

TECNO SAVIOR

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Vision

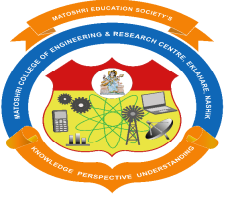
“To Establish Omnipotent Learning Centre Meeting the Standards to Evolve as a Lighthouse for the Society.”

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.”



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Rendering

Mrs. Swati Bhavsar
Computer Department

Rendering or **image synthesis** is the process of generating a photorealistic or non-photorealistic image from a 2D or 3D model by means of a computer program. The resulting image is referred to as the **render**. Multiple models can be defined in a *scene file* containing objects in a strictly defined language or data structure. The scene file contains geometry, viewpoint, texture, lighting, and shading information describing the virtual scene. The data contained in the scene file is then passed to a rendering program to be processed and output to a digital image or raster graphics image file. The term "rendering" is analogous to the concept of an artist's impression of a scene. The term "rendering" is also used to describe the process of calculating effects in a video editing program to produce the final video output. Rendering is one of the major sub-topics of 3D computer graphics, and in practice it is always connected to the others. It is the last major step in the graphics pipeline, giving models and animation their final appearance. With the increasing sophistication of computer graphics since the 1970s, it has become a more distinct subject. Rendering has uses in architecture, video games, simulators, movie and TV visual effects, and design visualization, each employing a different balance of features and techniques. A wide variety of renderers are available for use. Some are integrated into larger modeling and animation packages, some are stand-alone, and some are free open-source projects. On the inside, a renderer is a carefully engineered program based on multiple disciplines, including light physics, visual perception, mathematics, and software development.

Though the technical details of rendering methods vary, the general challenges to overcome in producing a 2D image on a screen from a 3D representation stored in a scene file are handled by the graphics pipeline in a rendering device such as a GPU. A GPU is a purpose-built device that assists a CPU in performing complex rendering calculations. If a scene is to look relatively realistic and predictable under virtual lighting, the rendering software must solve the rendering equation. The rendering equation doesn't account for all lighting phenomena, but instead acts as a general lighting model for computer-generated imagery. In the case of 3D graphics, scenes can be pre-rendered or generated in real-time. Pre-rendering is a slow, computationally intensive process that is typically used for movie creation, where scenes can be generated ahead of time, while real-time rendering is often done for 3D video games and other applications that must dynamically create scenes. 3D hardware accelerators can improve real-time rendering performance.

Usage:

When the pre-image (a wireframe sketch usually) is complete, rendering is used, which adds in bitmap textures or procedural textures, lights, bump mapping and relative position to other objects. The result is a completed image the consumer or intended viewer sees.

For movie animations, several images (frames) must be rendered, and stitched together in a program capable of making an animation of this sort. Most 3D image editing programs can do this.

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Machine Learning

Ms. Poonam R. Dholi
Department of Computer Engineering

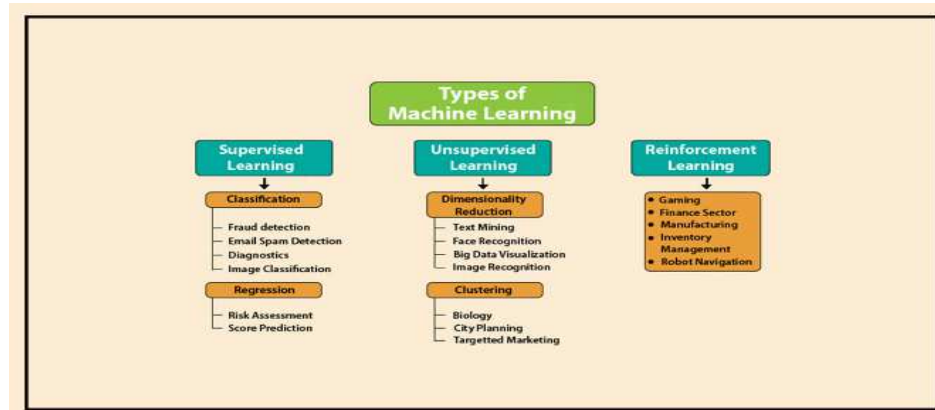
Machine Learning is a branch of artificial intelligence that gives systems the ability to learn automatically and improve themselves from the experience without being explicitly programmed or without the intervention of human. Its main aim is to make computers learn automatically from the experience.

Requirements of creating good machine learning systems

So what is required for creating such machine learning systems? Following are the things required in creating such machine learning systems:

- **Data** – Input data is required for predicting the output.
- **Algorithms** – Machine Learning is dependent on certain statistical algorithms to determine data patterns.
- **Automation** – It is the ability to make systems operate automatically.
- **Iteration** – The complete process is iterative i.e. repetition of process.
- **Scalability** – The capacity of the machine can be increased or decreased in size and scale.
- **Modeling** – The models are created according to the demand by the process of modeling.

Methods of Machine Learning



Machine Learning methods are classified into certain categories These are:

1. **Supervised Learning**
2. **Unsupervised Learning**
3. **Reinforcement Learning**

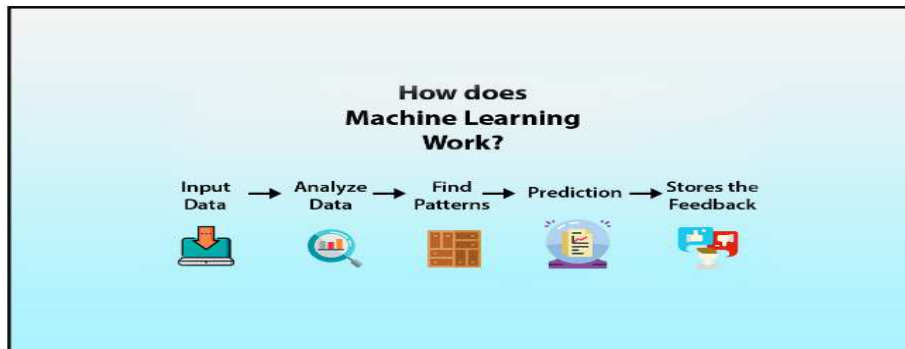
Supervised Learning – In this method, input and output is provided to the computer along with feedback during the training. The accuracy of predictions by the computer during training is also analyzed. The main goal of this training is to make computers learn how to map input to the output.

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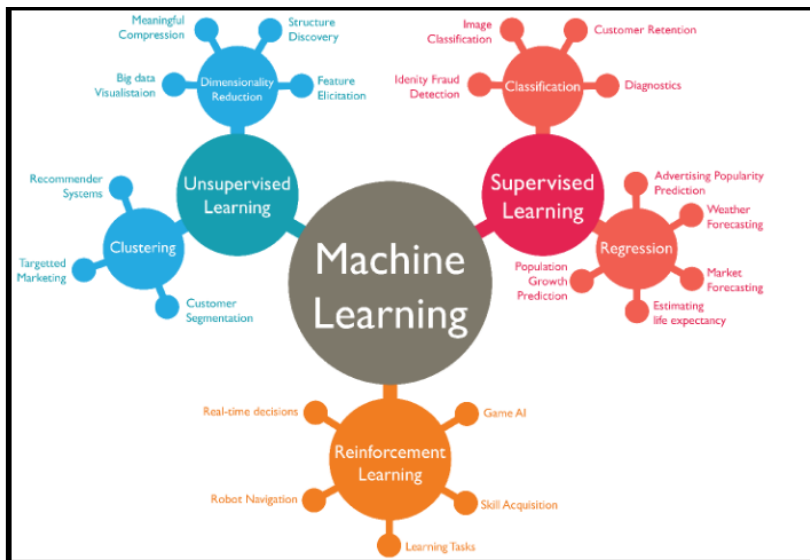
Unsupervised Learning – In this case, no such training is provided leaving computers to find the output on its own. Unsupervised learning is mostly applied on transactional data. It is used in more complex tasks. It uses another approach of iteration known as deep learning to arrive at some conclusions.

Reinforcement Learning – This type of learning uses three components namely – agent, environment, action. An agent is the one that perceives its surroundings, an environment is the one with which an agent interacts and acts in that environment. The main goal in reinforcement learning is to find the best possible policy.

How does machine learning work?



Machine learning makes use of processes similar to that of data mining. Machine learning algorithms are described in terms of target function(f) that maps input variable (x) to an output variable (y). This can be represented as: $y=f(x)$ There is also an error e which is the independent of the input variable x. Thus the more generalized form of the equation is: $y=f(x) + e$ In machine the mapping from x to y is done for predictions. This method is known as predictive modeling to make most accurate predictions. There are various assumptions for this function.

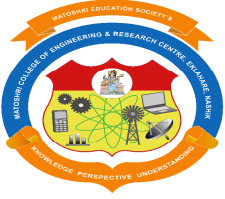


Benefits of Machine Learning

Everything is dependent on machine learning. Find out what are the benefits of machine learning.

- **Decision making is faster** – Machine learning provides the best possible outcomes by prioritizing the routine decision-making processes.
- **Adaptability** – Machine Learning provides the ability to adapt to new changing environment rapidly. The environment changes rapidly due to the fact that data is

being constantly updated.



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- **Innovation** – Machine learning uses advanced algorithms that improve the overall decision-making capacity. This helps in developing innovative business services and models.
- **Insight** – Machine learning helps in understanding unique data patterns and based on which specific actions can be taken.
- **Business growth** – With machine learning overall business process and workflow will be faster and hence this would contribute to the overall business growth and acceleration.
- **Outcome will be good** – With machine learning the quality of the outcome will be improved with lesser chances of error.

Branches of Machine Learning

- **Computational Learning Theory**
- **Adversarial Machine Learning**
- **Quantum Machine Learning**
- **Robot Learning**
- **Meta-Learning**

Computational Learning Theory – Computational learning theory is a subfield of machine learning for studying and analyzing the algorithms of machine learning. It is more or less similar to supervised learning.

Adversarial Machine Learning – Adversarial machine learning deals with the interaction of machine learning and computer security. The main aim of this technique is to look for safer methods in machine learning to prevent any form of spam and malware. It works on the following three principles:

- Finding vulnerabilities in machine learning algorithms.
- Devising strategies to check these potential vulnerabilities.
- Implementing these preventive measures to improve the **security** of the algorithms.

Quantum Machine Learning – This area of machine learning deals with quantum physics. In this algorithm, the classical data set is translated into quantum computer for quantum information processing. It uses Grover's search algorithm to solve unstructured search problems.

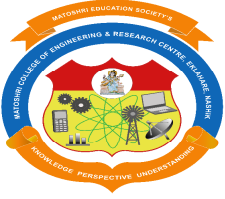
Predictive Analysis – Predictive Analysis uses statistical techniques from data modeling, machine learning and data mining to analyze current and historical data to predict the future. It extracts information from the given data. Customer relationship management(CRM) is the common application of predictive analysis.

Robot Learning – This area deals with the interaction of machine learning and robotics. It employs certain techniques to make robots to adapt to the surrounding environment through learning algorithms.

Grammar Induction – It is a process in machine learning to learn formal grammar from a given set of observations to identify characteristics of the observed model. Grammar induction can be done through genetic algorithms and greedy algorithms.

Meta-Learning – In this process learning algorithms are applied on meta-data and mainly deals with automatic learning algorithms.

Best Machine Learning Tools



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Here is a list of artificial intelligence and machine learning tools for developers:

1. **ai-one** – It is a very good tool that provides software development kit for developers to implement artificial intelligence in an application.
2. **Protege** – It is a free and open-source framework and editor to build intelligent systems with the concept of ontology. It enables developers to create, upload and share applications.
3. **IBM Watson** – It is an open-API question answering system that answers questions asked in natural language. It has a collection of tools which can be used by developers and in business.
4. **DiffBlue** – It is another tool in artificial intelligence whose main objective is to locate bugs, errors and fix weaknesses in the code. All such things are done through automation.
5. **TensorFlow** – It is an open-source software library for machine learning. TensorFlow provides a library of numerical computations along with documentation, tutorials and other resources for support.
6. **Amazon Web Services** – Amazon has launched toolkits for developers along with applications which range from image interpretation to facial recognition.
7. **OpenNN** – It is an open-source, high-performance library for advanced analytics and is written in C++ programming language. It implements neural networks. It has a lot of tutorials and documentation along with an advanced tool known as Neural Designer.
8. **Apache Spark** – It is a framework for large-scale processing of data. It also provides a programming tool for deep learning on various machines.
9. **Caffe** – It is a framework for deep learning and is used in various industrial applications in the area of speech, vision and expression.
10. **Veles** – It is another deep learning platform written in C++ language and make use of python language for interaction between the nodes.

Machine Learning Applications

Following are some of the applications of machine learning:

- Cognitive Services
- Medical Services
- Language Processing
- Business Management
- Image Recognition
- Face Detection
- Video Games
- Computer Vision
- Pattern Recognition

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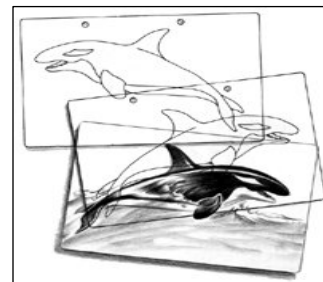
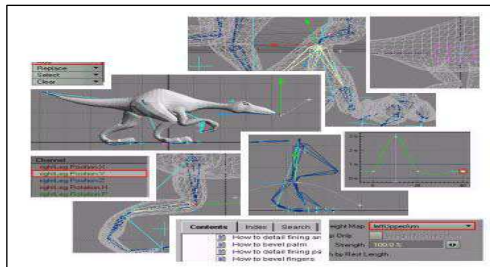
The Process of 3D Animation

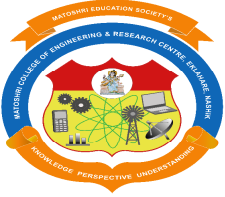
Ms. Manisha Waghmare
Department of Computer Engineering

Many people are confused when they see the word ‘3D’ tagged on in front of the words ‘Animation Studio’. Although animation has been with us for as long as a few decades now, the concept of animation still seem pretty much magical to the layman. ‘How do you make drawings come alive on screen?’ is what they usually ask. With the invention of 3D animation technology, the concept of animation becomes even more hazy and mystical to the layman. They still refer to 3D animation as ‘drawing’ and know not a thing about the process that goes on behind 3D animation. As the owner of a 3D animation studio, I feel that it is very important to educate our clients on what goes on behind 3D animation production. The knowledge will not just help them appreciate the service better, but also helps to facilitate the process of collaboration and manage their expectations. This is important because it helps our clients achieve what they want and allows us to communicate effectively with them.

So What Is 3D Animation?

Do not be fooled by the seeming simplicity of this question. In a nutshell, computer 3D animation refers to the work of creating moving pictures in a digital environment that is three-dimensional. Through the careful manipulation of objects (3D models) within the 3D software, we can then export picture sequences which will give the illusion of movement (animation) based on how we manipulate the objects. What happens in animation is that motion is simulated in a way that the eyes tend to believe that actual motion has taken place while the fact is the perceived sense of motion is only because of the consecutive images that are passed through very fast. This theory is inherent be it for 3D, 2D or stop motion animation. In traditional 2D animation, pictures are hand-drawn and every one showing subtle changes from the previous. When played back creates the illusion of motion. In 3D animation, real-life models are created and filmed. Again, the pictures are sequentially moved slightly within the computer and exported from the computer. The process of creating 3D animation can be sequentially divided into three phases: modelling – which describes the process of creating the 3D objects within a scene, layout and animation – which describes how objects are positioned and animated within a scene, and rendering – which describes the final output of the completed computer graphics. Through the combination of the above phases and a few other sub-phases, this completes the process of a 3D animation production. There is much software in the market for creating 3D animation, ranging from the cheaper lower-end ones to the professional high-end versions. If you are curious to see how a 3D software works, you can download a free one called Blender. Just Google it and you will be able to find its official website. 2D Cel animation involves illustrating many pictures of a scene in various phases of movement and flipping through them quickly digitally to create the illusion of movement or animation. 3D computer animation is a costlier and time-consuming process compared to 2D animation as it involves many more steps.





