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Matoshri College of Engineering & Research Centre, Nashik

Eklahareshivar, Near Odhagaon, Opposite to Nashik-Aurangabad Highway, Nashik,
Maharashtra 422105Contact: 0253-2406600/1/2/3

Website: engg.matoshri.edu.in/Email: matoshricoe.hr@gmail.com

Toll free No.:1800 233 6602

Vision

"To Establish Omnipotent Learning Centre Meeting the Standards to Evolve as a Lighthouse for the Society."

Mission

- Setting up state-of-the-art infrastructure
- Instilling strong ethical practices and values
- Empowering through quality technical education
- Tuning the faculty to modern technology and establishing strong liaison with industry
- Developing the institute as a prominent center for Research and Development
- Establishing the institute to serve a Lighthouse for the society

Quality Statement

"We, Matoshri College of Engineering & Research Center are committed to practice a system of Quality Assurance that inculcates quality culture, aiming at quality initiation, sustenance and enhancement of quality comprehensively ultimately leading the institute as Center of Excellence."

Matoshri Education Society's
Matoshri College of Engineering and Research Centre, Nashik
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A study on performance evaluation of hybrid constructed wetland

Ms. A. D. Khairnar

Appropriate management of available water resource is becoming more important due to scarcity of clean water as population increases. In this context, reuse of treated wastewater may offer a consistent solution for sustainable use of resources. Centralized wastewater treatment systems require sophisticated technologies and skilled manpower for their operation and maintenance; therefore Decentralized Wastewater Treatment System (DEWATS) are preferred over centralized in developing countries. Constructed Wetlands have been used successfully in the past as decentralized wastewater treatment technologies for the treatment of wastewater. They had been used in the treatment of various wastewaters, such as municipal sewage, domestic wastewater, secondary effluent, industrial effluents, agricultural wastewater, and landfill leachate. Physical, chemical and biological processes combine in wetlands to remove contaminants from wastewater. Domestic wastewaters could be successfully treated with efficient organic matter removal by hybrid constructed wetlands.

These hybrid systems are normally comprised of series of vertical flow (VF) and Horizontal Flow (HF) constructed wetlands arranged in many possible manners. The hybrid systems were developed in the 1960s but their use increased only during the late 1990s and in the 2000s mostly because of more stringent discharge limits for nitrogen and also more complex wastewaters treated in constructed wetlands (Vymazal, 2013). Hybrid constructed wetlands are advantageous such that HF constructed wetlands mainly provide organic matter removal and denitrification whereas VF wetlands provide nitrification (Salemaet al, 2015).It has been widely considered that the type of vegetation and Hydraulic Retention Time (HRT) are two key intervening ingredients which directly influence the performance of constructed wetlands Multispecies vegetated wetland have successfully treated domestic wastewater (Shamaet al, 2015).The limitations of traditional gravel substrate fostered the exploration of alternative substrates in wetland systems, for enhancing their treatment performance. No of types of media have been examined to treat wastewater. Use of light weight media can be an alternative for conventional media to improve performance.

Technosavior

A Study on Performance Evaluation of Moving Bed Biofilm Reactor and its Modifications

Ms. A. D. Khairnar

Decentralized wastewater treatment system consists of the collection, treatment and disposal/reuse of wastewater from individual household, clusters of homes, isolated communities, industries or institutional facilities as well as from portions of existing communities at or near the point of waste generation. Different decentralized wastewater treatment systems are available such as septic tank, constructed wetland, trickling filter, Upflow Anaerobic Sludge Blanket (UASB), anaerobic bio-filter, etc. (Guidelines, 2012). Moving Bed Biofilm Reactor (MBBR) is a recent treatment system for decentralized wastewater management. Now adays around 400 wastewater treatment plants in more than 22 countries are using MBBR based processes (Gulhane and Kotangale, 2013). MBBR for treating wastewater is being adopted in India such as in EON IT park in Pune,Quadron IT park in Pune, Sanjay Ghodawat college of Engineering in Atigre, Dist Kolhapur etc.

MBBR is a technology for the wastewater treatment that incorporatesthe best characteristics of processes with growth of biomass in suspension and adhered biomass (biofilm). Therefore, it ispossible to maintain a higher amount of biomass in the same biological reactor and thus allowing larger amount of substrate forbiodegradation. In reactor, for biomass to adhere 50-70 % media is introduced, in which 67 % is optimal (Odegaard, 1999). Researchers have proven that MBBR possesses many ex¬cellent benefits such as high biomass, high Chemical Oxygen Demand (COD) loading, strong tolerance to loading impact, relatively smaller reactor size and no sludge bulkingproblem.Generally the efficiency of MBBR is more than 88%. MBBR can be used for carbon removal as well as nitrogen removal from wastewater. There are some problems associated with MBBR which need to be addressed.

The Concept and Implementation of Kaizen in an Organization

Ms. N. P. Kushare

For continuous improvement in an organization, Japanese philosophy Kaizen is very popular. Flawless concepts of kaizen methodology and proper implementation of tools can lead to a successful kaizen program in a company. From the reviews of various case studies, it has revealed that most of the companies have implemented kaizen efficiently and observe better performance. Besides, some companies also failed to implement kaizen due to the lacking of proper knowledge about the concepts of kaizen.

Here both the success stories and failures of kaizen program in organizations are discussed. For an organization to realize the exact benefits of Kaizen, it should form a long-

term strategy, which admits that by involving employees in making their processes better and implementing kaizen tools appropriately. Finally, Kaizen is not a new word in this competitive marketplace. It is very popular term for improvement in a company, or a tool or methodology for problem solving. The basis of the Japanese Kaizen is the never-ending quest for continuously pinpointing problems and providing solutions. Implementing Kaizen may become easier with a continuous effort of the employees, besides identification of critical factors which may cause the failure of a kaizen program is essential to thrive. The Kaizen principles presume a practical approach and low costs of improvement. The base of Kaizen management system is on the continuous loss reduction by means of methods that do not rely on investments, but on the improvement of the processes and the employees' performance. According to the Kaizen principles, we must be sure that, when we take action, our action will go on in the best possible way and is not merely an intermediate action to generate a temporary result.

Reference – https://journalofbusiness.org

Implementation of Six Sigma Concepts in Construction Project for Ensuring Quality Improvements.

Jaydeep N. Chaudhari, Student, T. E. Civil

This work describes the implementation of Six Sigma concepts in Construction project to meet the quality standards and customer satisfaction. The critical objective of construction industries nowadays is to complete a project within a stipulated time and cost as per the required standards and specifications, minimization of waste and efficient use of resources. Six Sigma principles with an effective methodology in construction industry emphasizes on reducing variation and eliminating the root causes of defects. The basic theory of Six Sigma, Six Sigma principles, DMAIC (Define, Measure, Analyze, Improve, Control) methodology and tools used in each stage of DMAIC methodology has been discussed in this paper. A case study was conducted in a residential building to which Six Sigma principles were applied for internal finishing work (tiling work). A defect assessment sheet has been prepared and the existing sigma level of the process has been found to be 3.37 with corresponding yield of 95.76%. DMAIC methodology has been applied to enhance the quality of the existing process by analyzing the defects, their percentage of occurrence, the possible causes and effect of defects and recommendations to overcome them. The findings will suggest the proper training, management support and minor changes that is required in current work procedure which would help to improve the quality and ultimately enhancing the customer satisfaction which is of prime importance.

One of the major challenges faced by the construction firms is to deliver the product within the stipulated time without compromise in Quality. Execution of works with the Standard Quality

requirements reduces rework and hence the cost for it. There are various factors which have high impact on construction quality. These factors must be identified as early as possible so that quality can be improved. In this paper tiling work of a residential building has been studied and sigma level has been evaluated. DMAIC methodology has been implemented based on Six Sigma principles which give a systematic framework to identify the impact of defects, their root causes and ways to reduce them. DMAIC can be helpful to increase quality and quantity at the same time and it will affect technical and financial success of project considerably. Briefly, Six Sigma, as a quality initiative, that aims to reduce defects and variations in processes using statistical measurements, process design and quality control analysis in order to increase (external/internal) customer satisfaction.

Reference – http://www.ijirset.com/upload/2016/april/45_IMPLEMENTATION.pdf

Total Quality Management In Construction — *Ms. N. P. Kushare*

Construction industry plays an important role in the development of any country. The development of construction industry depends on the quality of construction projects. Quality is one of the critical factors in the success of construction projects. Improvement in the quality of construction projects is linked with quality management in the project life cycle. Although quality management at every stage of project life cycle is important but the quality management at the execution, (construction) stage contributes significantly on final quality outcome of construction projects. This project mainly focuses the importance and factors that affects the quality management in the execution (construction) phase. The project also includes visiting of some construction companies and conducts the questionnaire survey, then analyzes the difficulties (major factors) and the cost variance due to quality defect in quality management and suggests some proactive measures for the improvement of quality in the execution phase of construction projects.

Acceptable levels of quality in the construction industry have long been a problem. Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or non-existent quality management procedures. The manufacturing industry has developed Total Quality Management (TQM) concepts, first applied in Japan and in recent years used in the United States, which have increased productivity, decreased product cost and improved product reliability. These concepts are also applicable to the construction industry.

TQM is achieved through an integrated effort among personnel at all levels to increase customer satisfaction by continuously improving performance. TQM focuses on process improvement, customer and supplier involvement, teamwork, and training and education in an effort to achieve customer satisfaction, cost effective- ness, and defect-free work. TQM

provides the culture and climate essential for innovation and for technology advancement. In this paper, TQM concepts and their implications in the construction industry will be discussed.

