

GALGOTIAS COLLEGE OF ENGINEERING AND TECHNOLOGY

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**Department of
Electronics & Communication
Engineering**

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About ECE Department

The Department of ECE offers B.Tech and M.Tech course in Electronics and Communication Engineering from Dr. A.P.J. Abdul Kalam Technical University, (formerly Uttar Pradesh Technical University / Gautam Buddh Technical University) Lucknow. Electronics & Communication Engineering deals with the electronic devices, circuits, communication equipments like transmitter, receiver, integrated circuits (IC). microprocessors, satellite communication, microwave engineering, antenna and wave progression. The department aims to impart high quality education in ECE and conduct top notch research in ECE related fields.

The department provides state-of-art infrastructure and computing facilities to students and faculty. The faculty members are actively involved in different domains of research with special focus in four thrust areas: (i) Wireless Communication and Networks (ii) Microwave and Antennas, (iii) VLSI Design (iv) Communication Systems (v) Signal and Image Processing. The department has a regular hardware and software labs as well as the state-of-art research labs in microwave and antennas, where faculty and students are working on funding projects and offering consultancy services. Some of the available softwares in ECE department are MATLAB, HFSS, ns-2, ns-3, Riverbed Academic edition, OrCAD PSPICE, eSim, SCILAB, OR-Tools, Expeyes, etc. The Department follows a well proven pedagogy of sharing knowledge with the young and vibrant minds of the college. As we are affiliated to AKTU University, Lucknow, the curriculum and subjects are prescribed by AKTU University. In addition to instruction in core ECE subjects, we also teach elective subjects in advanced topics such as Voice over Internet Protocol, Filter Design, Digital Image Processing, Digital System Design using VHDL, Speech Processing, Advance Digital Design using Verilog, Microcontroller for Embedded Systems, etc.

The department imparts world class training and research besides promoting active industry-institute collaboration by identifying current trends and taking part in sponsored research projects and consultancy services. The department also has a worldwide reach with its vibrant alumni network. Working shoulder with shoulder with the institution, it is constantly aiming towards reaching greater heights to serve the needs of the society and meet the aspirations of the student community.

Vision of Department:

To be recognized as a center of excellence in Electronics and Communication Engineering for the quality and global education, interdisciplinary research and innovation, to produce committed graduates who can apply knowledge and skills for the benefit of society.

Mission of Department:

DM1: To provide quality education by providing state of the art facility and solutions for global challenges.

DM2: To provide a framework for promoting the industry-institution collaboration and empower the students in interdisciplinary research.

DM3: To transform students into socially responsible, ethical and technically proficient engineers with innovative skills and usage of modern tools.

DM4: To make the students corporate ready with spirit and necessary interpersonal skills.

Program Edu. Objectives:

PEOs of the B.Tech in Electronics and Communication Engineering are:

PEO1: Graduates will excel in their career by acquiring knowledge in the field of Electronics and Communication Engineering with the usage of modern tools and emerging technologies.

PEO2: Graduates will have the capability to analyze real life problems of the society and produce innovative solutions.

PEO3: Graduates exhibit professionalism, ethical attitude, communication skills and team work in core engineering, academia and research organizations through professional development and lifelong learning.

Program Specific Outcomes:

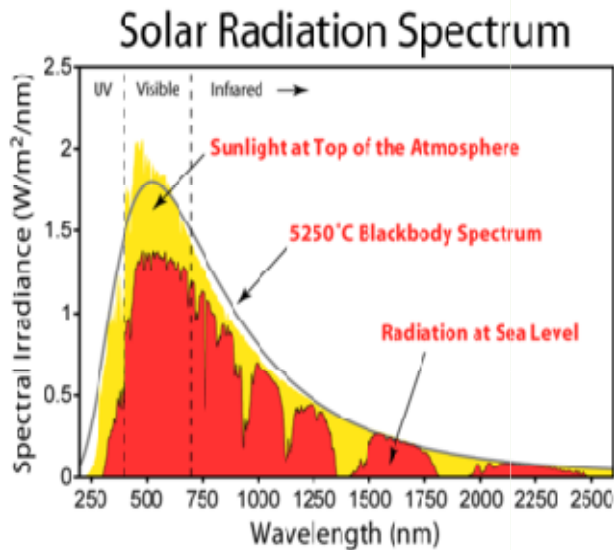
By the completion of Electronics & Communication Engineering program the student will have following Program specific outcomes:

PSO1: Design and develop models for analog & digital electronic circuits and systems.

PSO2: Design, develop and test electronic and communication systems for applications with real time constraints.

Faculty Articles

ARTICLE: Optical Rectifying Antenna (Rectenna)



A rectenna is a circuit containing an [antenna](#) and a [diode](#), which turns electromagnetic waves into [direct current electricity](#). While traditional (radio- and microwave) rectennas are fundamentally similar to optical rectennas, it is vastly more challenging in practice to make an optical rectenna. An **optical rectenna** is a [rectenna](#) (rectifying antenna) that works with visible or infrared light. One challenge is that light has such a high frequency—hundreds of [terahertz](#) for visible light—that only a few types of specialized diodes can switch quickly enough to rectify it. Another challenge is that antennas tend to be a similar size to a wavelength, so a very tiny

optical antenna requires a challenging [nanotechnology](#) fabrication process. A third challenge is that, being very small, an optical antenna typically absorbs very little power, and therefore tend to produce a tiny voltage in the diode, which leads to low diode nonlinearity and hence low efficiency. Due to these and other challenges, optical rectennas have so far been restricted to laboratory demonstrations, typically with intense focused laser light producing a tiny but measurable amount of power. Nevertheless, it is hoped that arrays of optical rectennas could eventually be an efficient means of converting sunlight into electric power, producing [solar power](#) more efficiently than conventional [solar cells](#). The idea was first proposed by Robert L. Bailey in 1972. As of 2012, only a few optical rectenna devices have been built, demonstrating only that energy conversion is possible. It is unknown if they will ever be as cost-effective or efficient as conventional [photovoltaic cells](#).

The term **nantenna** (nano-antenna) is sometimes used to refer to either an optical rectenna, or an optical antenna by itself. Currently, Idaho National Laboratories has designed an optical antenna to absorb wavelengths in the range of 3–15 μm . These wavelengths correspond to photon energies of 0.4 [eV](#) down to 0.08 eV. Based on antenna theory, an optical antenna can absorb any wavelength of light efficiently provided that the size of the antenna is optimized for that specific wavelength. Ideally, antennas would be used to absorb light at wavelengths between 0.4 and 1.6 μm because these wavelengths have higher energy than far-infrared (longer wavelengths) and make up about 85% of the solar radiation spectrum.

Prepared By:
Dr. R.L. Yadav
Professor, ECE

ARTICLE: Renewable Energy-The Energy of the Future

The global energy demand is anticipated to grow at a huge rate in the next 30 years. The International Energy Agency, IEA (2006) predicted that the world's energy needs will be almost 60% higher in 2030 than they are now. Two-thirds of this increase will arise in China, India and other rapidly developing economies, and these will account for almost half the energy consumption by 2030. Even as at present, there are significant deficits in energy supply in many countries, an example of which is Nigeria where the present demand hovers around 10,000 MW and the supply is just about a quarter of that figure. Still Nigeria aims at generating 20,000 MW by 2014. Sharp increases in world energy demand will necessitate important investments to enhance generating capacity and build new grid infrastructure. According to the International Energy Agency, the global power sector will need to build some 4,800 GW of new capacity between now and 2030. Security of supply, environmental concerns and the need for long-term, stable energy prices are all issues which could be alleviated through greater deployment of renewable energy technologies (IEA, 2010a).

The European Union has manifested the most ambitious goal thus far in respect of the development of renewable energy sources and application by adopting a binding target of 20% renewable energy in final energy consumption by 2020. A pathway has also been outlined towards a 100% renewable energy supply system by 2050 for electricity, heating, cooling and transport for the European Union. Some developing countries are developing similar policies while many others do not yet have clear-cut plans to integrate renewable energy into their overall energy scenarios.

The solution to the problem of securing adequate energy supply lies in the integration of several options and technologies from diversified fields, viz: biomass, biogas, bio ethanol, biodiesel, solar energy, wind energy, hydropower and other reasonably eco friendly options. No particular option may be regarded as the panacea. Different countries and respective regions of the world would have to decide and choose on the combination of options which suit them the best giving cognizance to their resource base, technology level, and available manpower to operate the various systems. Economic, environmental and political considerations are also vitally important. Other key options are solar power, wind power and hydro power. The experiences of Israel and India should encourage the African and other tropical countries to pursue these options more aggressively. As noted by the International Energy Agency (2010a), ensuring energy security and addressing climate change cost effectively are key global challenges. Finding solutions to the problems involved will require the participation of stakeholders worldwide by directing stronger efforts at renewable energy development and application. On a final note this article recommends country-level partnerships particularly in the areas of development of enabling policies, technology deployment, human resources provision and concessionary financial assistance to the developing countries.