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Mobile Train Radio Communication

Dhanesh Vaishmpyan
BE Computer

Each mobile uses a separate, **temporary radio channel** to talk to the cell site. The cell site talks to many mobiles at once, using one channel per mobile. **Channels use a pair of frequencies** for communication. One for transmitting from the cell site, **the forward link**, and one frequency for the cell site to receive calls from the users, **the reverse link**. Communication between mobile units can be either **half-duplex** or **full-duplex**. In case of **half-duplex**, transmit and receive communications between the mobile units are not at the same time, i.e. talking and listening cannot be done at the same time. In case of full-duplex communication, transmit and receive communication is at the same time, i.e. one can talk and listen at the same time.

MOBILE TRAIN RADIO SYSTEMS

Present Day Scenario

A choice of mobile system for a set up is governed mainly by the following facts.

- Ø Coverage area
- Ø Number of subscriber to be catered
- Ø Frequency spectrum available
- Ø Nature of the terrain
- Ø Type of application i.e. voice of data or both
- Ø Integration with other systems

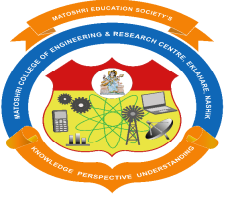
Railways' Present Day Requirements.

The Train Mobile System's present day requirements are not just voice transmission, but also along with voice the system shall be capable of handling data also. Typical applications for the Modern Train Mobile System are as under.

- Ø Text and status message transmission.
- Ø Automatic Train operation's critical alarms.
- Ø Train status and alarm information
- Ø Passenger information system control
- Ø Train passenger emergency system

Comparison of Various Open Standard Technologies Available Today MPT1327 System

MPT1327 is an **Open Standard for Analog trunked radio networks**. The British Department of Trade and Industry (DTI) developed it in year 1988. In the course of the next twelve months of development continued and resulted in MPT1343 standards. A system based on MPT1327 generally comprises of several radio channels. At least one of these channels will have been defined as the CC (Control Channel) and all the other channels are TCs (Traffic Channel). Data messages between the mobiles and the networks are exchanged on the Control Channel at 1200 bits/sec using FSK (Frequency Shift Keying). Each subscriber in a trunked radio network has a unique call number. It consists of a prefix (3 digits), a fleet number (4 digits), and a subscriber number within the fleet (2 or 3 digits). After it has been entered the call number will be converted in the mobile to a 20-bit address. For the duration of the



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call a subscriber is exclusively allocated a traffic channel from the available trunk. Western Railway has already opted for a MPT1327 system for the Motorman and Controller communication in its Suburban Section in Mumbai Division. This system is as a part of the TMS project between Churchgate and Virar Sections. M/s Tait New Zealand has supplied the Mobile System.

Tetra Systems

TETRA stands for Terrestrial Trunked Radio, covering PMR (Professional Mobile Radio) as well as PAMR (Private Access Mobile Radio) applications. As a trunked system, it is designed to be the true follower of MPT1327. TETRA applies digital speech transmission with TDMA (burst transmission), very fast call setup times, and may use powerful encryption. TETRA is an Open Standard defined by ETSI (European Telecommunication Standards Institute). TETRA applies a modulation format called pi/4 DQPSK, TDMA with 4 channels per carrier, and a carrier spacing of 25 KHz. TETRA does not have a fixed frequency allocation as GSM. But the systems currently planned or installed in Europe assumes frequencies in the range of 380..400 MHz for public a safety communication, and 410..430 MHz for commercial systems.

GSM System

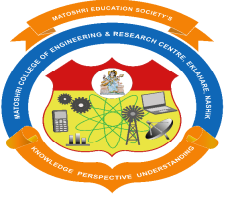
Ø The GSM (Global System for Mobile Communication) MoU Association, a Swiss registered Corporation, is the principle body responsible for promoting and evolving the GSM wireless platform worldwide. Today GSM is the most successful implementation of a global wireless standard using digital technology for point to point operations. There are over 293 members representing 120 countries/areas. The overall objective of the GSM MoU Association is “ The promotion and evolution of the GSM900, GSM1800, GSM1900 systems, and the GSM platform for international roaming, for the provision of standardized services.

WESTERN RAILWAY SUBURBAN SYSTEM (CHURCHGATE TO VIRAR)

Western Railway has gone for a mobile communication system in its suburban section in Mumbai. This project is a part of the Train Management System, which is commissioned in the suburban section of Mumbai Division. Basic purpose of this communication system is to provide a continuous communication between the Motorman and the controller. The system consists of two base stations. One is installed at Mahalakshmi, and the other at Borivili each transmitting 50 watts of power. The Regional Node is installed at Mumbai Central. Mobile units are 25 watts full-duplex sets installed in the Motorman and Guard compartment of the 75 EMU rakes of the Suburban section of the Mumbai division. Together they cover the whole suburban section between Churchgate and Virar, a distance of 60 Kms. The system works on the principle of trunking, and is based on the MPT1327, MPT1343 protocols. M/s Tait New Zealand has supplied the system.

Conclusion

Mobile Communication today is a fast growing field. No one can deny its role in Modern Railway Operations. However there is a need of proper choice of technology looking into Railways' Operational needs. It is beyond doubt that incorporation of Mobile Communication into Railways will open new operational. This shall not only help in increasing productivity, but also help in increasing safety of operations. Indian Railways, which is a lifeline of the nation, is also geared up to take the requirements of the new millennium, which is knocking the door of this century.



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Smart Tank Water Monitoring System using IOT Cloud Server at Home/Office

Shraddha Pankaj Rajguru SE Computer

To ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this project, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, hazardous Gas, dissolved oxygen, water Level. The measured values from the sensors are processed by microcontroller and these processed values are transmitted remotely to the core controller that is PIC Microcontroller using IOT protocol.

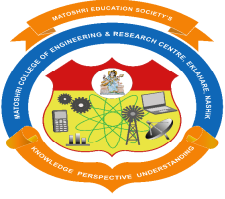
Water is one of the most important substances on earth. People now days always want something that can make their life easier. Water quality monitoring is incredibly useful to keep the planet healthy and sustainable. Many transmittable diseases are water born. Most of the fresh water resources located near urban areas are contaminated due to the garbage dumped by the individuals or the release of chemicals from manufacturing industries. Overhead tank is one of the containers used to store drinking water. It was observed that main cause of deterioration in water quality is due to re-growth of microorganisms in overhead tanks and the distribution system, corrosion of pipe material, non-replacement of old pipes. There is a need for continuous real time continuous remote monitoring of water quality parameters within the water system as the concentrations of the pollutants lead to serious health consequences. However, in most areas, the traditional approach of water quality monitoring based on collection of water samples from different sources and subsequent analyses in laboratories is expensive, time consuming and does not allow simultaneous and timely monitoring of the water quality.

This project mainly focuses to develop an indigenous, reliable, flexible WSN water quality monitoring system for in-situ monitoring of the remote water quality across a wireless sensor zone. Wireless Sensor Networks (WSNs) provide a new model for sensing and communicate information from various environments, to serve many and diverse applications. WSN provide significant advantages both in distributed intelligence as well as in cost. On the other hand, installation and maintenance expenses are reduced as it does not require any wiring .

Wireless sensor network for a water quality monitoring consists of coordinator and number of sensor nodes with networking capability which are deployed at different overhead tanks in an area. Each sensor node consists

of an PIC microcontroller, a wireless network connection module and water quality sensors that are able to continuously read the water quality parameters such as Electrical conductivity, pH and temperature are sensed continuously and send data to the base station or data center where the data is logged into central server.

Graphic User Interface (GUI) is provided for users to analyze water quality data when water quality detected is below standards. The recorded data can be analyzed using various simulation tools for future correspondence and actions to evaluate the reliability, feasibility and effectiveness of the proposed monitoring system.



Techno savior

What Is AI?

Prasad Birari
SE Computer

Will a robot take my job ? how is artificial intelligence likely to change my job in the next ten years? Where are AI technology being used right now and where will they come next ?AI is currently a “hot topic”: media coverage and public discussion about AI is almost impossible to avoid. However, you may also have noticed that AI means different things to different people. For some, AI is about artificial life-forms that can surpass human intelligence, and for others, almost any data processing technology can be called AI. Some real life application of AI

Self –driving cars Self-driving cars require a combination of AI techniques of many kinds: search and planning to find the most convenient route from A to B, computer vision to identify obstacles, and decision making under uncertainty to cope with the complex and dynamic environment. Each of these must work with almost flawless precision in order to avoid accidents.

The same technologies are also used in other autonomous systems such as delivery robots, flying drones, and autonomous ships.

Implications: road safety should eventually improve as the reliability of the systems surpasses human level. The efficiency of logistics chains when moving goods should improve. Humans move into a supervisory role, keeping an eye on what’s going on while machines take care of the driving. Since transportation is such a crucial element in our daily life, it is likely that there are also some implications that we haven't even thought about yet.

Content recommendation

A lot of the information that we encounter in the course of a typical day is personalized. Examples include Facebook, Twitter, Instagram, and other social media content; online advertisements; music recommendations on Spotify; movie recommendations on Netflix, HBO, and other streaming services. Many online publishers such as newspapers’ and broadcasting companies’ websites as well as search engines such as Google also personalize the content they offer. While the frontpage of the printed version of the *New York Times* or *China Daily* is the same for all readers, the frontpage of the online version is different for each user. The algorithms that determine the content that you see are based on AI.

Implications: while many companies don’t want to reveal the details of their algorithms, being aware of the basic principles helps you understand the potential implications: these involve so called filter bubbles, echo-chambers, troll factories, fake news, and new forms of propaganda.

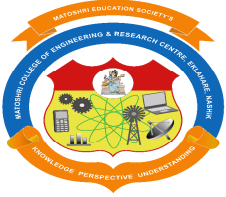
What is, and what isn’t AI? Not an easy question!

The popularity of AI in the media is in part due to the fact that people have started using the term when they refer to things that used to be called by other names. You can see almost anything from statistics and business analytics to manually encoded if-then rules called AI. Why is this so? Why is the public perception of AI so nebulous? Let’s look at a few reasons.

Reason 1: no official agerrrd definition

Even AI researchers have no exact definition of AI. The field is rather being constantly redefined when some topics are classified as non-AI, and new topics emerge.

There’s an old (geeky) joke that AI is defined as “cool things that computers can’t do.” The irony is that under this definition, AI can never make any progress: as soon as we find a way to do something cool with a computer, it stops being an AI problem. However, there is an element of truth in this definition. Fifty years ago, for instance, automatic methods for search and planning were considered to belong to



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the domain of AI. Nowadays such methods are taught to every computer science student. Similarly, certain methods for processing uncertain information are becoming so well understood that they are likely to be moved from AI to statistics or probability very soon.

Reason 2: the legacy of science fiction

The confusion about the meaning of AI is made worse by the visions of AI present in various literary and cinematic works of science fiction. Science fiction stories often feature friendly humanoid servants that provide overly-detailed factoids or witty dialogue, but can sometimes follow the steps of Pinocchio and start to wonder if they can become human. Another class of humanoid beings in sci-fi espouse sinister motives and turn against their masters in the vein of old tales of sorcerers' apprentices, going back to the Golem of Prague and beyond.

Often the robot hood of such creatures is only a thin veneer on top of a very humanlike agent, which is understandable as most fiction – even science fiction – needs to be relatable by human readers who would otherwise be alienated by intelligence that is too different and strange. Most science fiction is thus best read as metaphor for the current human condition, and robots could be seen as stand-ins for repressed sections of society, or perhaps our search for the meaning of life.

Reason 3: what seems easy is actually hard...

Another source of difficulty in understanding AI is that it is hard to know which tasks are easy and which ones are hard. Look around and pick up an object in your hand, then think about what you did: you used your eyes to scan your surroundings, figured out where are some suitable objects for picking up, chose one of them and planned a trajectory for your hand to reach that one, then moved your hand by contracting various muscles in sequence and managed to squeeze the object with just the right amount of force to keep it between your fingers.

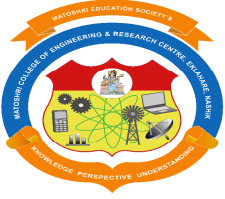
It can be hard to appreciate how complicated all this is, but sometimes it becomes visible when something goes wrong: the object you pick is much heavier or lighter than you expected, or someone else opens a door just as you are reaching for the handle, and then you can find yourself seriously out of balance. Usually these kinds of tasks feel effortless, but that feeling belies millions of years of evolution and several years of childhood practice.

By contrast, the tasks of playing chess and solving mathematical exercises can seem to be very difficult, requiring years of practice to master and involving our “higher faculties” and concentrated conscious thought. No wonder that some initial AI research concentrated on these kinds of tasks, and it may have seemed at the time that they encapsulate the essence of intelligence.

It has since turned out that playing chess is very well suited to computers, which can follow fairly simple rules and compute many alternative move sequences at a rate of billions of computations a second. Computers beat the reigning human world champion in chess in the famous Deep Blue vs Kasparov matches in 1997. Could you have imagined that the harder problem turned out to be grabbing the pieces and moving them on the board without knocking it over! We will study the techniques that are used in playing games like chess or tic-tac-toe in Similarly, while in-depth mastery of mathematics requires (what seems like) human intuition and ingenuity, many (but not all) exercises of a typical high-school or college course can be solved by applying a calculator and simple set of rules.

So what would be a more useful definition?

An attempt at a definition more useful than the “what computers can't do yet” joke would be to list properties that are characteristic to AI, in this case autonomy and adaptively.



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Modeling Of DSTATCOM Using Non Linear

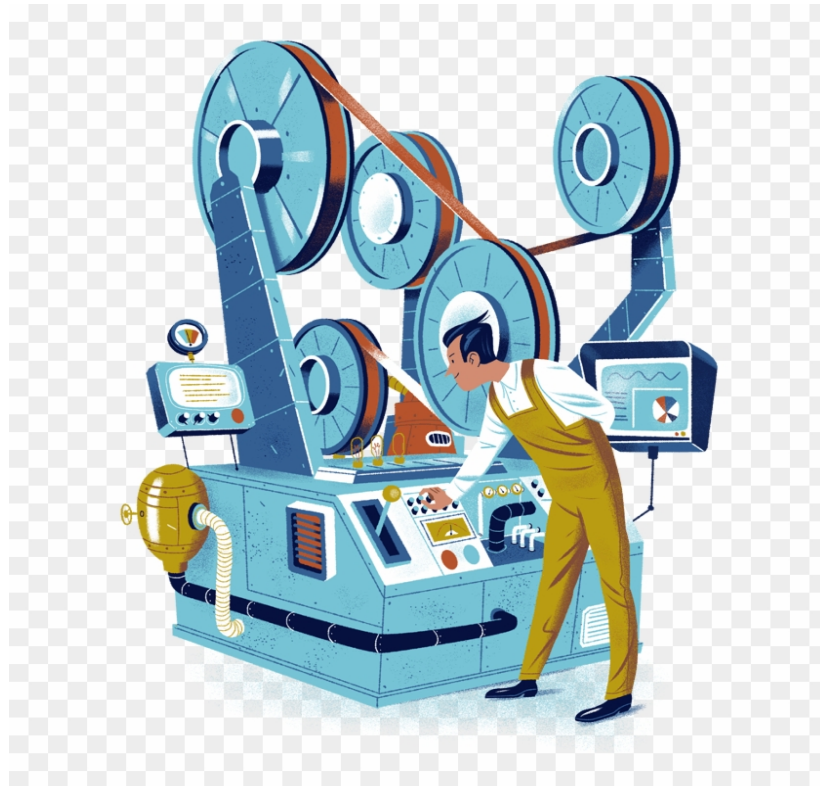
Mr. Sunil Chavan, ME Power System Second year

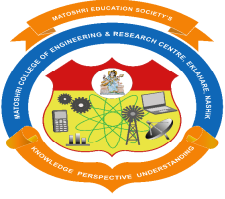
In power distribution networks, reactive power is required to maintain the voltage to deliver active power through distribution lines. Conventionally, Static Var Compensators (SVCs) have been used in conjunction with passive filters at the distribution level for reactive power compensation and mitigation of power quality problems. Another compensating system has been proposed by, employing a combination of SVC and active power filter, which can compensate three phase loads in a minimum of two cycles. Thus, a controller which continuously monitors the load voltages and currents to determine the right amount of compensation required by the system and the less response time should be a viable alternative. Distribution Static Compensator (DSTATCOM) has the capacity to overcome the above mentioned drawbacks by providing precise control and fast response during transient and steady state, with reduced foot print and weight. A DSTATCOM is basically a converter based distribution flexible AC transmission controller sharing many similar concepts with that of a Static Compensator (STATCOM) used at the transmission level. At the transmission level, STATCOM handles only fundamental reactive power and provides voltage support, while a DSTATCOM is employed at the distribution level or at the load end for dynamic compensation. The latter, DSTATCOM, can be one of the viable alternatives to SVC in a distribution network. Additionally, a DSTATCOM can also behave as a shunt active filter, to eliminate unbalance or distortions in the source current or the supply voltage, as per the IEEE-519 standard limits. Since a DSTATCOM is such a multifunctional device, the main objective of any control algorithm should be to make it flexible and easy to implement, in addition to exploiting its multi functionality to the maximum. Prior to the type of control algorithm incorporated, the choice of converter configuration is an important criterion.

