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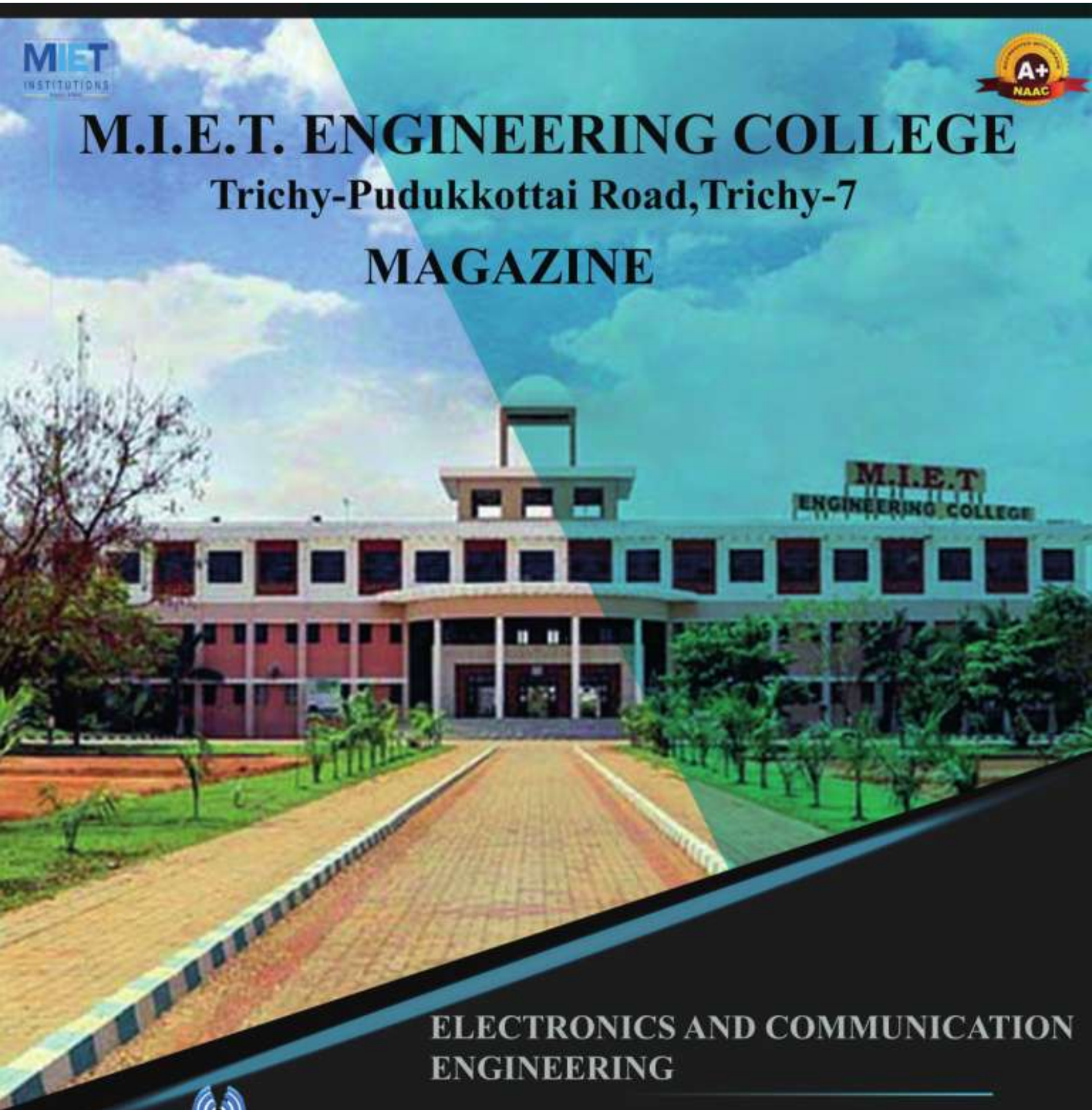
M.I.E.T. ENGINEERING COLLEGE

