaster affected area where human beings can't go.

II. OBJECTIVES

- Serve as distant monitoring and controlling device to check any suspicious packet or action.
- To allow the user to manipulate the suspicious packet using the robotic arms.
- To give visual display from suspicious place.
- To make the controlling of the robot such that it can be controlled very easily.
- serves as a control application, at the user end to control the robot from some distance using wireless technology.

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III. BLOCK DIAGRAM

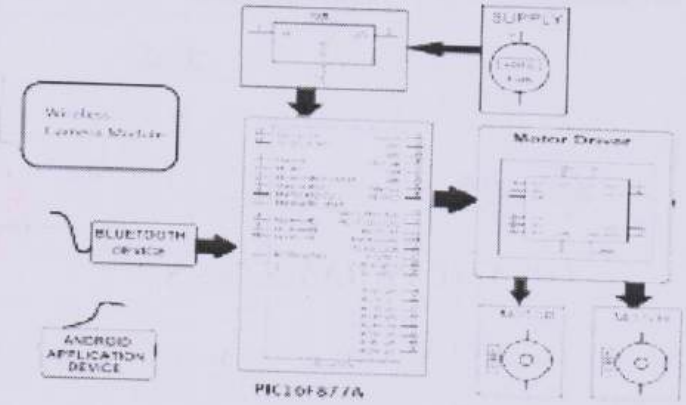


Figure: Block diagram of the system

Block Diagram Description

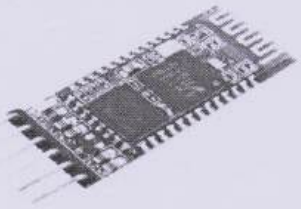
The Bluetooth module interfaced with the PIC microcontroller will receives characters as data from the host. TX[1] and RX pins of PIC IC are connected to the Bluetooth module. The PIC microcontroller is programmed in such a way to produce outputs for the motor driving IC so as to make required motion by the motors. The L293D will produce output as per the input obtained from the PIC microcontroller. And one of the output pins of PIC microcontroller is connected to the relay for the switching purpose of the night vision camera. If we are using an android device for the controlling purpose, we have to pair the HC-05 Bluetooth module with our smart phone. After pairing we have to open the SPY-BOT application in our smart phone and wait for a second to establish connection between the smart phone and HC-05 Bluetooth module. Once connection is made successfully we can start controlling the robot by touching on the buttons on your Smartphone's screen.

The night vision camera in this project is also having a wireless connectivity. By using a Smartphone we can see the visuals in it. When the camera is in dark area the IR lights are turned on and produces night vision visuals on our smart phone.

IV. HARDWARE DESCRIPTION

Bluetooth Module:

- HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.



- HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds.
- This module works on 3.3 V. We can connect 5V supply voltage as well since the module has on board 5 to

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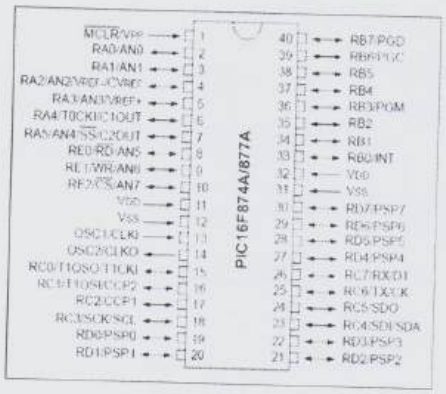
3.3 V regulator.

- As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, no need to shift transmit level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.

PIC 16F877A Microcontroller:

The microcontroller IC of the PIC 16F877A is one of the most used microcontrollers of the era. This controller IC is very easy for use and programming the controller is also relatively easier when compared with other microcontrollers. One of the main advantages of this microcontroller is that it provides RAM memory which can be rewritten as many times as the user desires. PIC 16F877A is used in many PIC microcontroller projects. PIC 16F877A IC also have many applications in embedded electronic circuits.

