Department of Electronics And Communication Engineering

E-SPARSH

Technical Magazine

JAN - JUN 2022

EDITORIAL BOARD

INSTITUTION

Vision of the Institute:

To be a premier center of learning in Engineering and Management education that evolves the youth into dynamic professionals with a social commitment

Mission of the Institute:

M1: To provide quality teaching- learning practices in engineering and management education by imparting core instruction and state-of-the-art infrastructure.

M2: To engage the faculty and students in acquiring competency in emerging technologies and research activities through Industry Institute Interaction.

M3: To foster social commitment in learners by incorporating leadership skills and ethical values through value-based education

DEPARTMENT

Vision of the Department:

To produce technically competent and research oriented Electronics and Communication Engineers to meet the Industrial and Social requirements.

Mission of the Department:

M1: To impart quality technical education in the field of Electronics and Communication Engineering through state-of-the art facilities and effective teaching learning process.

M2: To enrich the faculty and students with research and consultancy skills through Industry-Interaction and Training in Emerging areas of Electronics and Communication Engineering.

M3: To develop lifelong learning, leadership qualities and ethical values in learners to meet the societal and industrial needs.

Program Educational Objectives (PEOs)

PEO-I : Graduates will have the capabilities to analyze, design and develop innovative solutions for the problems in the field of Electronics and Communication Engineering using core competencies.

PEO-II :Graduates will have the ability to engage themselves in research and lifelong learning to achieve professional excellence.

PEO-III : Graduates will have successful career with leadership qualities, ethics and good communication skills in Electronics and Communication Engineering and related fields.

ECE PBRVITS | **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

Program Outcomes (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1 : Graduates will be able to design and analyze Image Processing and communication systems concepts using appropriate tools.

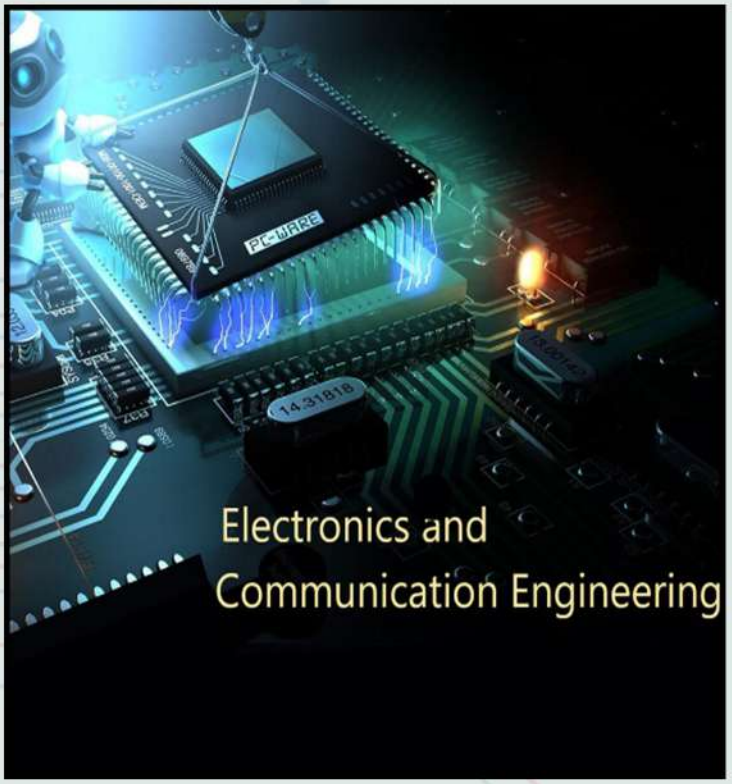
PSO-2 : Graduates will be able to design and develop solutions for real world problems by applying the concepts of VLSI and Embedded systems.

DEPARTMENT PROFILE

The Department of Electronics and Communication Engineering (ECE) was established in the years 1998–99 with an intake of 60 and currently running with an intake of 240. It is 24 years old now and one of the most well-established departments in our Institution. It is also offering one post graduate programme with the specialization of VLSI Design with an intake of 30 students.

The Department is known for its esteemed faculty members who are renowned for their path-breaking contributions in the field of electronics and communications. It is well equipped with laboratories, audio-visual facilities and software tools such as MultiSim, ModelSim, Lab View, HFSS, MATLAB, and Xilinx.

We offer our students an excellent educational experience that combines intellectual rigor and cross-disciplinary breadth. The course contents are periodically updated to introduce new scientific and technological developments. Electronic design, communication technologies, hands-on programming, a research focus, and entrepreneurship skills are all part of our signature educational curriculum. The ECE domain is often regarded as a challenging culmination of hardware and software. Our curriculum focuses primarily on the knowledge and skills that emerging engineers need.



PROFESSOR DESK

I am proud to see that the students of our department have put in appreciable effort into creating the e-magazine, E-SPARSH. It is good to see that today's generation has not lost its literary roots, despite the perpetual efforts of e-Technology to extinguish the flames of the written word.

This e-magazine is an exceptional proof that the literary flame is burning bright. I look forward to seeing the juniors taking up the reigns of this e- magazine in future, so that this tradition remains eternal.

It gives me immense pleasure to announce the release of E-SPARSH. The primary focus of this technical e- magazine is to empower our students with overall development. I am grateful to everyone involved in making this journey successful.

Dr. A. Maheswara Rao
Professor & HOD, ECE.

1. SMART NOTE TAKER

The Smart Note Taker is such a helpful product that satisfies the needs of the people in today's technologic and fast life. This product can be used in many ways. The Smart NoteTaker provides taking fast and easy notes to people who are busy one's self with something. With the help of Smart NoteTaker, people will be able to write notes onthe air, while being busy with their work.

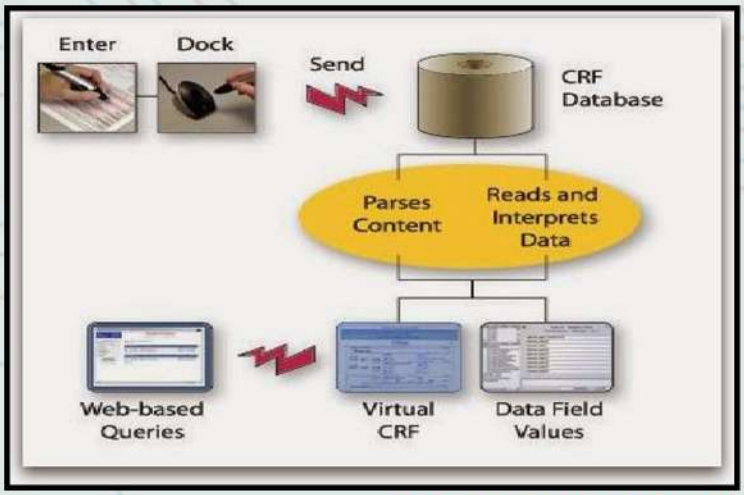
The written note will be stored on the memorychip of the pen, and will be able to read in digital medium after the job has done. This will save time and facilitate life. The Smart NoteTaker is goodand helpful for blinds that think and write freely. Another place, where our product can play animportant role, is where two people talks on the phone. The subscribers are apart from each other while their talk, and they may want to use figures or texts to understand themselves better. It's alsouseful especially for instructors in presentations.