Trichy-Pudukkottai Road,Trichy-7

MAGAZINE



ELECTRONICS AND COMMUNICATION ENGINEERING

2022-2023

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MIET ENGINEERING COLLEGE

DHWANI 2022-23

VOLUME: 11

CHAIRMAN's MESSAGE:

Er. A MOHAMED YUNUS,B.E., M.Sc., Engg
Chairman
M.I.E.T. Institutions

Higher education in our country is undergoing a remarkable transformation. Nowadays, education system is outcome-based rather than the traditional exam-centric one which was followed in our country for centuries. In outcome-based education, the real learning outcomes of students are measured in an objective manner. M.I.E.T. Trichy is a center of learning where young students nurtured in different fields of engineering. Our institution focus on imparting technical training to encourage curiosity and innovativeness among the students so as to meet the fast changing needs of the industries. We, M.I.E.T. Engineering College, give importance for importing life and communication skills to our students. Separate trainings on life and communication skills are being given to our students by special trainers.

PRINCIPAL's MESSAGE:

Dr. A NAVEEN SAIT,M.E, Ph.D.
Principal
M.I.E.T. Engineering College

Our goal is to bring changes in the world through education. The college has the privilege of having a healthy, harmonious ambience and rich values. We focus on our students by providing them with a world class outcome based education, hands-on experience through research, training and various student forums. There is a regular monitoring on the implementation of planned academic activities with desired results in grooming our future generation for their career& for higher studies in India and abroad. A research culture has taken shaped in the institution through advanced R & D activities. We believe in continuous development and strive to carry on the best efforts and endeavors towards the benefit of students. Our mission is to transform students into rational thinkers, competent engineers, law abiding citizens and spiritually enlightening individuals. traditions imbibed here would carry the students to greater levels in their life.

Dr. M Vijai Meyyappan,M.E.,Ph.D

HOD, ECE

HEAD OF THE DEPARTMENT MESSAGE:

I am overwhelmed to know that our department is bringing out the technical magazine "Dhwani" of this academic year (2022-2023). This is a productive technical material and subsidiary skill developing tool for the students. I congratulate and thank all the students and faculty coordinator who have made untiring efforts to bring out this magazine. I wish them all the very best for releasing more such magazines in future.

EDITORIAL BOARD

VISION OF THE INSTITUTION

To be a center of excellence in Technical Education through Technical, Ethical and Professional skills for meeting the diverse needs of the Society, in particular Muslim minority community and the Nation.

MISSION OF THE INSTITUTION

- To impart Quality Education, Training and Research in the fields of Engineering and Technology.
- To provide a conducive learning environment that enables the students to achieve professional and personal growth.
- To expose the contemporary issues of society, ethical practices and to create environmental awareness.
- To provide the required infrastructural facilities for developing the professional and innovative skills.

VISION OF THE DEPARTMENT

To be a top-class technical hub in imparting knowledge in cutting edge areas of Electronics and Communication Engineering, providing pleasant learning environment, nurturing scholars of excellent proficiency to meet the global and socio-economic challenges of the country

MISSION OF THE DEPARTMENT

- To provide remarkable teaching and research environment through state-of-the-art facilities.
- To strengthen the soft as well as hard skills of students to achieve technical and academic excellence.
- To raise the students to become responsible citizens with good human values and encourage them to work for the well-being of society.
- To develop the skills of lifelong learning and professional growth of students through utilization of the high-standard infrastructure facilities

Department Activities

I. Value Added Course (VAC)

One value added Course has been conducted in the department in odd semester, with an aim to enhance the hardware knowledge of the students and sharpening the soft skills. An overview of the courses is given below.

