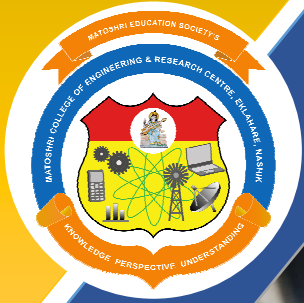


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Vision

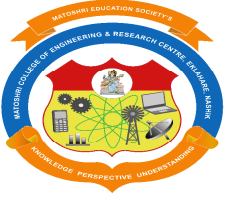
“To Establish Omnipotent Learning Centre Meeting the Standards to Evolve as a Lighthouse for the Society.”

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.”



Techno savior

Investigation of Flexural Strength of Concrete Subjected to Elevated Temperature and Its Retrofitting Using Carbon Fibers.

Mr. P.S. Sathe

The structural behavior of concrete subjected to elevated temperature due to fire is governed by the range of temperature, duration of temperature, and material properties of concrete. The reduction in compressive strength, crack formation, spalling phenomenon, adverse effect on reinforcement bars etc. are some of the effects on concrete due to elevated temperature. The mechanical properties of concrete, physical and chemical responses of constituents of concrete variation in thermal gradients during the fire and post fire cooling operations are responsible to govern the structural behavior of concrete.

Very less study is reported indicating the comparison of effect of elevated temperature, the method of cooling, and its retrofitting for different types of concrete such as concrete with M-20 and High performance concrete (H.P.C M-40).

The flexural behavior of M-20 and High Performance Concrete (H.P.C M-40), subjected to elevated temperature and its retrofitting. Beams of 150 mm × 150 mm × 750 mm size cast using two different types of concretes i.e. M-20 and High Performance Concrete (H.P.C M-40). Specimens were heated in an electrically gas operated furnace at temperature of 600°C and 800°C for 2 hours. Half of specimens were allowed to cool on their own by natural cooling while, remaining were quenched in water to provide maximum thermal shock by water jet cooling. This specimen was tested flexure in flexural testing machine (F.T.M), Up to first crack loading. The first cracked specimens were, then, retrofitted with carbon fiber to know their enhanced structural performance. Effect of this on flexural and compressive strength was then compared with control specimen.

The weight loss increases as the temperature increases and percentage weight loss was more in natural cooling. The percentage loss in compressive strength was more in case of natural cooling as the temperature increases, and the flexural strength also, reduces as the temperature increases for natural cooling. After the retrofitting of the specimen with carbon fiber more than 50% strength was regained.

Ferrocement- O'shell experiments with tension based structures

Mr. H. M. Pawar

In general, for a ferrocement structure, a standard of 150 mm spacing between reinforcements is to be maintained throughout. In this case, the students reached up to 750 mm in the top portion of the structure by simply utilizing their understanding of force lines. Devoid of any high-tech production systems, o'shell instead relied on the idea of human robots (the hands of students and unskilled laborers). The build was completed within 20 working days, from the conceptualization of the design, to construction of the structure and to final completion of the project.

Inspired by the pioneering works of antonio gaudi, frei otto and felix candela, the students at the C.A.R.E school of architecture in tiruchirapalli, india, have created the 'o'shell' prototype to explore the relationship between form and force. The experimental project sought to facilitate vital hands-on experience while establishing an understanding of tension based curved surface structures in an intuitive

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and playful way. Under the guidance of their mentor balaji rajasekaran (dmac group), the work formed part of the students' procedural design module.

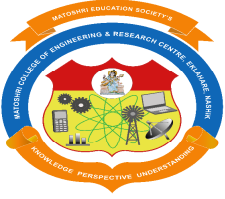
The o'shell project was an on-site exercise and gave students the opportunity to create an architectural response based on the parameters of the site. This included deciding on the orientation of the structure, its base-grid and the initial framework. The experiment also gave the students the chance to see the whole work through, from the initial design development to the realization of the structure.

The first step in the construction process was to excavate the ground to form the plinth beam. After this, the students worked together to erect the steel structure. By utilizing the tensile property of steel, the project embraced a non-standard/non-linear process with on-site active bending as a design driver without any formwork or shuttering to hold the concrete or guide the geometry. The base framework was derived using the site parameters, which was followed by weaving and bending of the steel based on the team's understanding of stress line methods to inform the conceptual structural design.



(images courtesy of Balaji Rajasekaran)

Project info: Project name: O'SHELL Location: Tiruchirapalli, India **Design:** the students at C.A.R.E SCHOOL OF ARCHITECTURE under the mentorship of Balaji Rajasekaran (Dmac Group)



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Water shade Management

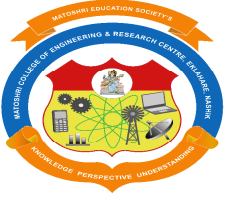
Mr. S. V. Pawar

Watershed is not simply the hydrological unit but also socio-political-ecological entity which plays crucial role in determining food, social, and economical Security and provides life support services to rural people. The criteria for selecting watershed size also depend on the objectives of the development and terrain slope. A large watershed can be managed in plain valley areas or where forest or pasture development is the main objective. In hilly areas or where intensive agriculture development is planned, the size of watershed relatively preferred is small. About 60 per cent of total arable land (142 million ha) in India is rain-fed, characterized by low productivity, low income, low employment with high incidence of poverty and a bulk of fragile and marginal land. Rainfall pattern in these areas are highly variable both in terms of total amount and its distribution, which lead to moisture stress during critical stages of crop production and makes agriculture production vulnerable to pre and post production risk. Watershed development projects in the country has been sponsored and implemented by Government of India from early 1970s onwards.

“Watershed” in general is an area that supplies water by surface or subsurface flow to a given drainage system or body of water – a stream, river, wetland, lake or ocean. The interaction between land and water and its use and management decides the characteristics of the water flow and its relationship to the watershed. Hence, experts argue that watershed should be the basic unit for an integrated planning of land and water use. The „watershed“ approach becomes the important driving factor when a country has been moving towards sustainable development of agriculture sector and achieving food security to all the people, particularly in developing countries. In recent decades, in many parts of the world, watershed degradation has emerged as a most serious problem causing natural resource degradation, which has been acting as a “pull factor” for the efforts of achieving food security and led to negative environmental and socio- economic consequences (World Bank, 2010a,b). Watershed degradation refers to the degradation of both soil and water in a watershed and also refers to long-term reduction of the quantity and quality of land and water resources. (Government of India, 2015). Particularly in rural areas, changes in the farming system, high population growth rates, poor economic opportunities in urban areas have led to widespread cultivation on steep and highly erosion-prone marginal lands.

Inequitable land distribution and the resultant overloading of carrying capacity and replacement of good cultivation practices by bad ones as an answer to external shocks like falling crop price have also resulted into degradation of watersheds. In rural areas, livestock plays an important role in the economic activities particularly in developing countries and for landless laborers and marginal and small farmers. The demographic pressures and economic necessities often influence the stock of livestock above the carrying capacity of the respective areas and land to overgrazing, which negatively impacts the vegetative cover and loss of fertile top soil. These necessities often cause a reduction in water infiltration rates, increase in run-off and accelerate soil erosion.

No doubt over the last 50 years, land and water management had met rapidly rising demand for food importantly due to input-intensive and irrigation- intensive mechanized agriculture. It was estimated that the world’s agricultural production has grown between 2.5 and 3 times over the period while the cultivated area has grown only by 12.0 per cent (FAO, 2011). In too many places, achievements in production were associated with management practices that have degraded the land and water systems.



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It is a proved fact that irrigation bestows both direct and indirect benefits in terms of production and incomes and indirectly in terms of reduced incidence of downstream flood.

That was why it was argued that there is a strong linkage between poverty and the lack of access to land and water resources. It was also estimated that in most of the developing countries the poorest have the least access to land and water and are locked in a poverty-trap of small farms with poor quality soils with high land degradation and climatic uncertainty (FAO, 2013). The Report on Global Hunger Index observed that the level of hunger in the world remains “Serious” with 870 million people going hungry (IFPRI, 2014). All these human-centered economic activities have propelled to adopt “Watershed Management

Approaches” for an integrated land and water management by recognizing the casual link between upstream land and water use and downstream impacts. The typical nexus between the degradation, depletion of resources and the resultant poverty was identified by the Governments of the majority of the developing countries. It was also observed that upland of developing countries are typically more fragile and have less productive environments where natural resource management and rural poverty are commonly linked (FAO, 2012). Being influenced by these consequences, focus was laid on the farming systems of the poor in upland areas in order to achieve poverty reduction and conservation of natural resources simultaneously. As a result, from the 1990’s, watershed management programmes supported by the International institutions have targeted livelihood improvements and poverty reduction objectives with special focus on resource conservation.

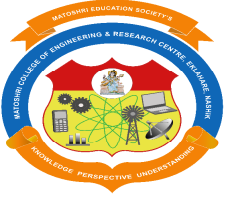
ACPS silt excluder in dam

Mr. R. R. Kshatriya

Removing silt from dam is a tedious process that requires a lot of manual force. In various scenarios it has been seen that people found themselves physically incapable of doing such kind of job when it comes to one. As an Engineer it is our duty to provide new technology to the society for the batterment of them, but also it is our concerns too to seek the need of reduction of human efforts in the places. Silt may occur as a soil (often mixed with sand or clay) or as sediment mixed in suspension with water (also known as a suspended load) and soil in a body of water such as a river. In the dam below DSL there is silt content. The increase in quantity of silt decreases the storage capacity of the dam. Thus, it became very necessary to remove the silt. In the dam below (Dead Storage Level) DSL there is silt content. The increase in quantity of silt decreases the storage capacity of the dam. Thus, it became very necessary to remove the silt. This silt is removed by using cranes and pumps. But this method proves uneconomical and risky. At the downstream side we can either install a motor to give rotary motion to the handle or during rainy season we can use the jet of water falling from spillway on the handle to give it circular movement, this will also generate the electricity. This electricity can be stored and used in other season for operation of motor. Thus, it will not consume the energy.

About the Mechanism

The utility model discloses an automatic sway blade mechanism for the air outlet of an automobile-used air conditioner and belongs to the field of automobile-used air conditioner fittings. The automatic sway blade mechanism comprises an air outlet framework, a sway blade linkage rod, sway blades and a driving device, wherein the sway blades and the sway blade linkage rod are arranged in the



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air outlet framework; the driving device comprises a speed-down electric motor, a reduction gear set, an eccentric wheel, a driven gear rod and a driving gear; the speed-down electric motor drives the reduction gear set which is linked with the eccentric wheel; the eccentric wheel is linked with the driven gear rod; one end of the driven gear rod is in meshed connection with the driving gear; the driving gear is linked with the sway blade linkage rod; and the sway blade linkage rod is connected with the sway blades. The automatic sway blade mechanism for the air outlet of the automobile-used air conditioner realizes automatic blade swaying at the air outlet of the air conditioner A Silt excluder consists of a number of rectangular tunnels running parallel to the caxisohhe head regulator and terminating near the undersluicdweir. The tunnel nearest to the crest of the head regulator has to be at least of the same length as the head regulator. The automatic sway blade mechanism comprises an air outlet framework, a sway blade linkage rod, sway blades and a driving device, wherein the sway blades and the sway blade linkage rod are arranged.