The instructors may not want to present the lecture in front of the board. The drawn figure canbe processed and directly sent to the server computer in the room. The server computer thencan broadcast the drawn shape through network to all of the computers which are present in the room. By this way, the lectures are aimed to be more efficient and fun. This product will be simple but powerful. The product will be able to sense 3Dshapes and motions that user tries to draw.

The sensed information will be processed andtransferred to the memory chip and then will be monitored on the display device. The drawn shape then can be broadcasted to the network or sent to a mobile device.

Technical Definition of the Product:

In order to meet the technical requirements of the product we need Operating System Like Windows or Linux in order to implement software part of the project, Displacement Sensors to recognize the displacement of the pen in three dimensions, parallel cable to communicate with computer, software to solve the displacement data and finds the individual coordinate displacements in three axes and transform the data into text format, analog to digital converter to process analog displacement data and convert them into digital format, switch to control the pen and Rechargeable battery.



DEVARAPALLI LAVANYA
(18731A0445)

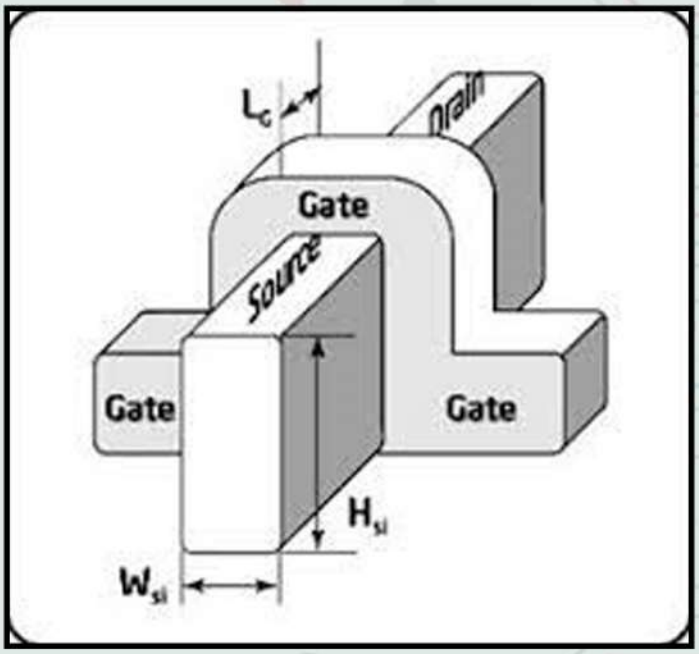
2.TRI GATE TRANSISTORS

Tri-Gate transistors, the first to be truly three-dimensional, mark a major revolution in the Semiconductor industry. The semiconductor industry continues to push technological innovation to keep pace with Moores Law, shrinking transistors so that ever more can be packed on a chip. In this regard Tri-gate transistor architecture makes it possible to continue Moore's law at 22nm and below without a major transistor redesign.

The physics, technology and the advantages of the device is briefly discussed in this paper. Since their inception in the late 1950s, planar transistors have acted as the basic building block of microprocessors. However, as these transistor elements become harder to scale, so does the transistor gate length. The scaling of planar transistors is getting more difficult due to the worsening electrostatics and short-channel performance with reducing gate-length dimension.

In a multigate device, the channel is surrounded by several gates on multiple surfaces, allowing more effective suppression of "off state" leakage current.

Multiple gates also allow enhanced current in the "on" state, also known as drive current. These advantages translate to lower power consumption and enhanced device performance. Non-planar devices are also more compact than conventional planar transistors, enabling higher transistor density which translates to smaller overall microelectronics state, also known as drive current.



These advantages translate to lower power consumption and enhanced device performance. Non-planar devices are also more compact than conventional planar transistors, enabling higher transistor density which translates to smaller overall microelectronics A new transistor architecture that can significantly improve the electrostatics and short-channel performance is the tri-gate transistor, as shown in Figure. This transistor, which can be fabricated either on the SOI substrate or standard bulk-silicon substrate, has a gate electrode on the top and two gate electrodes on the sides of the silicon body.

Other complementary strategies for device scaling include channel strain engineering, silicon-on-insulator-based technologies, and high-k/metal gate materials. Tri-gate or 3-D are the terms used by Intel Corporation to describe their non-planar transistor architecture planned for use in future microprocessors.

These transistors employ a single gate stacked on top of two vertical gates allowing for essentially three times the surface area for electrons to travel. . This allows up to 37% higher speed, and a power consumption at under 50% of the previous type of transistors used by Intel. Intel explains, "The additional control enables as much transistor current flowing as possible when the transistor is in the 'on' state (for performance), and as close to zero as possible when it is in the 'off' state (to minimize power), and enables the transistor to switch very quickly between the two states (again, for performance)." Further to increase the drive strength for increased performance, multiple fins are used.

GRIDDALURU NEERAJ
(18731A0447)

3. ULTRA CAPACITORS

Almost everything we use requires a battery(computers, mobile cell phones, flashlights, hybridelectric cars, personal entertainment devices like Ipod, etc). Recent work at MIT's Laboratory for Electromagnetic and Electronic Systems (LEES) offers the most economically viable alternative toconventional batteries in more than 200 years. The Ultracapacitor is both a battery and a capacitor. Ultracapacitors could allow laptops and cell phones to be charged in a minute. Unlike laptop batteries, which start to lose their ability to hold a charge after a year or two (several hundredcharge/discharge cycles), ultracapacitors have hundreds of thousands of charge/discharge cycles and could still be going strong long after the device is obsolete.

Ultra capacitors & Super Capacitors store electricity by physically separating positive andnegative charges— different from batteries whichdo so chemically. The charge they hold is like the static electricity that can build up on a balloon, but is much greater thanks to the extremely high-surface area of their interior materials. An advantage of the ultracapacitor is their super fast rate of charge and discharge... which is determined solely by their physical properties. Abattery relies on a slower chemical reaction for energy. A disadvantage of an ultracapacitor is that currently they store a smaller amount of energy than a battery does.