There is great potential for quality improvement in the construction industry. In today's competitive world, the term 'quality' and its concepts are vital for the construction industry. There is not much time nor resources to waste. Reworks and delays are not acceptable. As in the manufacturing industries, the construction industry should focus on process quality. It is clear that TQM and its principles do apply to the construction industry. TQM philosophy of teamwork and co-operation not confrontation and conflict, is long overdue for the construction industry. This study indicates that future strategies and potential developments should base on the following findings. Project managers and company administrators should consider the following points in developing their quality systems.

• Management commitment to quality and to continuous quality improvement is very important in each phase of the building process. Management must participate in the implementation process and be fully committed to it if TQM is to succeed.

Construction industry professionals are aware of the importance of quality training. Engineering, architecture and construction management students who eventually become the industry's future leaders must be instructed in the basics of quality management. Education and training in TQM theory and practice at all levels (management as well as operative levels) and in all phases (design, construction, and operation phases) are essential to enhance competitiveness.

Teamwork is necessary to allow each person to get the assistance required to be successful individually, and collectively as a team. The whole construction industry is project oriented; so improved quality performance must be project-related and must include the whole project team. Manufacturer, subcontractors, main con- tractor, vendors, professional designers, project managers and above all, the owner must be involved in the pro- cess. Partnering arrangements between these parties will enhance total quality.

Reference – http://www.jetir.org/view?paper=JETIRCV06095

Shading — *Dr. Swati Bhavsar*

Shading is used traditionally in drawing for depicting a range of darkness by applying media more densely or with a darker shade for darker areas, and less densely or with a lighter shade

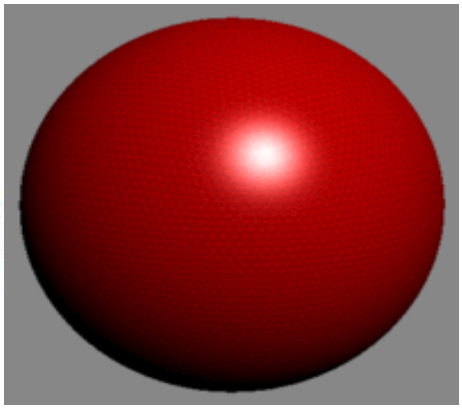
for lighter areas. Light patterns, such as objects having light and shaded areas, help when creating the illusion of depth on paper.

There are various techniques of shading, including cross hatching, where perpendicular lines of varying closeness are drawn in a grid pattern to shade an area. The closer the lines are together, the darker the area appears. Likewise, the farther apart the lines are, the lighter the area appears.

Powder shading is a sketching shading method. In this style, the stumping powder and paper stumps are used to draw a picture. (This can be in color.) The stumping powder is smooth and doesn't have any shiny particles. The paper to be used should have small grains on it so that the powder remains on the paper.

In computer graphics

In computer graphics, shading refers to the process of altering the color of an object/surface/polygon in the 3D scene, based on things like (but not limited to) the surface's angle to lights, its distance from lights, its angle to the camera and material properties (e.g. bidirectional reflectance distribution function) to create a photorealistic effect.Shading is performed during the rendering process by a program called a shader.



Shading alters the colors of faces in a 3D model based on the angle of the surface to a light source or light sources.

The first image below has the faces of the box rendered, but all in the same color. Edge lines have been rendered here as well which makes the image easier to see.

The second image is the same model rendered without edge lines. It is difficult to tell where one face of the box ends and the next begins.

The third image has shading enabled, which makes the image more realistic and makes it easier to see which face is which.

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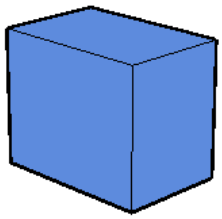
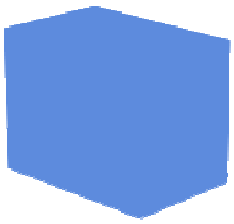
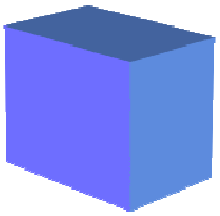


Rendered image of a box. This image has no shading on its faces, but instead uses edge lines to separate the faces and a bolder line to separate the object from the background.



This is the same image with the lines removed; the only indication of the interior geometry are the points of the object's silhouette.



This is the same object rendered with flat shading, which altered the colors of the 3 visible (front) faces based on their angle (determined by the normal vector) to the light sources.

SMART NOTE TAKER — *Radhika Sonar BE Computer*

The Smart Note Taker is such a helpful product that satisfies the needs of the people in today's technologic and fast life. This product can be used in many ways. The Smart Note Taker provides taking fast and easy notes to people who are busy one's self with something.

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With the help of Smart Note Taker, people will be able to write notes on the air, while being busy with their work. The written note will be stored on the memory chip of the pen, and will be able to read in digital medium after the job has done. This will save time and facilitate life. There will be an additional feature of the product which will monitor the notes, which were taken before, on the application program used in the computer. This application program can be a word document or an image file. Then, the sensed figures that were drawn onto the air will be recognized and by the help of the software program we will write, the desired character will be printed in the word document. If the application program is a paint related program, then the most similar shape will be chosen by the program and then will be printed on the screen.

INTRODUCTION: - The Smart Note Taker is such a helpful product that satisfies the needs of the people in today's technologic and fast life. This product can be used in many ways. The Smart Note Taker provides taking fast and easy notes to people who are busy one's self with something. With the help of Smart Note Taker, people will be able to write notes on the air, while being busy with their work. The written note will be stored on the memory chip of the pen, and will be able to read in digital medium after the job has done. This will save time and facilitate life. The Smart Note Taker is good and helpful for blinds that think and write freely. Another place, where our product can play an important role, is where two people talks on the phone. The subscribers are apart from each other while their talk and they may want to use figures or texts to understand themselves better. It's also useful especially for instructors in resonations. The instructors may not want to present the lecture in front of the board. The drawn figure can be processed and directly sent to the server computer in the room. The server computer then can broadcast the drawn shape through network to all of the computers which are present in the room. By this way, the lectures are aimed to be more efficient and fun. This product will be simple but powerful. The product will be able to sense 3D shapes and motions that user tries to draw. The sensed information will be processed and transferred to the memory chip and then will be monitored on the display device.

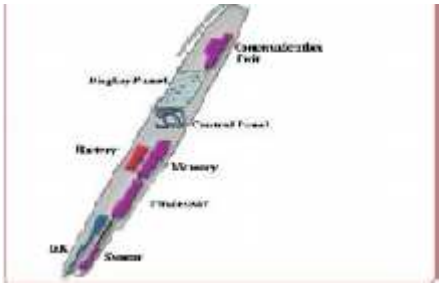
3. SYSTEM OVERVIEW :-Since, JAVA applet is suitable for both the drawings and strings,

Applet: Applet is a function of java which for example, is a kind of container (file) which contains a set of programs made in java. Java is a high level language. It is widely used in making various applications Based on java. It is one of the best features of java.

Database: The system installed in the pen will consist of a database which will help the processor to recognize various words made visually in the air. Each word written in the air will resemble to a word in the database and the word present in the database will be printed. This will remain the basic principle of the working of a smart note taker. Working: Smart note taker will be simple but powerful. The product will be able to sense 3D shapes and motions that user

tries to draw. The sensed information will be processed and transferred to the memory chip and then will be monitored on the display device. The drawn shape then can be broadcasted to the network or sent to a mobile device. There will be an additional feature of the product that will monitor the notes, which were taken before, on the application program used in the computer. This application program can be a word document or an image file. Then, the sensed that were drawn into the air will be recognized and with the help of the software program software we will write the desired character will be printed in the word document. If the application program is a paint related program, then the most similar shape will be chosen by the program and then will be printed on screen.

INTERIOR STRUCTURE:



TECHNICAL DEFINITION OF THE PRODUCT In order to meet the technical requirements of the product we need Operating System Like Windows or Linux in order to implement software part of the project, Displacement Sensors to recognize the displacement of the pen in three dimensions, parallel cable to communicate with computer, software to solve the displacement data and finds the individual coordinate displacements in three axes and transform the data into text format, analog to digital converter to process analog displacement data and convert them into digital format, switch to control the pen and Rechargeable battery. • Operating System · Software program to convert data into text or string format · Displacement Sensor · Parallel cable · Analog to digital converter · Switch · Rechargeable battery CURRENT PRODUCTS :-MOBILE NOTE TAKER :

The Ultimate Handwriting Capture Device Mobile Note Taker is the world's first portable handwriting capture device based on natural handwriting as an input. Attach plain paper of any kind and use Pegasus the electronic pen to capture, store and share handwritten drawings, sketches, notes, and memos at meetings, lectures, and conferences. Mobile Note Taker has a

built-in LCD to confirm input. The on- board flash memory can store up to 50 pages (size A4). Mobile Note Taker works in two modes: - mobile mode and Connected mode. In mobile mode note taker receiver unit is not connected to a PC via USB cable. In connected mode the base unit is connected to a PC through USB cable.

Mobile Note Taker Features &Benefits: Uses standard paper - no special paper required Stores up to 50 A4 pages Includes LCD to view and confirm input Operates both in mobile mode and when connected to PC, notebook or other device Connects to PC/Notebook via USB cable (included) Includes software for synchronization and management of stored files Writes directly into MS® Office applications (in Connected mode) Allows file transfer over LAN, email, and instant messaging application (in connected mode)Capture, Organize, and Share Your Notes Digitally-Anywhere, Anytime! Mobile Mode Enables capture and storage of notes and sketches digitally at meetings, lectures, and conference Connected mode synchronizes the Mobile Note Taker and a PC/Notebook via USB cable (included). You can upload, organize, move, edit or add to handwritten notes, ideas, sketches, phone numbers, or reminders. The included software also enables memos, notes, and sketches to be sent via e-mail or over the LAN network. It is also possible to write directly into MS® Word or Outlook, and add a personal touch to ICQ® instant messages. Based on Pegasus' successful PC Notes Taker, Mobile Note Taker is the ultimate handwriting capture device. Even if you don't have standard size paper or piece of paper with you - you can use anything - an envelope, an old receipt, a tear- off from a paper bag and best of all in your own natural and writing.