Road Safety Audit

Chintaman Bari B. E. Civil

Water is needed in all aspects of life and hence forms an essential part of human well-being. Nationally and internationally organizations and institutions are making efforts to provide adequate supply of potable water to everyone as it is 'Right to life' and proper handling of this resource would lead to sustainable development. But present day conditions with increasing water demand, urbanization and improper disposal of wastewater pose harm to this process of development. The conditions in cities are worse. Therefore, policy-makers and designers must consider these challenges as opportunities and develop systems which will help in conserving the depleting freshwater resources and use water efficiently and effectively.

CSIR-NEERI has developed improved & cost effective engineered natural and sustainable treatment system for treatment of Municipal, Urban, Agricultural and Industrial Wastewater. Phytorid Technology, which is the genesis of Phytorid-SWAB [Phytorid-Scientific Wetlands with Active Biodegradation] technology shared here, has Australian & European Patents (AU2003223110 A1, 2005 & WO2004/087584 A1, 2005). Phytorid-SWAB technology is combination of Physical, Biological and Chemical processes, gravity based, requires minimal power. The Phytorid-SWAB Technology can be constructed in series and parallel modules/cells depending on the land availability and quantity of wastewater to be treated, in subsurface flow.

Objective of the technology:

To design and establish a wetland technology for the treatment of wastewater To assess the feasibility to use the system with variable quantitative loading rate To assess the functionality of the system with respect to the pollutants parameters viz., biochemical oxygen demand, nitrogen, phosphorus, total suspended solids, total dissolved solids, oil & grease, total coliform, etc. To reuse the treated water for municipal gardens.

Limitations to the use of the technology

- Any system may have its own limitations to its use which could be tackled if properly designed and known.
- Clogging of the solids near the inlet of the treatment bed.

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- The time required for treatment of the wastewater is more compared to the conventional system.
- Maintenance costs are often lower than conventional systems but the monitoring costs could be higher. The plants require timely harvesting and proper disposal of contaminants this may not be a tedious job but only requires supervision and monitoring.
- High concentration of toxic materials could be hazardous to the growth of plants but as it used for treating domestic waste water in this case the toxic contaminants are relatively less.
- The use of it in the landscape areas adds to the aesthetics but with that also introduces it to the human contact of the wastewater treatment bed. Proper care has to be taken in the rainy seasons when the storm water is mixed with the systems and the systems usually fail in providing the required results. In the above case and in any other uncertainties there needs to be a provision for other back up system so that the water level is maintained.
- The land required is more than the conventional systems but this can be overcome by potentially dividing the systems in smaller units and strategically placing them in the negative spaces of the building like the Refuge floors, flower beds etc.
- The depth of treatment is limited by the penetration depths of the specific plants used.
- If the contamination is deeper than the root zone than additional remediation may be needed.

Natural drains, Domestic wastewater, Housing Colonies, Townships, Airports, Commercial complexes, Hotels, Villages, Lake Rejuvenation, Treatment of Agricultural wastewater, Dairy waste, Slaughter House Waste, Pre-treated industrial wastewater. The technology is shortlisted in National Mission for Clean Ganga (NMCG), Ministry of Drinking Water & Sanitation (MDWS), Maharashtra Jeevan Pradhikaran, various Urban Local Bodies. More than 100 plants are installed so far with a capacity upto 4.0 MLD.

THINK IT, BUILD IT, MAKE IT

THE ENGINEER

by Stephanie Calmenson

Listen up and you will hear
Why I am called an engineer.

I solve. I build. I invent.
I'd say my time is very well spent.

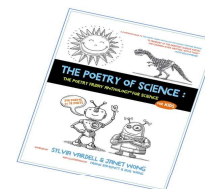
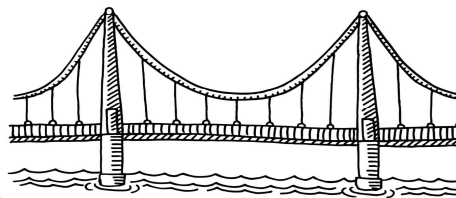
Want a bridge? I'll design it for you.
Want a new kind of wheel? I'll develop that, too.

I use computers. I use my brain.
I think and test till the answer is plain.

Want a robot, a rocket, an electronic device?
I'll take the assignment. I won't think twice.

I'll make running shoes that will send you soaring!
I'll develop a device that will keep you from snoring!

My life is all about invention.
Making the world work better is my intention.



Poem © 2014 Stephanie Calmenson; Illustration by Frank Ramspott from *The Poetry of Science: The Poem Friday Anthology for Science for Kids* by Sylvia Vardell and Janet Wong (Pomelo Books.com)



Techno savior

Application of Internet of Things in Agriculture *Ms. Pranjali Jadhav*

1. Climate Conditions:

Climate plays a very critical role for farming. And having improper knowledge about climate heavily deteriorates the quantity and quality of the crop production. But IoT solutions enable you to know the real-time weather conditions. Sensors are placed inside and outside of the agriculture fields. They collect data from the environment which is used to choose the right crops which can grow and sustain in the particular climatic conditions. The whole IoT ecosystem is made up of sensors that can detect real-time weather conditions like humidity, rainfall, temperature and more very accurately. There are numerous no. of sensors available to detect all these parameters and configure accordingly to suit your smart farming requirements. These sensors monitor the condition of the crops and the weather surrounding them. If any disturbing weather conditions are found, then an alert is send. What gets eliminated is the need of the physical presence during disturbing climatic conditions which eventually increases the productivity and help farmers to reap more agriculture benefits.

2. Precision Farming:

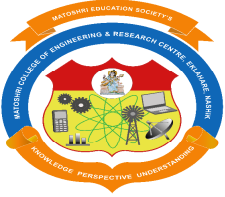
Precision Agriculture/Precision Farming is one of the most famous applications of IoT in Agriculture. It makes the farming practice more precise and controlled by realizing smart farming applications such as livestock monitoring, vehicle tracking, field observation, and inventory monitoring. The goal of precision farming is to analyze the data, generated via sensors, to react accordingly. Precision Farming helps farmers to generate data with the help of sensors and analyze that information to take intelligent and quick decisions. There are numerous precision farming techniques like irrigation management, livestock management, vehicle tracking and many more which play a vital role in increasing the efficiency and effectiveness. With the help of Precision farming, you can analyze soil conditions and other related parameters to increase the operational efficiency. Not only this you can also detect the real-time working conditions of the connected devices to detect water and nutrient level.

3. Smart Greenhouse

To make our greenhouses smart, IoT has enabled weather stations to automatically adjust the climate conditions according to a particular set of instructions. Adoption of IoT in Greenhouses has eliminated the human intervention, thus making entire process cost-effective and increasing accuracy at the same time. For example, using solar-powered IoT sensors builds modern and inexpensive greenhouses. These sensors collect and transmit the real-time data which helps in monitoring the greenhouse state very precisely in real-time. With the help of the sensors, the water consumption and greenhouse state can be monitored via emails or SMS alerts. Automatic and smart irrigation is carried out with the help of IoT. These sensors help to provide information on the pressure, humidity, temperature and light levels.

4. Data Analytics:

The conventional database system does not have enough storage for the data collected from the IoT sensors. Cloud based data storage and an end-to-end IoT Platform plays an important role in the smart agriculture system. These systems are estimated to play an important role such that better activities can be performed. In the IoT world, sensors are the primary source of collecting data on a large scale. The data is analyzed and transformed to meaningful information using analytics tools. The data analytics helps in the analysis of weather conditions, livestock conditions, and crop conditions. The data collected leverages the technological innovations and thus making better decisions. With the help of the IoT devices, you can know the real-time status of the crops by capturing the data from sensors. Using predictive analytics, you can get an insight to make better decisions related to harvesting. The trend



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analysis helps the farmers to know upcoming weather conditions and harvesting of crops. IoT in the Agriculture Industry has helped the farmers to maintain the quality of crops and fertility of the land, thus enhancing the product volume and quality.

5. Agricultural Drones:

Technological advancements has almost revolutionized the agricultural operations and the introduction of agricultural drones is the trending disruption. The Ground and Aerial drones are used for assessment of crop health, crop monitoring, planting, crop spraying, and field analysis. With proper strategy and planning based on real-time data, drone technology has given a high rise and makeover to the agriculture industry. Drones with thermal or multispectral sensors identify the areas that require changes in irrigation. Once the crops start growing, sensors indicate their health and calculate their vegetation index. Eventually smart drones have reduced the environmental impact. The results have been such that there has been a massive reduction and much lower chemical reaching the groundwater.

IoT enabled agriculture has helped implement modern technological solutions to time tested knowledge. This has helped bridge the gap between production and quality and quantity yield. Data Ingested by obtaining and importing information from the multiple sensors for real time use or storage in a database ensures swift action and less damage to the crops. With seamless end to end intelligent operations and improved business process execution, produce gets processed faster and reaches supermarkets in fastest time possible.

Introduction of Operating System

Ms. Harshala Antapurkar

An operating system acts as an intermediary between the user of a computer and computer hardware. The purpose of an operating system is to provide an environment in which a user can execute programs in a convenient and efficient manner.

An operating system is software that manages the computer hardware. The hardware must provide appropriate mechanisms to ensure the correct operation of the computer system and to prevent user programs from interfering with the proper operation of the system.

Operating System – Definition:

- An operating system is a program that controls the execution of application programs and acts as an interface between the user of a computer and the computer hardware.
- A more common definition is that the operating system is the one program running at all times on the computer (usually called the kernel), with all else being application programs.
- An operating system is concerned with the allocation of resources and services, such as memory, processors, devices, and information. The operating system correspondingly includes programs to manage these resources, such as a traffic controller, a scheduler, memory management module, I/O programs, and a file system.

Functions of Operating system – Operating system performs three functions:

1. **Convenience:** An OS makes a computer more convenient to use.
2. **Efficiency:** An OS allows the computer system resources to be used in an efficient manner.
3. **Ability to Evolve:** An OS should be constructed in such a way as to permit the effective development, testing and introduction of new system functions at the same time without interfering with service.

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Every general-purpose computer consists of the hardware, operating system, system programs, and application programs. The hardware consists of memory, CPU, ALU, and I/O devices, peripheral device, and storage device. System program consists of compilers, loaders, editors, OS, etc. The application program consists of business programs, database programs.

Every computer must have an operating system to run other programs. The operating system coordinates the use of the hardware among the various system programs and application programs for various users. It simply provides an environment within which other programs can do useful work.

The operating system is a set of special programs that run on a computer system that allows it to work properly. It performs basic tasks such as recognizing input from the keyboard, keeping track of files and directories on the disk, sending output to the display screen and controlling peripheral devices.