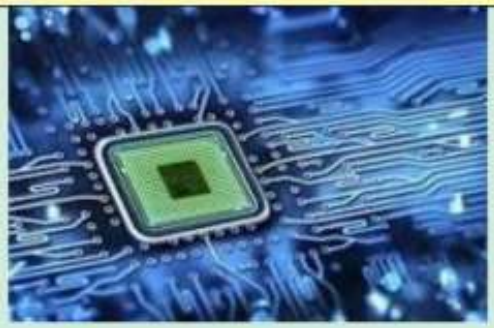
1. Certificate Course in Microprocessor and Applications

Objective:

- To familiarize the students with the basic working principles of a microprocessor
-
- Enable the students to differentiate between microprocessor and microcontroller
- Provide hands on session for the students on implementing small programs in 8085 microprocessor.

Course Instructor

The course was handled by Mrs .B.T. Kirthika, , Assistant Professor, Department of ECE.



Details of the course

The course duration was for three months, with 16 classes included. 21 students had enrolled for the course and successfully completed the course.

II. Guest Lectures

1. Image Processing: Fundamentals to System Implementation

Objective:

- To be familiar with the most effective techniques for generating digital images that can be viewed by the human eye or other types of receiving devices.
- To enhance the knowledge about image processing fundamentals for aerospace, biomedical engineering, industrial inspection, robot vision, and military guidance.

Resource Person

- The course was handled by Dr. Deepayan Bhowmik, Senior Lecturer in Data Science, School of Computing, Newcastle University, UK.

2. **Open source operating system for IoT Devices**

Objective:

Mobile phones are becoming an essential part of everyday life. Mobile phone use is increasing rapidly every day, yet most people are unaware of how cell phone towers affect personal well-being. The only way to get around these incompatible aspects of the most cutting-edge technologies is to replace them with something more reliable.

Course Instructor

The course was handled by Dr.P.Shahul Hameed, Scientist ,Radiation Ecology

3. **Industrial Automation**

Resource Person :Mr.R.Rakesh
Assistant Professor, Periyar Maniyammai Institute of
Science and Technology

4. **BER of Basic Digital Modulation Techniques**

Resource Person :Dr.N.Gunavathi,
Assistant Professor ,NIT,Trichy

III. Workshop on Biomedical Instruments

Resource Person : Mr.V.Abishek Raj(HR & Business Administrator) and team members Achievers Live Medical Solutions Private Limited, Tiruchirappalli.

IV. Inaugration of IEI

Objective:

- To encourage a research-oriented culture in aspiring engineers to aid in the country's advancement.
- To support the development of engineering generally and its uses.
- The organization and its members may share and update their
- engineering and technology skills via technical activities.
- Fostering and encouraging a rising commitment among engineers and
- technologists to the social goals of the profession.

Resource person

The session was handled by Dr. S. Karuppasamy, Committee Member, IEI - Tamilnadu State Center, Former Additional General Manager,BHEL, Trichy.

FACULTY ARTICLES

Miniaturized on-chip antennas forbiomedical implants

Dr. S Archana, AP, ECE

Biotelemetry is an active field of research due to its immense potential applications. In biotelemetry, the medical sensor data implanted in human body can wirelessly transmit data to receivers implanted in biomedical instruments for short/long range communication

Though implantable off-chip antennas are available commonly in India, not much research has been carried out using on-chip antennas. On-chip antennas are commonly made of silicon (Si) based technologies as it offers low cost of production and higher integration levels. On-chip antennas, have many advantages over off-chip antenna, the major reason being able to support the realization of fully integrated system-on-chip(SoC) transceivers. They can be directly connected to RF circuits inside the chip, whereby, the complex matching circuits can be avoided

Miniaturization is a major concern for RF System-on-chips. On-chip antenna provide a low-cost solution to this problem. At higher GHz, above 10 GHz, the resonant antenna size is comparable to chip size, hence on-chip antenna can attain sufficient gain and efficiency at higher frequencies. An on-chip monopole antenna proposed in [1] at 45 GHz has a gain of 3.3 dBi and dipole antenna reported in [2] at 24 GHz has a gain of -7.6 dBi.

At lower frequencies below 10 GHz, the designed antenna has very small size, hence they resonate at higher frequencies compared to their operating frequency. Hence, they have low gain and efficiency. An on-chip rectangular loop antenna with an efficiency of 8% and gain of -22 dBi at 5.2 GHz. A folded loop antenna [4] designed to work in 6-10 GHz band has an efficiency of 0.63%.