PC NOTE TAKER –

PC Note Taker PC Notes Taker is the world's first device that captures natural handwriting on any surface onto a PC in real time. Based on a revolutionary electronic pen, PC Notes Taker displays the user's handwritten notes, memos or drawings on the computer, and stores the image for future use. PC Notes Taker is ideal for markets where handwritten input is essential, such as health, educational and financial sectors. Supplied with user-friendly software, PC Notes Taker is compatible with PCs and notebooks. Adds Handwriting Input to any Computer PC Notes Taker is the world's first device that captures natural handwriting on any surface onto a PC in real time. Based on a evolutionary electronic pen, PC Notes Taker displays the user's

handwritten notes, memos or drawings on the computer, and stores the image for future use. PC Notes Taker is ideal for markets where handwritten input is essential, such as health, educational and financial sectors. Supplied with user-friendly software, PC Notes Taker is compatible with PCs and notebooks.

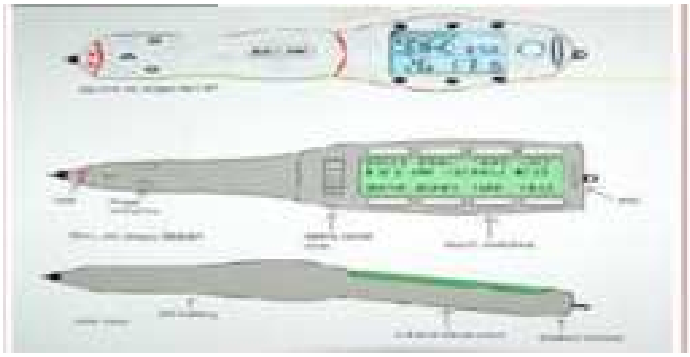
Features & Benefits: Capture of handwriting from any plain paper or other writing surface Input of continuous writing up to A4 page size Insert sketches, signatures, equations, and notes into Word® documents E-mail sketches or handwritten notes in any language using MS® OUTLOOK Convert handwriting to digital text using MS® word recognition engine Annotate, add comments, edit and draw in your own

SMART PEN:

The Smart Pen is a device that resembles a fat pen or stylus, but contains a tiny computer and a set of sophisticated sensors that record and analyze every motion, and then transmit this information to a nearby computer via infrared, radio or direct electric signal .A Smart Pen helps a computer to recognize handwritten or drawn input. A computer is treated as 1 level of Complexity higher in its ability to recognize the handwriting of anybody who uses a Smart Pen. Costs $50, weight is negligible. Fig 4.3 Smart Pen

TECHNOLOGY

DISPLAY TECHNOLOGY:-



Technology used in SmartNoteTaker for display is Kopin Corp's Cyber Display technology. Cyber Display is a¼ inch diagonal LCD that uses circuitry built on a silicon wafer, then removed and mounted to glass. The displays are integrated to miniature monitors using its own backlighting, optics, ICS and packaging. Fig: 5.1 Display Technologies

HAND WRITING RECOGNITION:

• Accelerometers measure hand movement in 2 or 3 planes. • On board DSP converts to ASCII characters for pen applications • Write on paper, flat surface, and vertical wall or in air • Single

character recognition on pen SmartNoteTaker works by measuring the pen's movements and matching them to the movements that produce letters and words programmed into its memory. It's similar to the way a microphone detects sound. Consistency of handwriting, rather than neatness, is the only condition for accuracy. There are 2 techniques used for this purpose : 1) Accelerometer technology 2) Handwriting recognition software

Accelerometer Technology: This technology uses a device called Accelerometer which is used for measuring motion. A tiny accelerometer in a pen could be used to detect the stops and starts, arcs and loops of handwriting, and transmit this information to a small microprocessor that would make sense of it as text. There's also the possibility of viewing a full page of text through a special monocular magnified "virtual" screen that could be built into the end of the pen. Invisible writing in air is achieved through this unique technology called accelerometer that monitors hand movements and can also be used as a 'virtual hinge' to scroll around the small screen on the pen and detect left or right- handed use. It records movement by using the earth's gravity system, whether you write on paper or in the air. Hence it is independent of surface used. Movements are stored within the Smart Note Taker. This information is transmitted on to a small microprocessor that would make sense of it as a text displayed on the sleek built in screen. There are 2 types of accelerometer: 1. Two Axes Accelerometer: This accelerometer measures acceleration in two axes. An Example for Two Axes Accelerometer is ADXL202 Accelerometer

ADVANTAGES -Can be used as standard pen and can carry anywhere without stressing mind to carry it. - With the help of smart note taker we can write notes on any surface even in air. That is we can write notes any time without using a paper. - is used along with paint and JAVA graphics so we can say this product is compatible with all graphics software. -Light weighted and easily portable -on phone talks or for instructor. -Useful for any person, any institute.

DISADVANTAGES - Expensive -No templates and other sophisticated formats available. - Can't drag items to other tabs directly. -Awareness requires.

APPLICATIONS - With the help of smart note taker handwritten notes will be instantly converted into editable text · Another place, where this product can play important role is where two people talk on the phone. The subscribers are apart from each other while their talk and they may want to use figures or text to understand themselves better. · Can be use by teachers directly and indirectly by students, too · Smart note taker is reliable and powerful. · It is helpful for blinds that think and write freely. · Smart note taker is used for instructors in presentations. · It is used along with paint and JAVA graphics so we can say this Product is compatible with all graphics software.

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http://wiki.openmoko.org/wiki/Technical:Accele rometer_Fundamentals

http://www.seminarprojects.com/Thread-smart- note-taker--6901
http://www.youtube.com/watch?v=Ky9dVevsm IEEE Paper- portable note taker for the blinds

Artificial Intelligence and Expert System

Vaishali Vijay Tambe SE Computer

The term Artificial Intelligence was coined by John McCarthy, in 1956, who defines it as "the science and engineering of making intelligent machines". The field was founded on the claim that a central property of humans, intelligence. The sapience of Homo sapiens can be so precisely described that it can be simulated by a machine. This raises philosophical issues about the nature of the mind and limits of scientific hubris, issues which have been addressed by myth, fiction and philosophy since antiquity.

Artificial Intelligence (AI) is the key technology in many of today's novel applications, ranging from banking systems that detect attempted credit card fraud, to telephone systems that understand speech, to software systems that notice when you're having problems and offer appropriate advice. These technologies would not exist today without the sustained federal

support of fundamental AI research over the past three decades. Artificial Intelligence (AI) in the field of information technology focused on creating machines that can participate in behaviors that humans consider intelligent. The possibility of intelligent machines to have human curiosity since ancient times and today with the advent of computer and 50 years of research into AI programming techniques, the dream of smart machines is a reality. Researchers create systems that can mimic human thoughts, understand speech, then the best player chess husband, and countless benefits not possible before.

This mainly concerned with one of the major branches of AI, which is expert systems.An expert system is a computer program, with a set of rules encapsulating knowledge about a particular problem domain (i.e., medicine, chemistry, finance, flight, etc.). These rules prescribe actions to take when certain conditions hold and define the effect of the action on deductions or data. The expert system, seemingly, uses reasoning capabilities to reach conclusions or to perform analytical tasks. Expert systems that record the knowledge needed to solve a problem as a collection of rules stored in a knowledge-based are called rule-based system

Expert systems are especially important to organizations that rely on people who possess specialized knowledge of some problem domain, especially if this knowledge and experience cannot be easily transferred. Artificial intelligence methods and techniques have been applied to

a broad range of problems and disciplines, some of which are esoteric and others which are extremely practical.

Smarter artificial intelligence may replace human jobs, freeing people for other pursuits by automating, manufacturing and transportation. Self-modifying, self-writing and learning software can relieve programmers of the burdensome tasks of specifying the functions of different programs. Artificial intelligence will be used as cheap labor, thus increasing profits for the corporation. It's now the time to sit and think upon for the future of artificial intelligence in expert systems whether as to go with traditional technologies or to adopt the science of artificial intelligence. The overall motivation behind this is to modernize our ancestral methods so as to bring in a rapid change in the growth of highly developed expert systems so as to cater to the needs of a growing population. The development process may be incremental but the overall concept requires a paradigm shift in the way we think about the modernization that is based more on needs and novel ways of meeting them rather than modifying existing techniques.

Whiteboard animation — *Ms. Manisha Waghmare*

Whiteboard animation is the process of which an author physically draws and records an illustrated story using a whiteboard, or whiteboard-like surface, and marker pens. The animations frequently are aided with narration by script. The authors commonly use time-lapse drawing[1] and stop motion animation to liven hand-drawn illustrations, with YouTube used as a common platform. It is also used in television and internet advertisements to communicate with consumers in a personal way. The earliest videos made using Whiteboard Animation were published in 2009 on YouTube, used mostly for experimental purposes until developing into a storytelling device, focusing mostly on narratives and educational explanations.