The two types of converter configurations are voltage source converter and current source converter, in voltage source converter passive storage elements capacitor and in current source inverter an inductor use. Normally, voltage source converters are preferred due to their smaller size, less heat dissipation and less cost of the capacitor, as compared to an inductor for the same rating. The following indices are considered for comparison – measurement and signal conditioning requirement, performance with varying nonlinear load, total harmonic distortion (THD), DC link voltage variation, switching frequency and sampling frequency. The project briefly describes the level shift pulse width modulation technic. The project also emphasizes the z domain model is derived to analyze multi sampled multilevel inverter of current control technique, as it significantly affects the performance of a DSTATCOM. A dynamic simulation model of the DSTATCOM has been developed in Matlab. Basically, the STATCOM system is comprised of three main parts: a VSI, a set of coupling reactors or a step-up transformer, and a controller. In a very-high-voltage system, the leakage inductances of the step-up power transformers can function as coupling reactors. The main purpose of the coupling inductors is to filter out the current harmonic components that are generated mainly by the pulsating output voltage of the power converters. The single line diagram of the STATCOM system is illustrated in Figure 1. In

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principle, the exchange of real power and reactive power between the STATCOM and the power system can be controlled by adjusting the amplitude and phase of the converter output voltage. In the case of an ideal lossless power converter, the output voltage of the converter is controlled to be in phase with that of the power system. In the case of an ideal lossless power converter, the output voltage of the converter is controlled to be in phase with that of the power system. In this case, there is no real power circulated in the STATCOM therefore, a real power source is not needed. To operate the STATCOM in capacitive mode or Var generation the magnitude of the converter output voltage is controlled to be greater than the voltage at the PCC. In contrast, the magnitude of the output voltage of the converter is controlled to be less than that of the power system at the PCC on order to absorb reactive power or to operate the STATCOM in inductive mode However in practice; the converter is associated with internal losses caused by non-ideal power semiconductor devices and passive components. As a result without any proper controls the capacitor voltage will be discharged to compensate these losses and will continuously decrease in magnitude. To regulate the capacitor voltage, a small phase shift is introduced between the converter voltage and the power system voltage.

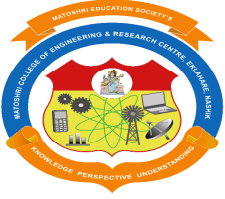




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Technique for a Single-Phase Grid-Connected Photovoltaic System of Nonlinear Current Control *Mr. Shradhha Ahirrao, ME Power System Second year*

Due to the global concern about climate change and sustainable electrical power supply, renewable energy is accurately and the model-based controllers are more useful to perform this task efficiently of sunlight and the switching functions of the converters and inverters. Exact linearization, which is a model-based and straightforward way to design nonlinear controllers, transforms a nonlinear system into a fully linear system by canceling inherent nonlinearities within the system. This linearization technique is independent of the operating point. Exact feedback linearization of grid connected PV systems is proposed in to enhance the dynamic stability. The control scheme proposed i and is independent of atmospheric conditions. However, exact feedback linearizing controllers are designed for a three-phase PV system in which the system is transformed into a α -frame through a straightforward way and the reference current for the linear controller is a steady-state value. But in the case of a single-phase grid-connected PV system, the α -transformation is not straightforward to that of a three-phase system. Thus, the implementation of an exact feedback linearizing controller on a single-phase grid connected PV system requires the reference current in terms of sinusoidal values which is not considered. Moreover, grid-connected PV system can be partially linearized and when the system is partially linearized, exact linearization is no more applicable. The partial feedback linearization algebraically transforms nonlinear system dynamics into a partly linear one which is a reduced order linear system and independent of operating points as the nonlinearities are canceled through nonlinear terms. It also introduces an autonomous system whose dynamics are called internal dynamics and these dynamics need to be stable. The main advantage of partial feedback linearizing controllers is that the dynamics of the full model is not essential. The aim of this paper is to design a new current controller through partial feedback linearization to control the current injected into the grid. The other novelty of this paper includes the stability of internal dynamics through the formulation Lyapunov function and the calculation of sinusoidal reference current which is essential for practical implementation. The performance of the proposed current control scheme is also investigated in this paper under changes in atmospheric conditions. The rest of the paper is organized as follows. The mathematical model of a single-phase grid-connected PV system is shown in Section II. Section III presents the brief overview of partial linearization and partial linearizability of the PV system to prove the suitability of the proposed model to design a partial feedback linearizing controller. The design of a partial feedback linearizing controller for a single-phase grid-connected PV system is shown in Section IV and the relationship between the MPPT and the proposed control scheme is shown in Section V. Section VI shows the performance evaluation of the proposed controller under different atmospheric conditions. Finally, the paper concludes with a comment on future trends and further recommendations. The grid-connected PV systems are nonlinear systems in which most of the nonlinearities occur due to the intermittency. The inclusion of proper controllers with a grid-connected PV system maintains the stable operation under disturbances such as changes in atmospheric conditions, changes in load demands, or an external fault within the system.



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Solar PV and Battery Storage Integration Three Level NPC Inverter

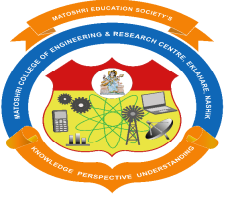
Ms. Shahane Ashwini, ME Power System First year

A PHOTOVOLTAIC (PV) system converts directly solar energy i.e. sun radiations into electricity. The PV cell is the main device of a PV system. Cells may be collectively used to form modules, panels and arrays. The output power available at the terminals of a PV system may directly used to supply small loads like lighting systems and DC motors. To use the electricity from the PV device more appropriate applications are required such as electronic converters. To regulate the current and voltage at the load such converters may be used and also to command the power flow in grid integrated systems, and importantly to track the maximum power point (MPP) of the device. In order to study electronic sophisticated converters for PV systems, one first needs to know how the modelling of the PV is done that is attached to the converter. The calculated modelling of the PV devices may be useful in the study of the dynamic analysis of converters, in the study of MPP tracking (MPPT) controls, and to simulate the PV system and its components using circuit simulators. PV devices such as cells, modules or arrays present a nonlinear I-V characteristic with several parameters that need to be adjusted from experimental information of practical devices. As the environmental problems and world energy crisis caused by non-renewable power generation, unconventional energy sources such as solar photovoltaic (PV), wind generation, hydro systems are becoming more promising alternatives to replace non-renewable generation units for electricity generation. Hence much fined power electronic systems are required to use and develop renewable energy sources. In solar PV or wind energy unconventional source is one of the most vital and special function of the power electronic systems. Types of power electronic configurations are regularly used to transfer power from the renewable energy resource to the grid are two; in three-phase applications: a) single-stage, b) double-stage conversion. In the double-step conversion for a PV system, the first step is usually a dc/dc converter and the second step is a dc/ac inverter. The function of the dc/dc converter is to available the maximum power extraction of the PV array and to produce the appropriate dc voltage for the dc/ac inverter. The duty of the inverter is to generate threephase sinusoidal voltages or currents to transfer the power to the grid in a grid integrated solar PV system or to the load in a stand-alone system. In the single-stage connection, only one converter is needed to fulfil the double-stage functions, and functions, and hence the system will have a lower cost and higher efficiency, however, a more complicated control method will be required. For high power applications the recent norm of the market is a three-phase, single step PV energy systems by using a voltage source converter for power conversion. Unpredictable and fluctuating nature is one of the major concerns of solar and wind energy systems. Grid-connected unconventional energy systems connected by battery energy storage systems can come over this situation. This solution also can increase the accessibility of power system control and rise in the overall availability of the system. Usually, a converter is required to handle the charging & discharging of the battery storage system and another different converter is required for dc to ac conversion of power; hence, a three phase solar PV system integrated to battery storage will require two converters. The control strategy here is the design

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and study of a grid connected three-phase solar PV system connected with battery storage with the use of only single three-level converter having the capability of MPPT with ac-side current control scheme, and also the ability of handling the battery charging and discharging. This will result in minimised investment, best efficiency and increased flexibility of power flow control. To inject power on demand, certain energy storage equipments must be included into the system. These devices like batteries must store PV energy in surplus of electricity demand and in consequence meet electricity demand in excess of PV energy. The more common lead–acid battery is the most commonly used energy storage device at the present time. Another very important view of the systems that are connected to the grid is to select a right power factor according to the grid demands i.e. active or reactive power. The most efficient and user friendly systems are those, which allows variation in the active and reactive power supplied into the grid, depending on the power grid requirements.





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Dissolved Gas Analysis (DGA) of Power transformer using ANN.

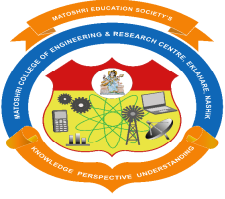
Bankar Rahul Sanjay, ME Power System First year

Power transformers are the heart of electric power distribution and transmission systems. They are considered capital investments in the infrastructure of every power system in the world. Power transformers are always under the impact of electrical, mechanical, thermal and environmental stresses that cause the degradation of insulation quality and ultimate failure of transformer leading to major breakdown of the power system itself. Because power transformers are critical to the reliable operation of every power grid ways to extend their lives, prevent incipient electrical failures, and improve preventive maintenance policies have become increasingly important. The replacement of power transformer is very expensive and time consuming and therefore it is essential to detect incipient faults as early as possible, which enable rectification of fault with minimum interruption of service. To avoid the power failure, periodically monitoring of the conditions of transformers is necessary. Results of early detection of fault are large savings in operation and maintenance costs and preventing any premature breakdown/failure. Transformer protection attains much more attention in fault free electric supply, to maximize transformer life period and efficiency.

In service, transformers are subject to electrical and thermal stresses, causing the degradation of the insulating materials which degradation then leading to the formation of several gases. These gases tend to stay dissolved. According to the temperature reached in the area, the product of the oil decomposition change. There is a correlation between type of the gases found and these temperatures. Thus, based on the temperature on which the oil decomposition occur and as a function of the formation of the gases for that temperature, it is assumed that faults may be present. Based on Dissolved Gas Analysis (DGA) gases, such as hydrogen(H_2), methane (CH_4), ethane (C_2H_6), ethylene (C_2H_4), acetylene (C_2H_2), carbon-monoxide (CO) and carbon dioxide(CO_2) can be detected and the concentrations of the gases, total concentrations of the combustible gases, the relative proportions of gases and gassing rates used to estimate the condition of the transformer and the incipient faults presented. Hence, qualitative and quantitative determination of dissolved gases in transformer oil may be of great importance in order to assess fault condition and further operating reliability of power transformers.

In some cases, conventional fault detection methods, fail to give diagnosis. This normally happens for those transformers which have more than one fault. In multiple fault condition, gases from different faults are mixed up resulting in confusing ratio between different gas components. Only a more sophisticated analysis method such as the Artificial Neural Network (ANN) could deal with this. Application of ANN can overcome the drawbacks of DGA methods which cannot diagnose multi-fault and no matching codes for diagnosis because of the coding boundary and the sharp codes change, thus, it greatly enhanced diagnosing accuracy.

The condition based diagnosis system is developed by applying ANN approach to DGA classical methods. A feasible MATLAB GUI conferred to give visual display of five methods. The results shows that diagnosis accuracy of DGA methods using ANN is higher than conventional DGA methods for fault detection of transformer.



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GAS GENERATION IN POWER TRANSFORMERS:-

Cellulose Decomposition:-

The thermal degradation of cellulose mainly produced carbon oxides (CO, CO₂) and hydrogen or methane (H₂, CH₄). Due to thermal degradation in oil, carbon dioxide produced. The rate at which they are developed depends exponentially on the temperature and directly on the concentration of material at that temperature.

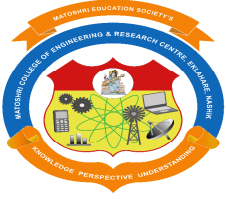
Oil Decomposition:-

Mineral transformer oils are combination of hydrocarbon molecules and its general formulae is (C_nH_{2n+2}), where n in the reach of 20 to 40. The deterioration forms for these hydrocarbons in thermal or electrical faults are more complex. The main cause of gas generation is the breaking of the chemical bonds between the atoms that make up the hydrocarbon molecules of the mineral oil. Lower amounts of energy or lower temperatures are required to create or break the C-H molecular bonds. Higher amounts of energy or higher temperatures are needed, to create, or break C-C molecular bond. In the ascending order the energy required for make or break the bonds are; C-C single bonds, C=C double bonds and triple bonds. The faults in the transformer produce the energy that is needed for breaking the chemical bonds [3]. The gases generated include hydrogen (H₂), methane(CH₄), ethane (C₂H₆), ethylene (C₂H₄), acetylene(C₂H₂), carbon dioxide(CO₂) and carbon monoxide(CO). The gases listed above are generally referred to as key gases. Based on dissolved gas analysis (DGA) gases, such as hydrogen(H₂), methane (CH₄), ethane (C₂H₆), ethylene (C₂H₄), acetylene (C₂H₂), carbon-monoxide (CO) and carbon dioxide(CO₂) can be detected and the concentrations of the gases, total concentrations of the combustible gases, the relative proportions of gases and gassing rates used to estimate the condition of the transformer and the incipient faults presented. DGA is one of the reliable and proven techniques to detect incipient fault in transformer. It can be used to assess current equipment condition, give advance warning of developing faults and determine the improper use of equipment in order to provide convenient scheduling of repairs.

DGA involves following steps:

1. Sample of the oil taken from the unit
2. Extract the dissolved gases from oil.
3. Detect the gas concentrations.
4. Analyze by diagnostic methods to find faults.

DGA mainly involves extracting or stripping of oil from the unit and subject to Gas Chromatography to extract the dissolved gases from oil. The next step of DGA is detection of gas concentration levels using suitable methods like Flame Ionization detector, Thermal conduction detector (FID, TCD) and analyse for faults by using suitable diagnostic methods to find cause.

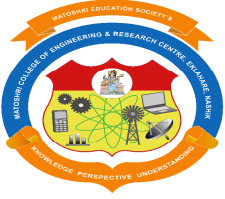


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Reactive Power Compensation through Grid Connected PV System Using STATCOM *Piyush Desai, ME Power System First year.*

India has a cumulative installed grid connected solar power capacity of 8,062 MW (8 GW) as of June 2016, and promises to grow further in coming years. Due to the rapid growth of the power electronics technique, the photovoltaic (PV) power generation system has been developed worldwide. By changing the duty cycle, the load impedance as seen by the source is varied and matched at the point of the peak power with the source so as to transfer the maximum power, the term coined as Maximum Power Point Tracking (MPPT). There are many MPPT techniques like Perturb and Observe (P&O) methods, Incremental Conductance (IC) methods, Fuzzy Logic Method, etc the most popular of MPPT technique (Perturb and Observe (P&O) method has been implemented in MATLAB Simulink. The utilization efficiency can be improved (at the cost of a small increase in implementation cost) by employing this hill-climbing MPPT technique. This is a simple algorithm that does not require previous knowledge of the PV generator characteristics or the measurement of solar intensity and cell temperature and is easy to implement with analogue and digital circuits. The algorithm perturbs the operating point of the PV generator by increasing or decreasing a voltage by a small amount (step size) and measures the PV array output power before and after the perturbation. If the power increases, the algorithm continues to perturb the system in the same direction; otherwise the system is perturbed in the opposite direction. The number of perturbations made by the MPPT algorithm per second is known as the perturbation frequency or the MPPT frequency. Both active and reactive power control can be achieved with distributed generation units coupled through an Inverter. Reactive power flow control envisages distributed generation units to be used as static var compensation units besides conventionally being used just as energy sources.