Prepared By:
Mr. Shahid Iqbal
Assoc. Professor, ECE

ARTICLE: Quantum Entanglement in Space

Quantum entanglement is a quantum mechanical phenomenon in which the quantum states of two or more objects have to be described with reference to each other, even though the individual objects may be spatially separated. For example, it is possible to prepare two particles in a single quantum state such that when one is observed to be spin-up, the other one will always be observed to be spin-down and vice versa, this despite the fact that it is impossible to predict, according to quantum mechanics, which set of measurements will be observed.

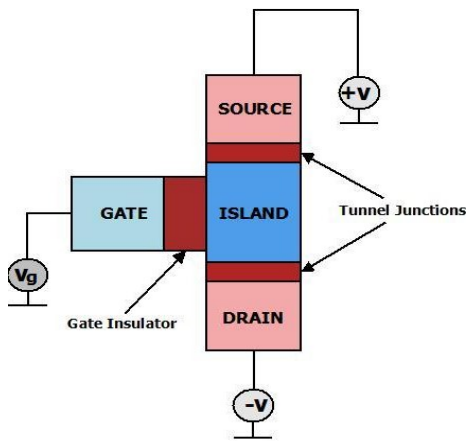
Quantum entanglement has applications in the emerging technologies of quantum computing and quantum cryptography, and has been used to realize quantum teleportation experimentally.

Juan Yin, lead author and physicist at the Science and Technology University of China in Shanghai, said that he and his team had demonstrated the distribution of two entangled photons from a satellite to two ground stations that were 1,203 kilometres apart.

The complicating thing is related with particles that get lost as they travel along optical fibres, or over open land when trying to achieve entanglement at long distance. By breaking the transmission line into smaller sections, and then swap, purify, and store the quantum information along the optical fibre is one way to improve particle distribution. The researchers make a start to communicate with three ground stations across China using entangled photons (light particles) with the help of Micius - the world's first quantum-enabled satellite which is launched last year. Each of the stations was around 1,200 kilometres apart and between 500 to 2,000 kilometres away from the orbiting satellite. Using a beam splitter, they split the laser beam from the satellite into two distinct polarised states. One of these split beams was used to send the entangled photons, while the other acted as a photon receiver. The main benefit of this approach is that satellites can easily cover two Earth-based locations that are thousands of kilometres apart. As most of the transmission path is in a vacuum, there's almost no loss of particles.

Prepared By:
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ARTICLE: Single Electron Transistor (SET)



The **single electron transistor** or SET is type of switching device that uses controlled **electron** tunneling to amplify current. A SET is made from two tunnel junctions that share a common electrode. A tunnel junction consists of two pieces of metal separated by a very thin (~ 1 nm) insulator. These are devices operating at the quantum/nanoscale that have switching properties controlled by the removal or injection of a single electron, a device through which only one electron can be transported at a time. The importance of SET can be seen as discussed below. In electrometry: It provides the possibility of measuring the electron addition energies (and hence the energy level distribution) in

quantum dots and other nanoscale objects. The SETs have also been used in the first measurements of single-electron effects in single-electron boxes and traps. A modified version of the transistor has been used for the first proof of the existence of fractional-charge excitations in the quantum hall effect. Low power logic gates and their derived devices. Single electron transistors (SETs) have high input impedances. Besides this, these are also very sensitive to random background charges. Let us analyze the terms Coulomb blockade and electron tunneling to understand the working principle of SET: SET consists of a metal island of a few hundred nanometers across, coupled to two metal leads via tunnel barriers. At temperatures below 1 K, no current can pass through the island with low bias voltage. This effect is known as the Coulomb blockade, which is the result of the repulsive electron-electron interactions on the island. Coulomb blockade is the repelling energy of previous electron present in the island to the next electron coming towards the island. The concept of Coulomb blockade refers to the phenomenon that tunneling through an island may be inhibited at low temperatures and small applied voltages. The reason is that the addition of a single electron to such a system requires an electrostatic charging energy. In metals, the coulomb-blockade oscillations are essentially a classical phenomenon, since the energy spectrum of the confined region may be treated as a continuum. This is not the case in semiconductor nanostructures which have dimensions comparable to the Fermi wave length.

Electron Tunneling: Tunneling refers to the ability of using the quantum wave properties of an electron to allow transmission through a thin voltage-potential barrier. According to the laws of classical electrodynamics, no current can flow through an insulating barrier. But quantum mechanics says that there is a finite probability for an electron on one side of the barrier to reach the other side. When a bias voltage is applied, there will be a current. This tunneling current will be proportional to the bias voltage. An arrangement of two conductors with an insulating layer in between not only has a resistance, but also a finite capacitance. The insulator is also called dielectric in this context; the tunnel junction behaves as a capacitor.

Prepared By:
Mr. Amit Gupta
Asst. Professor, ECE

ARTICLE: New Form of Compressed glassy carbon

When it comes to its physical properties, there are few elements as diverse as carbon. By heating carbon to an alarming 1,000 degrees Celsius (1,800 degrees Fahrenheit), scientists have discovered a brand new elemental form that's ultra-strong and ultra-light, but also elastic like rubber and electrically conductive.

Carbon gives rise to remarkable classes of materials with combined properties, such as low weight, high strength, hardness, elasticity, and tuneable electronic properties, because of the flexibility to form sp -, sp^2 -, and sp^3 -hybridized bonds. Diamond, entirely composed of sp^3 bonds, is a three-dimensional (3D) super hard insulator, whereas fully sp^2 graphene is a 2D Dirac semimetal with out-of-plane flexibility. Mixed sp^2 - and sp^3 -bonded carbon phases are expected to have advantages by integrating mechanical and electrical properties. The class of mixed sp^2 - sp^3 compressed Glassy Carbons (GCs) combines a variety of features into one material, including extraordinary specific compressive strength, high hardness, indentation elastic recovery, and electrical conductivity for many potential applications. Certain atomic configurations will result in the soft, slippery form of graphite, but arrange it another way, and you'll get diamond - one of the hardest materials on the planet. And then there's graphene, which is the strongest material known to science.

if you heat the element to almost 1,000 degrees Celsius, and put it under 250,000 times normal atmospheric pressure, you can produce an ultra-strong, yet super-flexible form of carbon that could see use in everything from exoskeletons to spaceships. Zhao and his team have finally found the optimal conditions, which force the carbon to buckle, merge, and connect in a range of configurations.

The result is a new, exotic type of carbon that contains both graphite-like and diamond-like bonds, plus layers of graphene, which help to impart softness and strength at the same time. The report given by the team indicates that the compressed glassy carbons have extraordinary specific compressive strengths - more than two times that of commonly used ceramics - and simultaneously exhibit robust elastic recovery in response to local deformations. Its elasticity beats organic rubber, silica, and even this shape shifting titanium-nickel wire, and it's about five times stronger than common metals and alloys. Researchers are finding new ways to create other extraordinary forms of carbon and entirely different classes of materials.

Prepared By:
Mr. S.P. Singh
Asst. Professor, ECE

ARTICLE: QUANTUM DOTS: Science & Applications

A **quantum dot (QD)** is a nanocrystal made of semiconductor materials that is small enough to exhibit quantum mechanical properties. Specifically, its excitons are confined in all three spatial dimensions. The electronic properties of these materials are intermediate between those of bulk semiconductors and of discrete molecules. Quantum dots were first discovered by Alexey Ekimov in 1981 in a glass matrix and then in colloidal solutions by Louis E. Brus in 1985. The term "quantum dot" was coined by Mark. Reed .Quantum dot (QD) is a conducting island of a size comparable to the Fermi wavelength in all spatial directions. A semiconductor quantum dot, however, is made out of roughly a million atoms with an equivalent number of electrons. Virtually all electrons are tightly bound to the nuclei of the material, however, and the number of free electrons in the dot can be very small; between one and a few hundred. The de Broglie wavelength of these electrons is comparable to the size of the dot, and the electrons occupy discrete quantum levels (akin to atomic orbitals in atoms) and have a discrete excitation spectrum. A quantum dot has another characteristic, usually called the charging energy, which is analogous to the ionization energy of an atom. This is the energy required to add or remove a single electron from the dot.

USAGE AND APPLICATIONS OF QDs:

Researchers have studied applications for quantum dots in transistors, solar cells, LEDs, and diode lasers. They have also investigated quantum dots as agents for medical imaging and also used in quantum computing. They can be set to allow labelling and observation of detailed biological processes. QDs can be useful tool for monitoring cancerous cells and providing a means to better understand its evolution. In the future, QDs could also be armed with tumor-fighting toxic therapies to provide the diagnosis and treatment of cancer. QDs are much more resistant to degradation than other optical imaging probes such as organic dyes, allowing them to track cell for processes for longer period of time. QDs offer a wide broadband absorption spectrum while maintaining a distinct, static emission wavelength. QD LEDs used to produce inexpensive, industrial quality white light. QD LEDs marked improvement over traditional LED- phosphor integration by dot's ability to absorb and emit at any desired wavelength. Utilizing QDs in solar cells allow realization of 3rd generation solar cells at approximately 60% efficiency in electricity production. Solar cells utilizing QDs are effective due to QDs ability to preferentially absorb and emit radiation that results in optimal generation of electric current and voltage. QDs also have future applications. They can be used in defence applications. Integrate QDs into dust that tracks enemies. QDs also provide protection against friendly-fire events. QDs also have the ability to specifically control absorption and emission spectra to produce unique validation signatures.