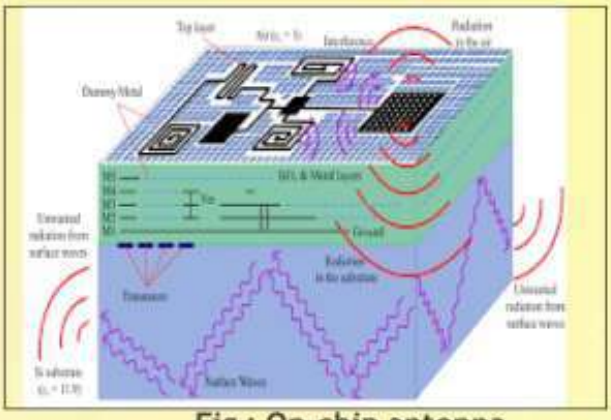


Fig : On-chip antenna

Low frequency on-chip antennas have to be miniaturized to improve their gain and efficiency. Miniaturization techniques that are reported in literature include meandering, increasing the number of turns of antenna, folding the antenna etc. At lower GHz, special care has to be made to improve the gain and efficiency of designed antenna. The efficiency of antenna is a function of surface area of the antenna. Hence the technique to be implemented is to increase the surface area of the antenna, without increasing the outer dimensions.

65nm technology consist of 300um thick substrate followed by SiO2 layer and 8 metal layers. The antenna is built on top most metal layer, since it has higher thickness, hence higher current carrying capacity.

Advanced design system(ADS) can be used for design of antenna and also generation of gdsii files. The flow of the tool is as follows

A. Importing substrate stack-up in ADS
B. Include the model for body parameters
C. Design the layout of on-chip antenna in Metal 8
D. Perform EM simulations
E. Calculate the radiation efficiency, gain, input impedance
F. Perform parametric analysis to optimize the antenna

MICROSTRIP ANTENNA FOR FOR IEEE 802.11be APPLICATIONS

Dr. P Rajalakshmi, AP,ECE

By the early 21st century, thanks in large part to mobile phones, the average person now carries one or more antennas on them wherever they go (cell phones can have multiple antennas, if GPS is used, for instance). This significant rate of growth is not likely to slow, as wireless communication systems become a larger part of everyday life. In addition, the strong growth in RFID devices suggests that the number of antennas in use may increase to one antenna per object in the world (product, container, pet, banana, toy, cd, etc.). This number would dwarf the number of antennas in use today. Hence, learning a little (or a large amount) about of antennas couldn't hurt, and will contribute to one's overall understanding of the modern world. This software makes it effortless to design and simulate parts, no matter how complex it is. In addition, it's easy to learn and adapt because of its intuitive interface.

In telecommunication, there are several types of microstrip antennas the most common of which is the microstrip patch antenna or patch antenna. A patch antenna is a narrowband, wide-beam antenna fabricated by etching the antenna element pattern in metal trace bonded to an insulating dielectric substrate, such as a printed circuit board, with a continuous meal layer bonded it the opposite side of the substrate which ground plane.

Microstrip antenna shapes are square, rectangular, circular and elliptical, but any continuous shape is possible. the resulting structure is less rugged but has a wider bandwidth. Microstrip antennas are relatively inexpensive to manufacture and design because of the simple 2-dimensional physical Geometry simulation.