The improvement in the power quality of supply in locations where electric grids are weak or sensitive loads need to be protected against problems such as low power factor, voltage regulation, and reactive power compensation. It is done using a STATCOM whose DC link is supplied through a PV module. Icos. Algorithm for STATCOM control has been applied to a inverter to provide reactive power compensation as demanded by the linear reactive load. The experimental results show that the control algorithm is effective for harmonic as well as reactive power compensation, so that it is necessary for the source to supply only the real power demanded by the load. The topology of three-phase four-wire Shunt Active Filter not only compensates power quality problems but also allows interface renewable energy sources with grid. The inverter stage of the active filter is based in two-level fourleg inverter and its control is based in the theory of Instantaneous reactive power (p-q Theory). The filter is capable of compensating power factor, unbalance, and current harmonics. Additionally it can also make the interface between renewable energy sources and the electrical system, injecting balanced practically sinusoidal currents (with low THD. Mathematical model of PV module, the Perturb and Observe (P&O) method for control of PV and Icos_ control of STATCOM are treated in this paper. The system configuration comprises of three phase source of 415 V 50 Hz, a linear R-L load of 50 kW and 30 kVAr, 29 kWp solar system.



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Flexible Electronic Skin

Prof.D.D.Dighe

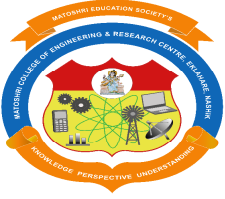
Source: www.electronicsforu.com

Electronics plays a very important role in developing simple devices used for any purpose. In every field electronic equipments are required. The best achievement as well as future example of integrated electronics in medical field is Artificial Skin. It is ultrathin electronics device attaches to the skin like a sick on tattoo which can measure electrical activity of heart, brain waves & other vital signals. Artificial skin is skin grown in a laboratory. It can be used as skin replacement for people who have suffered skin trauma, such as severe burns or skin diseases, or robotic applications. This paper focuses on the Artificial skin(E-Skin) to build a skin work similar to that of the human skin and also it is embedded with several sensations or the sense of touch acting on the skin. This skin is already being stitched together. It consists of millions of embedded electronic measuring devices: thermostats, pressure gauges, pollution detectors, cameras, microphones, glucose sensors, EKGs, electronic holographs. This device would enhance the new technology which is emerging and would greatly increase the usefulness of robotic probes in areas where the human cannot venture. The sensor could pave the way for a overabundance of new applications that can wirelessly monitor the vitals and body movements of a patient sending information directly to a computer that can log and store data to better assist in future decisions. This paper offers an insight view of the internal structure, fabrication process and different manufacturing processes.

Introduction: Electronics plays a very important role in developing simple devices used for any purpose. In every field electronic equipments are required. The best achievement as well as future example of integrated electronics in medical field is Artificial Skin. It is ultrathin electronics device attaches to the skin like a sick on tattoo which can measure electrical activity of heart, brain waves & other vital signals. Evolution in robotics is demanding increased perception of the environment. Human skin provides sensory perception of temperature, touch/pressure, and air flow. Goal is to develop sensors on flexible substrates that are compliant to curved surfaces. Researcher's objective is for making an artificial skin is to make a revolutionary change in robotics, in medical field, in flexible electronics. Skin is large organ in human body so artificial skin replaces it according to our need. Main objective of artificial skin is to sense heat, pressure, touch, airflow and whatever which human skin sense. It is replacement for prosthetic limbs and robotic arms. Artificial skin is skin grown in a laboratory. There are various names of artificial skin in biomedical field it is called as artificial skin, in our electronics field it is called as electronic skin, some scientist it called as sensitive skin, in other way it also called as synthetic skin, some people says that it is fake skin. Such different names are available but application is same it is skin replacement for people who have suffered skin trauma, such as severe burns or skin diseases, or robotic applications & so on. An artificial skin has also been recently demonstrated at the University of Cincinnati for in-vitro sweat simulation and testing, capable of skin-like texture, wetting, sweat pore density, and sweat rates.

History

Electronic skin or e-skin is a thin material designed to mimic human skin by recognizing pressure and temperature. In September 2010, Javey and the University of California, Berkeley developed a method of attaching nanowire transistors and pressure sensors to a sticky plastic film. In August 2011, Massachusetts-based MC10 created an electronic patch for monitoring patient's vital health signs which was described as 'electric skin'. The 'tattoos' were created by embedding sensors in a thin film. During tests, the device stayed in place for 24 hours and was flexible enough to move with the skin it was



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placed on. Javey's latest electronic skin lights up when touched. Pressure triggers a reaction that lights up blue, green, red, and yellow LEDs and as pressure increases the lights get brighter. Artificial skin identified by different name in a same way it is developed in different laboratories such as in MIT (Massachusetts institute of technology), in Tokyo led by Takao Someya, The Fraunhofer Institute for Interfacial Engineering and Biotechnology, and so on. In this report we see the different methods of manufacturing of artificial skin of different scientist & its application with its future scope. Another form of —artificial skin has been created out of flexible semiconductor materials that can sense touch for those with prosthetic limbs. The artificial skin is anticipated to augment robotics in conducting rudimentary jobs that would be considered delicate and require sensitive —touch. Scientists found that by applying a layer of rubber with two parallel electrodes that stored electrical charges inside of the artificial skin, tiny amounts of pressure could be detected. When pressure is exerted, the electrical charge in the rubber is changed and the change is detected by the electrodes. However, the film is so small that when pressure is applied to the skin, the molecules have nowhere to move and become entangled. The molecules also fail to return to their original shape when the pressure is removed. Sensitive skin, also known as sensate skin, is an electronic sensing skin placed on the surface of a machine such as a robotic arm. The goal of the skin is to sense important environmental parameters—such as proximity to objects, heat, moisture, and direct touch sensations. Examples of a sensitive skin have been made by a group in Tokyo led by Takao Someya.

Architecture of e-skin

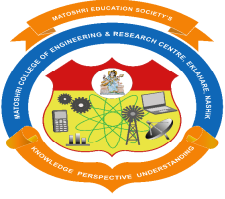
With the interactive e-skin, demonstration is takes place an elegant system on plastic that can be wrapped around different objects to enable a new form of HMI. Other companies, including Massachusetts-based engineering firm MC10, have created flexible electronic circuits that are attached to a wearer's skin using a rubber stamp. MC10 originally designed the tattoos, called Biostamps, to help medical teams measure the health of their patients either remotely, or without the need for large expensive machinery.

Javey's study claims that while building sensors into networks isn't new, interactive displays; being able to recognize touch and pressure and have the flexible circuit respond to it is 'breakthrough'. His team is now working on a sample that could also register and respond to changes in temperature and light to make the skin even more lifelike.

Fabrication of e-skin

a. By using zinc oxide with vertical nanowires

U.S. and Chinese Scientists used zinc oxide vertical nanowires to generate sensitivity. According to experts, the artificial skin is "smarter and similar to human skin." It also offers greater sensitivity and resolution than current commercially available techniques. A group of Chinese and American scientists created experimental sensors to give robots artificial skin capable of feeling. According to experts, the sensitivity is comparable to that experienced by humans. Trying to replicate the body's senses and indeed its largest organ, the skin, has been no mean feat but the need for such a substitute has been needed for a while now, especially in cases of those to whom skin grafts have not worked or indeed its use in robotics. To achieve this sensitivity, researchers created a sort of flexible and transparent electronics sheet of about eight thousand transistors using vertical nanowires of zinc oxide. Each transistor can directly convert mechanical motion and touch into signals that are controlled electronically, the creators explained. "Any mechanical movement, like the movement of an arm or fingers of a robot, can be converted into control signals," the Professor Georgia Institute of Technology (USA), Zhong Lin Wang. This technology "could make smarter artificial skin similar to human skin,"

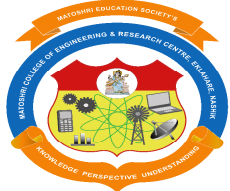


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said Zhong, after stating that it provides greater sensitivity and resolution. The system is based on piezoelectricity, a phenomenon that occurs when materials such as zinc oxide are pressed. Changes in the electrical polarization of the mass can be captured and translated into electrical signals thereby creating an artificial touch feeling

b. By using Gallium Indium The development of highly deformable artificial skin with contact force (or pressure) and strain sensing capabilities is a critical technology to the areas of wearable computing, haptic interfaces, and tactile sensing in robotics. With tactile sensing, robots are expected to work more autonomously and be more responsive to unexpected contacts by detecting contact forces during activities such as manipulation and assembly. Application areas include haptics humanoid robotics, and medical robotics. We describe the design, fabrication, and calibration of a highly compliant artificial skin sensor. The sensor consists of multilayered microchannels in an elastomeric matrix filled with a conductive liquid, capable of detecting multi-axis strains and contact pressure. A novel manufacturing method comprised of layered molding and casting processes is demonstrated to fabricate the multilayered soft sensor circuit. Silicone rubber layers with channel patterns, cast with 3-D printed molds, are bonded to create embedded micro channels, and a conductive liquid is injected into the micro channels. The channel dimensions are 200 μm (width) \times 300 μm (height). The size of the sensor is 25 mm \times 25 mm, and the thickness is approximately 3.5 mm. The prototype is tested with a materials tester and showed linearity in strain sensing and nonlinearity in pressure sensing. The sensor signal is repeatable in both cases. The characteristic modulus of the skin prototype is approximately 63 kPa. The sensor is functional up to strains of approximately 250% A highly elastic artificial skin was developed using an embedded liquid conductor. Three hyper-elastic silicon rubber layers with embedded micro channels were stacked and bonded. The three layers contain different channel patterns for different types of sensing such as multi-axial strain and contact pressure. A novel manufacturing method with layered molding and casting techniques was developed to build a multi-layered soft sensor circuit. For strain sensing, the calibration results showed linear and repeatable sensor signal. The gauge factors of the skin prototype are 3.93 and 3.81 in x and y axes, respectively, and the minimum detectable displacements are 1.5 mm in x-axis and 1.6 mm in y-axis. For pressure sensing, the prototype showed repeatable but not linear sensor signals. The hysteresis level was high in a high pressure range (over 25 kPa). The sensor signal was repeatable in both cases.

c. By using Organic Transistors: In July they reported the success of our experiments in the journal Nature. They fabricated organic transistors and tactile sensors on an ultrathin polymer sheet that measured 1 micrometer thick—one-tenth the thickness of plastic wrap and light enough to drift through the air like a feather. This material can withstand repeated bending, crumple like paper, and accommodate stretching of up to 230 percent. What's more, it works at high temperatures and in aqueous environments—even in saline solutions, meaning that it can function inside the human body. Flexible electronics using organic transistors could serve a range of biomedical applications. For example, they've experimented with electromyography, the monitoring and recording of electrical activity produced by muscles. For this system, they distributed organic transistor-based amplifiers throughout a 2- μm -thick film. This allowed us to detect muscle signals very close to the source, which is key to improving the signal-to-noise ratio, and thus the accuracy of the measurements. Conventional techniques typically use long wires to connect sensors on the skin with amplifier circuits, which results in a pretty abysmal signal-to-noise ratio. And they can imagine more medically urgent applications of such a system. In collaboration with the medical school at the University of Tokyo, we're working on an experiment that will place our amplifier matrix directly on the surface of an animal's heart. By detecting



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electric signals from the heart with high spatial resolution and superb signal-to-noise ratios, we should be able to zoom in on the exact location of problems in the heart muscle that can lead to heart attacks. Skin is essentially an interface between your brain and the external world. It senses a tap on the shoulder or the heat from a fire, and your brain takes in that information and decides how to react. If we want bionic skins to do the same, they must incorporate sensors that can match the sensitivity of biological skins. But that is no easy task. For example, a commercial pressure-sensitive rubber exhibits a maximum sensitivity of 3 kilopascals, which is not sufficient to detect a gentle touch. To improve an e-skin's responsiveness to such stimuli, researchers are experimenting with a number of different techniques. Zhenan Bao and her colleagues at Stanford University created a flexible membrane with extraordinarily good touch sensitivity by using precisely molded pressure sensitive rubber sandwiched between electrodes. A novel design of the thin rubber layer, using pyramid-like structures of micrometer size that expand when compressed, allowed the material to detect the weight of a fly resting on its surface. With such structures embedded in it, a bionic skin could sense a breath or perhaps a gentle breeze. This kind of sensitivity would be a great benefit in a prosthetic hand, for example, by giving the wearer the ability to grip delicate objects. In the most recent application of Bao's technology, her team turned the pressure sensors around so that instead of detecting external stimuli, they measured a person's internal functions. The researchers developed a flexible pulse monitor that responds to each subtle surge of blood through an artery, which could be worn on the inner wrist under a Band-Aid. Such an unobtrusive monitor could be used to keep track of a patient's pulse and blood pressure while in the hospital or during surgery.

d. By Organic Light Emitting Diode: Javey and colleagues set out to make the electronic skin respond optically. The researchers combined a conductive, pressure-sensitive rubber material, organic light emitting diodes (OLEDs), and thin-film transistors made of semiconductor-enriched carbon nanotubes to build an array of pressure sensing, light-emitting pixels. Whereas a system with this kind of function is relatively simple to fabricate on a silicon surface, —for plastics, this is one of the more complex systems that has ever been demonstrated, says Javey. The diversity of materials and components that the researchers combined to make the light-emitting pressure-sensor array is impressive, says John Rogers, a professor of materials science at the University of Illinois at Urbana-Champaign. Rogers, whose group has produced its own impressive flexible electronic sensors (see —Electronic Sensors Printed Directly on the Skin), says the result illustrates how research in nanomaterials is transitioning from the fundamental study of components and simple devices to the development of —sophisticated, macroscale demonstrator devices, with unique function. In this artist's illustration of the University of California, Berkeley's interactive e-skin, the brightness of the light directly corresponds to how hard the surface is pressed. Semiconducting material and transistors are fitted to flexible silicon to mimic pressure on human skin. The team is working on samples that respond to temperature. Scientists have created what's been dubbed the world's first interactive 'electronic skin' that responds to touch and pressure. When the flexible skin is touched, bent or pressed, built-in LED's light up - and the stronger the pressure, the brighter the light. The researchers, from the University of California, claim the bendy e-skin could be used to restore feeling for people with prosthetic limbs, in smart phone displays, car dashboards or used to give robots a sense of touch. Scientists from the University of California have created what's been dubbed the first 'electronic skin' that responds to touch and pressure by lighting up using built-in lights.

Result & Analysis by Application

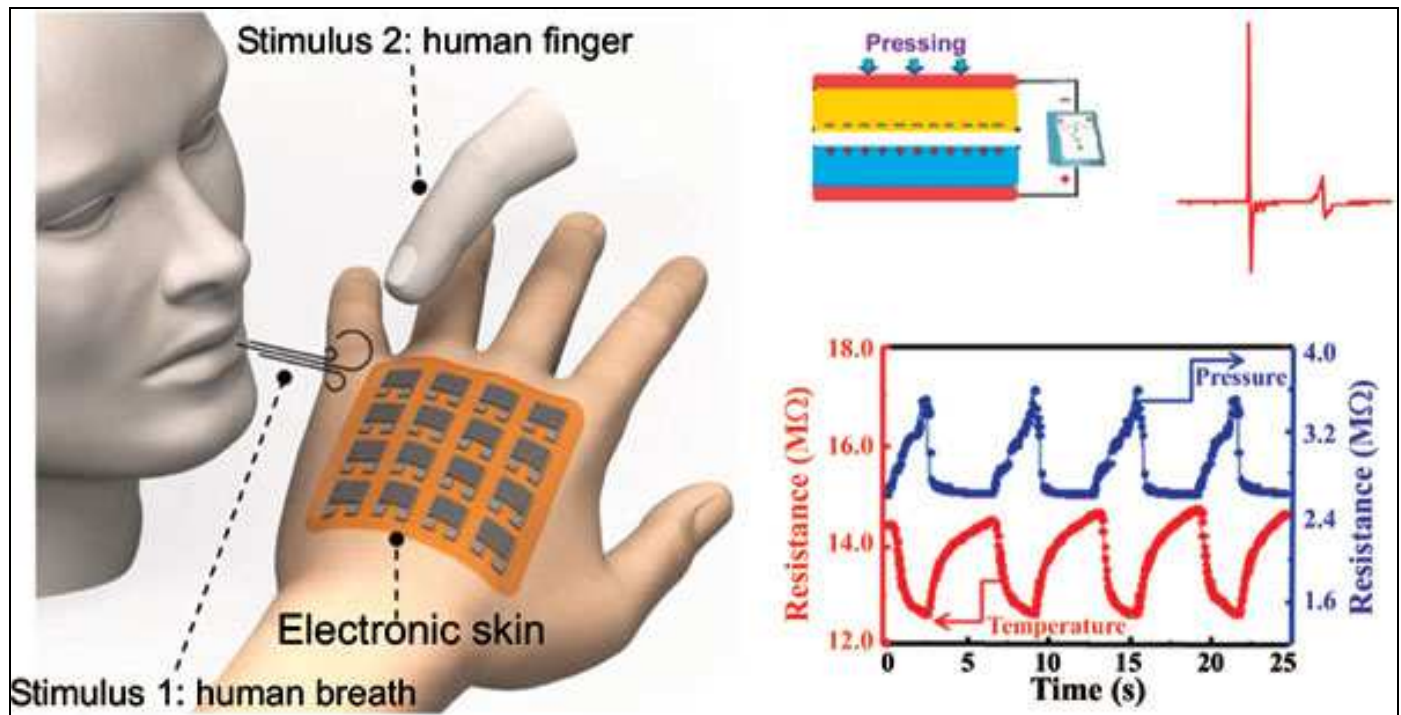
In this paper general information about electronic skin is shown and also a fabrication of electronic skin is given. From them we can say that electronic skin

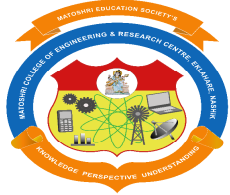
1. Reduces number of wires

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2. Compact in size
3. Attachment and detachment is easy
4. More flexible
5. Light in weight
6. It replaces present system of ECG and EEG
7. It gives sense to a robot
8. Wearable
9. Ultrathin
10. Twistable & stretchable
11. Easy to handle

So, some applications are given below to know the depth and use of electronic skin. When the skin has been seriously damaged through disease or burns then human skin is replaced by Artificial skin. It is also used for robots. Robot senses the pressure, touch, moisture, temperature, proximity to object. It can measure electrical activity of the heart, brain waves, muscle activity and other vital signals.