"Whiteboard animation" refers to a specific type of presentation that uses the process of creating a series of drawn pictures on a whiteboard that are recorded in sequence and then played back to create an animated presentation. The actual effect of whiteboard animation is time-lapse, or stop-motion. The actual sequential frame by frame animation is rarely used but has been incorporated. Other terms are "video scribing" and "animated doodling". These video animation

styles are now seen in many variations and have taken a turn into many other animation styles. With the introduction of software to create whiteboard animations, the process has many different manifestations of varying quality. Those who use whiteboard animation are typically businesses and educators.

The whiteboard animation production procedure begins with creating a topic. Once the topic is chosen, scriptwriting begins. After the content is created, it is time to create rough drafts of animations. These assist to set up the inventive bearing and timing for the movement. The rest of the process is as follows:

1. Compose the content
2. Record the voiceover
3. Make starting animations
4. Organize the animations
5. Make Guides
6. Record the video
7. Match up sound and video
8. Include music
9. Export and share

The steps listed above are not set in stone, they should be used as a guideline to create a whiteboard animation production.

Application:

Whiteboard animation has been used in a few TV spots and on internet video sites such as YouTube and Vimeo. Early types were UPS Whiteboard Commercials. Many companies and firms of all sectors and sizes are incorporating this style into their modus operandi to teach company employees different company policies or demonstrate a new software or product to consumers.

For educational purposes, whiteboard animation videos have been used for learning online to teach languages, as chapter summaries for educational textbooks, and for the public communication of academic scholarship. A 2016 study of whiteboard animation found that, despite claims and high popularity, there is little to no compelling experimental evidence that they are more effective in learning, motivation, or persuasion than other forms of learning.

Starting in 2010, the Royal Society of Arts converted selected speeches and books from its public events program into whiteboard animations. Made by whiteboard animation studio Cognitive, the first 14 RSA Animate videos gained 46 million views in 2011, making the RSA's YouTube channel the no.1 nonprofit channel worldwide.

Technosavior

High Quality Arduino Turbidity Sensor *D.D.Ahire*

Reference – www.google.com

TS-300B is a High Quality Turbidity Sensor with analog and digital interface for Arduino. This is the low cost Arduino Turbidity Sensor DIY Projects. The turbidity of water refers to the degree of turbidity caused by suspended matter such as sediment, clay, organic matter, plankton and microorganisms contained in water. Industrial grade turbidity sensors or turbid meters are expensive and not costly in electronics design; therefore, we have chosen a turbidity sensor that is widely used in household appliances washing machines and dishwashers.

Turbidity Sensor working Principle

The sensor uses the optical principle to comprehensively determine the turbidity by the transmittance and scattering rate in the solution. Inside the sensor is an infrared pair tube. When light passes through a certain amount of water, the amount of light transmitted depends on the degree of contamination of the water. The dirtier the water, the less light is transmitted. The light receiving end converts the transmitted light intensity into a corresponding current magnitude, and the transmitted light is large, and the current is large, and the transmitted light is small, and the current is small.

The turbidity sensor module converts the current signal output by the sensor into a voltage signal, and performs AD conversion data processing by the single chip microcomputer.

Function

The module has an analog and digital output interface. The analog quantity can be sampled by the microcontroller A/D converter to know the current water contamination. The digital quantity can be adjusted by the potentiometer on the module. When the turbidity reaches the set threshold, the D1 indicator will be illuminated, the sensor module output will change from high level to low level, and the microcontroller will monitor the level change.

Determine whether the turbidity of the water exceeds the standard, thus alerting or linking other equipment. The module is low in price, convenient to use, high in measurement accuracy, and can be used for measuring the degree of water pollution of washing machines, dishwashers, etc.; it can also be used for industrial site control, environmental sewage collection and other occasions requiring turbidity detection and control.

Specifications

- Operating voltage: 5.00V DC
- Working current: 40mA (MAX)
- Response time: <500ms
- Insulation resistance: 100MΩ (Min)
- *Output mode: analog output: 0~4.5V; digital output: high/low level signal (can adjust the potentiometer to select the corresponding threshold)*

- Operating temperature: -20 ° C ~ 90 ° C
- Module size: 38.6mm*22.1mm
- Sensor Interface: XH2.54 connector
- *Ratio Range (NTU): 0~1000±30*
- Infrared Emitting Diode: 940nm (Peak emission wavelength)
- Photo Transistor: 880nm (Peak emission wavelength)

Applications

- Washing machines,
- Dishwashers,
- industrial site control,
- environmental sewage collection
- Water quality monitoring using IOT
- Oil quality monitoring

Features

- Simple and convenient to use
- Low Cost
- Digital and analog output Mode

Conclusion

This is a super cool water quality sensor module that enable you to monitor the turbidity of any liquid using Arduino, without spending too much budget sometimes it can be tricky while detecting the Forward gesture.

Dual Axis Solar Tracking System Based on GPS Satellite *D.D.Dighe*

Reference – www.google.com

With the growing demand for energy worldwide, a drastic shortage of non-renewable sources of energy will be observed now. Hence, there is a need to replace these energy sources with those that are abundant and renewable. For collecting solar energy from sun, the current fixed configuration of solar panels is used which provides only 22 percent efficiency as it faces the sun only for a limited amount of time per day.

In this project, a smart dual axis solar tracker design which also monitor and logs data using IOT(internet of things). we monitor the most important parameter such as solar irradiation, battery voltage, temperature, sun angle and generated power. The solar tracker consists of five main blocks 1) Controller 2) Motor Driver and motors 3) Charge Controller with buck converter. 4) GPS receiver 5) Datalogger.

The tracking system utilizes the GPS module and a digital compass sensor for determining the location and the heading feedback of the system respectively. The output voltage efficiency of the automated tracking configuration has been compared and analyzed with a fixed configuration solar pan

Introduction

In the years ahead the demand for energy will escalate, whereas the conventional fossil fuel energy will deplete in a rapid pace.

Sun energy is one of the great pure useful power supply, the sun radiation supply the earth with a big amount of solar radiation power. The earth receives about 84 terawatts of power and our world consumes about 12 terawatts of power per day. This radiation can be converted to electrical power by photovoltaic pv cells. Additionally, PV technology is a fast growing technological progress that requiring very little maintenance with zero carbon foot-print.

The performance of a PV panel is not only dependent upon the solar irradiance power, weather condition, and the ambient temperature, but it also depends on the solar radiation's incidence angle to the PV panel.

During the day, the sun appears to move through the sky from east to west, therefore the angle between sun and a fixed PV surface is continually changing. Thus, the power density on a fixed PV module is less than that of the incident sunlight. Lately, there are many works have been taken in order to maximize the power extraction from the PV panel. Solar tracking system offers a practical technology solution to improve the power efficiency generated by the PV panel. Extensive research and experiment have shown that by maintaining consistent direct exposure from the sun to the PV module, the tracking system able to produce up to 40 percent more power over a fixed-tilted (non-tracking) PV panel

Problem Statement

Generally, the solar tracker is a device used for aligning a PV panel towards the sun. In this context, there are three types of the solar tracking system, namely passive tracker, active tracker and open-loop tracker. Passive tracker uses two canisters filled with compressed gas fluid that placed each in the east and west of the tracking. However, this gas tracker rarely points the PV panel direct to the sun due to the unpredictable ambient temperature. Yet, as the advancement of sensor technology, the light sensor is used in the active sun tracker system and it is placed at various locations at the tracker to determine the best sun position, which is done by tilting the PV panel using actuators. Nevertheless, the cloud and shadow effect are the major the drawback of the system. This consequence brings disadvantages because power is wasted to drive the tilting actuator back and forth for during its searching mode. Other than that, the open-loop tracker is also commonly used for tracking the sun path as in Fig. 1. The tracker uses a predetermined astronomical database to determine the sun position for any given time and location's coordinate by using micro-controller or PLC. In addition, the open-loop tracker is

based on the altitude and the azimuth position of the sun, therefore, this system is not dependent on the ambient temperature and weather. This circumstance gives great advantages, such that it will not eliminates unwanted power dissipation and complexity. Conversely, the open-loop tracker also has demerits that could reduce the efficiency output, as an instance, tracker's misalignment during setup due to human error. Besides, before the deployment of the solar tracker, solar path database is set manually by the supplier or contractor. As we all know, every location has its unique solar path, thereupon, it will involve extra manpower that will increase the installation or setup cost.

Heavy Duty Actuators Help Improve Mobility for Handicapped Travelers

Pranali Kaiche,Reference – www.google.com

Maximising mobility for handicapped vehicle passengers requires more accessibility features than conventional automotive manufacturers typically provide. Although some standard vehicles offer basic wheelchair lifts and options for higher-roofed models, improving on these and augmenting them with ramps, adjustable seating, hand controls and other capabilities requires customisation — or what is known in the industry as "upfitting."

Fenton Mobility, one of the largest upfitters in the United States, holds numerous patents for personal mobility innovation, including a low-angle wheelchair ramp that enables safe, easy van access via the rear entrance. Smooth, reliable operation of this ramp is critical to the comfort and safety of passengers, and Fenton achieves this cost effectively thanks to smart, heavy duty electromechanical actuators.

Addressing market challenges

Demand for custom vehicles among urban paratransit services, nursing homes and other cargo van users is growing steadily. Manually raising the roofs and doors on Ford Transit vans to accommodate wheelchair access had become a significant part of Fenton Mobility's business but was threatened in 2015 by the emergence of new European van designs that came right from the factory with raised roofs and doors.

"We actually saw the change coming around 2013 and went to work on ways to make it even easier for ambulatory and wheelchair clients to access these Euro-style vans which are also available in the US," said Scott Fenton, President of Fenton Mobility Products. "The result is our patented AbiliTrax platform, a universal flooring platform that bolts into European-styled

Dodge Ram ProMaster, Ford Transit or Mercedes Sprinter vans that are available in the U.S. The platform gives users more flexibility in locating seating and access ramps."