Ultracapacitors are very good at efficiently capturing electricity from regenerative braking, and can deliver power for acceleration just as quickly. With no moving parts, they also have a very long lifespan - 500,000 plus charge/recharge cycles. Ultracapacitors are currently used for wind energy, solar energy, and hydro energy storage. An ultra capacitor, also known as a double-layer capacitor, polarizes an electrolytic solution to store energy electro statically. Though it is an electrochemical device, no chemical reactions are involved in its energy storage mechanism. This mechanism is highly reversible, and allows the ultracapacitor to be charged and discharged hundreds of thousands of times.

Once the ultra capacitor is charged and energy stored, a load (the electric vehicle's motor) can use this energy. The amount of energy stored is very large compared to a standard capacitor because of the enormous surface area created by the porous carbon electrodes and the small charge separation created by the dielectric separator. An ultracapacitor can be viewed as two non-reactive porous plates, or collectors, suspended within an electrolyte, with a voltage potential applied across the collectors.

Electrical energy storage devices, such as capacitors, store electrical charge on an electrode. Other devices, such as electrochemical cells or batteries, utilize the electrode to create, by chemical reaction, an electrical charge at the electrodes. In both of these, the ability to store or create electrical charge is a function of the surface area of the electrode. For example, in capacitors, greater electrode surface area increases the capacitance or energy storage capability of the device.

As a storage device, the ultracapacitor, relies on the microscopic charge separation at an electrochemical interface to store energy. Since the capacitance of these devices is proportional to the active electrode area, increasing the electrode surface area will increase the capacitance, hence increasing the amount of energy that can be stored. This achievement of high surface area utilizes materials such as activated carbon.

However, in both situations, there is an intrinsic limit to the porosity of these materials, that is, there is an upper limit to the amount of surface area that can be attained simply by making smaller and smaller particles. An alternative method must be developed to increase the active electrode surface area without increasing the size of the device. A much more highly efficient electrode for electrical energy storage devices could be realized if the surface area could be significantly increased.

JEDDA MANASA KALYANI
(18731A0449)

4. SMART ANTEENA

One of the most rapidly developing areas of communications is “Smart Antenna” systems. A smart antenna is an array of antenna elements connected to a digital signal processor. Such a configuration dramatically enhances the capacity of a wireless link through a combination of diversity gain, array gain, and interference suppression. Increased capacity translates to higher data rates for a given number of users or more users for a given data rate per user.

Multipath paths of propagation are created by reflections and scattering. Also, interference signals such as that produced by the microwave oven in the picture, are superimposed on the desired signals. Measurements suggest that each path is really a bundle or cluster of paths, resulting from surface roughness or irregularities.

Smart antenna systems are also a defining characteristic of MIMO systems, such as the IEE 802.n standard. Conventionally, a smart antenna is a unit of a wireless communication system and performs spatial signal processing with multiple antennas. Multiple antennas can be used at either the transmitter or receiver. Recently, the technology has been extended to use the multiple antennas at both the transmitter and receiver; such a system is called a multiple-input multiple-output (MIMO) system.

As extended Smart Antenna technology, MIMO supports spatial information processing, in the sense that conventional research on Smart Antennas has focused on how to provide a digital beamforming advantage by the use of spatial signal processing in wireless channels. Spatial information processing includes spatial information coding such as Spatial multiplexing and Diversity Coding, as well as beamforming.

The random gain of the bundle is called Multipath fading.

Working: Each antenna element "sees" each propagation path differently, enabling the collection of elements to distinguish individual paths to within a certain resolution. As a consequence, smart antenna transmitters can encode independent streams of data onto different paths or linear combinations of paths, thereby increasing the data rate, or they can encode data redundantly onto paths that fade independently to protect the receiver from catastrophic signal fades, thereby providing diversity gain.

A smart antenna receiver can decode the data from a smart antenna transmitter this is the highest-performing configuration or it can simply provide array gain or diversity gain to the desired signals transmitted from conventional transmitters and suppress the interference. No manual placement of antennas is required. The smart antenna electronically adapts to the environment by looking for pilot tones or beacons or by recovering certain characteristics (such as a known alphabet or constant envelope) that the transmitted signal is known to have.

NIMMALA VANDANA
(18731A0455)

5. MICRO ELECTRONIC PILL

A micro electronic pill is basically a multi channel sensor used for remote bio medical measurements using micro-technology this has been developed for the internal study and detection of diseases and abnormalities in the gastro intestinal GI tract where restricted access prevents the use of traditional endoscopy the measurement parameters for detection include real time remote recording of temperature, pH, conductivity and dissolved oxygen in the GI tract.

This paper with the design of the micro electronic pill which mainly consists of an outer biocompatible capsule encasing 4 channel micro sensors a control chip, a discrete component radio transmitter and 2 silver oxide cells.

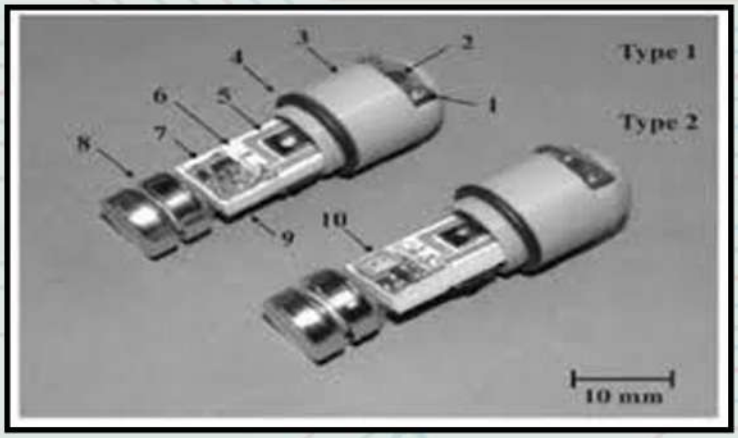
The invention of transistor enabled the first use of radiometry capsules, which used simple circuits for the internal study of the gastrointestinal (GI) tract. They couldn't be used as they could transmit only from a single channel and also due to the size of the components. They also suffered from poor reliability, low sensitivity and short lifetimes of the devices. This led to the application of single-channel telemetry capsules for the detection of disease and abnormalities in the GI tract where restricted area prevented the use of traditional endoscopy.