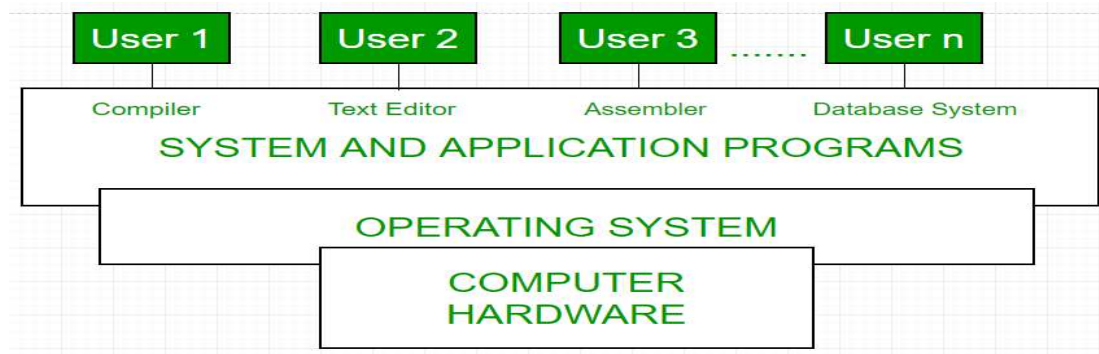


Figure: Conceptual view of a computer system

OS is designed to serve two basic purposes:

1. It controls the allocation and use of the computing System's resources among the various user and tasks.
2. It provides an interface between the computer hardware and the programmer that simplifies and makes feasible for coding, creation, debugging of application programs.

The Operating system must support the following tasks. The task are:

1. Provides the facilities to create, modification of programs and data files using an editor.
2. Access to the compiler for translating the user program from high level language to machine language.
3. Provide a loader program to move the compiled program code to the computer's memory for execution.
4. Provide routines that handle the details of I/O programming.

I/O System Management —

The module that keeps track of the status of devices is called the I/O traffic controller. Each I/O device has a device handler that resides in a separate process associated with that device.

The I/O subsystem consists of

- A memory Management component that includes buffering caching and spooling.
- A general device driver interface.

Drivers for specific hardware devices.

Assembler —

The input to an assembler is an assembly language program. The output is an object program plus



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information that enables the loader to prepare the object program for execution. At one time, the computer programmer had at his disposal a basic machine that interpreted, through hardware, certain fundamental instructions. He would program this computer by writing a series of ones and Zeros (Machine language), place them into the memory of the machine.

2D animation

Ms. Manisha Waghmare

2D animation is the art of creating movement in a two-dimensional space. This includes characters, creatures, FX and backgrounds.

The illusion of movement is created when individual drawings are sequenced together over time. One second of time is usually divided into 24 frames. Depending on the style of animation there can be as many as 24 unique drawings in one second of animation (24fps) or as little as two. Conventionally animation is done on "2s" meaning there is a drawing every 2 frames (12fps). This allows artists to save on production time/costs and gives 2D animation its unique look.

Dialogue example by CG Spectrum's 2D Animation Mentor Scott Claus (who worked at both Disney and DreamWorks)

While this process is sometimes referred to as traditional animation, mainstream 2D production has evolved from hand drawn processes using pencil and paper to the implementation of digital techniques using computer software like Toon Boom Harmony or Adobe After Effects.

2D Animation Today

2D is a popular and diverse medium that's making a massive comeback. It can be seen prevalently in TV shows, video games, feature films, advertisements, mobile apps and on websites. Popular modern examples of 2D include TV shows Rick and Morty and F is for Family. Social media platforms like Snapchat are launching 2D animated series with snappy 1-3 minute episodes. And there's even been a recent surge in 2D platform video games such as Cuphead.

“Animation is used for everything online (advertising, entertainment), even if you don't realize it initially,” says Scott Claus, 2D Animation Mentor at CG Spectrum. “The medium is evolving quickly. Television animation has taken off, and streaming services are constantly looking for new content.”

Demand for 2D animators who can create entertaining and engaging content has grown significantly in the last decade. There's a need for skilled and enthusiastic artists who love motion graphics and are adept at creating original and appealing content.

So what does a 2D animator actually do? What are the job prospects? What can a junior artist expect to earn vs. an established one? What's the best 2D animation software?

We've done the homework and gathered everything you need to know about the industry to help you prepare for your future.

What Does a 2D Animator Do?

2D animators convey stories or messages by making their characters, objects and backgrounds move in a two-dimensional environment.

Besides drawing, they must also be excellent storytellers. They are responsible for clearly communicating a story or message by moving characters in a way that engages viewers. (Anyone interested in becoming a 2D Animator should get to know the 12 Principles of Animation, which are covered in detail in the 2D Animation course)

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While most of the work is done on computer, traditional hand-drawn techniques are still a useful skill set to have.

Additional responsibilities may include:

- Sketching designs
- Designing characters
- Developing storyboards
- Creating special effects
- Animating scenes
- Transitioning backgrounds

This job is just one part of the production pipeline, which is divided into three parts: pre-production, production and post-production:

In pre-production, a project is in its early stages and the team may be working on story and character development, writing scripts, recording dialogue, storyboarding, background layout, and character animation.

In the production stage, animators breathe life into their characters and objects by giving them movement. The figures are then colored and processed (“digital ink and paint”) and composited over their appropriate backgrounds.

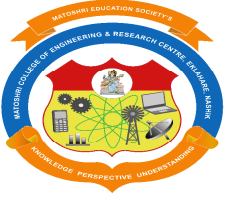
Post-production is the final stages of adding sound and editing to ensure the project looks sharp and flows seamlessly, and then it is exported in the final format.

Depending on the project and the size of the studio or agency, animators may work with a number of other people, so strong communication and people skills are a must.

Authentication Using Biometric Technology

Manjusha Sonawane SE computer

Biometric Technology has contributed tremendously to boost the advancement in digital electronics. It has made it easier to authenticate a trusted user. More importantly, it has sped up the authentication process and it is 100% secure when multiple authentication methods are used together. Despite the fact that there exist some drawbacks, it is a boon to the digital world. To understand its significance, you can compare the age old pattern based authentication and one touch finger scan on your smartphone. Biometrics comprises of methods for uniquely recognizing humans based upon one or



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more intrinsic physical or behavioral traits. Certain characteristics of every human being such as fingerprint, iris, retina, voice, face, DNA differ from each other. Biometric authentication makes use of these characteristics to identify individuals. In information technology, in particular, biometrics is used as a form of identity access management and access control. Biometric Technology is also used to identify individuals in groups.

Biometric characteristics can be divided into two main classes: Physiological and Behavioral.

- **Physiological:** This is related to the shape of the body. Examples include fingerprint, face recognition, DNA, hand and palm geometry, iris recognition etc.
- **Behavioral:** This is related to the behavior of a person. Examples include typing rhythm, voice, and gait. Some researchers have coined the term **behaviometrics** for this class of biometrics. Strictly speaking, the voice is also a physiological trait because every person has a different vocal tract, but voice recognition is mainly based on the study of the way a person speaks, commonly classified as behavioral.

Some of the commonly used Biometrics are:

Fingerprints – A fingerprint includes patterns found on a fingertip. There are a variety of approaches for the fingerprint verification, such as traditional police based method and using pattern-matching devices. Fingerprint scanning seems to be a good choice for in-house systems. It can be easily found on smartphones and laptops.

- **Hand geometry** – This involves analyzing and measuring the shape of the hand. It might be suitable where there are more users or where the user accesses the system infrequently. Accuracy can be very high if desired, and flexible performance tuning and configuration can accommodate a wide range of applications. Organizations are using hand geometry readers in various scenarios, including time and attendance recording.
- **Retina** – A retina-based biometric authentication involves analyzing the layer of blood vessels situated at the back of the eye. This technique involves using a low-intensity light source through an optical coupler to scan the unique patterns of the retina. Retinal scanning can be quite accurate but does require the user to look into a receptacle and focus on a given point. It is mainly used in high-security laboratories to permit only trusted users.
- **Iris** – An iris-based biometric authentication involves analyzing features found in the colored circular tissue that surrounds the pupil. The color of the iris determines the color of the eye. This uses a conventional camera element that helps to capture high-resolution images depicting the structure of the iris. Further, it is more reliable and results in highest pattern matching.
- **Face** – Facial recognition involves identifying a person based on the high-resolution images captured. Thousands of patterns of the face are captured by the facial recognition device and stored in its database. In subsequent uses, this data is used to match and authenticate a person. This kind of matching is mostly used in the police and intelligence departments. Read more on Face Identification and Recognition.

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Pill Camara

Akshay Gaikwad TE Computer

The camera which is in pill shape is known as a pill camera. This camera can be swallowed by the patient for the treatments of cancer, anemia & ulcers. This camera travels within the body to capture the inside of the body without harming any parts and sends it to the receiver.

The device, called Diagnostic imaging system, comes in capsule form and contains a camera, lights, transmitter & batteries. The latest pill camera is sized at 26*11 mm and is capable of transmitting 50,000 color images during its traversal through the digestive system of patient.

Various applications of pill camera are crohn's disease, mal-absorption disorders, tumors of the small intestine and vascular disorders, ulcerative colitis, medication related to small bowel injury.

Painless, no side affects or complications, small size so can move easily through digestive system, accurate, precise, effective, images taken are of very high quality which are send almost instantaneously to the data recorder for storage, Made of bio-compatible material, doesn't cause any harm to the body are the advantages of a pill camera.

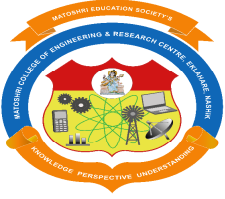
The capsule Endoscopy is a pioneering concept for medical technology of the 21st century. The endoscopy system is the first of its kind to be able to provide non-invasive imaging of the entire small intestine. It has revolutionized the field of diagnostic imaging to a great extent and has proved to be of great help to physicians all over the world.

COMPUTER GENERATED POETRY



Computer Generated poetry, that is generated through an algorithm, which is executed by a digital, electronic computer, which is intended, by whoever it may be, to be read as poetry.

The Longman Dictionary and Handbook of Poetry Myers and Simms define computer poetry as "a recently developed form of poetic composition in which data-processing machines are used to generate new sequences of words"



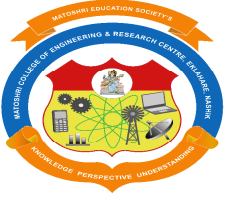
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ACTIVE POWER SHARING AND SELF-FREQUENCY RECOVERY IN AN ISLANDED MICROGRID **Mr. Shinde Yogesh, ME Second year , Power System**

The major problem is to meet this demand of electricity. However the electricity supply has become saturated due to some factors such as social, environmental and geographical. To fulfil these problems and to meet the electricity demand there are two ways such as via microgrids and distributed generation (DGs). There are various methods or control techniques for distributed generation to control active power sharing as in islanded microgrids. Generally most commonly used method is droop control. In this method active power - frequency is used for DG controller and frequency deviation is recovered by DG itself by self-frequency recovery control without using any secondary frequency control. But the electrical distance i.e. impedance between each DG and loads are different which may cause frequency deviation among the DG units. This difference is fed into the integrators of self-frequency recovery control which may cause the error in operation of active power sharing. So to solve this problem new technique or control method is developed which share active power more accurately, this method is compensation control method. To enhance reliability, controllers of DG's are designed to take account of the failure of communication system. The simulation results show the active power can be shared among DG's according to desired ratio without frequency deviation. The sustainability of the proposed power control made is simulated under MATLAB/SIMULINK.