Prepared By:

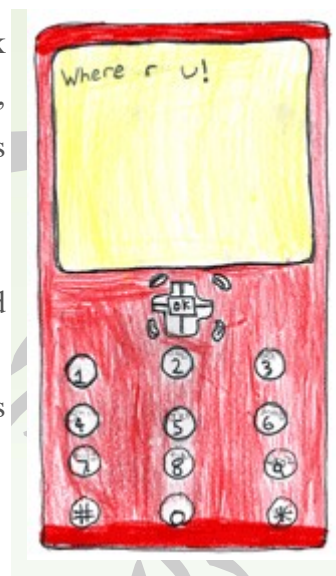
Mr. P. C. Joshi

Asst. Professor, ECE

ARTICLE: Be a Responsible Mobile User

Sometimes mobile phones can be used in a way that really annoys someone or hurts their feelings. Here are some tips on what **not** to do.

- Don't use someone else's phone unless they say it's ok.
- Text messages are private so don't read messages on someone else's phone.
- Be careful about what you text to someone. Maybe you are just kidding but think about whether the message is something you would not like to read yourself. Nasty, hurtful messages are the same as bullying or harassment. This 'cyber-bullying' is against the law and you could be in trouble.
- Only text people who have given you their numbers.
- Never text people who have asked you not to text them as that is harassment and illegal (against the law).
- Always add your name to the text unless you are sure you are on that person's contacts list.
- Don't pass on anyone's number without their permission.
- Don't give out your number unless you want that person to contact you.



Keep yourself safe

Mobiles are great if you remember to keep yourself safe. Have them switched on if you are alone or walking alone. If you are being cyber-bullied then:

- Save the messages into the saved messages box with the time and date.
- Text the bullies and tell them to stop.
- If they keep texting or calling turn off your phone.
- Tell an adult straight away.

Show the messages to a responsible adult like a parent or teacher. You can notify your service provider who will have some advice such as blocking that number, or if necessary, changing your number.

Prepared By:
Mr. Saurabh Katiyar
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ARTICLE: Switching optical media in the broadband era

Twenty years ago, when telephone services were dominant, if work was undertaken only when lines were not being used, there was little effect on customers. Now, however, in the optical broadband era, information flows nonstop, 24 hours a day, 365 days a year, via Internet, cloud computing, video distribution, and other services. Therefore, the old approach cannot be used without affecting customers. We are conducting R&D to find ways of switching optical media that are appropriate for the modern era.

Uninterruptible optical access line switching system approximately four years ago, we conceived principles that enable media to be switched without the disconnection or suspension of services and were able to demonstrate the practical implementation of this approach. Our technique involves (1) connecting an optical fiber (the detour path) of approximately the same length as the current optical fiber (the main path) in parallel with it, (2) disconnecting the main path and transmitting the optical signal over the detour path, (3) performing the switch work while the main path is offline, (4) adjusting the length of the detour path while it is transmitting the signal so that it is approximately the same as that of the main path after switching, (5) reconnecting the main path as the new line in parallel with the detour path, and (6) disconnecting the detour path. All of the steps in this procedure can be performed without interrupting the signal.

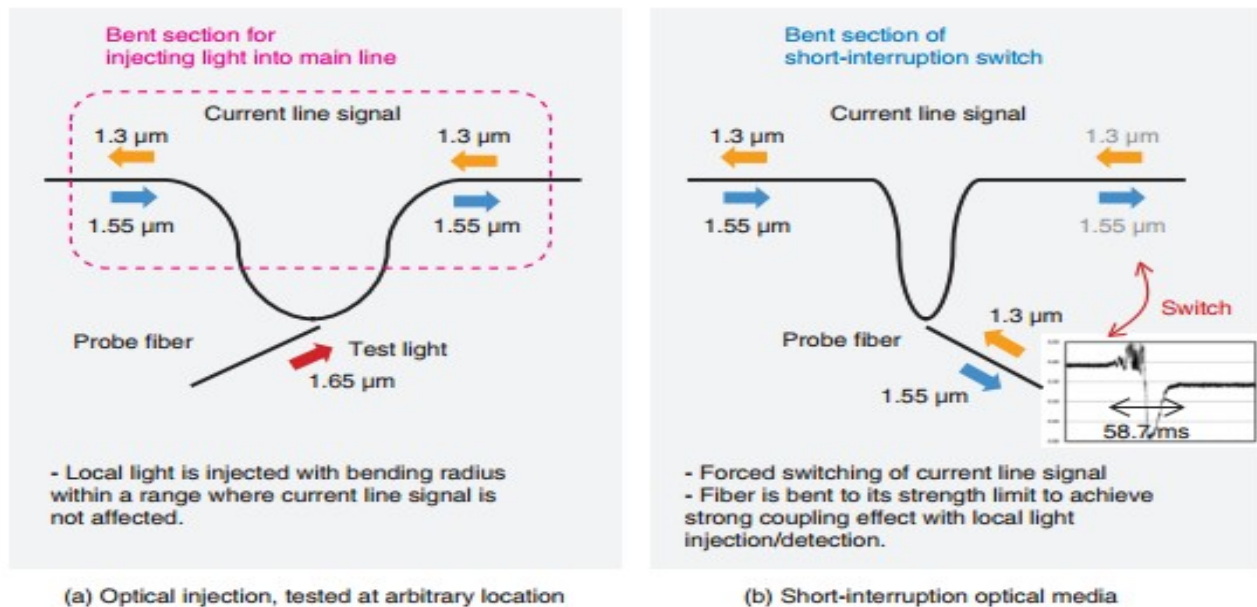


Fig. 3. Local optical injection/detection technology.

The system is complex and requires precise control of path lengths, measurements, loss compensation, and the cancellation of interference. We are therefore undertaking R&D to build a system that is compact, smart, and compatible with a variety of scenarios in the field. If this system can be realized, we will be able to change an optical access line at any time.

Prepared By:
Ms. Ruchi Agrawal
Asst. Professor, ECE

ARTICLE: Should Humans Trust Robots?

Trust between humans and robots can be tricky business. Early surveys have suggested people still hesitate to trust their lives with robotic vehicles such as self-driving cars. But a new study examines the opposite problem of how people may trust robots even when the machines make obvious mistakes during emergencies.

The study by the Georgia Tech Research Institute supposedly represents the first research to test human-robot trust in an emergency situation. Human volunteers who participated in the study were told to follow a brightly-colored “Emergency Guide Robot” as it led them to a conference room. The study participants obediently followed the robot for the most part, even when it seemed to lose its way or sometimes traveled in a circle. To the surprise of researchers, the humans still seemed to trust the robot’s directions even during a fake emergency triggered by artificial smoke setting off the fire alarm.

“People seem to believe that these robotic systems know more about the world than they really do, and that they would never make mistakes or have any kind of fault,” said Alan Wagner, a senior research engineer in the Georgia Tech Research Institute (GTRI), in a press release statement. “In our studies, test subjects followed the robot’s directions even to the point where it might have put them in danger had this been a real emergency.”

The enduring human trust in robots seemed especially unexpected given past research findings. A previous simulation study done without the emergency scenario had suggested people would not trust a robot that had made mistakes. Such mistakes were clearly made visible to the human volunteers in this latest study as well. Besides losing its way or circling aimlessly, the robot even stopped moving for several human participants. In those cases, a researcher told the volunteers that the robot had broken down.

When the fake emergency began, the robot tried to act as a guide with its brightly-lit red lights and white arms to point the way. But for the study, the robot intentionally directed the human volunteers to exist in the back of the building instead of toward the entrance doorway that displayed clear exit signs. Some people followed the robot even when it led them toward a dark room blocked by furniture.

The study, funded by the U.S. Air Force Office of Scientific Research and Georgia Tech’s Linda J. and Mark C. Smith Chair in Bioengineering, involved just 42 study participants and took place in a lab setting. Much larger experiments set in the real world—perhaps involving self-driving vehicles—will likely be necessary to better understand the relationship between humans and robots. Still, this study represents just one part of longer-term research on how humans trust robots as robots become more common companions. A presentation on the study is scheduled for March 9 at the 2016 ACM/IEEE International Conference on Human-Robot Interaction (HRI 2016) in New Zealand.

Trusting a robot goes beyond just emergency life-or-death situations. Some modern cars increasingly have the capability to drive by themselves on highways or in other limited scenarios. Tech companies and automakers have been testing fully autonomous self-driving cars that could drive themselves all the time without human intervention. Robots may also graduate from being household vacuum cleaners to doing more complex tasks

such as taking out the trash. Or they may even take on greater responsibilities such as caring for kids or elderly parents, said Paul Robinette, a research engineer at GTRI who conducted the study as part of a doctoral dissertation.

Researchers have mostly concerned themselves with the problem of getting humans to trust robots. Google and other companies building driverless vehicles have considered the self-driving cars' appearances as one possible factor for trust. Behavioral scientists at the Eindhoven University of Technology in the Netherlands tested virtual avatars with faces for self-driving cars as a way to win the trust of human passengers.