Reducing angle of access

Installing the ramp in the rear of the van provided more convenient access in confined spaces such as garages and other tight parking areas. However, the fact that the European-style van still required a relatively steep angle of access presented a unique opportunity for Fenton designers. If they could enable a lower angle of access to the back of the van, wheelchairs could roll in more easily and safely.

Accomplishing this required mounting actuators inside the back of the van to apply thousands of pounds of downward compression force to the vehicle's standard suspension. Fenton designers first considered using pneumatic actuators for this application but soon rejected the idea out of concern that condensation in cold weather could jeopardize reliability.

They then concluded that heavy duty electromechanical actuators would be the most effective solution. To meet Fenton specifications, these actuators would need to be compact while featuring higher force ratings than comparable hydraulic systems. With strength to apply at least 2200 lbs. of compression force to the van's rear suspension, the actuators would enable the vehicle to squat down, lowering the ramp by six inches.

A smart choice

After testing different electromechanical actuators, Fenton selected Thomson Electrak® HD linear actuators due to their high load handling capability and onboard electronics, which enable low-power switching, and environmental resistance.

"We can connect the high voltage required to drive the actuator directly to the battery and use low-voltage switching to control it," said Fenton. "Any time you can control high-voltage power with lower-voltage signals, it will be much easier, much safer, and less expensive because of the limited and reduced-size wiring needed to accomplish this. And it enables us to offer something that our competitors cannot."

Low-level switching allows the actuators to be extended or retracted with a simple control signal, which is much safer than switching the full current required by the motor. Built-in end-of-stroke indicators inform users when the actuator is fully extended or retracted, and the actuator electronics also facilitate cycle count data on the Abilitrax system.

Using additional features

Demanding applications such as the AbiliTrax system are ideal for Electrak HD actuators, which are more powerful (loads up to 3500 lbs [16 kN]) and feature longer strokes than comparable models. Fenton has found that the Electrak HD's onboard controls not only make them suitable for low level power switching but also equip them to provide digital position feedback, advanced diagnostics and CAN bus networking. These capabilities are achieved

through an integrated printed circuit board that replaces standalone controls. Electrak HD also meets the most extreme OEM component environmental acceptance tests, including IP69K.

"While this specific project did not utilise all the available Thomson features, there is much more that can be done with the onboard circuit board," said Fenton. "Everything is built right into the actuator. You can customise the functionality you need, and it is easy to work with. We have future projects to utilise other features, including CAN bus networking and synchronisation."

Ramping up

The lower-angled ramp is just one accessory that the AbiliTrax platform contributes to Fenton Mobility's continued success in the general purpose and luxury shuttle van markets. With the flexibility designed into the platform and the untapped potential of the intelligence embedded in Thomson Electrak HD actuators, Fenton is well poised to drive van passenger comfort to new heights.

Refining the content and design of an alcohol reduction app, Drink Less, to improve its usability and effectiveness: a mixed methods approach

Mansi Patil

Reference – www.google.com

Background: Digital interventions have the potential to reduce alcohol consumption, although evidence on the effectiveness of apps is lacking. Drink Less is a popular, evidence-informed app with good usability, putting it in a strong position to be improved upon prior to conducting a confirmatory evaluation. This paper describes the process of refining Drink Less to improve its usability and likely effectiveness.

Methods: The refinement consisted of three phases and involved qualitative and quantitative (mixed) methods: i) identifying changes to app content, based on findings from an initial evaluation of Drink Less, an updated review of digital alcohol interventions and a content analysis of user feedback; ii) designing new app modules with public input and a consultation with app developers and researchers; and iii) improving the app's usability through user testing.

Results: As a result of the updated review of digital alcohol interventions and user feedback analysis in Phase 1, three new modules: 'Behaviour Substitution', 'Information about Antecedents' and 'Insights', were added to the app. One existing module – 'Identity Change' – was removed based on the initial evaluation of Drink Less. Phases 2 and 3 resulted in changes to existing features, such as improving the navigational structure and onboarding process, and clarifying how to edit drinks and goals.

Conclusions: A mixed methods approach was used to refine the content and design of Drink

Less, providing insights into how to improve its usability and likely effectiveness. Drink Less is now ready for a confirmatory evaluation.

Introduction

Digital interventions have much promise in supporting health-related behaviour change; those for alcohol have been found to be effective at reducing hazardous and harmful alcohol consumption (Kaner et al., 2017; Riper et al., 2018). Digital interventions include websites, wearable devices, and smartphone apps. Apps have the advantage of being available to deliver support when and where needed, with smartphones being the most important device used to access the internet in the United Kingdom (UK) in 2020 (Ofcom; Critical Research, 2020). However, the majority of the alcohol-related apps available have been developed without reference to scientific evidence or theory (Crane et al., 2015), and evidence on the effectiveness of apps to reduce alcohol consumption is lacking. A recent Cochrane evidence review (Kaner et al., 2017) found that digital interventions may reduce alcohol consumption when compared with a control (i.e. screening, assessment, printed or onscreen health or alcohol-related information). However, only one of the 42 randomised controlled trials (RCTs) evaluated a smartphone app, and this study was conducted among university students in Sweden, not in a general population sample (Gajecki et al., 2014). Therefore, despite the availability of hundreds of alcohol-related apps in commercial app stores, none so far have been evaluated in an RCT among the general population of adult drinkers in the UK. The lack of current evidence on the effectiveness of alcohol reduction apps highlights the need for a robust evaluation strategy of an evidence- and theory-informed alcohol reduction app

Digital interventions tend to have multiple components, which pose a number of issues relating to initial evaluation with a RCT. These issues include understanding which components are driving intervention effectiveness, building in the ability to refine the intervention over time, making timely decisions about what components to retain in the intervention, and updating the intervention to keep pace with the rate of change of software. The Multiphase Optimisation Strategy (MOST) is an experimental approach for efficiently and systematically developing and optimising multi-component interventions within pre-specified constraints, such as financial (Collins et al., 2005, 2007, 2011, 2014). MOST can be simplified into a three-step process of: screening (efficient identification of intervention components for inclusion in the ‘first draft’ of the intervention); refining (fine-tuning of the selected components in the ‘first draft’); and confirming (evaluating the ‘final draft’ of the intervention in a standard RCT) (Collins et al., 2007). The initial screening and refining steps allow researchers to understand the effects of the individual intervention components and create an optimal intervention. MOST recognises that RCTs are the gold standard for assessing the effectiveness of an intervention as a package in its ‘final draft’, though highlights the importance of this being the last step after the intervention has been refined through experimentation. By following MOST, researchers are likely to avoid

the (typically very slow) cycle of intervention – RCT – post hoc analyses – revision of intervention – RCT.

Drink Less is a freely available, evidence- and theory-informed app that aims to help the general population of people who are hazardous or harmful drinkers to reduce their alcohol consumption ("Drink Less on iTunes store," n.d.; Garnett et al., 2019a). Drink Less was guided by MOST (Collins et al., 2005, 2007) and the first screening step was conducted between 2014 and 2016. The screening involved a systematic and transparent development process (Garnett et al., 2019a) involving users across a range of socioeconomic groups (Crane et al., 2017), and a randomised factorial screening trial (Crane et al., 2018). The aim of the screening trial was to identify the individual components, or combinations of components, within the multi-component intervention that affect change and to screen out the ineffective ones (Collins et al., 2014). The screening trial found no clear evidence for simple main effects but did find evidence that two-way combinations of certain components resulted in greater reductions in alcohol consumption, and there was an overall decline in weekly alcohol consumption among all trial users of 3.8 standard UK units (Crane et al., 2018). Furthermore, Drink Less appears to have favourable usability amongst its users: the app was launched in May 2016 and has since been downloaded by over 62,000 unique users and has an average 4.3/5 star rating (as of January 2021) in the Apple App Store.

Since Drink Less is a popular, evidence-informed app (Crane et al., 2018; Garnett et al., 2019a), a confirmatory evaluation is warranted. To ensure the evaluation was of optimal content and design, it was refined in line with the second step of MOST. This 'refining' step was important to fine-tune the selected components from the first version and ensure the app was in an optimal state prior to conducting a resource-intensive confirmatory evaluation. This refinement process is typically based on experimentation of the intervention (Collins et al., 2011); however, other study designs may also be used. Here, we describe the three-phase, mixed methods process of refining the Drink Less app to improve its usability and likely effectiveness across socioeconomic groups, in preparation for its evaluation in an RCT.

Methods

Ethics statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethics approval was granted by the University College London's Research Ethics Committee under the "The optimisation and implementation of interventions to change behaviours related to health and quality of life" project (CEHP/2016/556).

Refinement process

The refinement of the app consisted of three phases and involved a combination of qualitative and quantitative (mixed) methods: (i) identifying changes to the content of the app, (ii) design and translation of new content into app modules, and (iii) improving the usability of the app. The refinement began in January 2018 and the project ended in July 2019. The final version of the app (v2) was launched in January 2020.

Conclusions

The alcohol reduction app Drink Less has been systematically developed and refined based on evidence and theory. A mixed methods approach was used to refine Drink Less, following its original development (Garnett et al., 2019a), which provided insights into how to improve the likely effectiveness of the intervention whilst also providing users with what they want from the intervention, which is critical for longer-term engagement. This meant the app was not left to 'rot' in the app store, as is the case for many apps developed by academics (Larsen et al., 2016) and issues of poor user engagement were avoided. The three-phase refinement process involved adding three new modules to Drink Less ('Behaviour Substitution', 'Information about Antecedents' and 'Insights') as well as a number of changes to existing modules to improve its likely effectiveness, and its acceptability and usability to users. Drink Less is now ready for evaluation in an RCT to assess its effectiveness and cost-effectiveness at reducing hazardous and harmful alcohol consumption. Drink Less is a freely available intervention to people wanting support to reduce their drinking, which, if found to be effective, could be widely recommended resulting in important implications for public health.