The Microgrid is defined as one independent grid providing continuous power to load on grid and comprising two or more micro sources with enough capacity so as to operate independently storage assets and load. The Microgrid consists of a low- or medium-voltage distribution network containing loads and distributed energy resources. A microgrid includes central controller (CC), local controllers (LCs) [4], a static switch, loads, and various types of energy sources. A microgrid has operated in two different modes: grid-connected mode and islanded mode, depending on the connection state with the main grid. In grid-connected mode, a microgrid is connected to the main grid, which usually has large system inertia; this is reason of the microgrid frequency is almost identical to the nominal value [3]. So, DG units in a microgrid typically inject the desired output power, and the electrical power mismatch between supply and demand is balanced by the main grid. However, in islanded mode, using DG units the microgrid must supply its own demand and maintain its frequency solely. DG's can integrate eco-friendly renewable energy resources such as Solar cells, Wind turbines and Fuel cells to distribution networks. To offset the errors in active power sharing caused by Self-frequency recovery control, a compensation control scheme was developed. The main purpose of the compensation control is not to reduce transient frequency difference but to reduce the active power sharing error.

In active power-frequency (P-f) droop control was developed for active power sharing by emulating conventional power systems composed of synchronous generators. In, oppose to conventional droop control, a tunable droop controller with two degrees of freedom was proposed, considering an adaptive transient droop function. Islanded microgrids as in for Single-master and multiple-master operating modes considering secondary load-frequency control for frequency recovery. In a virtual impedance control scheme was used for decoupling the active and reactive power to enhance the control stability and power sharing ability. A method for determining the droop coefficient based on the generation cost of each DG unit was proposed in, a control method was used rather than frequency droop in a constant frequency and the state of charge of a battery energy storage system was used to monitor changes in the system load. Most literature have considered frequency deviation in sharing active power however, the frequency must be restored to its nominal value according to the requirements of the grid code, and



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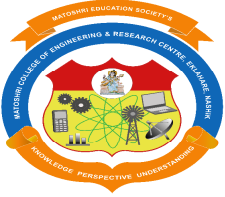
secondary control is required to achieve. Problems may arise if the frequency deviation is too great. Under these circumstances, this will impose too much burden on the frequency control units. It has been suggested that constant frequency control could be used making frequency restoration unnecessary; however, active power sharing was not considered. A DG control method that simultaneously implements accurate active power sharing and self-frequency recovery. Using this control method, DG units share the changes in load with a predetermined ratio and are able to restore their output frequency to the nominal value autonomously (hence the term "self-frequency recovery") immediately following a change in load. However, the self-frequency recovery action may lead to (small) errors in power sharing due to variations in the impedance among DG units.

Isolated Power Converters for DC Distribution System"

Mr. Shintre Shrui, ME Second year , Power System,

These days, renewable energy sources, DC electronic loads, and energy storage devices have been adopted to residential house and building applications. They have also been widely used in electrical vehicle and LED lighting applications in industrial fields and consumer areas. The DC distribution system can easily interface with different electrical systems composed of renewable energy sources and energy storage devices. The DC distribution system achieves higher power conversion and distribution efficiency because of the reduction of power conversion stages. In addition, it can easily integrate DC loads, electrical vehicle, and LED lighting into the distribution system, compared with the AC distribution system. Thus, DC distribution concepts for a residential house, telecommunication buildings and internet data centers were recently presented. With the increasing demands for electric power in future automobiles, uninterrupted power supplies (UPSs), renewable energy sources, telecom and computer systems, and aviation power systems, bidirectional dc-dc converters (BDCs) exhibit as an ever-lasting key component to interface between a high-voltage bus where an energy generation device such as a fuel cell stack and/or a photovoltaic array is installed, and a low-voltage bus, where usually an energy storage device such as a battery or a super capacitor is implemented, to actively provide clean and stable power and to enable high reliability, effectiveness, and maneuverability of the power systems aforementioned. In order to significantly reduce reactive component size and cost, high-frequency operation of BDCs is desirable. However, in a hard-switching converter, as the switching frequency increases, switching losses and electromagnetic interference increase. To resolve this problem, softswitching converters are employed.

Several isolated BDC topologies have been suggested for applications of the dc power distribution systems. A boost full-bridge ZVS PWM dc-dc converter was developed for bidirectional high power applications. This topology is proper to the bidirectional power conversion because it has a boost mode for low to high voltage power conversion and a buck mode for vice versa. However, this topology requires a snubber circuit to suppress the voltage stress of the switches, which increases circuit complexity and decreases power conversion efficiency. A Bidirectional phase shift full-bridge converter was proposed with high frequency galvanic isolation for energy storage systems. This converter can improve power conversion efficiency using a zero voltage transition (ZVS) feature; however, it requires input voltage variations to regulate constant output voltage because this topology can only achieve the step-down operation. The isolated unidirectional CLLC resonant converter has useful characteristics for regulating the DC-bus voltage. This converter shows soft switching capabilities of the primary and the



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secondary switches employing zero voltage switching (ZVS) and soft commutation under entire load ranges. In addition, it has a simple switching mechanism to control the power ow directions in the converter.

The DAB converter is good for power interfacing between battery stations and load sides because of its wide gain range and high boosting ratio. This converter has bidirectional buck and boost capability with high frequency isolation and simple structure with soft switching property. Finally, the LLC resonant converter is a frequently selected topology for high power DC-DC applications because of its outstanding performance in high power conversion e_iciency and high power density. Therefore, the LLC resonant topology is a good candidate for renewable energy simulators of a PV, fuel cell (FC), wind turbine, etc. The soft switching feature for the proposed converter is realized only by a very simple CLLC resonant tank. In the proposed system without any other additional soft-switching auxiliary circuits and being snubberless, the overall component count can be dramatically reduced.

**Authentication By Using NFC - Aher Mayur Dilip ,Bhamare Rohitkumar M
Gaikwad Yogesh Valmik**

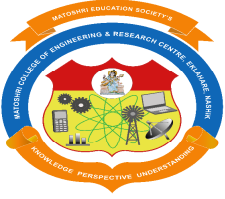
NFC is a new, short range, high frequency, low bandwidth, and wireless communication technology. NFC communication is activated by touching two NFC enabled devices together, or bringing them into close range. The range is usually few centimetres, and it operates at the frequency of 13.56 MHz. The maximum data transfer rate is 424kbit/s. NFC is based on Radio frequency Identification (RFID) thus its communication involves initiator and a target, the initiator actively generates a Radio Frequency (RF) field that can be used as a signal to power a passive target.

It works at less than 10cm distance. It is more efficient than the Bluetooth technology and it uses a passive technique of data transmission. The advance feature of the NFC is that just by tapping your NFC enabled phone to the NFC reader, you can transfer the data very quickly and in efficient way. NFC technique includes the NFC card as well as the NFC phones. The NFC card can also be brought into use. The people belonging to our organization can be given a NFC card, these cards will be swapped against the NFC readers and then access.

The vision of mobile devices can be used as means of payment existed for quite some year and had several global initiatives. The technologies employed by these initiatives had security or usability close like Bluetooth infrared and SMS. Recently a new technology has emerged the NFC, who came to fill the failuers of previous technologies. The evolution of science and technology creates a new generation of the access control system. Authentication By Using NFC

In computer security, general access control includes authorization, authentication, access approval, and audit. Authentication and access control are often combined into a single operation, so that access is approved based on successful authentication, or based on an anonymous access token. The available technologies related to this field don't have the all in one package like NFC. As NFC was invented so far ago but it doesn't get the globalization tag up to date

To enhance and personalize the systems, organization, industries, with secured access. Digitalization of record keeping for various forms of organizations Make availability of such system at possible low cost. To provide Fast, Secured and Reliable communication.



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Authentication and access control are often combined into a single operation, so that access is approved based on successful authentication, or based on an anonymous access token. Authentication methods and tokens include passwords, biometric scan, physical keys, electronic keys and devices, hidden paths, social barriers, and monitoring by humans and automated systems. In any access-control model, the entities that can perform actions on the system are called subjects, and the entities representing resources to which access may need to be controlled are called objects (see also Access Control Matrix). Subjects and objects should both be considered as software entities, rather than as human users: any human users can only have an effect on the system via the software entities that they control.

High Tech Agricultural Robot -

Bhuse Aboli Arun, Deore Madhuri Dilip, Sonawane Ankita

Food is Man's most basic need. Throughout the ages men have strived to produce more and better food for growing populations. Man has always been at the centre of food production and has now become the limiting factor all the process of cultivation was done by manually. The growing demand for food worldwide, implies a significant increase in agricultural production. The rapid growth in the industries is influencing the labours who are situating in the villages to migrate to the cities. This creates the labour problem for the agriculture. The wages for the labour is also more. This factors influencing the farmers who are interested in agriculture activity to leave their land uncultivated. Developed agriculture needs to find new ways to improve efficiency. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and target energy inputs in more effective ways than in the past. The advent of autonomous system architectures gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right thing, in the right place, at the right time in the right way. Chemical application of nutrients and fertilizers is one of the most important processes in agricultural production, but also one of the most dangerous agricultural operations. Difference between atomized and conventional techniques. Conventional techniques depend on human power and old techniques. Robots can work nonstop, humans need rest. Human may not be able to work in hazardous environments.

Our work aims to design a agricultural robot which is used for distribution of fertilizers to suppress the human labour. The main aim is to avoid distributing fertilizers manually at actual farm. It will be easy to achieve this by replacing human by robot through central station. Control the movements of robot & distributing fertilizer using android system.

Chemical application of nutrients and pesticides is one of the most important processes in agricultural production, but also one of the most dangerous agricultural operations. Chemical runoff associated with over application can cause serious environmental consequences. Fertilizing has a very important role to play to reduce the harvest losses and improving productivity. As mentioned by Cho and Ki (1999), between 30 and 35% of production losses can be saved while harmful insects and diseases are eliminated by fertilizing.

Conventional greenhouse fertilizing methods include an operator who manually walks through the greenhouse with a bag of external nutrients. The operator is exposed to hazardous chemicals, and

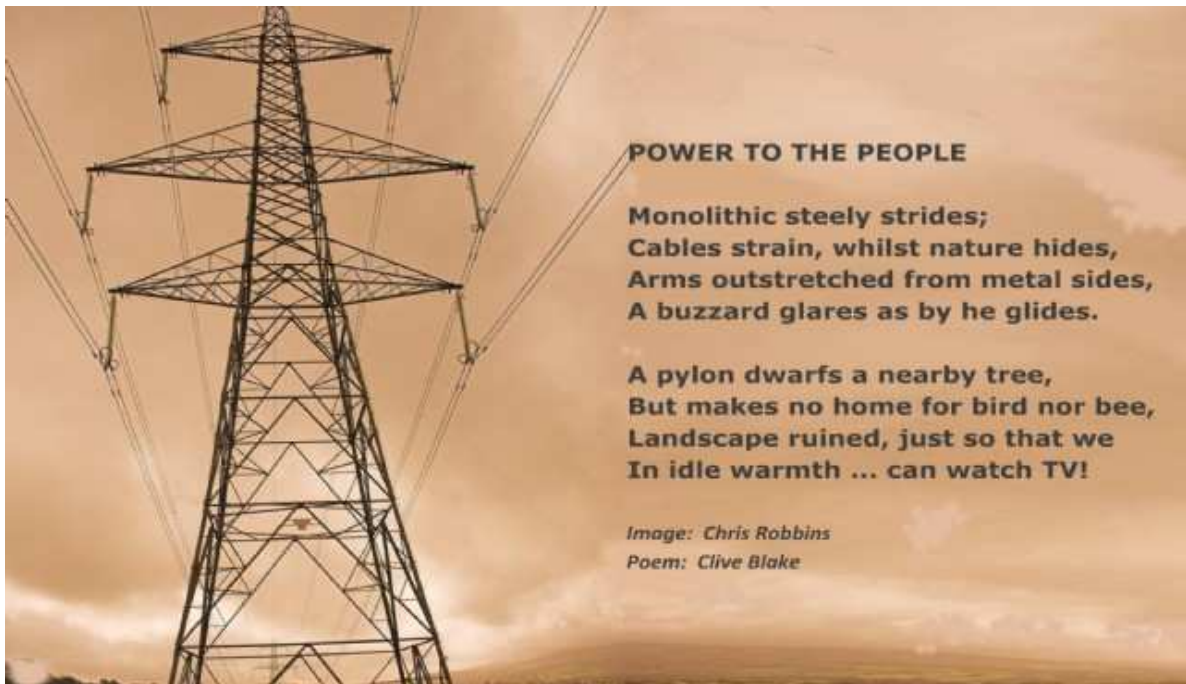
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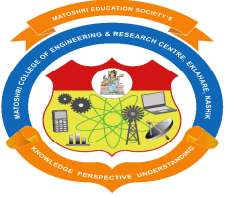
must try to consistently apply chemicals while working in a potentially hot environment wearing a protective rubber suit with gas mask.