By comparison, the latest study raises the different question of whether humans should only trust robots up to a certain point. Ideally, a robot that malfunctioned or made a mistake would display an obvious indicator telling humans they should stop blindly trusting its decisions. But that solution could prove tricky if the robot itself cannot tell it's making a mistake. The future of working relationships between humans and robots may still prove much more complex than just kicking back, switching off our brains and letting the robots get to work.

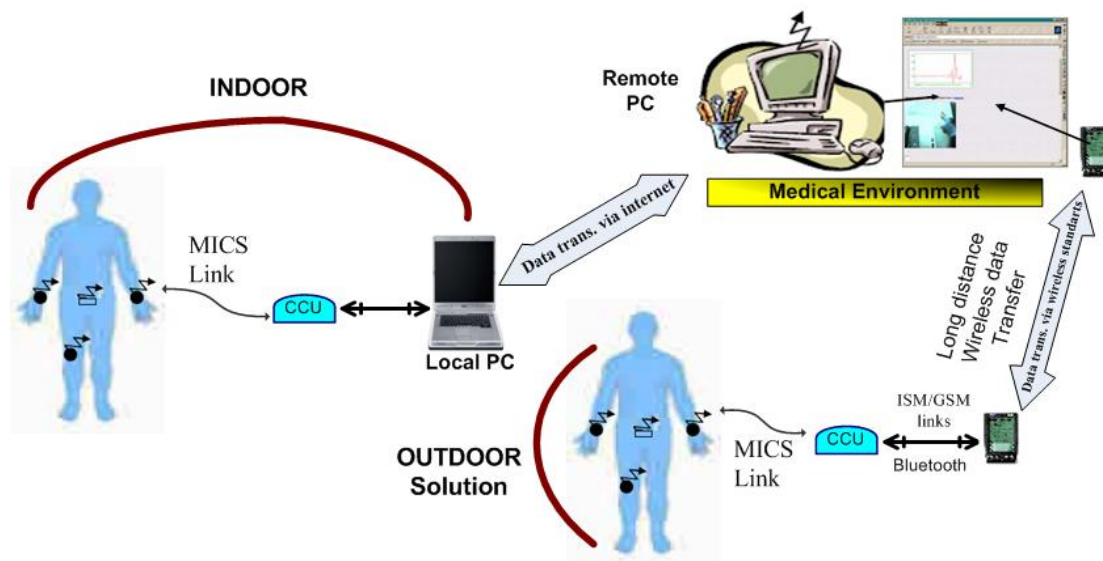
The U.S. Air Force's funding of such research also makes sense considering how computers and semi-autonomous systems already play a big role on modern battlefields. At some point in the future, human warriors will almost certainly find themselves putting their lives in the hands of walking military robots or perhaps flying drone ambulances. Their decision on whether or not to trust the judgment of a machine during the heat of battle may have life or death consequences.

Prepared By:
Mr. Kuldeep Singh
Asst. Professor, ECE

ARTICLE: WBAN- A Future Health Care Technology

Ubiquitous healthcare is an emerging technology that promises increases in efficiency, accuracy and availability of medical treatment due to the recent advances in wireless communication and in electronics offering small and intelligent sensors able to be used on, around, in or implanted in the human body. In this context, Wireless Body area networks (WBANs) constitute an active field of research and development as it offers the potential of great improvement in the delivery and monitoring of healthcare.

WBANs consist of a number of heterogeneous biological sensors. These sensors are placed in different parts of the body and can be wearable or implanted under the user skin. Each of them has specific requirements and is used for different missions. These devices are used for measuring changes in a patient vital signs and detecting emotions or human statuses, such as fear, stress, happiness, etc. They communicate with a special coordinator node, which is generally less energy constrained and has more processing capacities. It is responsible for sending biological signals of the patient to the medical doctor in order to provide real time medical diagnostic and allow him to take the right decisions.



As exposed in Fig.1, the WBAN common architecture consists of three tiers communications: Intra-BAN communications, Inter-BAN communications and beyond-BAN communications. Intra-BAN communications denote communications among wireless body sensors and the master node of the WBAN. Inter-BAN communications involve communications between the master node and personal devices such as notebooks, home service robots, and so on. The beyond-BAN tier connects the personal device to the Internet. Communications between different parts is supported by several technologies, such as Bluetooth, IEEE 802.15.4. IEEE 802.15.6 was designed especially for WBAN applications while responding to the majority of their requirements.

However, it looks less performing in some cases in comparison with other technologies supporting WBAN. Wi-Fi, Bluetooth and mobile networks can be solutions for implementing WBAN applications, since each technology offers specific characteristics, allowing it to meet the constraints of some applications. In fact, WBAN applications cover numerous fields in order to improve the user's quality of life. These applications can be categorized mainly according to whether they are used in medical field or in non-medical field. Non-medical applications include motion and gestures detection for interactive gaming and fitness monitoring applications,

cognitive and emotional recognition for driving assistance or social interactions and medical assistance in disaster events, like terrorist attacks, earthquakes and bush fires. Medical applications comprise healthcare solutions for aging and diseased populations mainly. Typical examples include the early detection, prevention and monitoring of diseases, elderly assistance at home, rehabilitation after surgeries, biofeedback applications which controls emotional states and assisted living applications which improve the quality of life for people with disabilities.

Generally, body sensors used in health monitoring³ can be either : (a) Physiological sensors used to measure human body vital signals internally or externally, like body temperature, blood pressure or Electrocardiography (ECG); or (b) Biokinetic sensors able to collect human body movement based signals as acceleration or angular rate of rotation. To offer additional information about ambient temperature, environment pressure, light or humidity, ambient sensors can be combined to body sensors. In fact, since these sensors are in charge of monitoring the environment, they can provide valuable additional information for medical diagnosis and treatment, which is often the case in home environment. However, the conception of WBAN applications should take into account many technical requirements, such as the motions and the temperature of the nodes, the node locations and the low node capacities in term of energy and processing. Other constraints tightly associated to wireless technologies, used for the communications between on body and in-body nodes, must be taken into account, such as the short area range, the data rate, etc. ISO/IEEE 11073 specifies for some classes of medical applications the required data rates and latencies.

Besides, WBAN applications can involve additional requirements, tightly related to the medical application as well as the patient condition. For example, applications using implanted sensors should rely on mechanisms minimizing energy consumption in order to extend battery life; while achieving maximum throughput and minimum delay is a prerequisite for applications with high criticality, like operation of elderly heart patients. All these statements and requirements motivate us to study the different WBAN applications and to highlight the constraints to satisfy for the well functioning. We study also the different technologies used and try to associate the WBAN applications with the appropriate technologies in order to achieve the maximum of QoS.

Prepared By:
Mr. Vinay Singh
Asst. Professor, ECE

ARTICLE: Latest trends in Wireless Communication (Massive MIMO)

Multi-user MIMO offers big advantages over conventional point-to-point MIMO: it works with cheap single-antenna terminals, a rich scattering environment is not required, and resource allocation is simplified because every active terminal utilizes all of the time-frequency bins. However, multi-user MIMO, as originally envisioned, with roughly equal numbers of service antennas and terminals and frequency-division duplex operation, is not a scalable technology. Massive MIMO (also known as large-scale antenna systems, very large MIMO, hyper MIMO, full-dimension MIMO, and ARGOS) makes a clean break with current practice through the use of a large excess of service antennas over active terminals and time-division duplex operation. Extra antennas help by focusing energy into ever smaller regions of space to bring huge improvements in throughput and radiated energy efficiency. Other benefits of massive MIMO include extensive use of inexpensive low-power components, reduced latency, simplification of the MAC layer, and robustness against intentional jamming. The anticipated throughput depends on the propagation environment providing asymptotically orthogonal channels to the terminals, but so far experiments have not disclosed any limitations in this regard. While massive MIMO renders many traditional research problems irrelevant, it uncovers entirely new problems that urgently need attention: the challenge of making many low-cost low-precision components that work effectively together, acquisition and synchronization for newly joined terminals, the exploitation of extra degrees of freedom provided by the excess of service antennas, reducing internal power consumption to achieve total energy efficiency reductions, and finding new deployment scenarios.

Prepared By:
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Asst. Professor, ECE

ARTICLE: Wireless Pacemakers

Researchers from Rice University in collaboration with Texas Heart Institute have introduced a wireless battery less pacemaker. This microwave powered device can be directly implanted into the patient's heart and can receive the energy wirelessly in form of RF radiations transmitted by an external battery source. The work of the pacemaker is to control abnormal heart rhythms by generating electrical pulses to prompt the heart to beat at a normal rate. Traditionally, the pacemakers are implanted somewhere away from the heart where surgeons can easily workout for changing onboard batteries with minor surgery. In such kind of arrangement, the electrical signals are transmitted to the heart via wires called 'leads'. Some common problems noted in the traditional setups are related to leads, including bleeding and infection. The wireless pacemaker has compensated for such risks by nullifying the use of leads. This new invention in the field of Pacemakers uses battery-less, lead-less and wirelessly powered microchips that are able to provide dual-chamber or biventricular pacing. The chip used is less than 4mm wide and incorporates the receiving antenna, AC/DC rectifier, a power management unit and a pacing activation signal. The microwaves received are in the range of 8-10 GHz of EM wave frequency spectrum. The amount of the power transmitted to the receiving antenna determines the frequency of the pacing signals. The power is stored till a predetermined threshold is achieved. At that point, the electrical charge is released to the heart and the cycle continues.