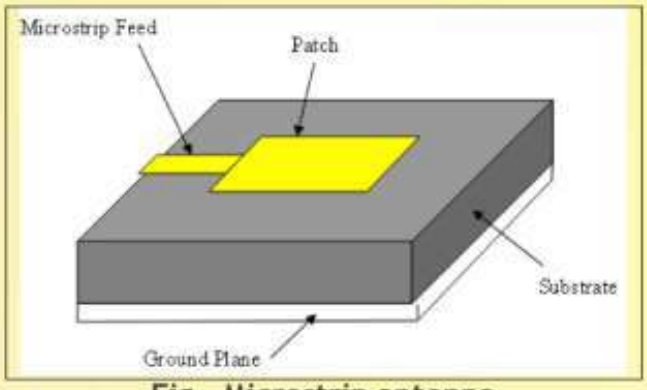


Fig. Microstrip antenna

Microstrip patch antennas can be fed by a variety of methods. These methods can be classified into two categories- contacting and non-contacting. In the contacting method, the RF power is fed directly to the radiating patch using a connecting element such as a microstrip line. In the non-contacting scheme, electromagnetic field coupling is done to transfer power between the microstrip line and the radiating patch.

Metamaterials are artificially engineered materials designed to exhibit properties that do not exist in nature. They are composed of arrays of tiny, repeating structures, and their properties can be manipulated by controlling the geometry and orientation of these structures. This allows for unprecedented control over electromagnetic waves, sound waves, and other types of waves. One of the most interesting properties of metamaterials is their negative index of refraction, which means that they can bend light in the opposite direction of ordinary materials. This property has led to the development of a new class of optical devices known as "metamaterial optics," which hold great promise for improving the performance of lenses, filters, etc.

IOT BASED SMART CROP PROTECTION

Mrs. J Nirmala, AP,ECE

Smart agriculture systems using IoT (Internet of Things) is an emerging technology that aims to improve the efficiency and productivity of agriculture. This technology uses sensors, actuators, and other loT devices to collect and analyze data about soil moisture, temperature, humidity, light intensity, and other environmental factors. This data is then used to automate and optimize various agricultural processes such as irrigation, fertilization. pest control, and harvesting.

In a smart agriculture system, sensors are deployed in the field to monitor various environmental parameters such as temperature, humidity, soil moisture, and light intensity. These sensors are connected to a central hub, which collects and analyzes the data. The central hub can be a local server or a cloud-based platform. Using this data, farmers can automate the irrigation process by controlling the water supply to crops based on their specific needs. This can be done using automatic irrigation systems that are controlled by loT devices such as actuators and controllers.

Similarly, farmers can automate the fertilization process by using loT devices that can analyze soil samples and dispense fertilizers accordingly. In addition, smart agriculture systems can be used to monitor the health of crops and detect the presence of pests and diseases.

This can be done using loT devices such as cameras and sensors that can detect changes in the crop's color, growth pattern, and other physical characteristics. Overall, smart agriculture systems using loT can help farmers to reduce costs, increase productivity, and improve the quality of their crops.

STRUCTURAL HEALTH MONITORING USING PIEZOELECTRIC SENSOR

Dr. Ayshathul Fouzia, AP,ECE

Asia is the largest and most populous continent in the world with over 45 million square kilometers of land mass and 4.5 billion people. It has 49 countries, including some developed country like Singapore, Malaysia,UAE, developing country like India,Pakistan and poor country like Myanmar. Asia is also characterized with numerous densely populated cities. Structural health monitoring (SHM) is a not an issue for poor countries where basic amenities of survival are more important. However, SHM is crucial for the developing and rich countries, especially those with densely populated cities like Singapore, Mumbai and Hong Kong, where any infrastructural failure could be devastating to their society and economy.

Structural health monitoring system(SHM) is to enhance the functionality of structures, improve its safety and reliability, reduces maintenance costs and increases the service life. A new kind of SHM technology based on piezoelectric ceramic transducer is an effective way to realize the prospective functions. However, many of piezoelectric ceramic SHM systems in existence are complicated and heavy weight that is used in laboratory.

Piezoelectric sensors embedded in concrete or other structural materials can detect changes in strain, vibration, or temperature. By connecting these sensors to the IOT, engineers can remotely monitor the health of bridges, dams, tunnels, and buildings in real-time. This helps identify any potential damage, fatigue, or structural deterioration, enabling timely maintenance and avoiding

STUDENT ARTICLES

SMART GRID TECHNOLOGY

Karishma A Saleem,IV year, ECE

A smart grid technology is a type of energy management system (EMS) that regulates how electricity is produced, distributed and stored inside a connected system. The introduction of smart grid technology is an extension of analog grid technology that allows for two-way communication to control the operation of appliances.