Using robots means the opportunity of replacing human operators, which provides effective solutions with return on investment. Robots are useful when the duties, that need be performed, are potentially harmful for the safety or the health of the workers, or when more conservative issues are granted by robotics. Heavy chemicals or drugs dispensers manure or fertilizers spreaders, etc. are activities more and more concerned by the deployment of unmanned options.

The motivations behind developing "an autonomous fertilizer distributor" for green house application were to maintain a healthy and productive crop, satisfy food safety concerns, reduce the use of chemicals and improve the efficiency of production, all within the limitations of the availability and cost of labour, reduce chemical, minimize labour hazards and reduce the harmful environmental damage.

Food is Man's most basic need. Throughout the ages men have strived to produce more and better food for growing populations. Man has always been at the center of food production and has now become the limiting factor all the process of cultivation was done by manually. The growing demand for food worldwide, implies a significant





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Automatic car washing system

Prof.V.V.Wadekar

Automatic car washing system is very common in developed countries. Car washing system is usually associated with fuel filling stations. It consists of large machines with automated brushes controlled by program logical controllers. Automatic car washing system is fully automated with different stages of foaming, washing, drying and brushing. Different types of car washing systems are discussed in this report. This system uses large quantity of water, thus water recycling plant is also an integral part of the automatic car washing system but at this level we are only presented the car washing only. We studied some of the car washing systems from Internet and decided to do this project. As compared to the foreign countries this system is used in very less no of cities in India because of its cost and complexity. But we have tried to minimise it according to the device list which will be definitely helpful for our project.

The first automatic car washes appeared in the late 1930s. Automatic car washes consist of tunnel-like buildings into which customers (or attendants) drive. Some car washes have their customers pay through a computerized POS (point of sale unit), also known as an "automatic cashier". The mechanism inputs the wash PLU into a master computer or a tunnel controller automatically. When the sale is automated, after paying the car is put into a line-up often called the stack or queue. The stack moves sequentially, so the wash knows what each car purchased. After pulling up to the tunnel entrance, an attendant usually guides the customer onto the track or conveyor. At some washes, both tires will pass over a tire sensor, and the system will send several rollers. The tire sensor lets the wash know where the wheels are and how far apart they are. On other systems the employee may guide the customer on and hit a 'Send Car' button on the tunnel controller, to manually send the rollers which push the car through. When the customer is on the conveyor, the attendant will instruct the customer to put the vehicle into neutral, release all brakes, and refrain from steering. Failure to do so can cause an accident on the conveyor. The rollers come up behind the tires, pushing the car through a detector, which measures vehicle length, allowing the controller to tailor the wash to each individual vehicle. The equipment frame, or arches, vary in number and type. A good car wash makes use of many different pieces of equipment and stages of chemical application to thoroughly clean the vehicle.

Smart Dust

Manisha Nimse

Reference - www.electronicsforu.com

Abstract:

Smart dust is a tiny dust size device with extra-ordinary capabilities. Smart dust combines sensing, computing, wireless communication capabilities and autonomous power supply within volume of only few millimeters and that too at low cost. These devices are proposed to be so small and light in weight that they can remain suspended in the environment like an ordinary dust particle. These properties of Smart Dust will render it useful in monitoring real world phenomenon without disturbing the original process to an observable extends. Presently the achievable size of Smart Dust is about 5mm cube, but we hope that it will eventually be as small as pack of dust. Individual sensors of smart dust are often referred to as motes because of their small size. These devices are also known as MEMS, which stands for micro electro-mechanical sensors.



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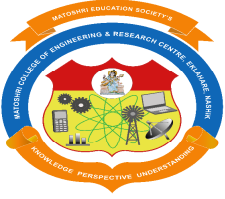
INTRODUCTION

“Smart Dust” is an emerging technology made up from tiny, wireless sensors called as „Motes“. Eventually these devices would be smart enough to talk with other sensors yet small enough to fit on a head of a pin. Berkeley’s Smart Dust project, explores the limits on size and power consumption in autonomous sensor nodes. Size reduction is paramount, to make the nodes as inexpensive and easy-to-deploy as possible. The research team is confident that they can incorporate the requisite sensing, communication, and computing hardware, along with a power supply, in a volume no more than a few cubic millimeters, while still achieving impressive performance in terms of sensor functionality and communications capability. These millimeter-scale nodes are called “Smart Dust.” It is certainly within the realm of possibility that future prototypes of Smart Dust could be small enough to remain suspended in air, buoyed by air currents, sensing and communicating for hours or days on end. Smart Dust sensors are networked computer nodes that are just cubic millimeters in volume. The smart dust project envisions a complete sensor network node, including power supply, processor, sensors and communications mechanisms, in single cubic millimeters. Smart dust motes could run for years, given that a cubic millimeter battery can store 1J and could be backed up with a solar cell or vibrational energy source. The goal of the Smart Dust project is to build a millimeterscale sensing and communication platform for a massively distributed sensor network. This device will be around the size of a grain of sand and will contain sensors, computational ability, bi-directional wireless communications, and a power supply. Smart dust consists of series of circuit and micro-electro-mechanical systems (MEMS) designs to cast those functions into custom silicon. Micro-electro-mechanical-systems (MEMS) consist of extremely tiny mechanical elements, often integrated together with electronic circuitry.

Early Applications Smart dust was used to detect the vehicles traveling through an isolated desert area in Palm Springs California. In doing so the experiment proved how smart dust can be used by military and Law enforcement personnel to monitor movement in the region. Next scientists approach smart dust from a biotechnology perspective to produce motes from chemical compounds rather than electrical circuitry. One experiment demonstrated the use of smart dust to detect the presence of hydrocarbon vapors from approximately 65 feet away. While the experiment was limited to hydro carbon vapors the researchers predict that with appropriate chemical modification the smart dust sensors used can specifically detect bimolecular, explosives chemical war fare agent such as „Sarin“. There is a need to better understand the routing trends and connectivity performance of the “Smart Dust” network. On this front, further analysis and more systematic tests will be conducted to detect the effect due to traffic interference and environment factors on the network performance. By varying frequency of transmission, distance and layout between motes and test environment (i.e., outdoor versus indoor, foggy/rainy/icy conditions), a more in-depth understanding of “Smart Dust” capabilities in real-world applications will be achieved. In addition, the embedding of an ice detection algorithm would help decrease the packet loss by decreasing the data sent. Instead of sending all the sensors readings, a 2-bit signal representing the road condition will be sent. The robustness and survivability of the proposed sensor-road button will be further investigated and its design will be improved.

IMPLEMENTATION

The MEMS Technology in Smart Dust Smart dust requires mainly revolutionary advances in miniaturization, integration & energy management. Hence designers have used MEMS technology to build small sensors, optical communication components, and power supplies. Micro-electro-mechanical-systems consist of extremely tiny mechanical elements, often integrated together with electronic circuitry. They are measured in micrometers, which are millions of a meter. They are made in a similar



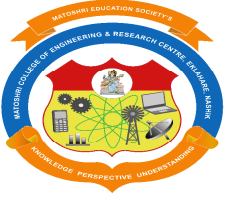
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fashion as computer chips. The advantage of this manufacturing process is not simply that small structures can be achieved but also that thousands or even millions of system elements can be fabricated simultaneously. This allows systems to be both highly complex and extremely low-cost. Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through microfabrication technology. While the electronics are fabricated using integrated circuit (IC) process sequences, the micromechanical components are fabricated using compatible "micromachining" processes that selectively etch away parts of the silicon wafer or add new structural layers to form the mechanical and electromechanical devices. MEMS realize a complete System On chip technology. Microelectronic integrated circuits can be thought of as the "brains" of a system and allow Microsystems to sense and control the environment. Sensors gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, and filtering, thereby controlling the environment for some desired purpose. Because MEMS devices are manufactured using batch fabrication techniques similar to those used for integrated circuits, unprecedented levels of functionality, reliability, and sophistication can be placed on a small silicon chip at a relatively low cost. The deep insight of MEMS is as a new manufacturing technology, a way of making complex electromechanical systems using batch fabrication techniques similar to those used for integrated circuits, and uniting these electromechanical elements together with electronics. Historically, sensors and actuators are the most costly and unreliable part of a sensor-actuator-electronics system. MEMS technology allows these complex electromechanical systems to be manufactured using batch fabrication techniques, increasing the reliability of the sensors and actuators to equal that of integrated circuits. The performance of MEMS devices and systems is expected to be superior to macro scale components and systems; the price is predicted to be much lower.

Smart Dust Technology

Integrated into a single package are: 1. MEMS sensors 2. MEMS beam steering mirror for active optical transmission 3. MEMS corner cube retro reflector for passive optical transmission 4. An optical receiver 5. Signal processing and control circuitry 6. A power source based on thick film batteries and solar cells This remarkable package has the ability to sense and to communicate and to self power. A major challenge is to incorporate all these functions while maintaining very low power consumption. Smart dust employs 2 types of transmission schemes: • Passive transmission: It uses corner cube retro reflector to transmit to base stations.