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Paper Battery

Namrata Kharate

Reference- www.electronicsforu.com

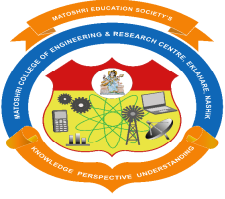
Introduction The continuously advancing technology of portable electronic devices requires more flexible batteries to power them. Batteries power a wide range of electronic devices including phones, laptop computers and medical devices such as cardiac pacemakers and defibrillators. With the ever increasing demand for efficiency and design, there is a need for ultrathin, safe and flexible energy storage options. A paper battery is a flexible, ultra- thin energy storage and production device formed by combining carbon nanotubes with a conventional sheet of cellulose based paper. A paper battery acts as both a high energy battery and super capacitor, combining two components that are separate in traditional electronics. This combination allows the battery to provide long term, steady power production and bursts of energy. Through the use of super capacitors, batteries can be made that will deliver renewable energy from bodily fluids such as blood or sweat. This technology can be greatly utilized by medical devices. It combines two essential materials, cellulose and carbon nanotubes (CNTs), that fit the characteristics of spacer and electrode and provide inherent flexibility as well as porosity to the system. Cellulose, the main constituent of paper and an inexpensive insulating separator structure with excellent biocompatibility, can be made with adjustable porosity. CNTs, a structure with extreme flexibility, have already been widely used as electrodes in electrochemical devices. By proper integration the output power of paper batteries can be adapted to required level of voltage–current. This cellulose based spacer is compatible with many possible electrolytes. Researchers used ionic liquid, essentially a liquid salt, as the battery’s electrolyte, as well as naturally occurring electrolytes such as human sweat, blood and urine. Due to the flexible nature of the cellulose and nanotubes, this power source can be easily modified or placed in the body or various medical devices. The need for surgery to replace batteries on internal medical devices would be nonexistent. This is because super capacitor does not show a loss in power dissipation over time like normal chemical batteries do. Patients with implanted medical devices will also benefit from the flexibility because previous devices may cause discomfort for person due to a larger solid power source. As this technology is adapted it will prove to be extremely useful and could even save not only cost but lives also.

History of Paper Batteries

The creation of this unique nanocomposite paper drew from a diverse pool of disciplines, requiring expertise in materials science, energy storage and chemistry. In August 2007, a research team at Rensselaer Polytechnic Institute (led by Drs. Robert Linhardt, the Ann and John H. Broadbent Senior Constellation Professor of Biocatalysis and Metabolic Engineering at Rensselaer; Pulickel M. Ajayan, professor of materials science and engineering; and Omkaram Nalamasu, professor of chemistry with a joint appointment in materials science and engineering) developed the paper battery. Senior research specialist Victor Pushparaj, along with postdoctoral research associates Shaijumon M. Manikoth, Ashavani Kumar and Saravanababu Murugesan, were co-authors and lead researchers of the project. Other co-authors include research associate Lijie Ci and Rensselaer Nanotechnology Center Laboratory Manager Robert Vajtai.

What is Battery

Battery or voltaic cell is a combination of many electrochemical Galvanic cells of identical type to store chemical energy and to deliver higher voltage or higher current than with single cells. The battery cells create a voltage difference between the terminals of each cell and hence to its combination in battery. When an external electrical circuit is connected to the battery, then the battery drives electrons through



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the circuit and electrical work is done. Since the invention of the first Voltaic pile in 1800 by Alessandro Volta, the battery has become a common power source for many household and industrial applications, and is now a multi-billion dollar industry.

Definition of Paper battery

A paper battery is a flexible, ultra-thin energy storage and production device formed by combining carbon nanotubes with a conventional sheet of cellulose-based paper. A paper battery acts as both a high-energy battery and supercapacitor, combining two components that are separate in traditional electronics. This combination allows the battery to provide both longterm, steady power production and bursts of energy. Non-toxic, flexible paper batteries have the potential to power the next generation of electronics, medical devices and hybrid vehicles, allowing for radical new designs and medical technologies. Paper batteries may be folded, cut or otherwise shaped for different applications without any loss of integrity or efficiency. Cutting one in half halves its energy production. Stacking them multiplies power output. Early prototypes of the device are able to produce 2.5 volts of electricity from a sample the size of a postage stamp

APPLICATIONS

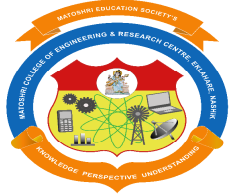
With the developing technologies and reducing cost of CNTs, the paper batteries will find applications in the following fields: In Electronics: • in laptop batteries, mobile phones, handheld digital cameras: The weight of these devices can be significantly reduced by replacing the alkaline batteries with light-weight Paper Batteries, without compromising with the power requirement. Moreover, the electrical hazards related to recharging will be greatly reduced. • in calculators, wrist watch and other low drain devices. • in wireless communication devices like speakers, mouse, keyboard, Bluetooth headsets etc. • in Enhanced Printed Circuit Board(PCB) wherein both the sides of the PCB can be used: one for the circuit and the other side (containing the components) would contain a layer of customized Paper Battery. This would eliminate heavy step-down transformers and the need of separate power supply unit for most electronic circuits. In Medical Sciences: • in Pacemakers for the heart • in Artificial tissues (using Carbon nanotubes) • in Cosmetics, Drug-delivery systems • in Biosensors, such as Glucose meters, Sugar meters, etc. In Automobiles and Aircrafts: • in Hybrid Car batteries • in Long Air Flights reducing Refueling • for Light weight guided missiles • for powering electronic devices in Satellite programs.

**There occurs a fault
Then the current should halt....**

**Otherwise the fault current would increase
And the service continuity decrease....**

**But the relay acts quick
And the circuit breaker trips....**

**The faulty part is disconnected
And the power system is protected....**



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Honeypots in Network Security

Prof.D.D.Ahire

Reference- www.electronicsforu.com

Day by day, more and more people are using internet all over the world. It is becoming a part of everyone's life. People are checking their e-mails, surfing over internet, purchasing goods, playing online games, paying bills on the internet etc. However, while performing all these things, how many people know about security? Do they know the risk of being attacked, infecting by malicious software? Even some of the malicious software are spreading over network to create more threats by users. How many users are aware of that their computer may be used as zombie computers to target other victim systems? As technology is growing rapidly, newer attacks are appearing. Security is a key point to get over all these problems. In this thesis, we will make a real life scenario, using honeypots. Honeypot is a well designed system that attracts hackers into it. By luring the hacker into the system, it is possible to monitor the processes that are started and running on the system by hacker. In other words, honeypot is a trap machine which looks like a real system in order to attract the attacker. The aim of the honeypot is analyzing, understanding, watching and tracking hacker's behaviours in order to create more secure systems. Honeypot is great way to improve network security administrators' knowledge and learn how to get information from a victim system using forensic tools. Honeypot is also very useful for future threats to keep track of new technology attacks.

INTRODUCTION

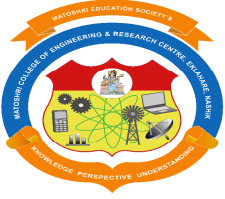
First of all, we would like to build a honeypot on a machine. One of us will try to find security flaws that exist on the system. After defining all those, we will try to attack the system. Once the hacker will be able to have access into the system, one of us will have the role of forensic examiner. Using useful forensic investigation tools, he will try to find out the changes that occurred on the victim system by looking at the tracks left behind the hacker. Furthermore, we will go deeper into the subject thinking about its problems bringing to the system. It will be helpful for network security administrators to create more and more secure systems and be aware of the threats.

Problem Description

As we are successful to make system that is interesting enough for hackers to attack, they will try to gain access by using security flaws on the system. By tracing the hacker, we are not sure if we will be the one who has the control. Therefore we do not know if honeypots are secure or not. Does the hacker know that it is a real system or a honeypot? Is he aware of how a great tool it is for investigators to acquire information about security flaws in the system? What does he gain from hacking it? It is a big problem if it is possible to reach other real systems using honeypot features and seize them, because the rest of the system will be compromised. We are not sure if the hacker will continue hacking even if he knows that it is a honeypot or not. Knowing all these issues does not make our investigation efficient. We will try to find answers and solutions to all these questions and think about what can be done to make honeypots more secure and make sure that the hacker will not be able to go further than hacking the honeypot. We will have two perspectives which are a forensic examiner and a hacker. We will use variety of hacking tools and forensic examiner tools to have very accurate results.

Motivation

First of all, we are very interested in this subject field of study. So, our motivation for this thesis is to understand how security systems are working and how an organization can be protected and being aware of the risks of security flaws in the system. We will learn how a system is working and how it can be developed. Once we have the results, we will examine the output with forensic science tools. While



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trying all these, we will come across some problems and we will try to solve it. At the same time we will have experience on creating and managing this kind of systems for the future. If we see similar problems in a network, we will be able to handle the system and recover the loss. Therefore, we will have a knowledge including both security problems examining and forensic science information gathering.

What is a honeypot?

First of all, a honeypot is a computer system. There are files, directories in it just like a real computer. However, the aim of the computer is to attract hackers to fall into it to watch and follow their behavior. So we can define it as a fake system which looks like a real system. They are different than other security systems since they are not only finding one solution to a particular problem, but also they are eligible to apply variety of security problems and finding several approaches for them. For example, they can be used to log malicious activities in a compromised system, they can be also used to learn new threats for users and creating ideas how to get rid of those problems. According to Mokube, I. & Adams M. (2007:p.322) we can divide honeypots according to their aims and level of interactions. If we look at the aims of the honeypots, we can see that there are two types of honeypots, which are research honeypots, and production honeypots.

Production honeypots

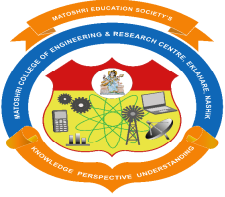
Production honeypots are used to protect the company from attacks, they are implemented inside the production network to improve the overall security. They are capturing a limited amount of information, mostly low interaction honeypots are used. Thus, security administrator watches the hacker's movements carefully and tries to lower the risks that may come from it towards the company. At this point, we will try to discuss and find out the risks of using production honeypots. Because while testing the security of the systems existing in an organization, unexpected actions may happen such as misusing other systems using honeypot features. If the network administrator is not aware of this problem, they put organization in a big trouble. Spitzner L. (2002) claims that it is easier to break the honeypot phases into groups and refers that Bruce Schneier model is good for understanding the honeypots. He groups the security issues into several steps, which are prevention, detection and response.

Prevention

Prevention is the first thing to consider in our security model. As a definition, it means to prevent the hackers to hack the system. So, we will try not to allow them to access the system. There are many ways to do this in security. One can use firewall to control the network traffic and put some rules to block or allow it. Using authentication methods, digital certificates or having strong passwords are the most common and well-known 4 security prevention techniques. There are also encryption algorithms that encrypt data. It is a good way to use it since it encrypts the messages and make them impossible to read. The relation between using prevention and honeypot can be explained as following. If the hacker understands the company he is trying to hack is using honeypots and they are aware of today's security problems, it will make them think about it. It will be confusing and scary for a hacker. Even if a company uses the methods that we discussed in the first paragraph in order to stay secure, it is still good to have honeypot in an organization since security issues are concerned and handled professionally. As the security is very significant, it is always good to be conscious. There is no tolerance when there is a problem, it can give a lot of damage to any company. Because every company has private and important data, there is a need to protect the data from intruders.

Detection

Detection is the act of detecting any malicious activity in the system. We are assuming that prevention did not work so one way or another, a hacker compromised the system. There are some ways for



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detecting those attacks. The well-known detection solution is Network Intrusion Detection Systems. This technology will help users to know if the network is compromised, but it will not prevent hackers from attacking the system. For companies, such detection systems are expensive. At this point, honeypots are valuable to monitor the activity.

Advantages of honeypots

There are many security solutions available in the market. Anyone can browse the variety of choices through internet and find the most suitable solution for their needs. Here are the reasons why we should choose honeypots according to Mokube I. and Adams M. (2007): Honeypots can capture attacks and give information about the attack type and if needed, thanks to the logs, it is possible to see additional information about the attack. New attacks can be seen and new security solutions can be created by looking at them. More examinations can be obtained by looking at the type of the malicious behaviors. It helps to understand more attacks that may happen. Honeypots are not bulky in terms of capturing data. They are only dealing with the incoming malicious traffic. Therefore, the information that has been caught is not as much as the whole traffic. Focusing only on the malicious traffic makes the investigation far easier. Therefore, this makes honeypots very useful. For the only malicious traffic, there is no need for huge data storage. There is no need for new technology to maintain. Any computer can be used as a honeypot system. Thus, it does not cost additional budget to create such a system. They are simple to understand, to configure and to install. They do not have complex algorithms. There is no need for updating or changing some things. As honeypots can capture anything malicious, it can also capture new tools for detecting attacks too. It gives more ideas and deepness of the subject proving that it is possible to discover different point of views and apply them for our security solutions.

Disadvantages of honeypots

As there are several important advantages of using honeypots, there are also some disadvantages of them as well. We are continuing with Mokube I. & Adams M. (2007)'s studies: We can only capture data when the hacker is attacking the system actively. If he does not attack the system, it is not possible to catch information. If there is an attack occurring in another system, our honeypot will not be able to identify it. So, attacks not towards our honeypot system may damage other systems and cause big problems. There is fingerprinting disadvantage of honeypots. It is easy for an experienced hacker to understand if he is attacking a honeypot system or a real system. Fingerprinting allows us to distinguish between these two. It is a not a wanted result of our experiment. The honeypot may be used as a zombie to reach other systems and compromise them. This can be very dangerous.

Mathematics

Client: "How do you estimate how long a project will take?"

Engineer: "I add the time needed for each activity, then multiply by pi."

Client: "Why multiply by pi?"

Engineer: "It explains why my estimates are always irrational."

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Boolean Algebra Calculator

Prof.RD.Deshmukh

Reference- www.electronicsforu.com

Boolean Algebra Calculator Features:

- Portable
- Fast
- Low power
- Low cost
- Reliable

Description:

1. **Power Supply:** It can be defined as a device that supplies electrical energy to one or more electric loads. The term is most commonly applied to devices that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy (e.g., mechanical, chemical, solar) to electrical energy. In our project a supply mains that is 5volt d.C. is given to the microcontroller, LED's , keypad, display.
2. **Microcontroller:** Microcontroller ATMEGA 16L is used for the automation purpose and acts as brain of the project. It controls the output (Display) according to the input given to it. Read the post: Microcontroller Basics to get basic knowledge about microcontrollers.
3. **Display:** The Display used here is 3 Bi-color LED's. The Glowing Pattern of LED's represent the desired minimized expression.
4. **Keypad:** In this project series of switches have been used as keypad, is used to give the input (min-terms) expression. Each digit on the keypad corresponds to one min-term each.