In simple, a smart-grid is an electric grid with the addition of components that enable power flow monitoring between the points of electricity generation and the points where it reaches the consumer and power flow controlin order to match real-time needs. This grid is a system of high voltage transmission lines that transports energy from power plants to homes and business. We use the grid at anytime to plug something in or turn on a lamp.

The grids has progressed in previous years and is likely to do so in the future. This modern system is known as a "Smart" grid, and it is an evolution of the existing grid that allow technology to connect with the network in order to extract more knowledge from the data.

Consumers no longer have to rely only on local electrical power providers, as they did previously. They now have a variety of alternatives as a consequence, the system for delivering power must adjust.

In these, most power companies around the world are embedding innovation smart grid technology into their networks, all the way up from consumers household, workplaces and manufacturers. The smart grid system gathers

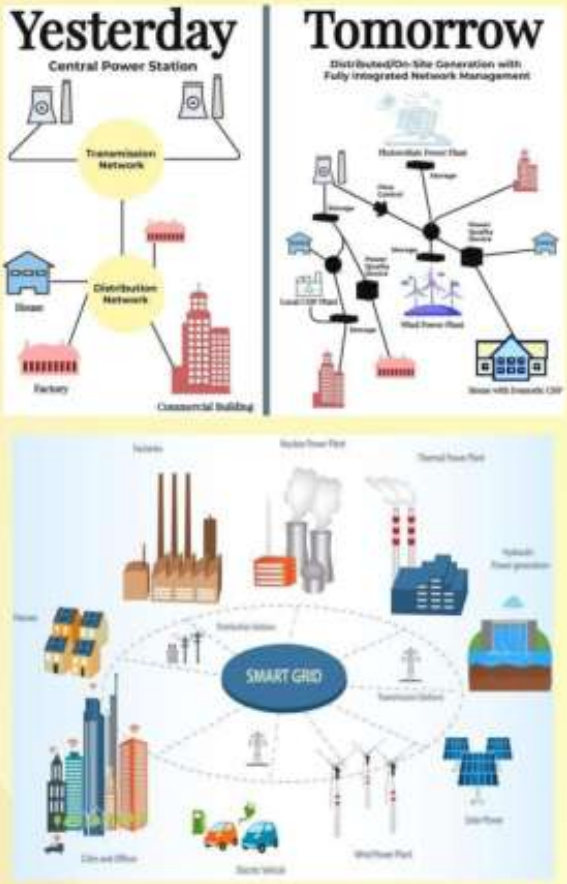


Fig. Smart-Grid

useful information to give customers and producer more leverage over different power sources. It also allow them to anticipate usage.

Smart grid solution, such as smart grid demand response and smart grid intrusion prevention system increases reliability and lower costs by enabling end-to-endconnectivity between storage facilities, power plants and end-users. Electrical engineers will undoubtedly encounter smart grid technology smart grid technologies and can be assist with their creation and maintenance in the near future. Electrical engineering would be critical in making the switch to smart grid solution of 5 GHz to 3.7 GHz bands.

BIOSENSORS

Sivaleswari M, IV year, ECE

Biosensors were first developed in 1962 by Dr. Leland Clark by using electrodes and measuring blood sugar. However, prior to this discovery, several breakthroughs had to be accomplished by other scientists in order for Dr. Clark to invent the first biosensor. The International Union of Pure and Applied Chemistry (IUPAC) first defined the term 'biosensor' in 1992, and the realm of biosensors has exponentially grown to become a key player in 21st century engineering all across the world.