Active transmission: It uses a laser diode & steerable mirrors for mote to mote communication. The photo diode allows optical data reception. • Signal processing • & control circuitry consists of analog I/O, DSPs to control & process the incoming data. The power system consists of a thick film battery, a • solar cell with a charge integrating capacitor for a period of darkness The Smart Dust mote is run by a microcontroller that not only determines the tasks performed by the mote, but also controls power to the various components of the system to conserve energy. Periodically the microcontroller gets a reading from one of the sensors, which measure one of a number of physical or chemical stimuli such as temperature, ambient light, vibration, acceleration, or air pressure, processes the data, and stores it in memory. It also occasionally turns on the optical receiver to see if anyone is trying to communicate with it. This communication may include new programs or messages from other motes. In response to a message or upon its own initiative the microcontroller will use the corner cube retro reflector or laser to transmit sensor data or a message to a base station or another mote. The primary constraint in the design

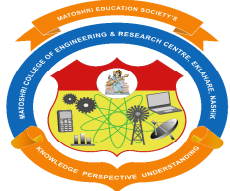


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of the Smart Dust motes is volume, which in turn puts a severe constraint on energy since we do not have much room for batteries or large solar cells. Thus, the motes must operate efficiently and conserve energy whenever possible. Most of the time, the majority of the mote is powered off with only a clock and a few timers running. When a timer expires, it powers up a part of the mote to carry out a job, then powers off. A few of the timers control the sensors that measure one of a number of physical or chemical stimuli such as temperature, ambient light, vibration, acceleration, or air pressure. When one of these timers expires, it powers up the corresponding sensor, takes a sample, and converts it to a digital word. If the data is interesting, it may either be stored directly in the SRAM or the microcontroller is powered up to perform more complex operations with it. When this task is complete, everything is again powered down and the timer begins counting again. Another timer controls the receiver. When that timer expires, the receiver powers up and look for an incoming packet. If it doesn't see one after a certain length of time, it is powered down again. The mote can receive several types of packets, including ones that are new program code that is stored in the program memory. This allows the user to change the behavior of the mote remotely. Packets may also include messages from the base station or other motes. When one of these is received, the microcontroller is powered up and used to interpret the contents of the message. The message may tell the mote to do something in particular, or it may be a message that is just being passed from one mote to another on its way to a particular destination. In response to a message or to another timer expiring, the microcontroller will assemble a packet containing sensor data or a message and transmit it using either the corner cube retro-reflector or the laser diode, depending on which it has. The laser diode contains the onboard laser which sends signals to the base station by blinking on and off. The corner cube retro-reflector transmits information just by moving a mirror and thus changing the reflection of a laser beam from the base station. This technique is substantially more energy efficient than actually generating some radiation. With the laser diode and a set of beam scanning mirrors, we can transmit data in any direction desired, allowing the mote to communicate with other Smart Dust motes.

APPLICATIONS

- Civil and military applications where chemical & biological agents in a battle field are detected.
- Virtual keyboard Glue a dust mote on each of your fingernails. Accelerometers will sense the orientation and motion of each of your fingertips, and talk to the computer in your watch. Combined with a MEMS augmented reality heads-up display, your entire computer I/O would be invisible to the people around you
- Inventory Control Smart office spaces The Center for the Built Environment has fabulous plans for the office of the future in which environmental conditions are tailored to the desires of every individual. Maybe soon we'll all be wearing temperature, humidity, and environmental comfort sensors sewn into our clothes, continuously talking to our workspaces which will deliver conditions tailored to our needs.
- Individual dust motes can be attached to the objects one wishes to monitor or a large number of dust motes may be dispersed in the environment randomly.
- Dust motes may be used in places where wired sensors are unusable or may lead to errors. Example: Instrumentation of semiconductor processing chambers, wind tunnels, rotating machinery etc.
- May be used in biological research example: to monitor movements & internal processes of insects



Techno savior

Portable Wireless Head Movement Controlled Human-Computer Interface for People with Disabilities

Gurupreet Singh

Reference - www.electronicsforu.com

ABSTRACT: This paper describes about an economical head operated computer mouse for people with disabilities. It focuses on the invention of a head operated computer mouse that employs one tilt sensor placed in the headset to determine head position and to function as simple head-operated computer mouse. The system uses accelerometer based tilt sensor to detect the user's head tilt in order to direct the mouse movement on the computer screen. Clicking of mouse is activated by the user's eye brow movement through a sensor. The keyboard function is designed to allow the user to scroll letters with head tilt and with eye brow movement as the selection mechanism. Voice recognition section is also present in the head section to identify the small letters which are pronounced by the paralyzed user. This system was invented to assist people with disabilities to live an independent professional life.

INTRODUCTION

OWING to the lack of appropriate input devices, people with disabilities often encounter several obstacles when using computers. Currently, keyboard and mouse are the most common input devices. Due to the increasing popularity of the Microsoft Windows interface, i.e., Windows 98 and NT, computer mouse has become even added important. Therefore, it is necessary to invent a simple mouse system for people with disabilities to operate their computers. People with spinal cord injuries (SCIs) and who are paralyzed have increasingly applied electronic assistive devices to improve their ability to perform certain essential functions. Electronic equipment, which has been modified to benefit people with disabilities include communication and daily activity devices, and powered wheelchairs. From our literature analysis there are many computer input devices are available. Finger mounted device using pressure sensors, but no hardware has been realized so far and it needs physical kind of interaction with computer system. A wide range of interfaces are available between the user and device and the interfaces can be enlarged keyboards or a complex system that allows the user to operate or control a movement with the aid of a mouth stick, However, for many people the mouth stick method is not accurate and comfortable to use. An eye imaged input system, electrooculography (EOG) signals, electromyogram (EMG) signals, Electroencephalogram (EEG) signals are capable of providing only a few controlled movements have slow response time for signal processing and require substantial motor coordination. In infrared or ultrasound-controlled mouse system (origin instruments' head mouse and prentke romish's head master), etc. There are two primary determinants that are of concern to the user. The first one being whether the transmitter is designed to aim at an effective range or not with respect to receiver, the other one being whether the cursor of computer mouse can move with his head or not. These considerations increase the load for people with disabilities. Thus, alternative systems that utilize commercially available electronics to perform tasks with easy operation and easy interface control are sorely required.

The ability to operate a computer mouse has become increasingly important to people with disabilities especially as the advancement of technology allows more and more functions to be controlled by computer. There are many reasons for people with disabilities to operate a computer. For instance, they need to acquire new knowledge and communicate with the outside world through the Internet. In addition, they need to work at home, enjoy leisure activities, and manage many other things, such as home shopping and internet banking. This research focuses on a tilt sensor controlled computer mouse.



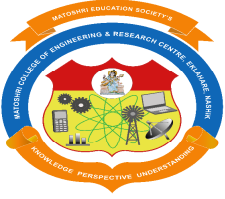
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The tilt sensors or inclinometers detect the angle between a sensing axis and a reference vector such as gravity or the earth's magnetic field. In the area of medicine science, tilt sensors have been used mainly in occupational medicine research. For example, application of tilt sensors in gait analysis is currently being investigated. Andrews et al. used tilt sensors attached to a floor reaction type ankle foot orthosis as a biofeedback source via an electrocutaneous display to improve postural control during functional electrical stimulation (FES) standing. Bowker and Heath recommended using a tilt sensor to synchronize peroneal nerve stimulation to the gait cycle of hemiplegics by monitoring angular velocity. Basically, tilt sensors have potential applications of improving the abilities for persons with other disabilities. The system uses MEMS accelerometers to detect the user's head tilt in order to direct mouse movement on the computer screen. Clicking of the mouse is activated by the user's eye-brow movement through a sensor. The keyboard function is designed to allow the user to scroll letters with head tilt and with eye brow movement as the selection mechanism. Voice recognition section is also present in the head section to identify the small letters which are pronounced by the paralyzed user. The tilt sensors can sense the operator's head motion up, down, left, and right, etc. Accordingly, the cursor direction can be determined.

The system replaces the original computer mouse with tilt sensors which are mounted onto a headset worn by people with disabilities. The user performs to control computer mouse in order to move the cursor and perform all necessary functions in Windows 98. This mouse controlled functions include: up, down, left, right, upper-left, upper-right, lower-left, lower-right. The circuit of computer mouse interface controlled by tilt sensor is composed of six major elements: 1) the tilt sensor module; 2) the voice recognition module; 3) Eye brow sensor module; 4) the signal processing module; 5) Microcontroller module; 6) Wireless communication module.

SUMMARY

The increasing number of various accidental injuries over the years has resulted in a dramatic increase in the population of individuals with disabilities. Although there are numerous devices that can supplement the loss of function for people with spinal cord injuries, there is still a substantial difference in terms of their convenience and accuracy. Most of the devices are designed to serve as a computer mouse supplement for the individuals with disabilities by utilizing methods of mouth stick, eyeball movements, or eye-ball-imaging to complete the input motion. Although mouth stick provides reasonable function and allow successful input through the computer mouse, it frequently lack good sanitation or convenience because it is orally activated. Similarly, eyeball movement and eyeball-imaging based systems rely on high level imaging analysis (with questionable accuracy), and they require a much longer operating time to input a number or a letter. As the head-controlled mouse relies on infrared and ultrasonic signals, the transmitter placed on the head sends signals to the remote receiver after a motion is detected. However, the user must focus on the cursor's movement on the computer screen and assure that the transmitted signals are within the reception range of the receiver. As a result, these devices certainly cause troubles for people with disabilities. In addition, these systems have disadvantages such as expensive instrument costs and the requirements of extended operational training. In the era of new millennium, it is our concern that individuals with disabilities do not become technological orphans in the areas of electronics and computers. Specifically, for people with disabilities to overcome inconveniences in their daily lives, we have utilized the least amount of circuitry as well as highly accurate control system to generate devices. The system presented in this paper allows people with disabilities to avoid the need to use uncomfortable input methods such as clutching a mouth stick. Rather, this system employs a tilt sensor module to control the computer mouse in response to the