Prepared By:
Mr. Gaurav Mehra
Asst. Professor, ECE

ARTICLE: Syncing, Co-existence, 5G And Some Meaningless Words

It's that time of the year again, with NIWeek 2017 rolling in full momentum. This year's event is also the first one since Dr. James Truchard (Dr. T) stepped down from CEO to remain as Chairman. Nevertheless, I've got to say that the NI team has definitely stepped up to join forces to try and make up for the difference.

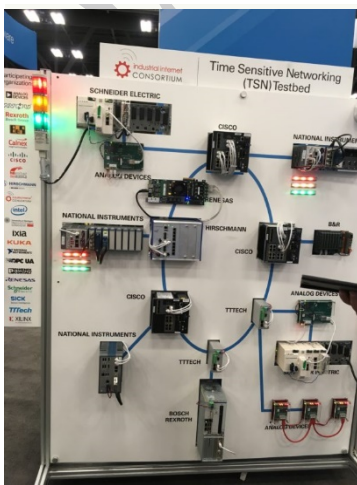
In Sync With the Times

One really interesting update is that NI (National Instruments) has now integrated Time Sensitive Networking (TSN) into the Compact DAQ Platform. TSN syncs through Ethernet, and while the technology is certainly interesting enough, it is the implications of this technology that are really noteworthy. Previously, engineers needed to manually synchronise using extra cables or UDP. The flip side of this was that UDP packets getting dropped will affect the sync, thus affecting the system adversely. TSN is immune to this. What's more is that TSN is immune to signal interference. Time sensitive networking is a set of IEEE 802.1 standards (Qbu, Qcc, As), and the implementations at NIWeek used Cisco switches to implement them.

Co-existence is Key, Even With Technology

WiFi and LTE co-existence was one of the themes for a demonstration on the expo floor at NI Week this time around. What's more interesting is that learnings from this can be applied to 6G when it comes around. This is definitely good since the converging dimensions of 5G, Industrial Internet of things, Semiconductor technology and autonomous driving will surely benefit from this. The other remarkable trend is that almost a decade ago, teams started working on LTE as a study item (around 2005). It later became a work item in 2011 taking 6 years for implementation. That pace has definitely picked up, and we expect 5G to be implemented much quicker.

What's to know about 5G???...



5G is not being designed as a standalone network this time around, but as a much more integrated solution. It is literally being looked at as a add-on technology that can be integrated to existing infrastructure. This means that network operators won't have to invest even more insane amounts of money into their networks to keep up with the technology that their users want on tap.

IoT, autonomous cars, systems and other meaningless words...

Yes, so one interesting viewpoint that I picked up from a speaker is that the "Internet of Things" is being used for so many things that it has almost become a meaningless word. From consumer electronics and toys, all the way to complex industrial systems are being tagged with the same term. The suggestion is to divide it into consumer, industrial, and analytics at least. "System" was the other word that kept having it's meaning changed depending on whom you were

speaking with. For some engineers, a system is a chip. For some, it is a wireless or embedded device. For others, it was something like a HyperLoop system.

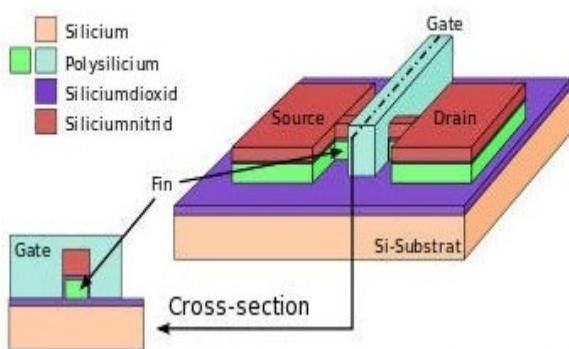
"Autonomous cars", was the other target — and with good reason. It was likened to calling cars as horse-less carriages. What's a better term? Carbots. Short and sweet.

Prepared By:
Mr. Amanpreet Singh
Asst. Professor, ECE

ARTICLE: FinFET

The finFET is a transistor design, first developed by Channeling Hu and colleagues at the University of California at Berkeley, which attempts to overcome the worst types of short-channel effect encountered by deep submicron transistors, such as drain-induced barrier lowering (DIBL). These effects make it harder for the voltage on a gate electrode to deplete the channel underneath and stop the flow of carriers through the channel – in other words, to turn the transistor Off. By raising the channel above the surface of the wafer instead of creating the channel just below the surface, it is possible to wrap the gate around up to three of its sides, providing much greater electrostatic control over the carriers within it.

FinFET Device Schematic



There are a number of subtly different forms of trigate transistor structure that are being described as finFETs. The architecture typically takes advantage of self-aligned process steps to produce extremely narrow features that are much smaller than the wavelength of light generally used to pattern devices on a silicon wafer. It is possible to create very thin fins - of 20nm in width or less - on the surface of a silicon wafer using selective-etching processes, although they typically cannot currently be made less than 20nm to 30nm because of the limits of lithographic resolution. The fin is used to form the raised channel. The gate is then

deposited so that it wraps around the fin to form the trigate structure. As the channel is extremely thin the gate has much greater control over the carriers within it but, when the device is switched on, the shape limits the current through it to a low level. So, multiple fins are used in parallel to provide higher drive strengths.

Originally, the finFET was developed for use on silicon-on-insulator (SOI) wafers. Recent developments have made it possible to produce working finFETs on bulk silicon wafers and improve the performance of certain parameters. The steep doping profile used to control leakage into the bulk substrate has a beneficial impact on DIBL, although increased doping has a negative impact on variability. A drive strength tunable FinFET, a method of drive strength tuning a FinFET, a drive strength ratio tuned FinFET circuit and a method of drive strength tuning a FinFET, wherein the FinFET has either at least one perpendicular and at least one angled fin or has at least one double-gated fin and one split-gated fin. It transistors have been shown to offer comparable or better performance than finFETs. However, the relative compatibility of the bulk-silicon finFET with existing wafer fabrication processes and today's wafer-supply chain favors the finFET for high-volume IC production at 22nm and below. FinFETs have key advantages over planar bulk devices. They exhibit more drive current per unit area than planar devices, largely because the height of the fin can be used to create a channel with a larger effective volume but still take advantage of a wraparound gate. The added performance capability of FinFETs can be used to achieve higher frequency numbers compared to bulk for a given power budget or lower power..

Prepared By:
Mr. Satya Prakash
Asst. Professor, ECE

Students Articles

ARTICLE: Smart City Implementation Models Based on IoT Technology

The rapid development of information technology (IT) has brought forward a hyper connected society in which objects are connected to mobile devices and the Internet and communicate with one another . In the 21st century, we want to be connected with anything anytime and anywhere, which is already happening in various places around the world. The core component of this hyper connected society is IoT, which is also referred to as Machine to Machine (M2M) communication or Internet of Everything (IoE).

Recently, many local governments have been aiming to implement an IoT-based smart city through the construction of a test bed for IoT verification and an integrated infrastructure . This movement also corresponds to the creative economy that is emphasized by the Korean government. In this chapter, smart city implementation models based on IoT that can be implemented by local governments are described through examples.

- **Smart Traffic Service:** Major smart traffic services include smart parking services to prevent illegal parking and facilitate convenient parking, citizen participation-oriented illegal parking prevention services, and smart safe crosswalk services. Smart parking refers to the construction of a platform that enables real-time checking of available space and parking prices in areas that require parking and facilitation of reservation/payment through Web and mobile connections. The citizen participation-oriented illegal parking prevention service is an improvement of the illegal parking crackdown system of the traffic authority by allowing citizens (including victims of illegal parking) to conveniently report such violations through their smartphones. Furthermore, the smart safe crosswalk service can contribute to the prevention of pedestrian accidents and secondary car accidents by detecting pedestrians in children protection zones, and alerting pedestrians and approaching vehicles through electronic display boards.
- **Smart Education Service:** This service provides real-time, interactive high-definition lectures that feel like faceto-face meetings at home through high-definition (HD) services and wide-area Internet infrastructure. Instructors participate in the lectures by using equipment in private educational institutes or separate places, and even foreign language teachers in other countries can access this service through the Internet.

Prepared By:
Abhishek Dwivedi
Student Editor
1309731005

ARTICLE : The Effects Of A Lightning Strike On The Human Body

Most of us have seen lightning dance through the sky, counting the seconds that pass before we hear thunder in order to see how close we are to that deadly charge. While thousands of people are struck by lightning each year, only a fraction are fatally injured. Yet for these survivors, the effects of a lightning strike are debilitating and last for decades. Here's why: A lightning strike is a massive electrical discharge between the atmosphere and an earth-bound object. A lightning bolt can heat the surrounding air to 50,000 degrees Fahrenheit—that's five times hotter than the sun—and can contain up to 300kV of energy.