- It has a total number of 40 pins and there are 33 pins for input and output in which specifically there are 5 ports named as A , B , C , D and E.
- A port has 6 pins, B, C and D ports have 8 pins each. Port E has 3 pins. Function wise there are 8 analog pins, 2 UART pins, 2 PWM pins.
- Apart from all this, PIC controller comes with inbuilt ADC.
- The IC works on 12 MHz of frequency that is supplied by crystal.



Night Vision Camera:

- For video transmission we will use a pair of mobile phones one each at transmitter and receiver.
- The mobile phone at receiver end will record video and sent it in real by an android application through internet to transmitter.
- For night vision purpose we will use infrared LEDs.

V. APPLICATIONS

- Military operations.
- Surveillance along border.
- Search and Rescue Operation.
- Maneuvering in hazardous environment.

VI. FUTURE ENHANCEMENT

The robot can be made more miniature in size. One of the limitations of this robot is the range of the robot. The Bluetooth module used here has a limited range and thus this robot cannot be operated over far distances. To increase the range many other modules such as Wi-Fi and Zigbee can be used.

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In future, the robot may also consist of gas sensors to detect the poisonous gases in the environment. The robot may also include a bomb disposal kit in order to diffuse bombs in the war field.

VII. CONCLUSION

The robotic vehicle is equipped with a wireless camera having night vision capability for remote monitoring/spying purposes. The system is a simple one which makes it easy to design and maintain. It can be used in environments like forests and other places where humans cannot possibly enter during the night. At the time of war where it can be used to collect information from the enemy and monitor that information at a far secure area, and safely make plans for the counter attack. The range of controlling is limited in Bluetooth range.

VIII. ACKNOWLEDGEMENT

The authors convey their gratitude to the department and university for providing the resources along with the appropriate equipments, which were necessary for completing this research paper.

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DESIGN OF FOLDING BICYCLE

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ABSTRACT

The Currently available Foldable bicycles in the Indian market are expensive which make them difficult to buy. The prices of the bicycles are also generally not affordable to the common man. Many of them are not foldable in a configurable geometrical order, because of which their transportation becomes very difficult. It also leads to a lot of difficulty, when it is to be stored for future use. This paper aims at evaluating the existing foldable bicycles in the Indian market and proposing a compact foldable bicycle which is less expensive and overcomes all the limitations in the currently available bicycles in the Indian market. The proposed bicycle is designed in such a way that it is foldable by providing fasteners at the joints. The design structure imparts stable bicycle geometry.

Keywords:- *foldable bicycle, expensive, conceptual design..*

I. INTRODUCTION

A folding bicycle is a bicycle designed to fold into a compact form, facilitating transport when folded, the bicycle can be more easily carried into buildings and workplaces or on public transportation and more easily parked in compact living quarters or aboard a car, boat or plane. Folding mechanisms vary, with each offering a distinct combination of folding speed, folding ease, compactness, ride, weight, durability and price. Distinguished by the complexities of their folding mechanism, more demanding structural requirements, greater number of parts, and more specialized market application, folding bicycle may be more expensive than comparable non-folding models. The choice of model, apart from cost considerations, is a matter of resolving the various practical requirements: a quick easy fold, compact folded size, or a faster but less compact model. There are also bicycles that provide similar advantages by separating into pieces rather than folding. Folding bicycles for accommodating different riders, because the frames are usually only made in one size. While folding bicycles are usually smaller in overall size than conventional bicycles. The material used for the folding bicycles are Carbon fibre, Aluminium, Steel etc. Selection of material depends upon the weight, cost, rigidity, stress. Etc. Different material have different property depending on the material is selected for the bicycle. By knowing this, the question raises, why we should used this type of bicycle? .The bicycle is the one of the most convenient way of transportation or traveling from one place to another. There are different ways of traveling such as bike, train, bus, But this all are costly as compare to bicycles. The cost of bicycle is nearly 10-12 times lesser than bike. As the folding bicycle can be folded in a compact form, it is very easy to carry it in a bag from one place to another and it can be again unfold in a shorter period of time. There are different countries that, using folding bicycles as a main source for traveling. In this way they are not only saving the quantity of fuels but also the human resources. It also helps to be a fit and fine. Japan is the one of a country who's around 75-80% people's uses folding bicycles for travelling. Even different country such as U.S.A, France, and many more uses.