Circuit Schematic:

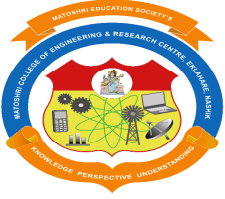
This circuit is a simple 3 variable Boolean expression minimizer. It uses the Quine McCluskey algorithm which was described in the chapter 1. In this the microcontroller plays a major role, it consists of code to implement the described algorithm as well as controls other components in the circuit.

Initially when the power is switched on an LED will glow which indicates that the microcontroller is ready to take the input. Here the input boolean expression is given in SOP form, i.e only min-terms are to be entered through the keypad provided.

The keypad consists of 9 switches of which 8 switches corresponds to one min-term each and the 9th one is used as next button. After entering the expression the input indicating LED will go OFF, now based on the algorithm microcontroller reduces the expression and the input representing LED glows which means that the expression has been minimized and is displayed.

The display consists of 3 Bi-color LED's in which Green Light represents the variables in normal form and the rest Red Light represents the variables in the complemented form, the order of them is as shown in the circuit diagram.

The output is displayed as one min-term at a time, next min-term is displayed by pressing the next button and after reaching the last min-term of the reduced expression the input indicating LED is switched OFF which represents end of the output. After few seconds it is again switched ON automatically when microcontroller is ready to take the next input



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Manual Full Height Turnstile

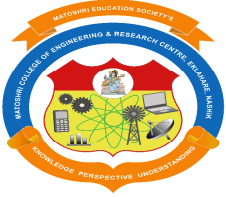
*Bairagi Gauri Rajendra
Malunjkar Nikita Ravindra
Vilayatkar Akshay Vijay*

The Full Height Turnstile provides unauthorized access control to the office or building. For any unauthorized access to any restricted area it is impossible to understand for the system, hence it eliminates unauthorized access. To get Authentication the person should have valid access to the system. When the Systems get its authentication it unlocks and allow the user to pass through In the requested direction.

Full Height Turnstile is often used high security access control solutions. Full Height Turnstile is ideal for both indoor and outdoor settings. It can be integrated with any kind of access control systems (e.g.: RFID devices, Fingerprint Devices and Biometric Device). It is very Safety to meet to fire Control requirements: the 'Dims. will be open automatically when the power is off.

Basically Full Height Turnstile is Stainless Steel which Is Robust. Rigid. Anti-Rust and Durable. Full Height Turnstile is designed to provide Controlled Access in and out of facilities where required locations are preferred. Full Height Turnstile is Intelligent Access Management Equipment. The product integrates with Mechanical. Microprocessor and various Identification Technology which configures all kinds of Identification Devices which includes Reliable Safeguard Devices, Alarm Devices, Direction Indicator and well-extended LED counting Display. This whole assembly is able to achieve Access Intelligent zed Control and Management. As the Framework is made up of Stainless Steel or Cold-Rolled Iron Rod it is Elegant, Rustproof and Durable. With some Standard Electric Interface, the Full Height Turnstile can be compatible with several of cards such as Bar code, ID card, IC card which not only provides people with orderly transit manner but also provides the Illegal in and out. For the Full Height Turnstile the Gate Unlocking is automatically made for in and out.

In today's society and contributing into the future, many appliances and devices are becoming more secured and more reliable. Most of the Turnstile earlier used to run mechanically. The convenience of finding a less security can be a problem in each situation where more rush or crowd is considered. As we have seen that places like Industries, Assembly house, Parliament House, etc. largely depends on high Security. They require continuous watch where these places are considered, hence they also require watching where these places are considered, and hence they also require watching how many people entered or exit. Sometimes it has been that any of the unauthorized persons gets an entry without any authentication. The group members are personally motivated to implement and design this project after so many years of studying engineering concepts. This project will be able to give the group a chance to utilize all of their knowledge and skills learned at the company and university. The group has genuine interest in designing the Full Height Turnstile. Successfully creating and designing this project will be a motivation to being future engineers.



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Using Intrabody communication for health monitoring system

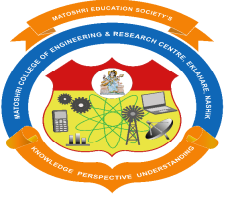
Chinchole Pooja (T.E.I.T)

It is rightly said and believed that “Health is wealth”. Health is very important aspect in everybody’s life. Thus, it is essential to take good care of health. As the technology is improving many new systems are entered in health care field. There are new health monitoring devices and system which can monitor one’s health 24 hours. This is because the treatment and diagnosis is heavily dependent on the monitoring reports. Without these reports it is impossible to give treatment to the patient. Though there are new instruments available for monitoring most of them use cables and wires attached to the patient’s body. This makes them uncomfortable and system become very messy . This is mostly unbearable if the monitoring is done for longer period and continuously. Monitoring is done using different sensors which sense parameters from the patients and send them to the device. The parameters like temperature, blood pressure, ECG, heartbeat etc. plays a very vital role in medical examination and helps in correct diagnosis and deciding the treatment plan. The current system uses sensors which are wired to the monitoring devices. It makes patient uncomfortable and unable to move freely. They also tend to make the treatment difficult as wires can mess when get tangled with each other. So there is need to make things simple and error free with wireless devices. It can provide better comfort to the patient and make them mobile. This can be achieved using different wireless technologies like ZIGBEE, BLUETOOTH etc. These technologies will help in simplifying the surgical monitoring and the critical patient data can be stored in the database for better diagnosis and it can also be used for future reference[This article introduces communication system which uses human body as the medium and transfers the data without any cables. It is important in medical field at it sends data wirelessly and it is very accurate. The accuracy and speed of data transmission are significant in medical field as lives are dependent on the data being transferred from one place to another. The proposed communication uses wearable device which is embedded with different sensors to measure vital parameters like heartbeat, temperature, blood pressure, ECG etc. This device has ARM7 as central processing unit and provides Intra body communication using insulating material. It is very secure system and provides data in real time as the device is always on the patient’s body. This proposed method is very robust and simple communication system using human body as transmission medium. This technology provides more security than other wireless technologies.

Online real time monitoring of patient using Intra Body communication is a very recent technology in communication field. This system shows the Intra-body communication can be used in medical monitoring and can generate a good result. The system has many sensors communicating through body and has ARM7 prototype for processing the vital parameters which then can be given to PC for displaying and studying by experts. The future scheme for this devise will have the smaller system that can be worn like a wristwatch. This system can be used with other wearable devices for health monitoring and has shown less complex system for patients. It also has less power consumption due to intra-body communication and gives accurate results. The device can be upgraded with more sensors and different communication technologies for the future.

Use of Bluetooth and GSM Technologies to control Digital Notice Board -Rucha Thakare (B.E I.T)

This article aims to introduce a digital notice board and electronic appliances control by using GSM and Bluetooth. By this idea the users can be provided with a simple, fast and reliable way to put up important notices in an LCD where the message can be send by the user to be displayed in the LCD. The



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message can be sent through an android application designed in this project. Similarly, a home automation system has been developed where home appliances like light, fan etc. can be switched on or off using the same android application designed in this project. So, using the android application, controlling the home appliances can be done and notices can be put up in an LCD display from any location in the world. It uses Arduino-2560 board to control the appliances and notice by the GSM technology, Real Time Clock (RTC), Temperature and Humidity sensor, Bluetooth system, Relay and an android application for user interface with the hardware. The device can be used anywhere irrespective of the place of deployment provided mobile network connectivity is available.

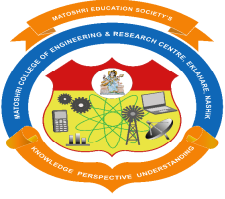
In this proposed system, a hardware capable of controlling electronic appliances and displaying notices electronically using an android application has been built. So, the hardware can perform broadly two functions. For controlling home appliances, the system can be used in much different kind of situations where as user can switch on/off any home appliance connected to it from anywhere using an android application installed in a smartphone. In order to display notices, a user can use the same application to type a notice and click on the send button to get it displayed. Both the functionality can be used only if sufficient balance amount is left in the user's SIM card since each access transacts a fixed amount for SMS. The motivation behind such a project is mainly to reduce physical effort for operating appliances especially for aged people. Also, it might help a person to save energy by switching off appliances on being out of home or to switch on appliances to get services like washing clothes, cooling room, heating water done by the time he reaches home. Another reason for this project is over usage of paper in educational institutions for printing notices. Due to mushrooming paper usage day by day, lot of trees is being cut which is harmful for the environment. So, if notices are displayed everywhere electronically, it would reduce paper usage and make communication easier and faster.

This automation system with GSM and Bluetooth system is designed and developed for the welfare of the human beings. The control system can be the betterment in time consumption; the system can easily control the hardware by use of android systems which are commonly used by all the people. This proposed system aims to reduce the paper work and physical notice board efforts, with such an ease the notice board can be updated on regular basis and can help the concern students or public effectively.

Concept of blind watermarking algorithm -Himalay Patil (B.E 2016)

Digital watermarking technique was first proposed in 1989. The totem or logo used to be the representation of the legal owner is embeded into the media in this scheme based on the character of the digital media can be distorted. With such technology, the identity of the legitimate owner of the multimedia can be claimed in order to achieve the purpose of protecting intellectual property rights. Because the digital media can be easily downloaded, transmitted or even copied without restriction via web pages or the internet, the copyright and the intellectual property rights are greatly threatened

Proposed article introduces , a blind watermarking algorithm is proposed to explore the influence of DCT coefficients in watermarking mechanism. Each two DCT coefficients are selected and compared from the same DCT block. And, the coefficient of the lower frequency region is used as the basis for comparison. Then, the watermark bit will be embedded and extracted with this relation of the coefficients in the same block and the watermark rule. The characteristics of the DCT coefficients in the lower frequency region are not easily changed, thus the relation of the coefficients can be more relatively stable. Moreover, the quality of the retrieved watermark and the robustness of the watermarking will be raised up. And, the proposed method is designed as blind, which the host image and original watermark are not needed in the extracting process.



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Each two DCT coefficients are selected from the different DCT blocks and modified using the embedding rule and the information of the watermark. In this paper, we would like to explore the results of that each two DCT coefficients are selected and modified from the same DCT block. The coefficient of the lower frequency region is used as the basis for comparison. Since, the characteristics of the DCT coefficients in the lower frequency region are not easily changed, the relation of the coefficients can be relatively stable. Thus, the proposed algorithm can used to raise the quality of the retrieved watermark and to enhance the robustness of the water marking

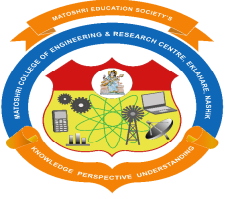
The fire joke

There's a fire in the middle of a room and 3 buckets of water in the corner.

A physicist walks in, takes a bucket of water, pours it around the fire and waits for the fire to put itself out.

An engineer walks in and pours a bucket on the fire, it doesn't go out so he goes off to check the fire safety standards.

A mathematician walks in, looks at the fire and the remaining bucket of water, convinces himself there's a solution and walks out.



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Semantic Similarity Between the sentences

- *Thakare Shamli (B.E I.T)*

Sentence similarity measures are becoming increasingly more important in text-related research and other application areas. Some dictionary-based measures to capture the semantic similarity between two sentences, which is heavily based on the WordNet semantic dictionary. Sentence similarity is one of the core elements of Natural Language Processing (NLP) tasks such as Recognizing Textual Entailment (RTE) and Paraphrase Recognition. Given two sentences, the task of measuring sentence similarity is defined as determining how similar the meaning of two sentences is. The higher the score, the more similar the meaning of the two sentences. WordNet and similarity measures play an important role in sentence level similarity than document level. The task of measuring sentence similarity is defined as determining how similar the meanings of two sentences are. Computing sentence similarity is not a trivial task, due to the variability of natural language - expressions. Measuring semantic similarity of sentences is closely related to semantic similarity between words. It makes a relationship between a word and the sentence through their meanings. The intention is to enhance the concepts of semantics over the syntactic measures that are able to categorize the pair of sentences effectively. Semantic similarity plays a vital role in Natural language processing, Informational Retrieval, Text Mining, Q & A systems, text-related research and application area. Traditional similarity measures are based on the syntactic features and other path based measures. In this project, we evaluated and tested three different semantic similarity approaches like cosine similarity, path based approach (wu – palmer and shortest path based), and feature based approach. Our proposed approaches exploits preprocessing of pair of sentences which identifies the bag of words and then applying the similarity measures like cosine similarity, path based similarity measures. In our approach the main contributions are comparison of existing similarity measures and feature based measure based on Wordnet. In feature based approach we perform the tagging and lemmatization and generates the similarity score based on the nouns and verbs. We evaluate our project output by comparing the existing measures based on different thresholds and comparison between three approaches. Finally we conclude that feature based measure generates better semantic score.

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Emotion Detection based on facial detection

- Varade Darshana (B.E I.T)

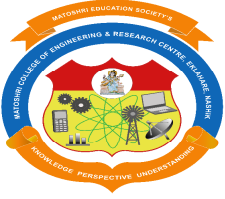
Facial expression indicates the mind of human. The proposed work highlights the study of facial expression detect the emotion recognize and advise the music library. This images processing using apply the input like capture image, video and output is to keep of happy, sadness, angry, disgust, surprise, neural. In the proposed work a different technique are used to emotion recognition .After words it species humans playlist depend the user emotion two important categories of program and capture the image using web cam and detect the emotion of the person specify the playlist which is based on that emotion . In this developed application such a method that it can analysis the properties of image and determine the mood of user. Also incorporate categories playlist of music based on mp3 which is according to mood Emotion Recognition System, Emotion recognition is portion in to three point; face detection, feature extraction and emotion classification. One the face place has inflexible and face extracted management moves onto extracting field of interest, in special the eye, mouth, eyebrow. This state is after words by a feature extraction state, where to individualize algorithm are used to resource multiple technical .Their output are accessed and display after the testing and evaluation. This extracted datum is blasé to classifier which decide the emotion of the persons.

The study of facial expression with emotion recognizes and suggests the music. The main purpose of this article is to recognize the human emotion depend on facial expression and list of music based on the different emotion. The study of emotion and music suggested, there is connection between a emotion of persons and type of songs they listen to. Two important approaches of expression recognition template based and classifier based by using naive base classifier also cascade. The facial characteristic point (FCP) easy to calculated by using template . Information is the facial expression cognition field like mouth, eye, eyebrow this sector are splitting from the facial expression image. The aim of this paper was to explore to sector of automatic facial expression recognition based music player. Initiative with the mental impulse for facial bearing analysis, this field of science has been extensively studied in terms of instance and automation. Manuscript face analysis used by psychologists was fast replaced by suitable computer software. Thus the instance developed volition reduce the practice of user in creating and managing playlist. It will supply better joy to the music listeners by providing the most suitable songs to the user in conformity with current emotion. It will not only contribute user but also the songs are systematically sorted.



How Quickly Do You Judge A Face?





Techno savior

Floor Marking for Factories

Mr. Pratik K. Sonawane

Factory environments have a lot going on, and keeping everything running smoothly is very important. One effective way to improve safety and organization is to use floor markings. These markings are a low-cost option that provides a significant amount of benefit for the facility, and the employees. Understanding how floor markings are used, and how to get the most benefit out of them is important for any facility. In many cases, a factory will have a safety manager work along with department leadership teams to come up with an effective floor marking strategy. Since floor markings can last for many years without needing to be replaced, it makes sense to put in the time and effort needed to get everything set up correctly.

Types of Floor Markings for Factories

When choosing floor markings for a factory, there are quite a few options to be aware of. Different types of floor markings can be used for different things, and in some situations, it may be necessary to use more than just one type.

Floor Marking Tape

Floor marking tape is one of the most popular options because it is inexpensive, easy to apply, and long lasting. Floor marking tape also comes in many different colors, and can have patterns printed right on the tape to help convey clear messages.

When applied correctly, floor marking tape can last for years without any issues. In high-traffic areas, or areas where heavy machinery is used, there are heavy duty products that can ensure it won't peel up or have other issues.