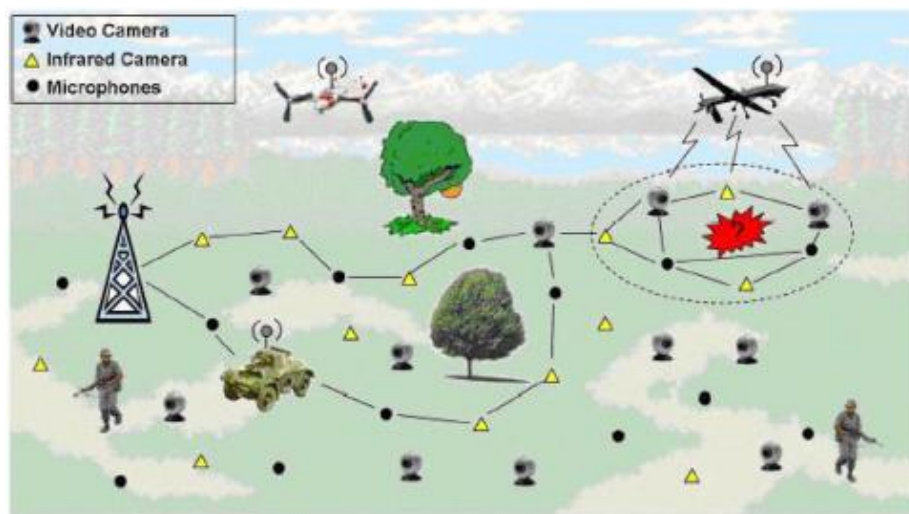
How Can We Survive A Lightning Strike?

When you think about all the power, heat and electricity that comprise a lightning bolt, it is hard to imagine anyone surviving a strike. Yet most people do survive, in part because lightning rarely passes through the body. Instead, a “flashover” occurs, meaning that the lightning zips *over* the body, travelling via ultra-conductive sweat (and often rainwater), which provides an external voltage pathway *around* the body. When people do die from a lightning strike, it is usually due to an electrical discharge-induced heart attack.

Prepared By:
Kushagra Agarwal
Student Editor
1309731043

ARTICLE : Next Generation Defense System with Wireless Sensor Network

The rise of Wireless Sensor Networks (WSNs) has brought revolution in the field of technology. These networks comprise of a large number of densely deployed sensor nodes which works through collaboration. In WSNs, each sensor node has limited resources such as, low energy, less bandwidth, limited memory and small computational power. These nodes are very inexpensive in terms of cost, so resource limitation is not a big problem. If a node runs out of energy, so instead of replacing the battery, we can replace the entire node with a new node. There are different types of sensors available like temperature sensor, humidity sensor, multimedia sensor and others.



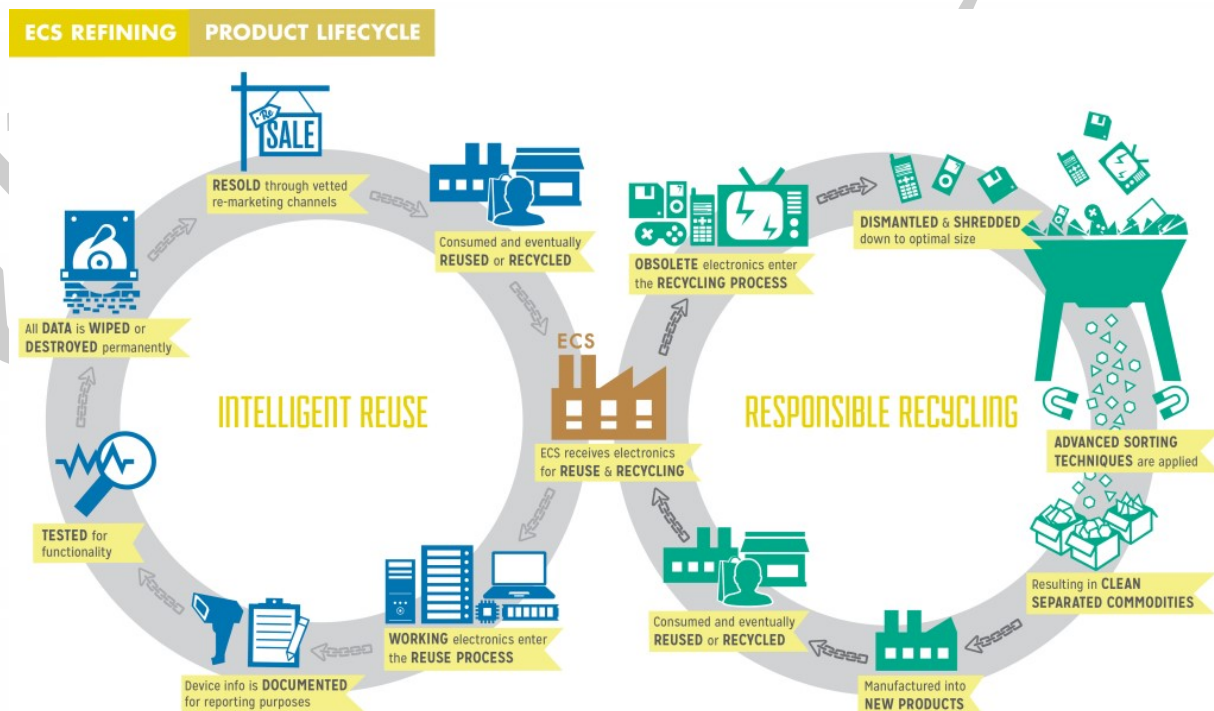
Due to these variant sensors, WSNs got applications in different fields such as environment monitoring, agriculture monitoring, industrial monitoring, health monitoring, home applications and military operations. Sensor Networks were initially designed for military operations and surveillance. WSNs have been emerged as an excellent tool for military applications involving intrusion detection, various parameters monitoring, information gathering and, smart logistics support in an unknown deployed area. These networks can provide different services to military and air force like information collection, battlefield surveillance and attack detection. Because of their capabilities of real time transmission, WSNs play an important role in military operations. These networks offer several advantages over traditional sensor devices such as fault tolerance, robustness and low budget deployment. In case of enemy attack, some nodes will be damaged but node damage in WSNs does not disturb the complete network. Due to their unique characteristics, these networks are well-known among the research communities and industrial partners.

Prepared By:
SANCHIT GOEL
1209731095

ARTICLE: E-waste Disposal Solutions

E-waste is a term used to cover almost all types of electrical and electronic equipment (EEE) that has or could enter the waste stream. Although e-waste is a general term, it can be considered to cover TVs, computers, mobile phones, fridges, washing machines, dryers, home entertainment and stereo systems, toys, toasters, kettles – almost any household or business item with circuitry or electrical components with power or battery supply. Large scale consumption of these devices and changing technology brings end to their life and makes them obsolete, thus increasing waste stream. Furthermore, the post consumptive remains of these electronic and electrical products contain toxic elements like mercury, cadmium, lead, nickel, polyvinyl chloride, BFRs which leads to various diseases of the skin and decrease nerve conduction velocity, lung cancer, kidney damage, pulmonary emphysema and bone diseases and many more. Thus, it becomes necessary to look for solutions that provide proper end of life management to these obsolete turned devices.

Disposal Solutions Disposal covers all operations making use of physical, chemical or biological treatment, incineration and deposition in secured landfills. A large part of e-waste not fit for recycling needs such disposal solutions. Generally, E-waste is disposed of using same methods as adopted for solid waste but the presence of hazardous materials in e-waste makes it essential to dispose it separately paying concern to the environment. There are various disposal methods available presently which can be categorized into 2 categories:



A. Thermal Treatment Disposal

In this kind of disposal, thermal treatment in the form of heat is used to treat and decompose waste. There are 2 ways by which thermal treatment disposal is done.

(a) **Open Burning:** Open burning refers to burning waste in open pits, barrels, fireplaces in which emissions are directly released into the ambient air. This open burning disposal is practiced at a very small level for household

and industrial waste disposal. (b) **Incineration**: The process of burning the waste in large furnaces at very high temperature in controlled manner is incineration. Incineration is generally followed for small scale disposal. The heat emitted can be productively used to generate energy.

B. Dumping Disposal

Dumping disposal follows filling the waste in designed dig trenches. The waste can be placed openly, filled in landfills or specially designed sanitary landfills. These are methods employed for large scale disposal of waste.

(a) **Open dumps**: This is the cheapest kind of disposal in which dumps of waste are dumped in low lying areas on the city outskirts and continuously leveled by bull dozers. Open dumping is not a scientific way of dumping and is not emphasized.

(b) **Conventional Landfill dumping**: In unused areas, mining voids or craters, trenches of required depth and area are developed in which waste is dumped. In order to prevent contamination of atmosphere with the hazardous waste dumped in the landfill, a layer of soil or debris is scattered over the landfill on routine basis. After the landfill trench is completely filled, the area is covered with a thick layer of mud and the site can be used for construction of some parking lot or park. Leaching of the hazardous material in the waste is a concern in such kind of landfills.

(c) **Sanitary Landfill dumping**: Sanitary landfills have come out as modern landfills replacing conventional landfills. They make use of protective measures against spreading of pollution in the form lining of bricks or cement which makes leaching impermeable. Sanitary landfills solve the problem of leaching to a large extent.