Introduction to Photodiodes: The Nature of Light and pn Junctions

M.N.Navale

Reference – www.google.com

Photodiodes are measurement devices that produce electrical signals in response to various types of high-frequency electromagnetic radiation—ambient light, light focused by a camera lens, laser signals used in communication systems, thermal emissions, and so forth.

This introduction to photodiodes will serve as preparation for further study of light-sensitive circuits, applications, and techniques. The introduction is organized as five separate articles:

1. **The Nature of Light and pn Junctions**
2. Physical Operation of Light-Sensitive pn Junctions
3. Understanding Photovoltaic and Photoconductive Modes of Photodiode Operation
4. Characteristics of Different Photodiode Technologies
5. Understanding the Photodiode Equivalent Circuit

What Is Light?

If you've studied quantum mechanics, you know that this question is not as straightforward as it seems. Fortunately, we don't need to unravel the mysteries of the universe in order to successfully incorporate photodiodes into our electronic systems. We do, however, need to have a basic scientific understanding of light.

Electromagnetic Radiation and Wavelengths

Electromagnetic radiation (EMR) propagates as a wave and also consists of massless particles called photons. We categorize electromagnetic waves according to their wavelength. Light is simply EMR that falls within a specific range of wavelengths.

If we adopt a strict interpretation of the word "light," we would associate this word only with optical wavelengths, i.e., wavelengths of light to which the human eye is sensitive. The optical wavelengths extend from 400 nm to 700 nm, with different wavelengths corresponding to different colors.

As you can see in the diagram, the colors start at violet (which has the shortest wavelengths) and move through the rainbow toward red (which has the longest wavelengths).

We can also apply the word "light" to electromagnetic radiation that is near but not actually within the optical range. Infrared light extends from 700 nm to 1 mm, and ultraviolet light extends from 400 nm to 10 nm. When "light" is interpreted in this broader sense, we can use the term "visible light" to distinguish optical EMR from infrared and ultraviolet.

Electromagnetic Radiation and Photons

Electrical engineers often emphasize the quantum nature of light, because photons play an important role in the interaction between light and electronic circuitry. Photons transfer energy, and the energy associated with an individual photon is determined by wavelength.

EMR with higher frequency (or shorter wavelength) has higher-energy photons, and EMR with lower frequency (or longer wavelength) has lower-energy photons.

The pn Junction and the Diode

Get some semiconductor-grade silicon (the **really** pure stuff). Dope a section of it with a pentavalent element to make n-type silicon, and dope an adjacent section of it with a trivalent element to make p-type silicon. You've got a pn junction—one of the pillars of postmodern civilization.

When a silicon pn junction is packaged and used in a circuit, we call it a diode (or a silicon junction diode if you want to be more precise). When we implement ordinary diodes, we're usually thinking in terms of forward-bias operation: the diode blocks current when its forward-bias voltage is less than about 0.6 V, and it freely conducts current when its forward-bias voltage is greater than 0.6 V. (This is a major simplification, but a useful one. For a more in-depth discussion, consider reading my article on simplified circuit-analysis techniques for forward-conducting diode circuits.)

With photodiodes, however, we're interested in zero-bias operation or reverse-bias operation. This principle of photodiode implementation is crucial, so let's discuss it a bit more before we finish up.

The pn Junction as an Optical Detector

The purpose of a photodiode is to generate current that is proportional to the intensity of visible, infrared, or ultraviolet light. The technical term for light intensity as measured by a photodiode is illuminance.

A photodiode has transparent packaging that allows light to reach the pn junction, and in a properly designed photodiode circuit, incident light will create precise variations in the amount of current flowing through the photodiode.

If we forward bias a photodiode to the point of conduction, we no longer have an optical detector. Detection occurs when the energy transferred by incident photons significantly influences the total diode current. Current flows freely through a forward-conducting diode, regardless of the incident light. Thus, photodiode circuits are designed such that the photodiode has zero bias or reverse bias.

A photodiode implemented with zero bias operates in photovoltaic mode, and a photodiode implemented with reverse bias operates in photoconductive mode. These two modes are explored in detail later in this introduction.

Measuring Light, Infrared Radiation, and Ultraviolet Radiation

Photodiodes are semiconductor devices that can be used to measure visible light, infrared radiation, or ultraviolet radiation. A silicon photodiode is not fundamentally different from a typical silicon rectifier diode, but photodiodes take advantage of the zero-bias or reverse-bias characteristics of a pn junction.

Credit Card Fraud Detection System Using Machine Learning :

Omkar Pawar(SE IT)

Detecting fraud transactions is of great importance for any credit card company. We are tasked by a well-known company to detect potential frauds so that customers are not charged for items that they did not purchase. So the goal is to build a classifier that tells if a transaction is a fraud or not. There are various challenges when we wish to find a solution for tracking such frauds. A deep neural network model can successfully help to detect the frauds. The node selection criteria if set effectively it can find and detect the frauds. A computer automated system can be more applicable if it provides efficient security. A further extension to this problem can be solved using random forest algorithm for the same. Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and

make decisions with minimal human intervention. A system which can solve such errors will have the huge demand and can be profitable for all the stake holders too.

Cloud Based Data Leakage Detection System - Prajakta Karve (TE IT)

Large government bodies, multi-National Companies and private or public sectors are working based upon the crucial data and information. This data is mostly sensitive and private to the company. The data leakage is the problem of accidental leakage of data by any security illiterate or an intentional attempt by a guilty employee within the organization. The leakage of such sensitive data can work as the profitable factor to the rival company and huge monetary loss to the original company and owner. In order to overcome this problem, we need to maintain a transaction log to find whether one or more users have leaked the data. Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. The term is generally used to describe data centers available to many users over the Internet. This will, to a much extent, makes the solution for prevention of the problem. The proposed model implements the SHA algorithm, which is used for the encrypting data which is to be communicated. For security of data from illegal accesses we have also implemented the concept of Fake Object Module in the proposed system.

Home price prediction system using Machine Learning - Pratik Magar (TE IT)

Every year and in generally houses prices are increasing every year.so there is a need for a system to predict house prices in the future. House price prediction can help the developer determine the selling price of a house and can help the customer to arrange the right time to purchase a house. There are three factors that influence the price of a house which include physical conditions, concept and location. Based upon the research study of predicting house prices in Malang city with regression analysis and particle swarm optimization (PSO), we can also use the same technique to predict the cost of other cities. PSO is used for selection of affect variables and regression analysis is used to determine the optimal coefficient in prediction. **Machine learning** is a method of data analysis that automates analytical model building. It is a branch of artificial **intelligence** based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention. The result from this research proved combination regression and PSO is suitable and get the minimum prediction error.

Technosavior

Weather Monitoring system Using IoT - Omkar Joshi (TE IT)

The proposed described is an advanced solution for monitoring the weather conditions at a particular place and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. Here things might be whatever like electronic gadgets, sensors and automotive electronic equipment. The system deals with monitoring and controlling the environmental conditions like temperature, relative humidity and CO level with sensors and send the information to the web page and then plot the sensor data as graphical statistics. The data updated from the implemented system can be accessible in the internet from anywhere in the world.

IOT Based Safety and Health Monitoring for Construction Workers - Shraddha Rakibe(BE IT)

Safety is a major problem in construction works. There is no proper solution to solve the problem. People's safety is not ensured in the construction works. In most of the cases, the problem occurs due to work stress or poor health conditions. Some of the accidents occur where people fall down from heights and left unnoticed which leads to death due to lack of medical attention. According to the international report almost 48000 workers die every year due to workplace accidents and the construction site tops the list with 24.20 percent. However, most deaths occurred were preventable. This project aims to develop smart wearable devices such as band and helmet using various sensors that will help in monitoring the health and safety of workers. The devices constructed using IOT help in detecting the fall of any workers and sends SMS notification for immediate aid. Moreover, the workers vitals such as heart rate and temperature are also monitored and warned regarding abnormal health conditions. The project aims to provide a secure and safer working environment for worker thus reducing the number of deaths happening in construction sites. The prototype developed was tested on various conditions and showed high accuracy in the performance.

Need for Alternative Fuel Mr. Niraj B. Dole

Excessive use of the fossil fuels has led to global environmental degradation and health hazards. The increasing concern of environmental protection and more stringent regulation on exhaust emissions, reduction in engine emissions becomes a major task in engine development. In addition to this lots of efforts are needed to reduce dependence on the petroleum fuels as it is obtained from limited reserves. These concerns led research on alternative renewable. Among the proposed

alternative fuels biodiesel and ethanol have received much attention in recent years for diesel engines.