II. METHOD AND MATERIAL

The Main part which is used in our cycle which will help for folding is C-Clamp, we have use two C-Clamp joints in our bicycle model, one is for joining two Frame Bars with handle and another one is for connecting frame to the chain mechanism. C-Clamp is connected to Frame as well as sprocket chain with Nut & Bolt mechanism which provides easy motion for folding. Handle C-Clamp consist of two Nut & Bolts.

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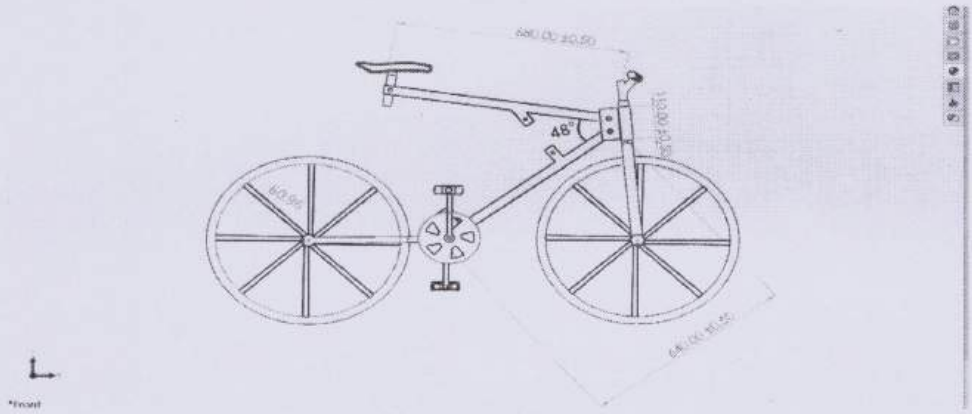
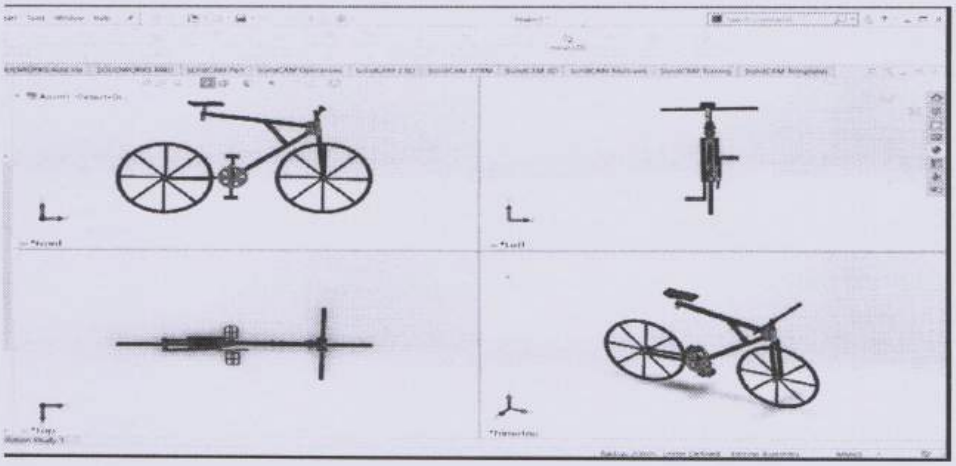
Figure:



Dimensions of Bicycle

We have used "Mild Steel 1018" material which is easily available in market with less cost, which also have more Strength as compare to other material like Aluminium, Carbon Fibre, Titanium etc. Also Manufacturing is easy with Mild Steel. Mild steel can also sustain more load as compare to other Materials.