(d) **Deep well disposal**: An Injection well is a device that places hazardous waste deep underground into porous rock formations, such as sandstone or limestone, or into or below the shallow soil layer. Deep wells that inject hazardous wastes into isolated formations far below the Earth's surface are designed to provide multiple layers of protective casing and cement.

ARTICLE: HBand: Where Your Hand Becomes the Phone

Next time, when you see people talking with their hand on the ear with no phone but just a watch on the wrist, don't be bewildered, they must be using the HBand. You may ask, "How can a band or watch replace a phone?" But, HBand, with its unique concept, makes it possible to talk without a phone. HBand is a luxury leather watch strap that is compatible with most of the smart watches. It has a built-in Bluetooth audio fob, which compensates for the need of a phone during a call. This compact, ultra-slim Bluetooth headset is embedded in the watch strap but can be easily removed, thereby making it both audio on the wrist and headset on the wrist. HBand provides the convenience of phone call in two modes: hands-on mode and headset mode.

Mobile phones have advanced to such an extent that call features are being provided in smart watches. So there are no issues like the phone getting lost. Surprisingly, though, none of smart watches provides call handling in private mode. HBand completes Apple or other smart watches by adding the private call feature that they lack, using the patented Hands-on-Talk technology. You just have to flip open the fob and raise your hand to the ear to take the phone call. There is no need to reach for your phone and rush to pick it up. This is called hands-on mode, and is the ideal solution for a quick phone call. If you must take a longer call, you can pull out the fob from the watch strap, insert it in your ear and use the device like a normal Bluetooth headset. This is called the headset mode. Directional audio is fired from the bottom of the wrist, at higher volume and pressures with sufficient back volume, towards the palm of the user. When the palm is held in cupped position to the ear, it acts like a parabolic reflector, redirecting the sound to the ear. Typically, the audio is omni-directional. Partial directivity can be given to the audio by firing at a close range with proper openings. HBand uses normal micro speakers with suitably designed back volume, front volume and openings to provide partial directivity. This method renders partial to full private sound.

HBand uses the same technology as that of basic Bluetooth headsets. To achieve the higher volumes required for hands-on private calling, though, the amplification circuit of a basic headset is modified. A couple of hardware components are used to make the concept possible, the most important being a Bluetooth communication module to provide two-way audio to the phone. A directional speaker is used to fire audio to the user's hand, while an omni-directional microphone placed beside the speaker reads the user's speech. Noise-cancellation algorithms are included to cancel out the wind and other ambient noises. The watch strap uses a quick-snap magnetic buckle, which provides docking for the Bluetooth audio fob.

"The biggest challenge was to shrink the circuits and achieve speaker back volumes in a slim form factor suitable for the wrist," shares Ram Pattikonda, chief technology officer (CTO), iMetrix Technology—the company behind HBand. HBand uses a new strap clasp concept that accommodates the slim fob on the wrist and makes fob-open and pull-out functions easy, without adding to the thickness on the wrist. The electronics and the audio acoustics are miniaturised, while maintaining the style and multi-function capability. The HBand product development took about one-and-a-half years because of the delays in plastic tooling, packaging and integration due to the product's mechanical complexity. The electronics system, though complex, was designed in less than six months. Almost all smart watches feature music, call display, weather information and message notification. HBand enhances these features with its audio support and easy-to-use mechanical structure. Its innovative combination of mechanical, electronic and acoustic features takes ordinary smart watches to another level. The product has already been launched in India and the US. In fact, there is more to come. The next version of HBand is being designed with focus on better product design and touch-button facilities. The team is also working towards adding features like fitness and sleep tracker, high-resolution OLED display and notification with scrolling text, while extending the battery life to one week.

Prepared By:
APOORVA BHARDWAJ
1309731022

ARTICLE: ‘Capacitor-Tuning’ via ‘illumination’

Researchers at the Israel Institute of Technology have come up with an innovation in the field of electronics industry. The team has developed a capacitor with a metal-insulator-semiconductor (MIS) diode structure that is tunable by illumination. The capacitor that is comprised of metal nano particles is similar to a metal-insulator-metal (MIM) diode. The device has wireless capability for information processing, sensing, and telecommunications. Such kind of capacitor-tuning is not possible in any other device. This device will find its applications in a wide variety of optoelectronic circuits. Such photosensitive capacitors can be potentially used in remote sensing circuits. The researchers have fabricated MIS structures on a bulk silicon substrate based on a multilayer dielectric stack, consisting of a thin thermal silicon dioxide film and a hafnium oxide layer. The two layers were separated by Strontium Fluoride (SrF_2) sub-layers in which Iron or Cobalt nano particles were incorporated. Some additional tests revealed the importance of the combination of Fe and SrF_2 towards photosensitive capability. In all, a capacitor with the ability to tune the capacitance by using light has come into existence.

Prepared By:
Prakhar Gupta
1309731058

ARTICLE: Next-generation optical fiber research for the ultrahigh-speed, high-capacity era

Internet traffic is increasing exponentially with the accelerating spread of services such as social networking and video content services. The bandwidth of optical fiber communications systems that form the backbone for this communication is also being increased yearly. However, there are limits to the increase in bandwidth and speed that can be achieved with the single-mode optical fiber currently in use, and it is estimated that these limits will be reached in ten years. Therefore, a new transmission medium that overcomes these limitations will need to be created. We are focusing on ways to spatially extend the transmission area of optical fiber, which is one way to overcome these limitations .

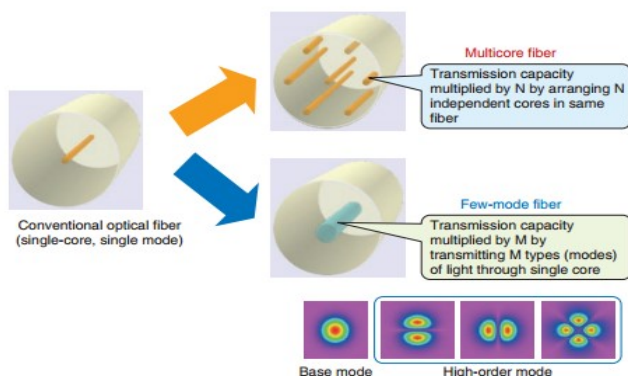


Fig. 4. Next-generation fiber for space-division multiplexing.

Current optical fibers transmit optical signals using a single mode, through a single core (transmission path) within a strand of quartz glass. However, optical fiber design and production technology is advancing because of the employment of complex cross sections such as hole structures, and digital transmission processing technology. Fiber with multiple cores in a single strand of quartz glass, and multi-mode fiber capable of transmitting stable signals with multiple modes in a single core are presenting new possibilities for novel fiber structures with higher spatial multiplexing.

We have continued to demonstrate the possibilities of multicore fiber with, for example, a successful 1-Pbit/s transmission over a single 12-core optical fiber of 52 km, which is a world record (ECOC (European Conference on Optical Communication) International Exhibition, Sept. 2012, and NTT News Release).

Prepared By:
Srishti Sharma
1409731106

ARTICLE: Work from Home – A Solution of Air Pollution

India has been struggling with the air pollution problem over the past years. Despite the important regulatory efforts, the problem remains unsolved and it continuously threatens both the public health and the environment. Air pollution can have devastating effects especially if the individuals are constantly exposed to it. Researchers agree on the fact that long- term exposure to air pollution can trigger various diseases, such as heart and lung problems, which may result in hospitalization or death. In Delhi alone, where the level of air quality is the lowest, thousands of people die every year. And the numbers are only increasing.



There are several main causes of air pollution, but one of the major one is diesel cars, the production and usage of which have been increasing gradually. In addition to that, the vast majority of British are still commuting to work by car, which has a direct impact on the pollution. British loves their cars, thus they are reluctant to use public transportation or cycling when going to work, which only worsens the problem. Within this context, working from home is considered as a possible alternative, which might in fact help controlling air pollution. Some researchers suggest that working from home, at least couple of days a week, can help reducing the air pollution by 20%. This can only be successful when the great number of companies allows their employees to work from home. This might help to reduce the number of commuters, which in return affects the environment positively and lowers air pollution risks. Given the importance of the problem, we have asked some experts' professional and personal opinion regarding the problem and possible alternative.