Fig.1.1 Callophyllum seedling

Fig.1.2 Flowers of callophyllum

Fig 1.3 Dried fruits

Fig.1.4 Fresh fruit with shell

World's energy consumption has increased continuously since decade, because the world population is increasing and the economies of developing countries are expanding rapidly Present day's energy demand is increasing continuously due to the faster industrial development, increasing population and increasing the pollution due to the petroleum-based fuels. Nonedible sources like Undi, Waste cooking oil, mahua oil, Karanja oil, neem oil, jatropha oil, simarouba oil etc. are being investigated for biodiesel production. Fatty acids like stearic, palmitic, oleic, linoleic and linolenic acid are commonly found in non-edible oils. Vegetable oils blended with diesel in various proportions have been experimentally tested by a number of researchers in several countries. To fulfil this energy demand and to control the pollution by using alternative fuel. The alternative fuels like biodiesel production. Vegetable oil are high fatty acid with high viscosity compare to the pure diesel fuel, so it is need to reduce the free fatty acid level and viscosity of vegetable oil. The main scope of the project is to use the callophylluminophyllum vegetable oil as bio diesel, due to high acid value of oil, pre-processing was carried out to reduce it by using sulfuric acid. Calcium Oxide

is used as heterogeneous catalyst in transesterification process to reduce the viscosity of biodiesel by removing glycerol content, after that post treatment processes were carried out to remove the excess alcohol and catalyst in the biodiesel. The petroleum fuels are one of the major sources of energy are currently the dominant global source of CO2 emissions, greenhouse gases and global warming. The rise in petroleum prices and increase in environmental pollution Also, depletion of fossil fuels, vehicular population, increasing industrialization, growing energy demand, explosion of population, environmental pollution and emission norms jointly have necessitated to find renewable alternatives to conventional petroleum fuels.

The source and supply of primary energy sources like coal, oil and natural gas seem to decrease to a critical point. The petroleum fuels are one of the major sources of energy are currently the dominant global source of CO2 emissions, greenhouse gases and global experimentally investigate performance parameter on application of Undi and Waste cooking oil methyl ester with EGR in single cylinder diesel engine. The rise in petroleum prices and increase in environmental pollution jointly have necessary to find renewable alternatives to conventional petroleum fuels. Also, depletion of fossil fuels, vehicular population, increasing industrialization, growing energy demand, explosion of population, environmental pollution, emission norms, etc emphasize on the need for alternative fuels. The possible renewable energies are solar power, hydrogen, bio alcohol such as methanol, ethanol, butanol, propane, non-fossil methanol, non-fossil natural gas, emulsified fuels, biofuels mostly from non-edible seed oils, biodiesels. Recently, significant problems associated with fossil fuel like short supply, drastically increasing price, non-renewability, contamination of environment, adverse effect on bio systems compiles researcher to search for an alternative fuel, which promises a harmonious correlation with sustainable development, energy conservation, management, efficiency, and environmental preservation has become highly pronounced in the present context. The situation is very grave in developing countries like India which import 70% of the required fuel, spending 30% of his total foreign exchange on oil imports. In view of this, found and analyze many energy sources like CNG, LNG, LPG, ethanol, methanol, hydrogen, bio-diesel and many more. Among these alternative fuels, India is having significant scope for development of bio fuel. Diesel engines are widely used in transportation, power generation, marine application, agriculture vehicles etc. Moreover, transportation and agriculture sector depend on diesel fuel therefore, it is essential that alternatives to diesel fuels must be developed. In the view of these, vegetable oils like palm oil, Karanja oil cotton seed oil, neem oil, are considered as alternative fuels to diesel which are promising alternative.

The Global Carbon Project reported that worldwide carbon emissions reached an all-time high in 2018, with the number expected to increase again for 2019. The EPA published Greenhouse Gas Emissions guidelines for passenger cars and trucks, with Phase 2 affecting model years through 2025. Although the EPA seems to be rethinking some guidelines, it's still the **political and environmental atmosphere** that's pushing internal combustion engine efficiency improvements through, more so than consumer demand. Whether engineers and executives personally agree or not with the changes in the air, the industry is moving steadily in that direction

How to Increase Efficiency of IC Engine Emissions?

The Office of Energy Efficiency & Renewable Energy reports that manufacturers reduced pollutant emissions by more than 99% over the last 30 years. Creative minds accomplished this while still maintaining or increasing fuel economy. In addition to gasoline and diesel, manufacturers are studying other ways to increase fuel economy:

- Using biodiesel
- Using other alternative or renewable fuels
- Combining IC engines with hybrid electric powertrains

3. Diesel Engines Vs. Traditional Gasoline Engines

When Europeans switched from diesel to gasoline cars, there was a related increase in carbon dioxide emissions. In an unexpected twist, some of today's auto strategies are based around diesel engines.Many big diesel trucks actually create less CO2 emission than some smaller, gas-powered vehicles, reports indicate. Increased technology has produced diesel-powered engines that **can fuel smaller vehicles** and provide:

- Better gas mileage
- Lower carbon emission rates
- Greater torque
- A longer-lasting engine

4. Competing With Electric Engines

You knew this was coming. Although gasoline powered engines don't appear to be completely disappearing, they do face stiff competition from their electric rivals.

While some see electric cars as the future, even BMW isn't backing away from the internal combustion engine just yet. One thing IC engine supports could hang over the heads of the pro-electric crowd was their battery. Specifically, its:

- Size
- Cost
- Longevity
- Charging capabilities, or lack thereof

However, electric car prices are projected to be competitive as soon as 2022 as battery costs plummet. The battery was once about 50% of the car's cost, but could go **as low as 20%** by 2025. These reductions are certainly coming more quickly than the market expected.

Concerns about range are less of an issue for electric vehicles going forward. The technology is evolving, and more charging stations are popping up. "Range anxiety" (consumer fear that they'll be stranded with nowhere to charge their battery) is still a very real issue OEMs still need to resolve.

5. Powder Metallurgy Supports the Move to Eco-Friendly

Powder metallurgy is becoming more of a factor in component design for engines, whether IC engine designers like it or not. The "green" technology that is powder metallurgy goes hand in hand with the future of the eco-friendly automobile. Sintered soft magnetic materials with higher densities are providing a boost in performance not seen before. You may have heard the story of powder metal before, but these new materials are different from the Standard 35 materials that manufacturers have relied on for decades. MPIF's Standard 35 is a great baseline for powder metallurgy manufacturers, but your future designs may need materials and processes that surpass "standard" performance levels. In some cases you can even **eliminate a component from the assembly** by designing with powder metal. Today's advanced compaction technology may be a little more expensive at the onset, but it can save manufacturers (and drivers) a lot in the long run. Many components can be transitioned to powder metal. Powder metallurgy has made great advances in creating small parts for electric motors and other auto parts for many reasons:

- Reduces weight
- Improves electric motor efficiency, including better magnetic properties
- Creates net-shape parts
- Allows for advanced materials and processes
- Higher strength and hardness

Specifically, soft magnetic composite materials are leading the way toward a super-efficient electric motor.

Powder metallurgy is not just rods and end caps any longer!

Source- https://www.horizontechnology.biz/blog/future-of-internal-combustion-engine-design-trends

Ecofriendly Refrigerant Author: Ms. Mukti Kadam, -BE Mechanical

Refrigerants do an efficient job at cooling air inside an HVAC system that is then distributed throughout a home or building. But refrigerants can also do a number on the climate by releasing pollutants and contributing to the depletion of the ozone layer. Freon in particular has been found to be especially harmful to the environment, and it's a refrigerant we've been dependent upon for years. However, freon is now on the way out, with the Environmental

Protection Agency EPA phasing out its use before an outright ban in 2030. Fortunately, there are some alternative refrigerants that are more eco-friendly and others continue to be discovered, tested, and developed all the time. This article will discuss environmentally friendly refrigerants and the properties that make them climate-friendly.

➢ What Makes a Refrigerant Environmentally Friendly?

of a refrigerant can be measured by its ODP (ozone depletion potential) and GWP (global warming potential). The most environmentally friendly refrigerants are hydrofluorocarbons (HFC) and hydrofluoro-olefins (HFO). HFCs are comprised of fluorinated hydrocarbons. While HFCs can contribute to global warming, they do not affect the ozone layer directly. HFOs are made up of hydrogen, fluorine, and carbon and have zero ODP, along with a very low GWP, and therefore are considered to be the currently most environmentally friendly type of refrigerant.

- **List of Environmentally Friendly Refrigerants**

The following refrigerants have been designated as environmentally friendly by the EPA.

HFOs

These HFO refrigerants are found in commercial and industrial air conditioning and refrigeration systems, water chillers, automobiles, portable air conditioners, and heat pumps.

- R449A
- R454C
- R513A
- R1234yf
- R1234ze
- R1233zd
- R1336mzz

HFCs

These HFC refrigerants are used in industrial refrigerators, residential and commercial air conditioners, automobiles, and centrifugal chillers.

- R32
- R134a
- R426A
- R428A
- R434A
- R442A
- R453A

HFO/HFC Blends

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There are also refrigerants made up of a blend of HFOs and HFCs that are often found in supermarket refrigeration systems, vending machines, heat pumps, and air and water chillers. These include:

- R448A
- R450A
- R455A
- R464A

Source = https://www.jadelearning.com/blog/environmentally-friendly-refrigerants/#:~:text=The%20most%20environmentally%20friendly%20refrigerants,affect%20the%20ozone%20layer%20directly.

Career as a Mechanical Engineer . Rushikesh Jagtap, BE Mechanical

About Mechanical Engineer

A mechanical engineer is the one who deals with the designing and construction of machines. Constructing a cost-effective machine and doing relevant and related modifications in the mechanism is the sole aim of a mechanical engineer. Mechanical engineers produce machines keeping in mind the designing, testing, and development of the theoretical representation drawn for the purpose of construction. The automobile industry, construction companies, and other manufacturing industries hire mechanical engineers. There is also a wide range of linked job profiles for mechanical engineers that includes automation, aerospace engineers, control, instrumentation specialist, and maintenance specialist. To become a mechanical engineer, knowledge of Physics, Applied Engineering and Mathematics is a must. A good understanding of these subjects and requisite skills collectively make a mechanical engineer.