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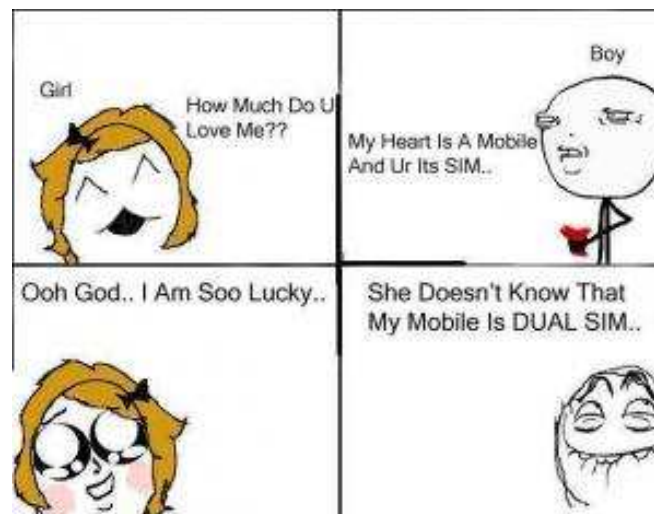
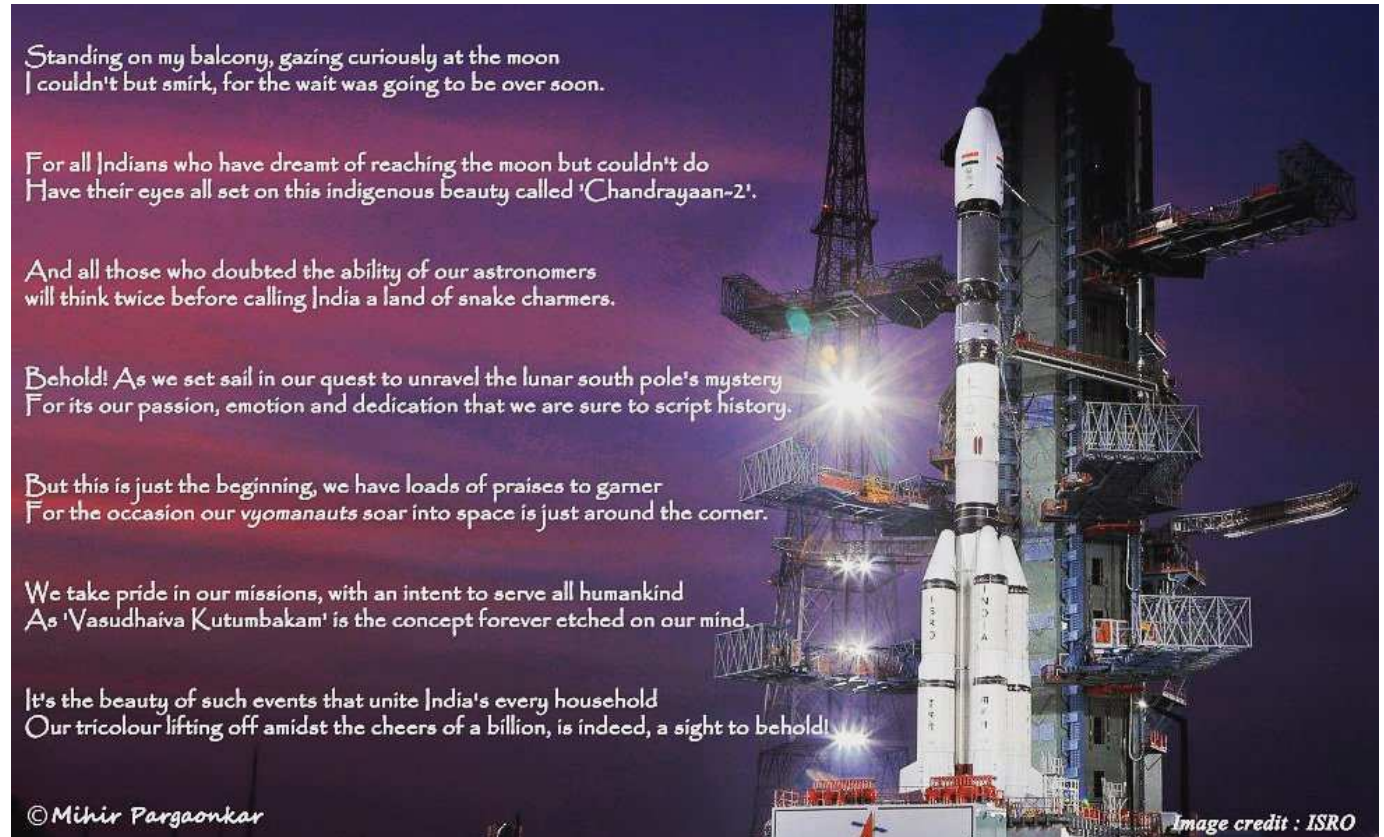
movements of neck's rotation. There are several user-friendly features also included in this system. As a result, this system outperforms the mouth stick-based system in terms of providing users the advantages such as convenience, accuracy, and sanitation. In addition, a headset-type control method is especially helpful for those who are quadriplegic due to spinal cord injuries. The quantitative data also revealed that following limited training, nondisabled and people with disabilities can operate the system with an accuracy that exceeds 95%. On average, it took 7–9 s to complete a single mouse motion. The result shows people with disabilities can operate the system as good as nondisabled. Furthermore, when compared to the previously developed infrared controlled human–computer mouse interface, the newly developed system can complete a single mouse command 3–4 s faster, which proves the practical value of the system. People with disabilities can also mount the tilt sensor module on prosthesis, a protective gear, or on a powered wheelchair to achieve the objective of using the computer mouse easily and sanitarily. This computer mouse interface, which is controlled by tilt sensor, utilizes current circuit technology to accomplish the control of a computer mouse system effectively. In the future, this interface can be introduced into many control systems at home such as powered wheelchairs, telephones, and appliances with great potential demanded by the market.

Vision based hand gesture recognition using Indian sign language. –Shivani Kasar (T.E I.T)

The sign language is basically a language in which there is manual communication to convey meaning, contrary to conveyed sound patterns. This involves simultaneous combinations of orientation, hand shapes and movement of the person's hands, arms and body to express his thoughts. A number of sign languages share a lot of similarities with the spoken languages, that depends primarily on sound, and linguists considered both to be the types of natural language. Although there are many significant differences between spoken and signed languages, like as how they use space grammatically, sign languages show the same linguistic properties and use the same language faculty as do spoken languages. Still it is not known that how many sign languages exist. One of the very common misconception is all sign languages are same worldwide or sign language is international. Aside from the pidgin International Sign, almost every country has its own, native sign language, and some countries have more than one because of different languages in the country itself based on the regions. The 2013 edition of Ethnologue lists 137 sign languages. Some sign languages have achieved some form of legal recognition, while there are many others which have no status at all. In South Asia, Indo-Pakistani Sign Language (IPSL) is the predominant sign language used by at least several hundred thousand deaf signers. As with many sign languages, it is highly difficult to count numbers with any certainty, as the Census of India has not listed sign languages and most of the studies have focused on the north and urban areas. Human Computer Interaction moves forward in the field of sign language interpretation. Indian Sign Language (ISL) Interpretation system is a good way to help the Indian hearing impaired people to interact with normal people with the help of computer. As compared to other sign languages, ISL interpretation has got less attention by the researcher. In this paper, some historical background, need, scope and concern of ISL are given. Vision based hand gesture recognition system have been discussed as hand plays vital communication mode. Considering earlier reported work, various techniques available for hand tracking, segmentation, feature extraction and classification are listed. Vision based system have challenges over traditional hardware based approach; by efficient use of computer vision and pattern recognition, it is possible to work on such system which will be natural and accepted, in general. This article proposes an algorithm for automatically recognizing some certain amount of gestures from hand movements to help deaf and dumb and hard hearing people. Hand gesture recognition is quite a challenging problem in its form. We have considered a fixed set of manual

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commands and a specific environment, and develop a effective, procedure for gesture recognition. Presented approach contains steps for segmenting the hand region, locating the fingers, and finally classifying the gesture which in general terms means detecting, tracking and recognizing. The algorithm is non-changing to rotations, translations and scale of the hand.





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Gesture and Voice recognition in Internet of Things -Chinhole Pooja (B.E I.T)

IoT is defined as “An open and comprehensive network of intelligent objects that have the capacity to auto-organize, share information, data and resources ,reacting and acting in face situation and changes in environment. Proposed system gives an approach for combination of voice and gesture. Gesture and voice control system is for humanized interface with any electronic device. In previous system four different color makers were used to recognize fur different fingers but it has lightning condition. In the proposed work, voice and gesture are combined to make humanized interaction with devices. The system is used to recognize gesture by counting number of fingers and voice recognize method can be used to support complicated voice command. The proposed combination of voice and gesture can be applicable in smart homes and also in personal area networks.

The Internet of Things (IOT) is a comparatively recent concept of systems where Internet-enabled "things" in the physical world equipped with sensors, actuators and capable of interacting with the environment are connected to the Internet for monitoring and control of the "things". The concept has grown enormously during the last one and half decade. The growth of the IoT has influence on everyone and everything, and is expected to make great differences in the next decades. In this paper, an approach of combined voice and gesture control of IoT is proposed. A prototype system based on an ARM Cortex-A8 processor under embedded Linux operating system has been developed for performance study and measurement on a real-time test set-up. Test results show that the system is capable of recognizing hand gestures and voice commands on real-time frame for controlling ZigBee-enabled devices over the wireless communication channel.

SMART DOCTOR: An emergency health care system - Sapkal Sweety (B.E I.T)

Health care system is the need of the day , especially remote and rural areas still lack the necessary primary health care units. Proposed system is the use of medical based communication and information technology to provide clinical health care from a distance. It has been used to overcome distance barriers and to improve access to medical services that would often not be consistently available in distant rural communities. It can be also applicable to save lives in critical care and emergency situations. Although there were distant precursors to medicine, it is essentially a product of medical based communication and information technologies. Bandwidth and cost are major determinants for the success of any medical based program. In this medical based system, be developed which works on low bandwidth and is less costly to provide consultation services in rural and remote areas of India. Expected outcome: A web-based consultation system which can work on low bandwidth mobile internet connection to provide online care for rural patients.

In recent days and in near future we will be witnessing the online world and in such a fast chaging world, we also need virtual health care systems. This article focuses on importance of such smart doctor an online way of medical help especially in rural areas. When all the remote areas will get the health help and medical facilities soon, we can be enhancing our development.



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Applying techniques of Sentiment Analysis on LinkedIn Comments -

Pratik Patil (B.E I.T)

Sentiment Analysis is the process of determining whether a piece of writing is positive, negative or neutral. A sentiment analysis system for text analysis combines natural language processing and machine learning techniques to assign weighted sentiment scores to the entities, topics, themes and categories within a sentence or phrase. **Natural Language Processing (NLP)** is a subfield of artificial intelligence (AI). It helps machines **process** and understand the human **language** so that they can automatically perform repetitive tasks. Examples include machine translation, summarization, ticket classification, and spell check. Today, the social networking has become a part of every days life. Because people post, share their opinions, own feelings and own comments for the post and rates the products, photos and videos. Many social platforms have millions of active users. Among all of the social media platforms, the LINKEDIN which is a Professional website will help the people to post comments, like and share the post, and also help the people search about the job. There is lot of opinions for the single post, but people want the common opinions about the post to clearly know about the job/post. In that situation, sentiment analysis will help the people to know the common opinions about the post/job are positive or negative or neutral. In this paper we have analyzed the peoples opinion in the text format about the post whether it is positive or negative or neutral using the NLP (Natural Language Processing), Linguistic Process with programming like that of Python Coding.

The proposed article focuses on using sentiment analysis to detect the emotions about the product or service. Such detection can help the brand owners to understand their brand performance. They can improve their performance if they understand the customer feedback. They can even perform better when they work on customer needs and understand the psychology behind their brands market portfolio.

Artificial intelligence in teaching and learning -Patil Mayur (T.E I.T)

Today, the world is going digital and its an online revolution, with all the domains going digital its time for education too. The future of higher education is intrinsically linked with developments on new technologies and computing capacities of the new intelligent machines. In this field, advances in artificial intelligence open to new possibilities and challenges for teaching and learning in higher education, with the potential to fundamentally change governance and the internal architecture of institutions of higher education. With answers to the question of ‘what is artificial intelligence’ shaped by philosophical positions taken since Aristotle, there is little agreement on an ultimate definition.

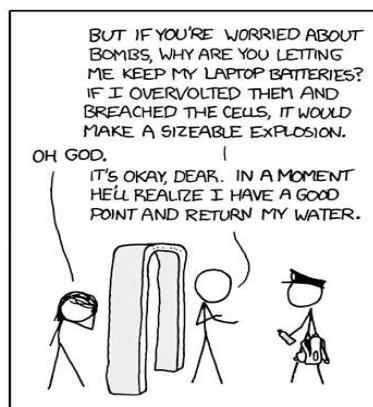
In 1950s, Alan Turing proposed a solution to the question of when a system designed by a human is ‘intelligent.’ Turing proposed the imitation game, a test that involves the capacity of a human listener to make the distinction of a conversation with a machine or another human; if this distinction is not detected, we can admit that we have an intelligent system, or artificial intelligence (AI). It is worth remembering that the focus on AI solutions goes back to 1950s; in 1956 John McCarthy offered one of the first and most influential definitions: “The study [of artificial intelligence] is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.” (Russell and Norvig 2010).