They were later modified as they had the disadvantage of using laboratory type sensors such as the glass pH electrodes, resistance thermometers, etc. They were also of very large size. The later modification is similar to the above instrument but is smaller in size due to the application of existing semiconductor fabrication technologies. These technologies led to the formation of "MICROELECTRONIC PILL".

Microelectronic pill is basically a multichannel sensor used for remote biomedical measurements using micro technology. This is used for the real-time measurement parameters such as temperature, pH, conductivity and dissolved oxygen. The sensors are fabricated using electron beam and photolithographic pattern integration and were controlled by an application specific integrated circuit (ASIC). Microelectronic pill consists of 4 sensors (2) which are mounted on two silicon chips (Chip 1 & 2), a control chip (5), a radio transmitter (STDtype 1-7, type2-crystal type-10) & silver oxide batteries (8). 1-access channel, 3-capsule, 4- rubber ring, 6-PCB chip carrier.

An array consisting of both temperature sensor & pH sensor platforms were cut from the wafer & attached onto 100-µm- thick glass cover slip cured on a hot plate. The plate acts as a temporary carrier to assist handling of the device during level 1 of lithography when the electric connections tracks, electrodes bonding pads are defined. Bonding pads provide electrical contact to the external electronic circuit.

ASIC is the control chip that connects together the external components of the micro system. (ASIC) An integrated circuit designed to perform a particular function by defining the interconnection of a set of basic circuit building blocks drawn from a library provided by the circuit manufacturer. ASIC is a novel mixed signal design that contains an analog signal conditioning module operating the sensors, 10-bit ADC & DAC converters & a digital data processing module. An RC relaxation oscillator (OSC) provides the clock signal.



Radio Transmitter is assembled prior to integration in the capsule using discrete surface mount components on a single-sided PCB. It's designed to operate at a transmission freq. of 40.01 MHz at 20˚C generating a signal of 10 kHz. BW. A second crystal stabilized transmitter was also used. This unit is similar to the free running STD transmitter, having a transmission freq. limited to 20.08 MHz at 20˚C, due to crystal used. Pills incorporating the STD transmitter are Type 1, where as the pills having crystal stabilized unit is Type 2. The transmission range was measured as being 1 m & the modulation scheme FSK, with a data rate of 1 kb/s.

OBBU UPENDRA
(18731A0456)

6.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. Microelectro mechanical systems consists of extremely tiny mechanical elements, often integrated together with electronic circuitory. They are measured in micrometers, that is millions of a meter. They are made in a similar 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 (e.g., CMOS, Bipolar processes), 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 realizes a complete System 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.

Operation of the mote:

The Smart Dust mote is run by a microcontroller that not only determines the tasks performed by the mote, but 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.

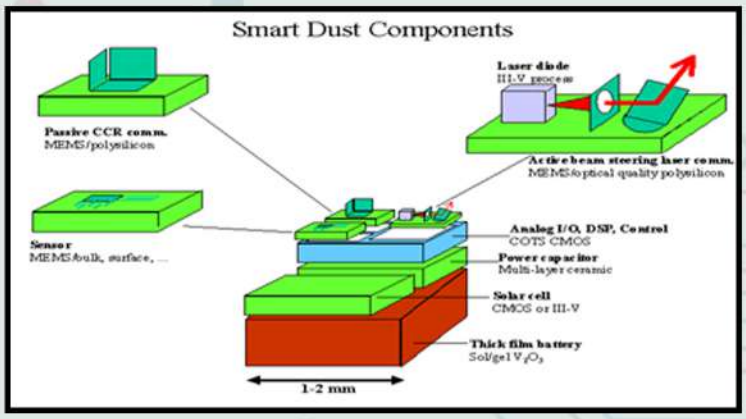
The primary constraint in the design of the Smart Dust motes is volume, which in turn puts a severe constraint on energy since we do not have much room for batteries or large solar cells.Thus, the motes must operate efficiently and conserve energy whenever possible. Most of the time, the majority of 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.

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 looks 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 retroreflector 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 retroreflector 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.



PALAKONDU SUSHMA
(18731A0458)

7.NIGHT VISION TECHNOLOGY

The word 'Night vision' itself means the ability to see in low light conditions. Humans have poor night vision compared to many other animals. With the proper night-vision equipment, you can see a person standing over 200 yards (183 m) away on a moonless, cloudy night!. Originally developed for military use, it has provided the United States with a strategic military advantage, the value of which can be measured in lives. Federal and state agencies now routinely utilize the technology for site security, surveillance as well as search and rescue. Night vision equipment has evolved from bulky optical instruments in light weight goggles through the advancement of image intensification technology. Two technologies are used for night vision:-
(1)Thermal Imaging

This work by collection the tiny amounts of light including the lower portion of infrared light spectrum that are present but may be imperceptible to your eyes, and amplifying it to the point that we can easily observe the image.

Biological Night Vision Technical Night Vision Thermal Imaging This technology operates by capturing the upper portion of the infrared light spectrum, which is emitted as heat by the objects instead of simply reflected as light. Hotter object, such as warm bodies, emit more of this light than cooler objects likes trees or buildings.

Types of Night Vision:
There are two type night vision such as

* Biological Night Vision:

In biological night vision, molecules of rhodopsin in the rods of the eye undergo a change in shape as light is absorbed by them. The peak rhodopsin build-up time for optimal night vision in humans is 30 minutes, but most of the adaptation occurs within the first five or ten minutes in the dark. Rhodopsin in the human rods is insensitive to the longer red wavelengths of light, so many people use red light to preserve night vision as it will not deplete the eye's rhodopsin stores in the rods and instead is viewed by the cones.

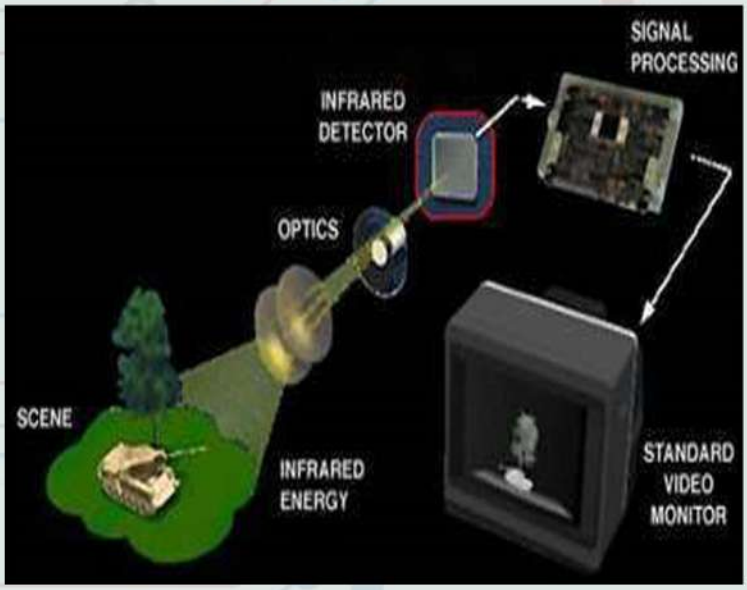
Some animals, such as cats, dogs, and deer, have a structure called tapetumlucidum in the back of the eye that reflects light back towards the retina, increasing the amount of light it captures. In humans, only 10% of the light that enters the eye falls on photosensitive parts of the retina. Their ability to see in low light levels may be similar to what humans see when using first or perhaps second generation image intensifiers.

* Technical Night Vision

A night vision device (NVD) is an optical instrument that allows images to be produced in levels of light approaching total darkness. They are most often used by military and law enforce agencies but are available to civilian users. Night vision can work in two very different ways, depending on the technology used.

* Thermal Imaging

A special lens focuses the infrared light emitted by all of the objects in view. The focused light is scanned by a phased array of infrared-detector elements. The detector elements create a very detailed temperature pattern called a thermogram.



Night Vision Devices:

* Goggles:

While goggles can be handheld, they are most often worn on the head. Goggles are binocular (two eye-pieces) and may have a single lens or stereo lens, depending on the model. Goggles are excellent for constant viewing, such as moving around in a dark building. Fig:-goggles worn on the head.

* Cameras:

Cameras with night-vision technology can send the image to a monitor for display or to a VCR for recording. When night-vision capability is desired in a permanent location, such as on a building or as part of the equipment in a helicopter, cameras are used. Many of the newer camcorders have night vision built right in

CHEKURU VINAYKUMAR
(19731A0410)

8.SPINTRONICS

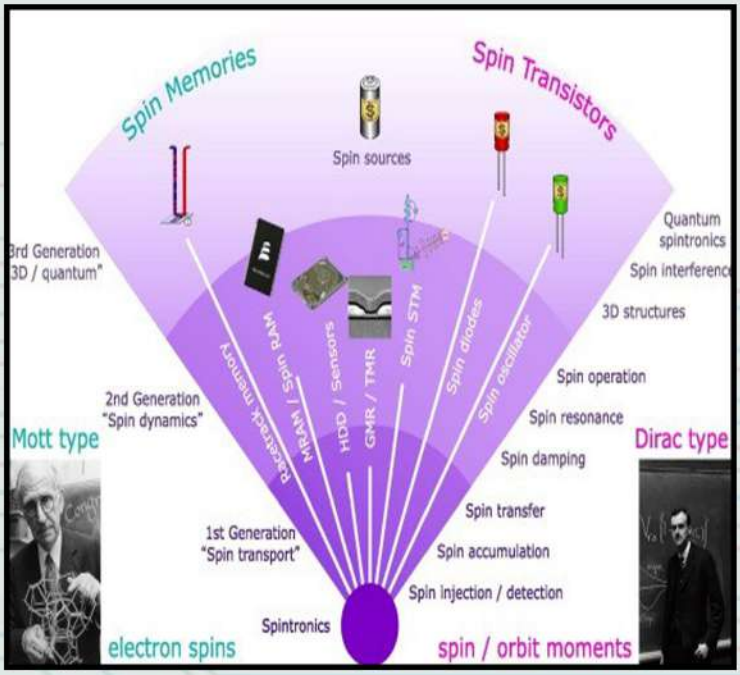
In the weird world of quantum mechanics the fundamental, particle, electron possesses a property Called 'spin'. It is not the sort of spin used in common everyday speech but, the angular momentum or the rotational momentum of a subatomic particle that creates its own tiny magnetic field. By exploiting this spin property, in a field called spintronics, computer scientists and physicists have the potential to revolutionise the basis of computer processing and storage technologies.

'Spintronics' can be a fairly new term for you but the concept isn't so very exotic this technological discipline aims to exploit the subtle and mind-bending esoteric quantum properties of the electron to develop a new generation of electronic devices. The word itself is a blend of electronics with spin, the quantum property it exploits. Like so many words applied to the subatomic realm, you can refer spin figuratively as a convenient label for a property that has no equivalent in gross matter.

Every electron exists in one of two states, namely, spin-up and spin-down, with its spin either +1/2 or - 1/2 (refer Figs 1 and 2). In other words, an electron can rotate either clockwise or anticlockwise around its own axis with constant frequency. The two possible spin states naturally represent '0' and '1' states in logical operations. And just because of this it is possible to make a sandwich of gold atoms between two thin films of magnetic material that acts as, a filter or a valve permitting only the electrons in one of the two states to pass. The filter can be changed from one state to the other using a brief and tiny burst of current.

Semiconductor spintronics devices combine advantages of semiconductor with the concept of magnetoelectronics. This category of devices includes spin diodes, spin filter, and spin FET. To make semiconductor based spintronic devices, researchers need to address several following different problems. A first problem is creation of inhomogeneous spin distribution.

It is called spin-polarisation or spin injection. Spin polarised current is the primary requirement to make semiconductor spintronics based devices. It is also very fragile state. Therefore, the second problem is achieving transport of spin-polarised electrons maintaining their spin-orientation. Final problem, related to application, is relaxation time.



This problem is even more important for the last category devices. Spin comes to equilibrium by the phenomenon called spin relaxation. It is important to create long relaxation time for effective spin manipulation, which will allow additional spin degree of freedom to spintronics devices with the electron charge. Utilizing spin degree of freedom alone or add it to mainstream electronics will significantly improve the performance with higher capabilities.

In a diffusive conductor, a spin diffusion length can be defined as the distance over which a non equilibrium spin population can propagate. Spin lifetimes of conduction electrons in metals are relatively short (typically less than 1 nanosecond). An important research area is devoted to extending this lifetime to technologically relevant timescales. The mechanisms of decay for a spin polarized population can be broadly classified as spin-flip scattering and spin dephasing.

Spin-flip scattering is a process inside a solid that does not conserve spin, and can therefore switch an incoming spin up state into an outgoing spin down state. Spin dephasing is the process wherein a population of electrons with a common spin state becomes less polarized over time due to different rates of electron spin precession. In confined structures, spin dephasing can be suppressed, leading to spin lifetimes of milliseconds in semiconductor quantum dots at low temperatures. Superconductors can enhance central effects in spintronics such as magnetoresistance effects, spin lifetimes and dissipationless spin-currents.

KONDAYAPALLE MOUNIKA
(19731A0422)

9.AIR CHARGE TECHNOLOGY

Introduction:- Wireless charging removes the need for a cable, but it still requires carefully placing your device on a charging pad. Xiaomi's latest tech promises a much better experience by allowing an entire room to act as a wireless recharging zone. The tech is called Mi Air Charge.

It uses a combination of 144 antennas and beamforming to accurately detect when a device is in range of the wireless charger and triggers charging to commence using & an extremely narrow millimeter-wide wave beam."The core technology behind Xiamoi's remote charging phenomenon lies in space positioning and energy transmission. Sounds too complicated, right? Let's take it this way, Xiaomi has a self-developed isolated charging pile, more like a set of interference antennas. Which can accurately detect the location of your smartphone

Smart Phone Charging through beamforming Technology

If your smartphone comes in contact with the said charging pile, it transmits millimeter wide waves through beamforming. Beamforming essentially allows an antenna to transmit a wireless signal from one location to a specific endpoint (in this case your device) instead of aimlessly and inefficiently around an area.

So we know how the charging pile emits waves, but is there anything on the smartphone side. According to Xiaomi, it has developed an antenna array comprising a 'beacon antenna' and 'receiving antennas.' These antennas convert the millimeter-wave signal emitted by the charging pile into electric energy through the rectifier circuit, which is basically turning the SC-fi charging experience into reality.

Limitations:- There are, of course, some limitations to this new technology. First of all, charging is limited to 5 watts, but multiple devices can be charged at the same time at that rate. The second limiting factor is the need for an array of "beacon antennas" to be present within the device being recharged. So this isn't going to work with existing devices.

NALAMALAPU SUREKHA
(19731A0427)

10.DIGITAL TRANSFORMATION

Digital transformation is one of the hottest topics in every industry, and as consumers are eagerly adopting increasing amounts of digital tech, electronics, and IT players have a unique opportunity to impact more industries than ever before. To help guide innovation in this booming space. Expert analysis of the hottest innovation topics and best tech startups found that the top five technologies

AI-Enabled Sensors - Merging hardware and software to collect and validate critical data will be a major part of use cases from consumer wearables to medical devices to industrial IOT.

Digital Biomarkers - Using data analytics to detect disease through changes in streams of data analytics is a potent path for electronics companies to grab a piece of the healthcare pie.

Natural Language Processing - Natural Language Processing (NLP) allows electronics and IT players to extend into new services and industry segments, either by using it to leverage their own data or by providing it as a service.

Edge Computing - Limitations in bandwidth and latency are pushing critical computation away from the cloud and out to the edge, with rapidly improving hardware and software enablers.

Synthetic Data - AI needs vast amounts of training data, and when real data is scarce, synthetic data can be a solution. It also boosts data diversity and privacy.

"Digital transformation as a concept has reached a point where developers and end users have to look past the hype and find real ROI from deployment of digital technologies,"

The central theme of these technologies is extracting value from data - whether layering AI on sensor outputs, analysing digital biomarkers to detect conditions, or using edge computing to extract insight locally in close to real time. These technologies are primed to impact every industry, from healthcare to manufacturing and beyond.

NELLORE HARITHA
(19731A0428)

11.CHANDRAYAAN-2

Chandrayaan-2 is the second lunar exploration mission developed by the Indian Space Research Organisation (ISRO), after Chandrayaan-1. It consists of a lunar orbiter, and also included the Vikram lander, and the Pragyan lunar rover, all of which were developed in India.

The main scientific objective is to map and study the variations in lunar surface composition, as well as the location and abundance of lunar water.

Chandrayaan - 2: Lander & Rover

The spacecraft was launched on its mission to the Moon from the second launch pad at the Satish Dhawan Space Centre in Andhra Pradesh on 22 July 2019 at 09:13:12 UTC by a GSLV Mark III-M1. The craft reached the Moon's orbit on 20 August 2019 and began orbital positioning manoeuvres for the landing of the Vikram lander. The lander and the rover were scheduled to land on the near side of the Moon, in the south polar region at a latitude of about 70° south on 6 September 2019 and conduct scientific experiments for one lunar day, which approximates to two Earth weeks. A successful soft landing would have made India the fourth country after the Luna 9 (Soviet Union), Surveyor 1 (United States) and Chang'e 3 (China) to do so.

However, the lander crashed when it deviated from its intended trajectory while attempting to land on 6 September 2019.According to a failure analysis report submitted to ISRO, the crash was caused by a software glitch. ISRO will re-attempt a landing in August 2022 with Chandrayaan-3.

NOTI MOUNIKA
(19731A0429)

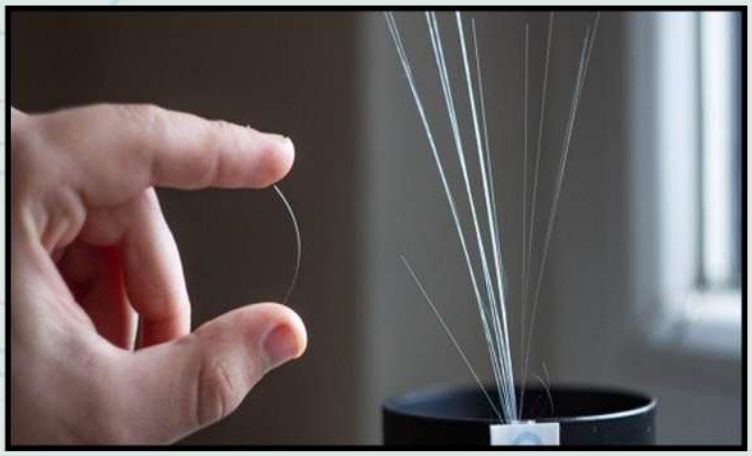
12. GLASS-COATED CUSTOM PASSIVE SENSOR

The robust contactless sensors are magnetic and can measure a range of physical quantities for IOT applications The robust contactless sensors are magnetic and can measure a range of physical quantities for IOT.

Introduction: Micro Wire sensors by RV magnetics are miniaturised (diameter ca. 3–70 µm) magnetic contactless sensors of physical quantities (temperature, pressure, pull, mechanical stress, torsion, magnetic field, position, etc.). Micro Wires are made of metallic alloy core (diameter ca. 1–50 µm) and glass coating (thickness 2–20 µm). They are prepared by drawing and rapid quenching of molten alloys and glass.