Figure:



Diff. Views Of Bicycle

III. FOLDING MECHANISM OF BICYCLE

The Bicycle consist of Two Folds mechanism as compare to other Folding Bicycle Which are having more than two Folds.

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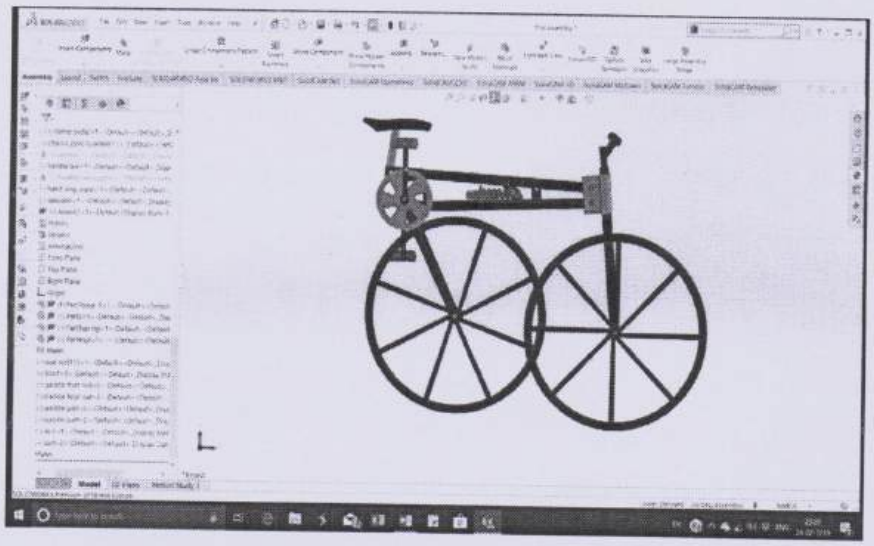
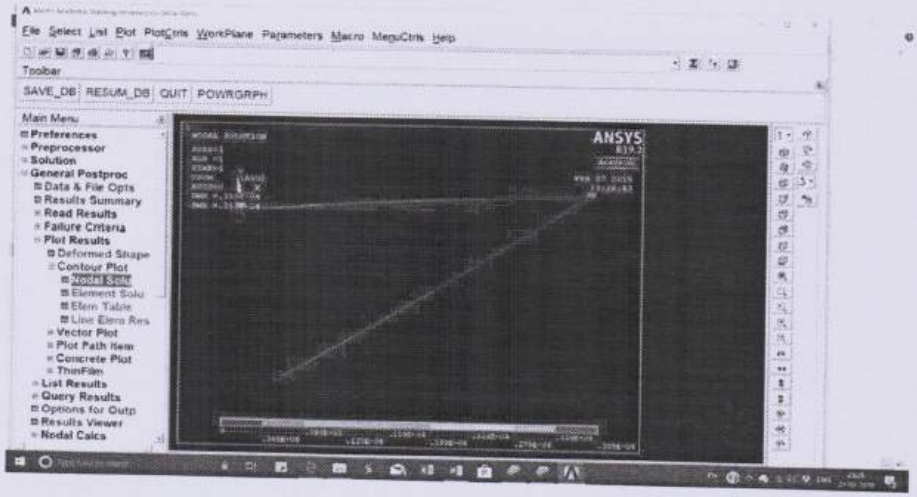
Figure:



IV. RESULT AND DISCUSSION

Analysis of Bicycle on ANSYS Software is given below

Figure:



Ansys

V. CONCLUSION

- We have completed design and Manufacturing of foldable Bicycle.
- We have used Mild steel so overall Manufacturing cost is less.
- Design consist of only two folds which makes it easy for folding.
- We have used skewer hub for tyres which is easily removable in less time.
- C-Clamp is used for folding purpose which is less expensive than other joints

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