Floor Marking Paint

Floor marking paint is another option to consider, and it can be very effective in some situations. Applying paint does take more work, and in many environments, may require the facility to shut down while it is applied due to fumes or other issues.

One advantage of floor marking paint is that it can be easily applied in different patterns to convey specific messages. Using stencils to make letters is a common way to benefit from floor marking paint. Paint can also be used in outdoor areas where there is a lot of rain or other elements that could impact tape, though there are types of tape made for these environments as well.

Floor Marking Signs and Shapes

Floor marking shapes and signs are a very popular option for conveying specific information. These are similar to floor marking tape in that they are applied with a strong adhesive, but they come in the shape that is needed.

Floor marking shapes can be footprints to indicate where people should travel, arrows to give direction, or any number of other things. Floor marking signs are signs that convey messages, and can be applied to the floor. Things like stop signs, exit signs, and others can be used to effectively send a very specific message to those in the area.

Benefits of Floor Markings in Factories

Adding floor markings to a facility will provide many advantages that make it a very cost-effective option. These benefits go beyond simply following the standards set forth by OSHA or other regulatory agencies.

Improved Safety

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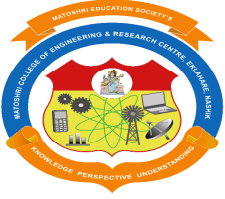
The most significant advantage of using floor markings in a factory is the improved safety. Using floor markings can help with things such as:

Improved Organization

Floor markings can help to dramatically improve the organization of any factory. A company can use markings to identify where equipment should be stored when not in use, establish a visible boundary for work areas, and much more.

(Source: <https://www.creativesafetysupply.com/articles>)





Techno savior

Title: Focusing on Continuous Improvement in the Workplace

Author: Mr. Aniket Bagad, Student-TE Mechanical

A continuous improvement strategy is any policy or process within a workplace that helps keep the focus on improving the way things are done on a regular basis. This could be through regular incremental improvements or by focusing on achieving larger process improvements. Facilities that focus on improving continuously become more competitive over time and can maintain their advantages in their industry, but only if the improvement efforts are done correctly. Taking good baseline measurements and taking ongoing measurements will help identify the effectiveness of the efforts being made.

Continual Process Improvement Model

Many strategies and methodologies can be used when focusing on continuous improvement. Finding the right one for a given industry is important as it will help maximize the results. All the continual improvement models, however, will focus on similar types of improvement, as seen in this image:

Making ongoing improvement in performance, commitment, strategy, and process all help build up the company's bottom line. This image also illustrates that any improvements in these four categories will also help build up improvement in the overall quality being produced by the facility.

Plan-Do-Check-Act

Another helpful concept is the "plan, do, check, act" process. This is a cyclical process that walks a company or group through the four steps of improvement. By continuing to cycle through these steps, improvement is always being worked on and evaluated.

Each step builds on the previous step, and then feeds into the next.

Plan - In the planning phase, teams will measure current standards, come up with ideas for improvements, identify how those improvements should be implemented, set objectives, and make the plan of action.

Do - Implement the plan that was created in the first step. This includes not only changing processes, but also providing any necessary training, increasing awareness, and adding in any controls to avoid potential problems.

Check - Taking new measurements to compare with those taken prior to the change is an important step here. Analyze those results and take any corrective or preventative actions to ensure the desired results are being achieved.

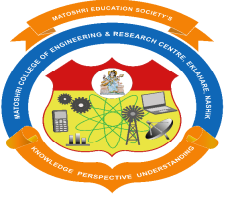
Act - All the data from the change is analyzed by management teams to determine whether the change will become permanent or if further adjustments are needed. The act step feeds into the plan step since once a change has been fully implemented, it is time to begin looking for new ways to make further improvement.

Improvement Strategies

The concept of continuous improvement is an umbrella term covering many methodologies used to achieve the goal. Choosing the right strategies for a facility will help maximize results and ensure the long-term success of the efforts. A facility can choose to have multiple continuous improvement strategies in place at any given time. Different areas of the company, or even different departments within an area, can each work off of a separate strategy to maximize results.

Lean & Continuously Improving

Lean continuous improvement is a strategy designed to help eliminate waste throughout a company. Waste is anything that doesn't add value for the customer. In many ways, this continuous process



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improvement strategy works to eliminate problems rather than directly improve a process. The results are similar, but by taking a waste-focused approach, it is often easier to come up with goals from which improvement strategies can be developed.

Value Stream Mapping

Value stream mapping is one of the most important continuous improvement strategies because it can be used within almost all others. This process looks at the design and flow of processes within a company to see where value is being added. A value stream map can also be a great brainstorming tool for areas that could be improved. A good value stream map will be very detailed and formatted like a flow chart. It is utilized to help isolate each of the steps in a process to see where value is being added and where it is not. This makes it easier to eliminate or modify the areas where value is either missing or could be increased in the process. The idea of value stream mapping was originally developed for manufacturing processes, but it can be adapted to other industries as well.

Kaizen

Kaizen is a popular continual improvement strategy that has been around since the 1980s. This concept helps focus on improvements that are based on making a lot of small changes rather than fewer larger changes. The ideas for the changes typically come from the front-line employees rather than the management team or other planning department. This is effective because those working on the front-line are directly impacted by problems and will be able to more easily identify where improvements can be made.

Some of the benefits of Kaizen include:

Capital Investments - By focusing on smaller, incremental changes, the company doesn't typically need to come up with significant capital resources to implement the changes.

Engaged Workplace - By encouraging employees to contribute the improvement ideas, they become more engaged.

Long-term Improvement - Each small improvement made builds on previous improvements, leading to a snowball effect.

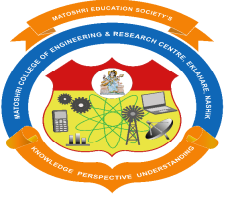
Total Quality Management

Total Quality Management (TQM) began in the manufacturing sector, but has since been adapted for use in many other environments. It focuses on improving employee involvement, customer satisfaction, communication, and other key elements for success within a company. This is a continuous improvement strategy that is often incorporated into or alongside, other strategies to help maximize the successes.

The 5S Strategy

5S is an organization method that helps identify how a workspace should be organized to improve efficiency and effectiveness. This is done by identifying what is needed at each step of a process and ensuring it is immediately available. There are many ways to do this including organizing tools so they are easy to find, moving machinery around so that a part flows from one to the next, and ensuring stored parts or equipment are available when needed.

(Source: <https://www.creativesafetysupply.com/articles>)



Techno savior

Understanding Risk Assessments in the Workplace

Mr. Pratik K. Sonawane

Risk assessments are the process of identifying, analyzing, and evaluating risks within the workplace. Understanding the role risk assessments play can be a lot of work for the employer, stakeholders, and employees alike. These types of assessments always begin with a risk management plan that will ultimately try and prepare for various threats imposed on the workplace. For clarification, threats are uncertainties with negative impacts. With such a broad definition of a threat and the risks pertaining to them, these can in fact cover anything regarding the potential for natural disasters, accidents, financial risks, legal liabilities, etc.

While this may not be an all-encompassing article on risk assessment and risk management, it will go over the basics of a risk management program's infrastructure by touching on the three essential core concepts as well as how and why risk assessments are needed and used in the workplace.

What is risk management?

Risk management follows the process of identifying, evaluating, and prioritizing various risks found within a business and then systematically works to minimize, control, and monitor the probability in which those risks may come to pass. Or, in some cases, to maximize the company's understanding of positive risk opportunities within reach. ISO states that risks are uncertainties regarding objectives that deviate from the expected outcome. Risks can be positive, negative, or both, and have the ability to result in threats or opportunities within the scope of the business's values and objectives.

One of the most important things to note about risk management is the difference between risks and hazards. These two concepts are easily misidentified in any business needing either, or both, a job hazard analysis and risk assessment. Risks are uncertainties, and the related consequences are measured by the probability of the event occurring. On the other hand, hazards pose immediate physical danger to those in the vicinity. Essentially, hazards are a part of the existing risks in a workplace, but risks are not solely defined as physical dangers/hazards. This logic can be compared with the priori belief that "all squares are rectangles but not all rectangles are squares."

The Principles, Framework, and Process of Risk Management

ISO 31000 defines risk management as solely relying on three aspects—its principles, framework, and process. These three concepts work together to clearly communicate the following:

Establishing context for risk identification, analyzation, evaluation, and treatment

Consistent monitoring of consequences for any activity, function process, or product created.

The goal of a successful risk management program is to be able to report the results of the company's findings, and then work to continuously improve uncertainties that may manifest into physical dangers or financial/liability threats over time.

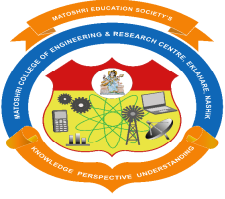
The Principles of Risk Management

To further explain how risk management aims to protect the value of a company, the principles of the method must be defined. Those are:

Integrated: Risk management is a base for all activities within the organization.

Structured and comprehensive: This type of approach aims to accomplish consistent and comparable results.

Customized: A risk management framework and process should be completely proportionate to the company's external and internal context put forth by its objectives.



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Inclusive: An improved awareness and informed risk management system must involve stakeholders and their knowledge, views, and perceptions.

Dynamic: as the organization's internal and external context changes with time, the risk management program must anticipate, detect, acknowledge, and respond to those changes as soon as they can.

Best available information: Future expectations and data from the past and present must be taken into account when reviewing limitations and uncertainties (risks) within a process. Information should also be available for any and all stakeholders involved with the organization.

Human and cultural factors: These factors influence most all aspects, stages, and levels related to risk management.

Continual improvement: Through the process of learning and gaining more experience, the management tool will be improved upon continuously.

The principles of risk management are the building blocks to the following framework and process developed at an organization.

The Basic Framework of Risk Management

Designing a framework is necessary for successful risk management processes because it assists the business in correctly integrating risk management ideals into the appropriate functions and activities of an organization. The following characteristics are essential for any risk management framework:

Strong leadership: Upper management and all relevant stakeholders have a responsibility in providing strong leadership. Without this, the risk management program will not be able to align its ideals with the organization's objectives, culture, and strategic plans to lower uncertainties that exist. Without a strong leadership infrastructure, communication and monitoring protocols will suffer from a muddled chain of command.

Integration: Integration within a risk management framework is wholly reliant on the understanding of organizational context and structure. ISO 31000 states that risk management should be a part of the organizational process, governance, leadership and commitment, strategy, objectives, and operations.

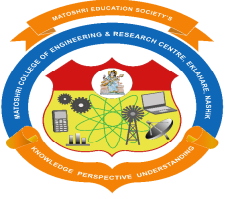
Design: Designing a risk management program requires understanding an organization's goals and objectives, this includes the internal and external context elements. Top management members should write out a policy or statement that clearly outlines their objectives for risk management. The design phase is the building block of risk management programs and will ultimately determine if the program is set up for success.

Implementation: Implementing a risk management plan requires an organization to develop an appropriate time frame with needed resources, they must identify how, when, and where decisions are being made, be prepared for possible change, and make arrangements for putting the practice into action. Success requires the attention and engagement of any and all stakeholders that are relevant to the objective, whether that be financial gain or protecting employees from safety hazards.

Evaluation: To adequately evaluate a risk management plan, those with the responsibility must measure the framework performance against the purpose of the plan, the status of implementation, and expected behavior and its indicators. Then, they must decide if the plan is still suitable for achieving the organization's objectives.

Improvement: Continual improvement is the root of risk management. The company must adapt to internal and external context changes within the organizations because those often alter the company's objective. If done correctly, the value of the company will increase.

(Source: <https://www.creativesafetysupply.com/articles>)



Techno savior

Supply Chain Management (SCM)

: Mr. Chetan Patil, Student-TE Mechanical

The supply chain is a network of businesses that partner together to manufacture and deliver specific products or services. Suppliers make up the individual “links” of the chain and move a product along, from its original creation as raw material to assembly of the final product, and ultimately to delivery/consumption. Organizations are linked through either information or physical goods; physical goods are the most visible aspect to the chain, while information allows various business partners to coordinate the flow of materials up and down the supply chain.

It's possible to regulate this flow of goods and services so that all the companies involved achieve maximum benefits. Supply chain management (SCM) is the supervision of activities within the supply chain. These activities involve production, shipment, and distribution, not only to the end consumer but between the suppliers themselves. SCM is increasingly become an important role in a variety of industries, including manufacturing, retail, technology, and healthcare.

Supply chain managers aim to develop and run supply chains in the most effective way possible, as well as:

- Improve trust and collaboration among supply chain partners
- Ensure inventory movement is efficient so the customer receives their product or service as quickly as possible
- Minimize costs and material shortages
- Improve inventory visibility along each section of the chain
- Maximize customer satisfaction
- Achieve a competitive advantage that can be sustained into the future

As a cross-functional approach, SCM additionally covers the logistics and information systems required to coordinate activities. It's not just about the cost and movement of physical assets; a large aspect to today's SCM involves the management of data. Analytical experts use software programs and other tools to study the data created by the chain process. They monitor sales, make future predictions, and ensure products are delivered as fast as possible. This often leads to recommendations for improving the quality and efficiency of operations.

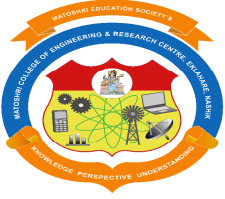
The Development of Supply Chain Management:

The concept of SCM is based on two main ideas:

- Every product that end users receive is the cumulative effort of a variety of organizations
- Traditionally, most organizations simply supervised what happened within their “four walls”, which resulted in inefficiency for both the consumer and the business

Supply chains have existed for a long time, but the core ideas behind SCM emerged especially in the 20th century for several reasons. Among the biggest influencers were growing attention to Japanese management practices such as Lean manufacturing, and the event of globalization. It wasn't until the late 1980s that businesses even began to incorporate supply chain activities on a large scale. Walmart and Procter & Gamble were the first major corporations to work together, and are considered to be the classic example of supply chain collaboration. By sharing their information and automating the billing and payment process, the two businesses obtained lower costs. Once they were able to demonstrate that there were benefits to these types of partnerships, many other companies followed suit.

Globalization made a large impact on supply chains. Companies began to extend their supply chains internationally and took advantage of other countries' lower wages, as well as the ability to report profits



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in places that had lower corporate taxes. The globalization era of supply chain management is characterized by reduced costs, increased competitive advantage, and added value. Consumers benefited as well as they gained access to cheaper services, and products they had not seen or heard of before.

In the 1950s and 60s, the principles of Lean manufacturing were developed by the Toyota Motor Corporation in Japan. These revolutionary production methodologies included goals such as maximizing efficiency, improving quality, and eliminating waste, and became known as the Toyota Production System (TPS). They are much like the goals that supply chain managers aim to achieve; effective SCM allows cost, waste, and time to be reduced in the production cycle. Today, many supply chain managers have incorporated Lean manufacturing methods into their operations.

An important concept that the Toyota Production System introduced is just-in-time manufacturing. Just-in-time systems don't attempt to predict customer demand; instead, they produce for actual customer demand and create what is exactly needed only when it's needed. Many supply chains have adopted this mindset, which is also known as a "pull" system, as a means to prevent waste and save on costs.

Core Components to SCM

There are several central elements to supply chain management that ensure success. They are interdependent; all together, they create a smooth system and prevent any gaps, weak links, or other types of problems in the supply chain.

The five core components include:

- Creating a plan. The first step to effective SCM is to identify demand and supply trends in the market and finalize business-specific strategies to navigate these trends. Many companies create a blueprint or roadmap as they consider the pros and cons, and determine metrics for all aspects of production. A proper management plan makes it possible to achieve long-term benefits, meet company goals, and deliver value to customers.
- Sourcing raw materials or services. Supply chain management involves selecting the suppliers needed to create the product/service, then monitoring the supplier relationship. This includes managing inventory, payments, orders, and receiving. Materials should be obtained at cost-effective prices and in a timely manner, and should be of high quality, as all of these make an impact on the reputation of each individual company within the supply chain.
- Manufacturing. This section encompasses not only the production of goods, but also quality testing, packaging, and the final preparation/schedule for delivery. Alongside a focus on efficiency and productivity, a detailed account of inventory must be kept.
- The delivery of goods. Transportation is vital to supply chain management, and includes both the delivery of raw materials for production and the delivery of the final product to the market. Timely, safe, and secure transportation is essential; the aim is to achieve minimal loss or damage during transit. Two aspects to secure transportation are efficient invoicing and well-managed logistics.
- The return of goods. No business is perfect, and in certain circumstances products are bound to be unwanted, defective, or produced in excess. To ensure a smooth process and positive reputation, SCM creates a way for customers to return their goods and acknowledges complaints. Additionally, a return process should be in place all along the supply chain, not just for the end product; if it's noticed that raw material is defective, that material should be returned to the original supplier before it is incorporated into manufacturing.
- Source: <https://www.creativesafetysupply.com/articles>

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Use of Bamboo as Reinforcement for Construction of Low Cost structures.