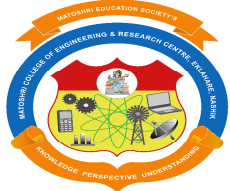
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Since 1956, we find various theoretical understandings of artificial intelligence that are influenced by chemistry, biology, linguistics, mathematics, and the advancements of AI solutions. However, the variety of definitions and understandings remains widely disputed. Most approaches focus on limited perspectives on cognition or simply ignore the political, psychological, and philosophical aspects of the concept of intelligence. For the purpose of our analysis of the impact of artificial intelligence in teaching and learning in higher education, we propose a basic definition informed by the literature review of some previous definitions on this field. Thus, we can define artificial intelligence (AI) as computing systems that are able to engage in human-like processes such as learning, adapting, synthesizing, self-correction and use of data for complex processing tasks.

Artificial intelligence is currently progressing at an accelerated pace, and this already impacts on the profound nature of services within higher education. For example, universities already use an incipient form of artificial intelligence, IBM's supercomputer Watson. This solution provides student advice for Deakin University in Australia at any time of day throughout 365 days of the year (Deakin University [2014](#)). Even if it is based on algorithms suitable to fulfill repetitive and relatively predictable tasks, Watson's use is an example of the future impact of AI on the administrative workforce profile in higher education. This is changing the structure for the quality of services, the dynamic of time within the university, and the structure of its workforce. A supercomputer able to provide bespoke feedback at any hour is reducing the need to employ the same number of administrative staff previously serving this function. In this context, it is also important to note that 'machine learning' is a promising field of artificial intelligence. While some AI solutions remain dependent on programming, some have an inbuilt capacity to learn patterns and make predictions. An example is AlphaGo—a software developed by DeepMind, the AI branch of Google's—that was able to defeat the world's best player at Go, a very complex board game (Gibney [2017](#)). We define 'machine learning' as a subfield of artificial intelligence that includes software able to recognize patterns, make predictions, and apply the newly discovered patterns to situations that were not included or covered by their initial design.

BAG CHECK





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Mechanochemistry

Mr. Beg Anis Yunus, Student-BE Mechanical

Mechanochemistry or mechanical chemistry is the coupling of mechanical and chemical phenomena on a molecular scale and includes mechanical breakage, chemical behavior of mechanically stressed solids (e.g., stress-corrosion cracking or enhanced oxidation), tribology, polymer degradation under shear, cavitation-related phenomena (e.g., sonochemistry and sonoluminescence), shock wave chemistry and physics, and even the burgeoning field of molecular machines. Mechanochemistry can be seen as an interface between chemistry and mechanical engineering. It is possible to synthesize chemical products by using only mechanical action. The mechanisms of mechanochemical transformations are often complex and different from usual thermal or photochemical mechanisms. The method of ball milling is a widely used process in which mechanical force is used to achieve chemical processing and transformations. The special issue of Chemical Society Review (vol. 42, 2013, Issue 18) is dedicated to the theme of mechanochemistry. Fundamentals and applications ranging from nano materials to technology have been reviewed. The mechanochemical approach has been used to synthesize metallic nanoparticles, catalysts, magnets, γ -graphyne, metal iodates, nickel–vanadium carbide and molybdenum–vanadium carbide nanocomposite powders

Mechanochemistry is radically different from the traditional way of dissolving, heating and stirring chemicals in a solution. Because it eliminates the need for many solvents, mechanochemistry could help make many chemical processes used by industry more environmentally friendly. For example, the mechanochemical process has been used as an environmentally preferable way to synthesize pharmaceutically-attractive phenol hydrazones.

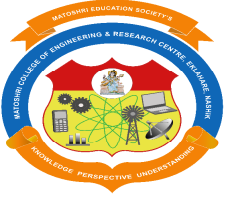
The term mechanochemistry is sometimes confused with mechanosynthesis, which refers specifically to the machine-controlled construction of complex molecular products.

Mechanochemical phenomena have been utilized since time immemorial, for example in making fire. The oldest method of making fire is to rub pieces of wood against each other, creating friction and hence heat, allowing the wood to undergo combustion at a high temperature. Another method involves the use of flint and steel, during which a spark (a small particle of pyrophoric metal) spontaneously combusts in air, starting fire instantaneously.

Railcar

Mr. R.S.Patil

A railcar is a self-propelled railway vehicle designed to transport passengers. The term "railcar" is usually used in reference to a train consisting of a single coach (carriage, car), with a driver's cab at one or both ends. Some railway companies, such as the Great Western, termed such vehicles "railmotors" (or "rail motors"). Self-propelled passenger vehicles also capable of hauling a train are, in technical rail usage, more usually called "rail motor coaches" or "motor cars" (not to be confused with the motor cars, otherwise known as automobiles, that operate on roads).



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The term is sometimes also used as an alternative name for the small types of multiple unit which consist of more than one coach. That is the general usage nowadays in Ireland when referring to any diesel multiple unit (DMU), or in some cases electric multiple unit (EMU).

In North America the term "railcar" has a much broader sense and can be used (as an abbreviated form of "railroad car") to refer to any item of hauled rolling-stock, whether passenger coaches or goods wagons (freight cars). Self-powered railcars were once common in North America; see Doodlebug (rail car).

In its simplest form, a "railcar" may also be little more than a motorized railway handcar or raisin, otherwise known as a speeder.

Uses

Railcars are economic to run for light passenger loads because of their small size, and in many countries are often used to run passenger services on minor railway lines, such as rural railway lines where passenger traffic is sparse, and where the use of a longer train would not be cost effective. A famous example of this in the United States was the Galloping Goose railcars of the Rio Grande Southern Railroad, whose introduction allowed the discontinuance of steam passenger service on the line and prolonged its life considerably.

Railcars have also been employed on premier services. In New Zealand, although railcars were primarily used on regional services, the Blue Streak and Silver Fern railcars were used on the North Island Main Trunk between Wellington and Auckland and offered a higher standard of service than previous carriage trains. In Australia, the Savannahlander operates a tourist service from the coastal town of Cairns to Forsayth, and Traveltrain operates the Gulflander between Normanton and Croydon in the Gulf Country of northern Queensland.

Regulation and licensure in Engineering

Mr. Akshay Wani, Student-BE Mechanical

Regulation and licensure in engineering is established by various jurisdictions of the world to encourage public welfare, safety, well-being and other interests of the general public and to define the licensure process through which an engineer becomes authorized to practice engineering and/or provide engineering professional services to the public.

As with many other professions, the professional status and the actual practice of professional engineering is legally defined and protected by law in some jurisdictions. Additionally, some jurisdictions permit only licensed engineers (sometimes called registered engineers) to "practice engineering," which requires careful definition in order to resolve potential overlap or ambiguity with respect to certain other professions which may or may not be themselves regulated (e.g. "scientists," or "architects"). Relatedly, jurisdictions that license according to particular engineering discipline need to define those boundaries carefully as well so that practitioners understand what they are permitted to do. In many cases, only a state or provincial licensed/registered engineer has the authority to take legal responsibility for engineering work or projects (typically via a seal or stamp on the relevant design documentation). Regulations may require that only a licensed or registered engineer can sign, seal or stamp technical documentation such as reports, plans, engineering drawings and calculations for study



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estimate or valuation or carry out design analysis, repair, servicing, maintenance or supervision of engineering work, process or project. In cases where public safety, property or welfare is concerned, it may be required that an engineer be licensed or registered – though some jurisdictions have an "industrial exemption" that permits engineers to work internally for an organization without licensure so long as they are not making final decisions to release product to the public or offering engineering services directly to the public (e.g. consultant).

Expert witness or opinion in courts or before government committees or commissions can be provided by experts in the respective field, which is sometimes given by a registered or licensed engineer in some jurisdictions.

Registration and regulation

Becoming an engineer is a process that varies widely around the world. In some regions, use of the term "engineer" is regulated, in others it is not. Where engineering is a regulated profession, there are specific procedures and requirements for obtaining a registration, charter or license to practice engineering. These are obtained from the government or a charter-granting authority acting on its behalf and engineers are subject to regulation by these bodies. In addition to licensure, there are voluntary certification programs for various disciplines which involve examinations accredited by the Council of Engineering and Scientific Specialty Boards.

Due to occupational closure, licensed engineers enjoy significant influence over their regulation. They are often the authors of the pertinent codes of ethics used by some of these organizations. Engineers in private practice most often find themselves in traditional professional-client relationships in their practice. Engineers employed in government service and government-run industry are on the other side of that relationship. Despite the different focus, engineers in industry and private practice face similar ethical issues and reach similar conclusions. One American engineering society, the National Society of Professional Engineers, has sought to extend a single professional license and code of ethics for all engineers, regardless of practice area or employment sector.

GPS aircraft tracking System

Mr. Jayesh Parate, Student-BE Mechanical

GPS aircraft tracking is a means of tracking the position of an aircraft fitted with a GPS receiver. By communication with GPS satellites, detailed real-time data on flight variables can be passed to a server on the ground. This server stores the flight data, which can then be transmitted via telecommunications networks to organizations wishing to interpret it. Some devices are avionics components like ACARS and ADS-B. In these cases the receiving and transmitting antenna are usually located outside of the airframe. When devices are not installed as avionics components they have to be completely independent from the aircraft. They are typically placed inside of the airframe in a location where the GPS and communication satellites are directly visible to the device, for example through the cockpit window. The output signal must also be able to penetrate the aircraft - most civil aviation authorities require compliance with DO-160 for audio frequency conducted susceptibility and induced signal susceptibility. Authorities classify non-installed components as "transmitting portable electronic devices" (T-PEDS) and as such require them to be switched off during the critical phases of flight.

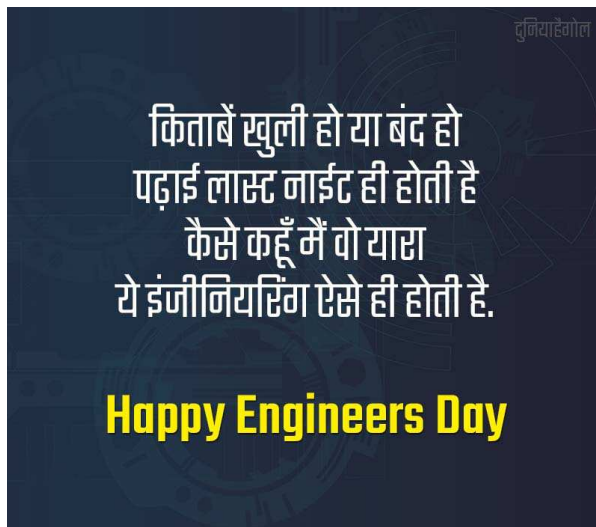
Applications

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Accurate real-time data provided by GPS aircraft tracking may be offered to air traffic control using ADS-B technology. This can safely reduce airspace separation of aircraft. GPS aircraft tracking also enables airlines to track their fleet of aircraft over the ACARS system, and allows aircraft to be more easily located in the event of an accident. The data is processed to gather "OOOI" information about movements within the airport and to compute flight time. Finally, GPS aircraft tracking permits a flight school to track a trainee pilot and debrief his/her flight path afterwards.

Active aircraft tracking

There are several active aircraft tracking systems available on the market that use the "bread-crumbs approach" to SAR. Rather than relying on an emergency locator transmitter to transmit upon impact, the next generation of emergency locating devices are active tracking devices that send position reports at regular time intervals. If the unit stops transmitting upon impact, the historical transmissions will give the last known location of the aircraft, its speed, direction and altitude. Tracking as an alternative or complement to current technology has recently been encouraged by the Coroner in New Zealand.



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