Their size, high added value, robustness, simple production process and also their symmetry, glass- coating, possibility of contactless sensing leads to their utilisation as a miniaturised sensor with a wide range of applications in different industries. Micro Wire sensors are magnetic. Magnetic properties are mainly given by magneto-elastic interaction of magnetic moments with a distribution of mechanical stresses induced during production.

Axial mechanical stresses arise as a result of drawing and rapid quenching of the wire. Radial and circular stresses arise from different thermal expansions coefficients of glass coating and metallic core. In addition, shape anisotropy is given by physical dimensions (diameter of the wire ⊠1–40 µm, length of the wire ⊠1–4 cm).



Operation Behind :

To sense the magnetic energy, an AC magnetic field needs to be generated with an excitation coil. Unless present in noisy magnetic or electric fields, the coil is powered with a few milli amperes. The magnetic response from the Micro Wires (with high sensitivityto temperature, pressure and position in the magnetic field), in terms of a magnetization change, is sensed with another pick up/sensing coil.Output from the sensing coil includes signals from magnetic and electric noises present in the vicinity of the sensing coil during the measurements. Filtered and amplified signal is digitalized in MCU (ARM chip) and ready for data post-processing in customer's preferred software.

Conclusion:

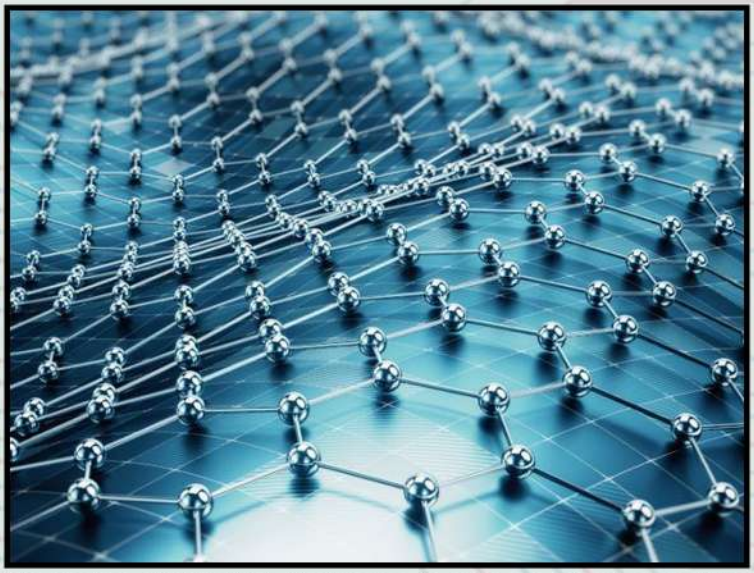
Smart sensors has developed and proved a new miniatured Smart Sensor Network Measurement System. It significantly reduces the number and lengths of cables, the components size and system weight. It provides greater flexibility in design, configuration and installation.

PALUKURU VANI
(19731A0430)

13.GRAPHENE - THE FUTURE

With the rapid advancement in the field of electronics, size, speed and flexibility have become the most important aspects. With the existing technology, we have to compromise with any one of these aspects. The only way to not compromise with these three aspects is by using graphene. Graphene is an allotrope of carbon in the form of a single layer of atom in 2- Dimensional Hexagonal lattice in which one atom forms each vertex. Graphene is so small that it is considered the world's first 2-D crystal. It was discovered by Russian born scientists

Andre Geim and Kostya Novoselov in 2004 and they won the Nobel Prize for their discovery in 2010. Graphene has very high conduction capability because of its electron mobility. The mobility of electrons is 100 times faster than silicon and its heat conduction is also two times better than diamond. Graphene possesses electrical conductivity about 13 times better than copper. Graphene is harder than diamond and also more elastic than rubber. It is one of the strongest known materials if not the strongest material and also it is tougher than steel and yet lighter than aluminum. Graphene has the potential to create the electronics materials which are now considered as science fiction.



Graphene might find its place in almost all engineering fields. Because of its conductivity it can be used as superconducting material, solar cells, transparent conducting electrode. In biomedical application graphene can be used for improved drug delivery and it can also be used in cancer treatment. It can be used in flexible displays, efficient solar panels, bulletproof vest as it can absorb twice as much impact as Kevlar which is normally used in bullet proof vests.

Coming to aerospace industry, graphene can be used in space propulsion due to its lightweight and strong interaction with light. One day it might find its place in super computer. The only problem with graphene is that, it is not easy to produce in large quantities at a decent quality and it costs about 100 dollars to 200 dollars per gram. All these things can be possible only if we can produce it in bulk or is it all just hype for the material!

AMBULURI MADHUMITHA
(20731A0401)

14. SMART POT

Smart Pot is the one of the methods to grow a plant effectively. Each and every thing related to grow a plant that is temperature, moisture, sunlight everything is monitored by Smart Pot. So, it will inform the owner about his/her plant. And also, Smart Pot saves water by turning off the water supply when plant is having enough amount of water. Two main effective things in this project is, it is concerned to save water and plant, which are very precious things on the earth.

This project is modern way of growing plant. Because it includes technology like IOT and electronics things to monitor plants status. So, this is best way of growing plant effectively. It is our duty to protect the plant. If we allow to destroy our natural resources like this then it will be dangerous for all human beings. Because without oxygen we can't even imagine our life. Trees and plants are the source of oxygen. So, we have to think about saving greenery on the earth. Our innovation should not be harmful towards natural resources.

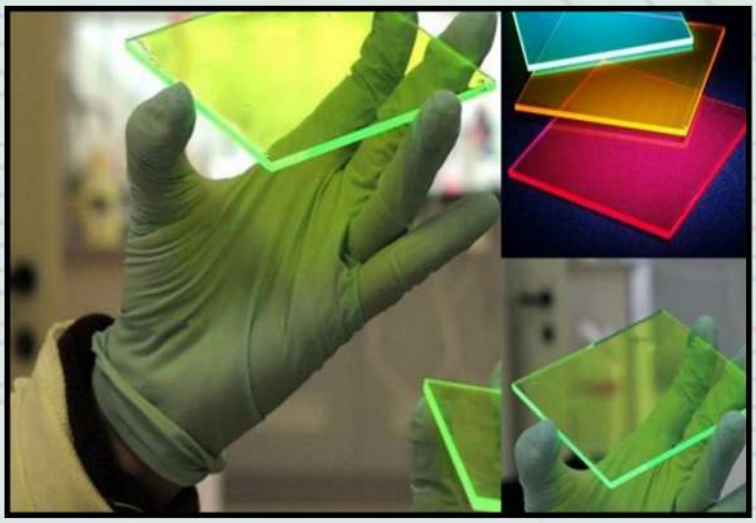
- The smart pot which will nourishes the plant itself without human effort.
- The components which are used to make this smart pot are esp8266, OLED, DTH11 sensor, Soil moisture sensor, servo motor.
- Soil moisture sensor gives the amount of water content in the soil and displays the reading on OLED
- If water supplied is less, then servo motor runs and supplies the water.
- DHT11 sensor senses the humidity & temperature around the plant &displays that on dashboard.
- LDR measures the amount of sunlight fallen on the plant and displays that on dashboard.