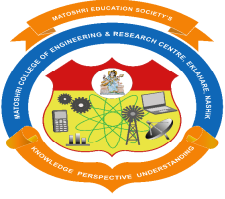
*Mr. P.S. Sathe,
Civil Engineering Department*

Bamboo has a remarkable property as construction material being both light weight and extremely strong & Durable. From the early times Bamboo is used as a construction material. The Bamboo is used in both technical as well as non-technical ways. We can use Bamboo in the construction of the minor important structures such water closet, lintel beams, benches, door and window frames. The Bamboo was used as the struts, posts, roofs etc. in the construction of the houses. Now a day's concrete is used as the basic materials for the construction works. The concrete is good in compression but weak in the tensile strength. So steel is used as reinforcement in the concrete to achieve the tensile strength. Problems encountered with the commonly used construction material like steel are high in cost, corrosion, etc. Due to the advantageous characteristics of Bamboo, in the last few years, studies have been made on the use of Bamboo as structural material and reinforcement in concrete. Samples constructed as use of bamboo can offer respectable amount of strength that can be safe for low cost and minor important structures.

Now a day's government is focusing in constructions of water closet structures, and minor important structures in rural areas, as villagers can't afford the construction of whole WC and Benches with brickwork and concrete respectively. To overcome this problem we can Design a low Cost light weight water closet structures, by using Bamboo Reinforcement. This light weight WC is not only of low cost but also detachable one. Due to light weight we can easily transport the concrete panels where we want to erect. Water absorption of bamboo is range in between 29 to 31 %. Because of high water absorption the strength of bamboo reduces. For that water proofing layer is applied which increase material cost of construction. Bamboo having 0.7 times less load carrying capacity than steel but it takes 1.77 times more design load safely before failure occurs.



Panels with Bamboo Reinforcement.



Techno savior

Analysis of Air Quality and Control Measures of it (Air Quality Index)

Mr. S. V. Pawar
Civil Engineering Department

As a tool to evaluate the characteristics of aerosol nano-particles, a high-volume air sampler for the collection of nano-particles was developed based on the inertial filter technology. Instead of webbed fiber geometry of the existing inertial filter, wire mesh screens alternately layered using spacing sheets with circular holes aligned to provide multi-circular nozzles were newly devised and the separation performance of the filter was investigated experimentally. The separation performance was evaluated for a single- nozzle inertial filter at different filtration velocities. A webbed stainless steel fiber mat attached on the inlet surface of the developed inertial filter discussed as a pre- separator suppressing the bouncing of particles on mesh.

The separation performance of a triple- nozzle inertial filter was also discussed to investigate the influence of scale-up on the separation performance of multi-nozzle inertial filter. The influence of particle loading on the pressure drop and separation performance was discussed. A supplemental inlet for the nano-particle collection applied to an existing portable high-volume air sampler was devised and the consistency with other types of existing samplers was discussed based on the sampling of ambient particles. The layered- mesh inertial filter with a webbed stainless steel fiber mat as a pre-separator showed good performance in the separation of particles with a dp_{50} ranging from 150 to 190 nm keeping the influence of loaded particles small. The developed layer-mesh inertial filter was successfully applied to the collection of particles at a dp_{50} 190nm that was consistent with the results from existing samplers Analysis of Air Quality and it's Control Measures.\

Air pollution is a major global health concern, especially in developing countries like China. India having the population of about 138 crores according to the 2020 census is the second largest populated country in the world. High the population, high is the pollution across the country. Almost three fourth of the country's population owns vehicle and there are lot of industries. Scientific studies have provided strong evidence on the effects of PM_{2.5} on mortality and morbidity, and for both short-term and long-term exposures^{8,9}. In May 2018, the World Health Organization (WHO) reported that 4.2 million deaths occur annually as a result of exposure to ambient air pollution globally with developing countries having the highest burden¹⁰. The first WHO Global Conference on Air Pollution and Health held in November 2018 emphasized an aspirational goal of reducing the number of deaths from air pollution by two-thirds by 2030 and the urgent need for bold and prompt actions to address the present health crisis caused by air pollution¹The smoke from the industries and the vehicle are being the major reason for the air to be polluted. Air pollution occurs when there are harmful gases and smoke mix up with the atmosphere and the air gets contaminated and the quality of air becomes low. The level of contamination in air is measured by the common principle called air quality index. Air Quality Index is a tool, introduced by EPA in USA to measure the levels of pollution in air.[1]Air Quality Index is also used by the government for easier understanding of the air pollution to common people. Awareness of the daily levels of air pollution is important for the citizens, because of the diseases spreading in the air exposed by the air pollution. The concept of Air Quality Index shows the weighted values of individual air pollutants into a single value which is used for decision. The main objective of the Air Quality Index is to give quick results with the given polluted values. The proposed Air Quality Index has six categories with elegant color scheme, the below

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Air Quality Index (AQI) Values	Levels of Health Concern
0 to 50	Good
51-100	Moderate
101-150	Unhealthy for Sensitive Groups
151-200	Unhealthy
201-300	Very Unhealthy
301 to 500	Hazardous

Air Quality Index Calculation

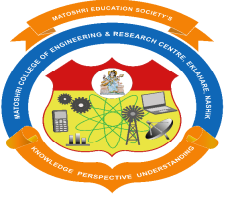
Air Quality Index is the index for reporting daily air quality. Higher the Air Quality Index, higher is the level of air pollution and higher the health concern. We have a data set of three cities Chennai, Bangalore, Delhi containing values of four pollutants SO₂, NO₂, RSPM, PM for 78 days of the year 2015. The dataset contains Air Quality Index values of pollutants separately. The overall total Air Quality Index value is found with the Air Quality Index values of all the pollutants. Air Quality Index is calculated by taking the maximum value of all the pollutants and naming it as the Air Quality Index or bringing up the average of all the pollutant's Air Quality Index values [1]. The found Air

Quality Index value is then branded as the following

- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy
- Hazardous

Analysis of Air Quality and it's Control Measure

These classifications are done for the calculated Air Quality Index values. This is done as, if the Air Quality Index value is between 0-50 then it is classified as good, 51-100 as moderate, 101-150 as unhealthy for sensitive groups, 151-200 as unhealthy, 201-300 as very unhealthy and 301-500 is classified as hazardous. There are also color barriers for this classification. Each type has separate color which shows the quality easily. Green represents good, yellow as moderate, orange as unhealthy for sensitive groups, red as unhealthy, purple as very unhealthy and maroon as the hazardous. This is for the easier understanding. This Air Quality Index value is calculated for all the cities and analyzed. U.S. EPA's AQI is defined with respect to the five main common pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}) and sulphur dioxide (SO₂). The individual pollutant index as in the eqn. (1) is calculated first by using the following linear interpolation equation, pollutant concentration data and reference concentration. The breakpoint concentrations have been defined by the EPA on the basis of National Ambient Air Quality Standards (NAAQS) as shown in Table 1, and on the results of epidemiological studies which refer to the effect of single pollutants on human health.



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Light weight ferrocement wall panels using expanded polystyrene

Mr. H. M. Pawar
Civil Engineering Department

Ferro cement is a form of reinforced concrete that differs from conventional reinforced or prestressed concrete primarily by the manner in which the reinforcing elements are dispersed and arranged. It consists of closely spaced, multiple layers of mesh or fine rods completely embedded in cement mortar. Ferrocement panels are being used in construction industry due to its good structural performance and low cost. Ferrocement is suitable for the construction of roofing/floor elements, precast units, manhole covers, and construction of domes, vaults, grid surface and folded plates.

Ferro cement regarded as highly versatile thin material possessing superior properties which cannot be matched by other conventional thin materials. The development and construction of lightweight structural elements in building construction is a growing trend in construction industry all over the world due to its high strength-to-weight ratio. In the present study using expanded polystyrene (EPS) beads in ferrocement. At 28 days, it was found that compressive strength of columns, bending strength of wall panels and Flexural strength of beams of 0%, 5%, 10% and 15% EPS replace by sand volume it's have reduced weight and good thermal insulation characteristics as well as good impact resistance property use in the ferrocement construction.

In this project the specimen of beams for flexural test, columns for compression test and wall panels for bending test are to be cast. Beam of size 70.6mm x 70.6mm x 350mm and total numbers of beam specimen is 8; out of this 2 sample are ferrocement beam without EPS beads and remaining 6 samples with EPS beads by replacement of 5%, 10% and 15% of sand volume. Column of size 70.6mm x 70.6mm x 850mm and total number of column specimen is 8; out of this 2 sample are ferrocement column without EPS beads and remaining 6 samples with EPS beads by replacement of 5%, 10% and 15% of sand volume. Panel of size 1m x 1m x 25mm and total numbers of panel specimen is 4 and out of this one panel is ferrocement wall panel without EPS beads and remaining three ferrocement wall panels are with EPS beads with four layer of welded wire mesh.

With increase in demand for construction material there is a strong need to utilize alternative material for sustainable development. In ferrocement construction method it always lightweight than conventional concrete but no other material used in this type of construction to make lightweight, economical better, thermal insulating, temperature resisting to reduce thermal stresses. So it's find the alternative method in ferrocement construction using Expanded polystyrene (EPS).

Methodology

The methodology of study includes the experimental investigation of ferrocement wall panels using EPS beads. The study follows testing of various specimens for compressive strength on ferrocement cubes and columns, flexural strength on ferrocement beams and bending strength on ferrocement wall panels with varying percentage of EPS beads in ferrocement.

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Artificial Reefs

Ruhi Patil
T.E. Civil

The State government has accorded administrative sanction for project. To enhance fish production and provide livelihood support to the fishermen, 400 artificial reefs are to be installed off the coast of Thiruvananthapuram and the Poovar fishing village. The RS. 3.75-crore fish production enhancement programme is part of the Rs 475-crore Vizhinjam Rehabilitation project to rehabilitate and provide compensation to fishermen affected by the upcoming international deepwater seaport.

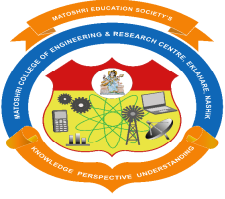
Monolithic structures: Two hundred monolithic triangular-shaped Reinforced Cement Concrete (RCC) reef modules will soon be lowered into the sea off the coast near the fishing villages of Kollamcode, Paruthiyoor, Valiyathura, Kochuthura, Puthiyathura, Pallom and Adimalathura. **Another 200 ferro cement reef modules will be installed** off the coast of Poovar fishing village, further south in the district. Together, an artificial cluster of 400 reef modules will be created.

Artificial reefs are considered favourable habitats for periphyton, a colony of microscopic planktonic organisms that are the prime source of food for omnivorous and herbivorous fishes. Sting ray, electric ray, lobsters, carangids, scad, and scud are expected to reach these artificial reefs to feed on the small fishes.

Besides enhancing the overall fish availability off the coast, the artificial reef cluster will revitalise the aquatic environment, act as spawning and nursery ground, reduce fishing time for scouting, and provide livelihood to the catamaran fishermen who have been displaced due to the mega project. Kerala State Coastal Area Development Corporation (KSCADC) has been tasked by the Fisheries and Ports department to install the 400 artificial reefs.

Each RCC artificial reef module will cost Rs 47.79 lakh, which include casting, lowering and monitoring. Each ferro cement reef module will cost Rs 41.10 lakh. *It is for the first time that ferro cement reef module is being used for casting artificial reef in a large scale, and the KSCADC has plans to make it popular by roping in more NGOs*





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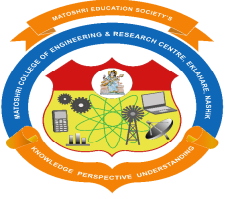
Study of brick mortar using sawdust as partial replacement for sand

Dhanashri Dhatrak
T. E. Civil

The paper reports results of study on standard masonry mortar containing sand and sawdust as aggregates in a mix proportion of 1:3 and water-cement ratio of 0.55. A modified mortar of same design mix proportion (1:3) but varying water/cement ratio and constant slump of 74.3 mm to achieve higher workability was also evaluated. Six different percentages (5, 10, 15, 20, 30 and 50%) of sand replacement were investigated. The flexural tensile strength, compressive strength, dry density, masonry wallet compressive strength, water absorption and slump were evaluated. The British code recommended masonry wallet compressive strength of 5.3 N/mm² was achieved with 8 and 13% sawdust contents in the standard and modified mortars, respectively. Such mortars can be used as jointing and rendering materials on interior walls of buildings where water absorption by the mortar would be reduced.

The demand for new building structures in developing countries is exceedingly high due to ever-increasing population growth. This demand cannot be met as the cost of construction is untenable due to the everincreasing cost of building materials. Construction depends heavily on conventional materials such as cement, sand and stones for the production of mortar and concrete. Their ever-increasing costs has led to research into the use of alternative locally available building materials, especially wastes from industry, building construction and agricultural activities Their ever-increasing costs has led to research into the use of alternative locally available building materials, especially wastes from industry, building construction and agricultural activities. Quarry dust (Galetakis et al., 2016), glass powder (Afshinnia and Rangaraju, 2016), laterite (Falade, 2001), wood ash (Cheah and Ramli, 2011), rice husk ash (Antiohos et al., 2014), coconut shells (Ali et al., 2013), palm kernel shells (Acheampong et al., 2016) and concrete wastes from demolition (Gastaldi et al., 2015) are a few of the materials which have been studied. In spite of the numerous publications on wood/cement composites such as Berra et al. (2015), Dilip et al. (2014), Horsakulthai et al. (2011), Ramos et al. (2013), Sarkar et al. (2012), Torkaman et al. (2014), Turgut (2007) and Yong et al. (2013), none seems to address the possibility of using sawdust-mortar as masonry mortar. A study by Jelle et al. (2001) revealed that a small wood village in Kumasi of Ghana alone generates 100-150 metric tonnes of sawdust per day. On a larger scale, the annual wood waste generated from the timber industry in Ghana is about 0.8 million m³ which accounts for 62% of the initial wood input to the timber industry. Sawdust is usually disposed of by open burning, producing harmful smoke that threatens human health. A more environmentally desirable way of disposing it is to use it in cement composites.

The overwhelming volumes of sawdust generated as waste from the timber industry could be used as a partial replacement of fine aggregates in mortar and concrete production to alleviate the pressure on the scarce available natural resources. Sawdust composites are characterised by low mechanical performance, low durability and bad compatibility (Lei et al., 2006). Attempts have been made by researchers to overcome these weaknesses. Mixing with synthetic fibres, addition of additives and modification of sawdust and so on are some researches that have been conducted to overcome these weaknesses. The inclusion of sawdust in concrete and mortar production may not only mitigate environmental damage, but could also preserve the conventional concrete/mortar materials. It exhibits many benefits over the traditional concrete including reduction in weight of the structure (thereby



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reducing the dead loads transmitted to the foundation), high economy compared to normal weight concrete, reduced damage and prolonged life of formwork due to lower exerted pressure, easy handling, mixing and placing as compared with other types of concretes, improved absorbent properties due to its high void ratio (Dilip et al., 2014; Yong et al., 2013).

Notwithstanding these advantages, sawdust-concrete exhibits irregular setting times and poor adaptation to dimensional variation as major set-backs (Adeagbo, 1999). EXPERIMENTAL PROGRAMME Materials Ordinary Portland cement with a 28-day compressive strength of 42.5 N/mm² was used in the study. River sand with maximum aggregate size of 2 mm and specific gravity of 2.53 was used as fine aggregate. Sawdust obtained from a saw-milling company was also used as partial replacement for the fine aggregates. Standard brick mortar with a mix design ratio of 1:3 (cement: sand) and w/c ratio of 0.55 was prepared for the experiment. The fine aggregate was partially replaced with the sawdust. The percentage replacements considered were 5, 10, 15, 20, 30 and 50. Approximately square wallets were also constructed using the prepared mortar as the jointing material.

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