The amount of glucose was estimated by the reduction in the dissolved oxygen concentration. Clark's ideas became commercial reality in 1975 with the successful re-launch (first launch 1973) of the Yellow Springs Instrument Company (Ohio) glucose analyzer based on the amperometric detection of hydrogen peroxide (Turner 1996). In 1963 Garry A. Rechnitz together with S. Katz introduced one of the firstpapers in the field of biosensors with the direct potentiometric determination of urea after urease hydrolysis. At that time the term "biosensor" had not yet been coined. Thus, these types of devices were called enzyme electrodes or biocatalytic membrane electrodes.

For the first time, in 1964 enzymes were used as fuel cell catalysts by Yahiro et al. in a glucose/O 2 biofuel cell. In 1969 George Guilbault introduced the potentiometric urea electrode. First generation sensor measure the concentration of analytes and/or products of enzymatic reactions that diffuse to the transducer surface and generate an electrical response. With the effect of nanotechnology, the 4th generation of biosensors is called nano-biosensors. They are in use in industrial areas such as medicine, drug, food, agricultural, environmental etc. A Biosensor is an instrument for the measurement, identification and transformation of biological events. The biological sensor, it can be a tissue of microorganisms, enzymes, antibodies, nucleic acid chains, etc.

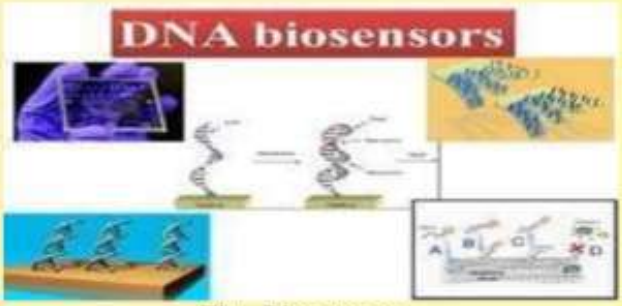


Fig. Biosensor

Nanowire biosensors are a class of sensors or measuring devices, of which the major sensing components are made of wires or fibers in nanometer scale formed by biological molecules, such as DNA molecules, polypeptides, fibrin proteins, and filamentous bacteriophages, etc. Nanowire biosensors are a class of nanosensors, of which the major sensing components are made of nanowires formed by biological molecules, referred to as Bionanowires. A bionanowire is a one-dimensional fibril-like nanostructure, with the diameter constrained to tens of nanometers or less (1 ~ 100 × 10−9m) and unconstrained length. Bionanowires offer a few significant advantages.

There are two types of nanosensor

Mechanical sensors

Nanomaterials that are used as mechanical nanosensors change their electrical conductivity when the material is physically manipulated, and this physical change invokes a detectable response.

Chemical sensors

Nanosensors that detect chemical works by measuring the change in the electrical conductivity of the nanomaterial once an analyte has been detected.

Fabricated using nanomaterials such as carbon nanotubes, metal oxide or Si nanowires(Si-NW). Extremely sensitive to environment well matched in size with molecular interactions. Provide a basis for biological probes with single-molecule sensitivity. With a particular focus on fast mechanical biosensing in fluid by mass- and force-based methods and the challenges presented by non-specific interactions.

EXPLORING ARDUINO: UNVEILING MY JOURNEY THROUGH PROJECTS

Hasan Basari A, III year,ECE

Greetings! I am Hasan Basari A., an enthusiastic adventurer navigating the captivating terrains of electronics and technology. Since embarking on my college odyssey, Arduino, the dynamic microcontroller platform, has not only been my guide but also the catalyst for my creative ingenuity.

Arduino, akin to a technological compass, has been my trusted companion since my freshman year, enabling me to chart a course from abstract concepts to tangible creations. This ingenious platform has consistently nurtured my inquisitiveness, propelling me to dive even deeper into the intricate world of electronics.