BOLLAVULA BHAGYALAKSHMI
(20731A0408)

15.AUREUS THE NEXT FUTURE

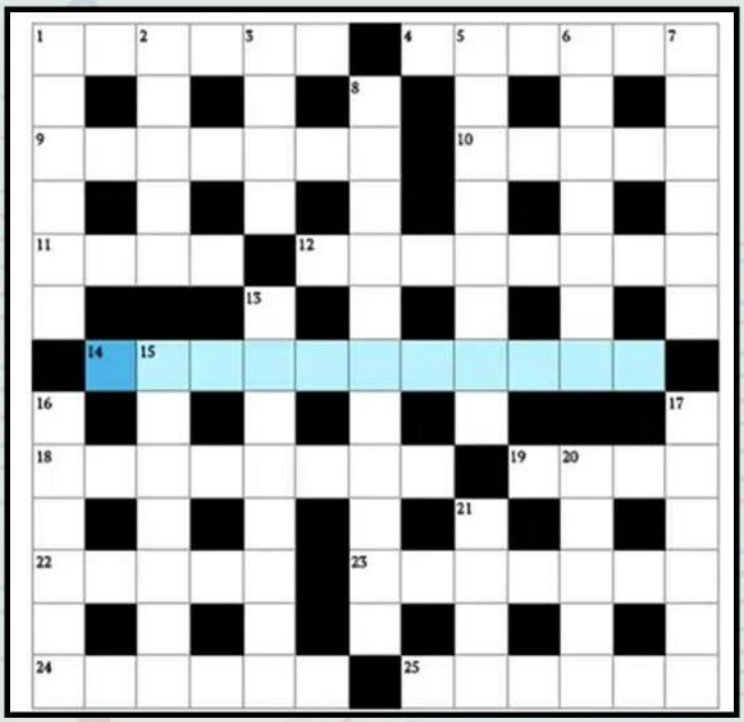
Aureus is a thin transparent , biodegradable and folding solar panel. Aureus is a new material made from waste crop ,which Converts UV light into renewable energy. Especially it is made from biowaste of plants, fruits and vegetables. It is a foldable thin transparent solar panel that can be folded like a paper and moved anywhere. We can stick this foldable material panel on multistorey buildings ,upon windows, on our clothes, bikes which produce electricity from UV light. In this high energy ultraviolet rays of sun can be converted into visible light. Solar films can be used to convert this light energy into electricity. Luminescent particles (derivable from certain fruits and vegetables) is used as the core technology on both devices.

When hit by UV light, the particles absorb and re-emit visible light along the edges due to internal reflectance. PV cells are placed along the edges to capture the visible light emitted. The captured visible light are then converted to DC electricity. Aureus can function even when not directly facing the sun, it can rely on UV scattering through clouds and by UV light bouncing along walls, pavements, other buildings. This will enable the construction of a Vertical Solar Farm even with a small lot area. This is highly applicable for skyscrapers in urban settings allowing access to clean renewable electricity. It can be used on our clothes, bikes and on doors also. It works on rainy day sand even on cloudy days as it need only UVlight.



THIRUVAIPATI MANJUSAI
(19731A0463)

CROSS WORDS



* DOWN

1. German goes into outskirts of Copenhagen for fabric(6)
2.Natural leader sure to be irritated in 5 8's job(5)
3.Note carried by politician could be enlightening(4)
5.God informally enclosed by wall in European city(8)
6.Learned to make EU editor unwell with hypoxia(7)

* ACROSS

11.Surgical procedure out of proportion in public(4)
12.Urinate audibly with vigour,showing sign of illness(8)
14.Mr Li's science experiment (not new) making shapes(11)
18.8 may be kept here,in messy bed with craig(8)
19.A fish that bacteria might grow on(4)
22.Harass graduate with accepted theory(5)

ALLI VENKATA SUREKHA
(18731A04D7)

TECHNICAL QUIZ

1. What about the stability of system in

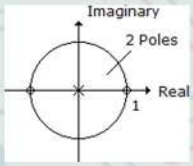
$$H(z) = \frac{z(3z-4)}{(z-0.4)(z-2)}$$

A. system is stable
B. unstable
C. stable at 0.4
D. can't say

2. Which one most appropriate dynamic system?
A. y (n) + y (n - 1) + y (n + 1)
B. y (n) + y (n - 1)
C. y (n) = x (n)
D. y (n) + y (n - 1) + y (n + 3) = 0

3. An energy signal has G (f) = 10. Its energy density spectrum is
A. 10
B. 100
C. 50
D. 20

4. Consider Pole zero diagram as shown, if two Poles are moved in opposite direction towards ω = p/2 and -p/2, the filter will be



A. change to high pass filter
B. change to Band Pass filter
C. remains same
D. change to LPF

5. In an Ac circuit the fundamental component of current wave lags the corresponding voltage wave by 20°. The third harmonic component of current wave lags the corresponding voltage by an angle.
A. less than 20°
B. more than 20°
C. equal to 20°
D. equal to or more than 20°

6. If transfer function of a system is H(z) = 6 + z-1 + z-2 then system is
A. minimum phase
B. maximum phase
C. mixed phase
D. none

7. A voltage V (t) is a Gaussian ergodic random process with a mean of zero and a variance of 4 volt2. If it is measured by a dc meter. The reading will be
A.0
B.4
C.2
D.2

8. A first order system will never be able to give are sponse
1. Band stop
2. Band pass
3. All pass
Choose the correct option
A.1, 2, 3 true
B.1 and 3 true, 2 false
C.1, 2 are true 3 is false
D.1, 2 are false, 3 is true

9. In the given figure the ratio T/d is the duty factor.
A. True
B. False

10. If £ [f(t)] = F(s), then £[f(t - T)] =
A. est F(s)
B. e-st F(s)

M. SUDHEER KUMAR
(18731A04C5)