Eligibility to become Mechanical Engineer

- Candidates should have passed 10+2 from a recognized institution with PCM (Physics, Chemistry and Mathematics) as major subjects.
- A minimum of 55% marks in 10+2 or equivalent is compulsory (relaxation rules apply for different categories and varies from college to college) for taking admission in undergraduate and diploma courses of mechanical engineering.
- For admission in M.Tech in Mechanical Engineering course, candidates must have a passing certificate of graduation level with a minimum aggregate of 50% in the required field.
- A valid passing scorecard of any of the required entrance exams is compulsory for admission in undergraduate, diploma, postgraduate and Ph.D. programmes.
- **Types of Job Roles Mechanical Engineer**

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- After attaining the required educational qualification to become a mechanical engineer, there are a number of profiles that you can take up. Based on your choice and interest, you can select a job profile that comes under the umbrella of mechanical engineering. Since mechanical engineering is a broad field, you can explore the following job options.
- **Aerospace Engineer:** It is a profile that deals with the maintenance and manufacturing of aircraft and airports keeping in consideration the technical aspects involved.
- **Maintenance Engineer:** The role of a maintenance engineer is to keep a check of the functioning of the machines and equipment. To check the continuous running of the machinery and equipment, maintenance engineers are hired.
- **Automotive Engineer:** Designing and development of mechanical components and machines related to automobiles is the functionality of an automotive engineer. An automotive engineer typically focuses on research and development, design and production.
- **Control and Instrumentation Engineer:** Often referred as C&I Engineer, these are professionals that deal with the designing, development, installation, management, and maintenance of equipment that are used for monitoring and controlling machines and systems involved in the work of engineering.
- **Contracting Civil Engineer:** A contracting civil engineer is the one who deals with the consultancy involved in the field of construction and designing of projects like buildings, highway construction, dams and canals construction, etc. They are responsible for checking the ongoing on-site construction and work in conjunction with consulting engineers.
- **Nuclear Engineer:** These engineers provide with technical support to the nuclear power stations. Their role is to design, build, run or dismantle the machinery of the nuclear power station. A nuclear engineer can be a reactor operator, process engineer, quality engineer, project manager or instrumentation and control engineer.
- **Mechanical Engineer:** A mainstream job profile framed for the designing, crafting, developing, maintaining and managing various machines and equipment are covered by the mechanical engineers. The job profiles for mechanical engineers ranges from designing, production, analysis, and testing to installation, maintenance, and structural engineering.
- **Employment Sector/Industry for Mechanical Engineer**
- There are a number of employment opportunities for mechanical engineers available in the market. It is the choice and preference of the candidate to choose a particular sector. Given below is a list of employment opportunities in different sectors that can be considered by the candidates:
  - Aerospace Industries
  - Automotive Industries
  - Construction and Building Services

- Indian Armed Forces and Ministry of Defense
- Manufacturing Industries
- Engineering Consultancies
- Energy Utilities
- Government Agencies
- Biomedical Industries

Top Recruiting Companies for Mechanical Engineers

Let's take a look at some of the leading companies where the aspirants of mechanical engineering can find good job opportunities.

- Honda SITEL Car Division
- Bharat Electronics Limited (BEL)
- Hindustan Petroleum Corporation Limited (HPCL)
- Tata Group
- National Aluminum Company Ltd. (NALCO)
- Larsen & Toubro (L&T)
- BOSCH India
- Coal India Limited (CIL)
- Oil and Natural Gas Corporation Limited (ONGC)
- Indian Oil Corporation Limited (IOCL)
- Thyssen Krupp
- Godrej Group
- Thermax
- Siemens
- Bharat Heavy Electricals Limited (BHEL)

Source = https://www.collegedekho.com/careers/mechanical-engineer

Career in Marine engineering . Vaibhav Shinde, BE Mechanical

- **What is Marine engineering?**

Marine engineers are skilled individuals involved in the design, construction, and maintenance of vehicles and structures used on or around water. Marine engineering technology and techniques are used to create cruise ships, oil platforms, and harbors.The Marine Engineer was born on the day the French inventor Deni'sPapin constructed a steam boat powered by his steam engine in 1704.

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- **Want to become a Marine Engineer?**
- Those interested in pursuing a career in marine engineering must complete a significant amount of education in science, technology, and engineering.
- A pass in Plus Two with a 60% aggregate in Physics, Chemistry, and Maths.
- Good marks (usually 50%) in English.
- A bachelor's degree in marine engineering is the minimum requirement for career entry, and graduate programs in this field are also available.
- Bachelor's degree programs in marine engineering introduce students to basic concepts of marine propulsion, fluid dynamics, and ship design.
- Master's and doctoral programs in the field cover advanced topics in materials science, managing engineering projects, and electrical power systems.

- **Eligibility Criteria:**

- As working at sea can sometimes be strenuous, candidates for marine training colleges must meet certain physical standards, which are determined by the Merchange Shipping Medical Examination Rules.
- No younger than 17 and no older than 25, with 5 years of relaxation for candidates from Scheduled Castes or Scheduled Tribes.
- Good eyesight with no color blindness or impaired field of vision.
- No impairment in hearing.

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- The weight of no less than 42 kilograms and height of at least 150 centimeters. Good dental health.
- Mentally stable and in good psychological condition.
- Be otherwise in good health as determined by a medical examination.
- Other requirements: There are no gender restrictions for marine engineering training.
- Candidates should be unmarried by the time of commencement.
- Indian citizenship, though a few foreign candidates may receive special permission from the Ministry of Shipping.

- What are the duties of a Marine engineers?
-
- Some marine engineers also work onboard ships to maintain these systems; these workers are sometimes called ship engineers. Marine engineers are responsible for designing onboard systems such as Steering or control systems. Propulsion systems (gas turbine, diesel engine, or nuclear reactor)
  Marine engineers design the vessels that we use to navigate and explore the world's lakes and oceans. Marine engineers' work supports key activities like naval defense, environmental research, international trade, and resource
- What are the skills required to be a Marine Engineer?
-
- Aspiring marine engineers, like all engineers, should have a strong aptitude for math and physics, and the ability to think both independently and work collaboratively.
- They should also have the patience for work that undergoes rounds of changes and takes years to complete. Where can marine engineers find employment? Marine engineers can also find employment with government agencies, transportation companies, and scientific services.

- List of Marine Engineering Courses:
-
- Diploma in Marine Engineering
- B.E / B.Tech in Marine Engineering
- M.E / M.Tech in Marine Engineering
- M.Sc in Marine Geology
- List of colleges which offer Marine Engineering?
-
- International Marine Communication Centre.
- Cochin University. Marine Engineering and Research Institute, Kolkata.
- Marine Engineering and Research Institute, Chennai.

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- Marine Engineering and Research Institute, Mumbai.
- Indian Maritime University. Mangalore University.
- Tolani Maritime Institute (TMI), Pune.
- Vels Academy of Maritime Studies, Chennai.
- Maharashtra Academy of Naval Education & Training (MANET), Pune.
- Mohamed Sathak Engineering College (MSEC), Kilakarai, Ramnad District, Tamil Nadu.
- College Of Engineering (Andhra University), Visakhapatnam.
- Chennai School of Ship Management (CSSM), Tamil Nadu.
- Marine Engineering and Research Institute (MERI), Kolkata.
  List of entrance examinations for Marine Engineering:
-
- MERI: Marine Engineering and Research Institute Entrance Examination
- IMU CET: Indian Maritime University Common Entrance Test
- JEE Advanced: Joint Entrance Examination
- GATE: Graduate Aptitude Test in Engineering
- CAT

- **Want to study marine engineering in abroad?**
- Here, are the top 10 institutions:
- South Tyneside College, England.
- Webb Institute, New York.
- Maine Maritime Academy, USA
- Massachusetts Maritime Academy, United States.
- California Maritime Academy, Unites States
- United States Merchant Marine Academy. The United States.
- The United States Coast Guard Academy, United States.
- University of Michigan, United States.
- Australian Maritime College, Australia.
- Japan Coast Guard, Japan.
- Salary Ranges by Rank
- These are the average salary ranges by rank. These figures are payment per month:
- 1. Fifth Engineer or Engineering Cadet: Rs 35 to 75 thousand; or 300 to 1200 USD
- 2. Fourth Engineer: Rs 1.5 to 2.25 lacs; or 2000 to 4000 USD
- 3. Third Engineer: Rs 2.75- 3.5 lacs; or 4000 to 5900 USD
- 4. Second Engineer: Rs 4 to 5 lacs; or 7500 to 9500 USD

- 5. Chief Engineer: Rs 5 lacs and above; or 10,000 USD and above

- Who can take up marine engineering as a career option?

- Marine engineers have various job responsibilities in the industries like shipping, ship manufacturing, steel industry, power sector, the manufacturing sector, consultancy firm.
- They design, construct and develop nautical equipment.
- After completing Marine Engineering courses candidates can option for lucrative career options in public and private shipping companies, engine production firms, ship building and designing firms, navy, research bodies.
- After graduating as a marine engineer, one can get a job on a ship as a third assistant engineer or fourth engineer.
- They can also get employed in different foreign and Indian shipping companies.

- Source:https://www.careerindia.com/courses/unique-courses/what-is-marine-engineering-010930.html

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Matoshri College of Engineering & Research Centre, Nashik

Eklahareshivar, Near Odhagaon, Opposite to Nashik-Aurangabad Highway, Nashik, Maharashtra 422105

Website: engg.matoshri.edu.in/Email: matoshricoe.hr@gmail.com

Contact: 0253-2406600/1/2/3

Toll free No.:1800 233 6602