Arduino serves as a harmonious bridge between software and hardware, endowing me with the power to craft intricate projects that transcend the confines of the classroom. Witnessing the seamless convergence of code and circuits has been a revelation beyond words. Through Arduino, I've gained the ability to conceptualize, design, and execute projects that redefine possibilities and surpass conventional limitations. Allow me to illuminate a few exemplars from my trove of projects, each resonating with technical prowess and creative brilliance: -

Gesture-Controlled Lift UI: Elevating Interaction Through Gestures In the realm of user interfaces, my vision took flight with the creation of a gesture controlled lift system that reshapes accessibility and interaction. By ingeniously integrating gesture sensors with Arduino, I aspired to birth a mechanism where the graceful motions of hand gestures choreograph the intricate dance of an elevator's ascent and descent. This endeavor captures my fascination with merging cutting-edge electronics with intuitive user experiences.

Fig. Arduino Board

Bluetooth Extension Box: Crafting Connectivity Beyond Conduits Amid a world driven by seamless connectivity, my inquisitiveness led me to conceptualize a Bluetooth extension box. Harnessing Arduino's essence, my ambition was to design a versatile contraption that seamlessly interfaces with a spectrum of household appliances. Empowered by a user-friendly mobile application, users would wield the ability to wirelessly command lights, fans, and more. This pursuit not only underscores my expertise in IoT but also echoes the escalating demand for interconnected smart ecosystems. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplifier.

As I stand at the summit of my academic expedition, I reflect upon the resounding impact of Arduino. It's not merely a platform; it's a manifestation of my evolution as a technologist. I am Hasan Basari A., and my voyage is illuminated by Arduino, a canvas where I articulate my ideas, aspirations, and relentless curiosity. With each project, I inch closer to realizing my identity as a true maestro of electronics. With Arduino as my North Star, I eagerly embrace the unwritten chapters of discovery that beckon ahead.

DEEP TALK

S Evangeline, IV year, ECE

Deep talk is a new computer software that uses both artificial intelligence and natural language processing and a smart meeting assistant which is developed to convert the conversations into actions .It securely collects, analyses and understands the intentions during the conversations. It mainly creates a searchable source for verbal knowledge that results to smart and productive collaboration .This is a useful platform which makes a company meetings productive by transferring the documentation and conversations from humans to AI.It also understands the texts in chats, emails, surveys or other social media posts and it collects the data by extracting the actionable insights and using the text data. As it as a no code deep learning platform, it is highly useful for the users and customer's experience, success and their sales. Deep talk is used by the customers success & experience team, sales and support teams and AI analytics teams to detect the kind of issues that people are experimenting, new requested features and frequent topics they talked about. Deep talk reduces the work of data scientists in the various fields as it is already pre-trained to analyze the text data. It is also used for discussing and sharing the unique perspectives and knowledge in technologies such as AI, Machine Learning , IoT, Block chain, Fin tech etc., by the leaders, experts and trend letters of the conversation .

5G-THE NEW FUTURE

S Sriganth, II year, ECE

5G technologies will change the way most high-bandwidth users access their phones. People will experience a level of call volume and data transmission never experienced before 3G technology is offering the services in Product Engineering.Documentation,supporting electronic transactions (e-Payments, e-transactions) etc. As the customer becomes more and more aware of

Fig. 5G communication

the mobile phone technology, including all the advanced features a cellular phone can have. Hence the search for new technology is always the main motive of the leading cell phone giants to out innovate their competitors. Features that are getting embedded in such a small piece of electronics are huge.

The 5G design is based on user-centric mobile environment with many wireless and mobile technologies on the ground. In heterogeneous wireless environment changes in all, either new or older wireless technologies, is not possible, so each solution towards the next generation mobile and wireless networks should be implemented in the service stratum, while the radio access technologies belong to the transport stratum regarding the Next Generation Networks approach.

SG technology going to be a new mobile revolution in mobile market. Through SG technology now you can use worldwide cellular phones and this technology also strike the china mobile market and a user being proficient to get access to Germany phone as a local phone. With the coming out of cell phone like to PDA now your whole office in your finger tips or in your phone. 5G technology has extraordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. 5G May be in coming days 5G technology takes over the world market. The 5G technology distributes internet access to nodes within the building to be deployed with wireless network .

Student Achievements

Mr. Navin Prasanth G, third year student has participated in the "Independence day Parade at New Delhi".

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