Prepared By:
PRAKHAR AGARWAL
1409731072

Departmental Events



Seminar/ Workshop/ Expert lectures:

Topic	Date	Expert Name/ Organization	Description
Workshop on PCB Design tools using ORCAD	01/04/16	Mr. Rahul Kumar, 3ST Technologies Pvt. Ltd., Noida	PCB Designing
Seminar on Cyber Security	17/02/16	Mr. Lokender Bhatia, DuCAT, Noida	Threat warning and detection systems
Lecture on Challenges and Trends in Embedded System	03/10/15	Mr. Devendra Khari Director, DKOP Lab, Noida	Micro Controllers for Embedded System
Career Counseling, Technical workshop & Mock Test	16/09/15	Mr. Devendra Khari, Director, DKOP Lab Pvt Ltd, Noida	Career Counselling
Workshop on Semiconductor Industry Trends	26/08/15	Mr. Devendra Khari, Director, DKOP Lab Pvt Ltd, Noida	Semiconductor Devices

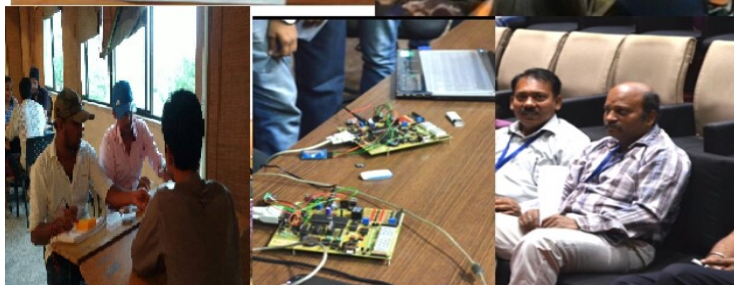
“Cyber Security” and “Ethical Hacking Workshop



Recently, the most veracious workshop conducted on “Cyber Security” and “Ethical Hacking” which flushed in the need to know how to protect our gadgets from being trashed by some crooks on 17/2/16.

Workshop on Semiconductor Industry Trends:

inducted workshop by DKOP LABS on Semiconductor Industry Trends (Embedded, IOT and Android).



Workshop on Today's Semiconductor Industry Trends is conducted by DKOP Labs Pvt. Ltd. on 26 August 2015

Events & Contest Participated by Students:

Name of student	Event	Position
Vatsala Shukla	Paper presentation on "Harnessing Energy for Space" at National Student's Space Challenge organized under Kalpana Chawla Space Cell (I.S.R.O.) at IIT Kharagpur	3rd Rank
Vatsala Shukla	Smart EVM (Electronic Voting Machine) Texas Innovation Design Challenge 201415	Quarter final
Vatsala Shukla	IEEE programming league Under IEEE women in engineering	Precision certificate
Sanchit Goel	Dance events: at DTU	Winner
Palak Singh	Kalakriti dramatics society	Participated
Shubham Bhambey	Solo dance competition at GQUASAR, GCET	Won 1st price
Ankur Raj Singh	GNIX	Head coordinator G CARE

GNIX (An official club of Department of ECE, GCET)



**Galgotias College of Engineering &
Technology**
GNIX TEAM



S.NO.	ROLL NO.	STUDENT NAME	GNIX DEPARTMENT
1	1309731016	ANKIT YADAV	GEN. SEC.
2	1309731057	POOJA AGRAWAL	JOINT SEC.
3	1309731005	ABHISHEK DWIVEDI	Technical
4	1309731045	MANAS SRIVASTAVA	Technical
5	1309731052	Neha Jain	Creative
6	1309731053	Nidhi Sharma	Creative
7	1309731071	Ram Prakash Yadav	Creative
8	1309731041	Km Divya Singh	Marketing
9	1309731072	Ranjeet Kumar Singh	Marketing
10	1309731073	Rishikesh Rai	Marketing
11	1309731074	Ritesh Sharma	Literary
12	1309731047	MAYANK SRIVASTAVA	Literary
13	1309731079	Sachin Goyal	Office
14	1309731080	Sachin Kumar	Office
15	1309731081	Sahil Chaudhary	G-Care
16	1309731085	SAUMYA SINGH	G-Care

ZEST - A Technical & Cultural Event:

GNIX student forum organized a two days technical fest ZEST- 2016 was held between 10th - 11th September 2015, which includes various fascinating events (like code cracker, Spot the bug, Circuit debugging, Poster presentation, Treasure Hunt, Wire loop, Debate, Rangoli, X-factor, General Quiz, Math Quiz, Digital Quiz etc). To the start the event, the members of the Music Club rendered a soulful Saraswati Vandana.



Activities under Gnix Society:

SN	Topic	Date	Expert Name/ Organization
1	Introduction to Met materials and its applications in Antenna	21/11/2016	Dr Reena Pant, FET, MJP Rohilkhand University, Bareilly
2	Cyber Security and VLSI technology	17th Feb 2016	Mr Lokender Bhatia, DuCAT, Noida
3	NS2	30/04/2016	Dr. R Vishwakarma, Assistant Professor, GCET, Gr. Noida
4	Internet- 2030	27/02/2016	Mr Arvind Kumar Mishra, Director DoT, Lucknow
5	Verilog and Xilinx FPGA	22/04/2016	Mr Ajay Sharma, DKOP Labs Pvt. Ltd., Noida
6	PCB Design tools using ORCAD	1/4/2016	Mr Rahul Kumar, 3ST Technologies Pvt. Ltd., Noida

Excursion/ Industrial Visit:



Students of 3rd year Electronics and Communication Engineering during Industrial visit at HMT Limited, Pinjore on 30th September 2015. On 1st October 2015 B.E. 2nd year students visited Hydal Power Project, Manali.

Faculty Publications:

List of Publications in Journals

S No.	Name of Author	Title of Paper	Name of Journal
1.	Deepak Gangwar, R. L. Yadava, et al	Circularly Polarized Inverted Stacked High Gain Antenna with Frequency Selective Surface	Microwave and Optical Technology Letters, Vol. 58, No. 6, pg. 732-740.
2.	S. Pratap Singh, et al	BER analysis over α - μ fading channel using proposed novel MGF	International Journal of Wireless and Mobile Computing, Vol. 10, No. 02
3.	Satya P Singh, et al.	An improved CAD system for breast cancer diagnosis based on generalized pseudo-Zernike moment and Ada- DEWNN classifier	Journal of Medical system
4.	Satya P Singh, et al.	Breast Cancer Detection using PCPCET and ADEWNN: A Geometric Invariant Approach to Medical X-rays Image Sensors	IEEE Sensors Journal
5.	Satya P Singh, et al.	Three types of moment invariants for color object recognition based on radon and polar harmonic transform	Arabian Journal of Science and Engineering

		in space	
6.	Madan Kumar Sharma, et al.	Performance Analysis of Vapour Compression and Vapour Absorption Refrigeration Units Working on PhotoVoltaic Power Supply	International Journal of Renewable Energy Research, Vol. 06, No. 2.
7.	Nishtha rani, et al.	A Powerline Filter Circuit Design for Biomedical Applications	Journal of Computational and Theoretical Nanoscience, Vol. 13, No. 5, pg. 3345-3351.
8.	Kuldeep Singh, et al.	Study on Development and Designing of All Optical Logic Devices for the High Speed Fully Optical Networks	International Journal of Communication System and Network, Vol. 6, No. 2, pg. 58-66.
9.	Bhawna Ahuja, et al	A Novel Design of Improved Hybrid Spectrum Sensing Technique for Cognitive Radio Network	International Journal of Computer Applications USA, Vol. 125, No. 13, pg. 7-10.
10.	Bhawna Ahuja, et al	Throughput Analysis of Cooperative Spectrum Sensing for Cognitive Radio Network	International Journal of Computer Networking, Wireless and Mobile Communications (IJCNWMC), Vol. 5, No. 6, pg. 1-7.

List of Publications in Conferences

S No.	Name of Author	Title of Paper	Name of Conference
1.	S. P. Singh, et al	To Study the Various Weather Effect on FSO Link	2nd IEEE International Conference on Advances in Computing and Communication Engineering (ICACCE)
2.	S. P. Singh, et al	Review on New Paradigm of Wireless System: Relaying	2nd IEEE International Conference on Advances in Computing and Communication Engineering (ICACCE)
3.	S. P. Singh, et al	Closed form Expression of Ergodic Capacity for Multi Cell Cooperation using MHCP	IEEE International Conference, UPCON, 2015

4.	Bhawna Ahuja, et al	Throughput Maximization in Cooperative Spectrum Sensing	International Conference on Recent Advances in Computer Science, Vol. 3
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Student Publications:

Name of the Students	Name of Project Guide	Title of the Paper	Event
Sumit Mishra	Ms. Bhawna Ahuja	Network Security Protocol for Constrained Resource Devices in Internet of Things	12 th IEEE Indian International conference INDICON 2015, 17-20 December 2015
Sumit Mishra	Ms. Bhawna Ahuja	Optical Parameters Testing to Redefine Visibility for Low Cost Transmissometer using Channel Modeling	Optik journal, ELSEVIER, Vol. 127, 2016, pp. 11326 – 11335
Antra Kashyap Nikhil Bhati Mukesh Dwivedi Kamal Rajpal	Mr. Madan Kumar Sharma	UWB-MIMO Diversity Antenna for Next Generation Wireless Applications	3 rd International Conference on Computing for Sustainable Global Development (INDIACom), 16-18 March 2016
Nikhil Bhati Shashank Shukla	Mr. Madan Kumar Sharma	Design and Optimization of Ultra wide band Monopole Antenna with DGS for Microwave Imaging	3 rd International Conference on Computing for Sustainable Global Development (INDIACom), 16-18 March 2016

Placements:

Company Name	No. of Students placed
Broadcom	1
Cognizant	40
Ericsson	22
FACE	1
Globussoft Technologies Pvt. Ltd.	1
HCL Tech	2
IBM	1
Infosys	29
Lava International	1
NTT Data	1
Spreadtrum Communications India (P) Ltd.	1
Tech Mahindra	4
Wipro Technologies	23

Eminent Recruiters:



