ELECTRONICS & COMMUNICATION ENGINEERING SOCIETY

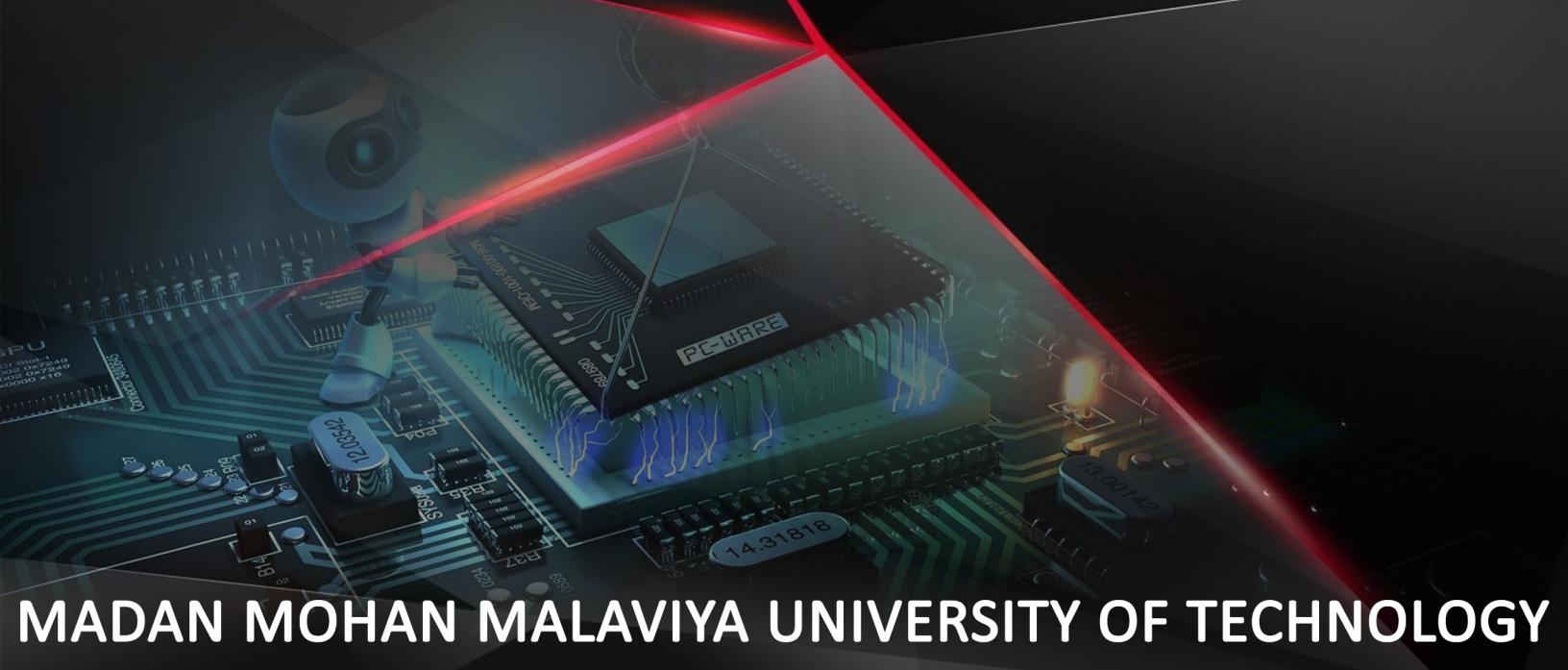
Electronics & Communication Engineering Society

ECES

M.M.M. University Of Technology

THE ELECTRONICLE

VOLUME XIX

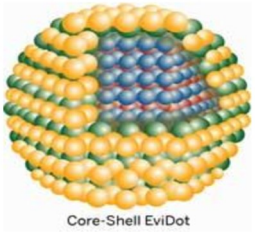


MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY

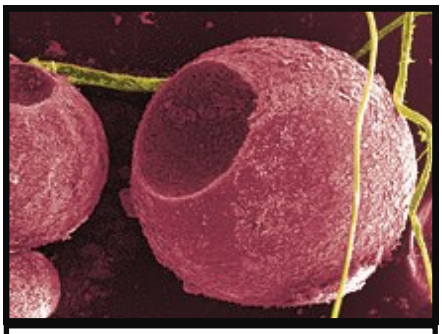
QUANTUM DOTS

Quantum Dots (**QDs**) are nanocrystals made of semiconductor materials. They range from 2-10 nm in diameter, which is small enough to exhibit quantum mechanical properties. Due to their small size, the electrons in quantum dots are confined in a small space (quantum box), and when the radii of the semiconductor nanocrystal is smaller than the exciton Bohr radius there is quantization of the energy levels according to Pauli's exclusion principle. Specifically, its excitons are confined in all three spatial dimensions. The electronic properties of these materials are intermediate between bulk semiconductors and of discrete molecules. This allows properties such as the band gap, emission color, and absorption spectrum to be highly tuneable, as the size distribution of quantum dots can be controlled during fabrication. For example, the band gap in a quantum dot, which determines the frequency range of emitted light, is inversely related to its size. In fluorescent dye applications, the frequency of emitted light increases as the size of the quantum dot decreases, shifting the color of emitted light from red to violet.

What is a quantum dot?



- Nanocrystals
- 2-10 nm diameter
- Semiconductors



Cadmium sulfide quantum dots on cells

PRODUCTION

There are several ways to confine excitons in semiconductors resulting in different method to produce quantum dots. Quantum dots are grown by advanced epitaxial techniques in nanocrystals, produced by chemical methods or by ion implantation, or in nanodevices made by state of the art lithographic techniques.

Comparison between QDs and atoms

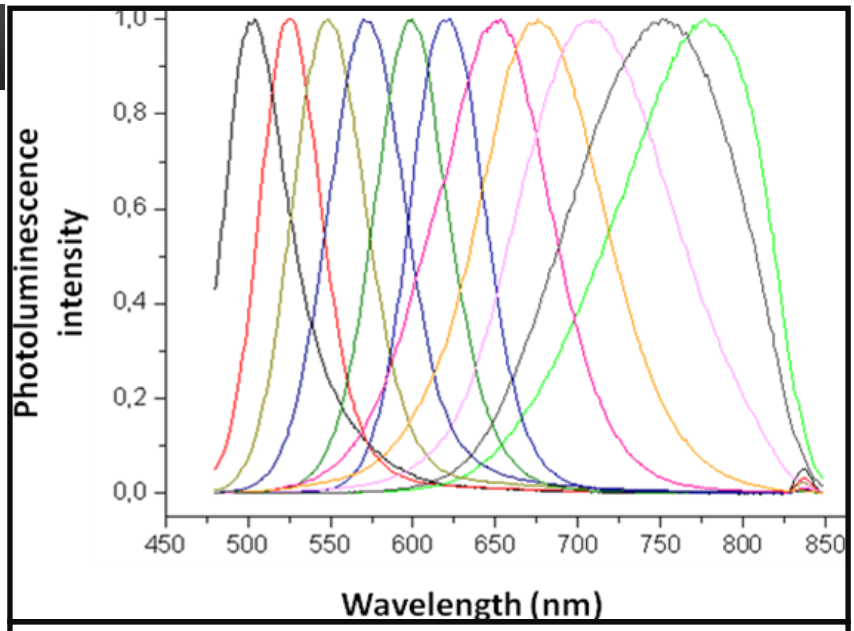
Parameter	Atoms	Quantum dots
Level spacing	1 eV	0.1 meV
Ionization energy	10 eV	0.1 meV
Typical magnetic field	10^4 T	1-10 T

Tiny lattices with enormous potential

A ceramic which is one of the strongest and lightest substances ever made. It is also not brittle. Structure of this material can be precisely tailored so it is strong yet flexible and extremely light. It shows the promise of architectural control in making new materials with bizarre properties.

OPTICAL PROPERTIES

In semiconductors, light absorption generally leads to an electron being excited from the valence to the conduction band, leaving behind a hole. The electron and the hole can bind to each other to form an exciton. When this exciton recombines (i.e., the electron resumes its ground state), the exciton's energy can be emitted as light, which is called Fluorescence.



Size evolution spectra of CdTe (Cadmium Telluride) quantum dots.

As the confinement energy depends on the quantum dot's size, both absorption onset and fluorescence emission can be tuned by changing the size of the quantum dot during its synthesis. The larger the dot, the redder (lower energy) its absorption onset and fluorescence spectrum. Conversely, smaller dot absorbs and emits blue (higher energy) light.

SPINTRONICS POSSIBLE WITHOUT MAGNETIC MATERIAL

A young researcher at Argonne National Laboratory has stumbled upon the amazing discovery that a magnetic material may not be required in order to generate spin current from insulators. This fundamental difference is believed to be a solution to many of the problems associated with electronics, such as high power consumption and the need for more space on a chip.

APPLICATIONS

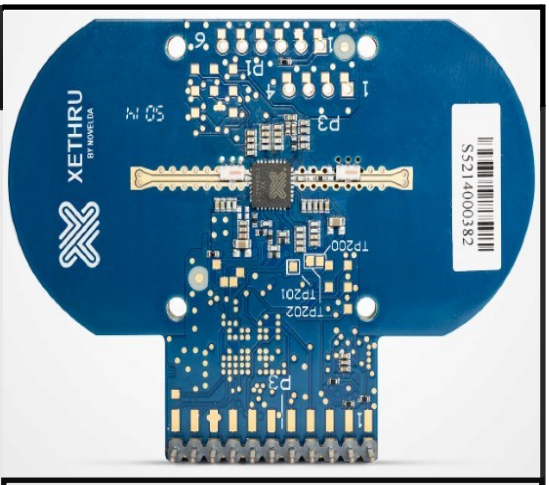
1-Quantum dot technology is one of the most promising technologies for use in solid-state Quantum Computation.

2-The usage of quantum dots for highly sensitive cellular imaging has seen major advances over the past decade.

3-Quantum dots may be able to increase the efficiency and reduce the cost of today's typical silicon photovoltaic cells and improve existing light-emitting diode design, including "Quantum Dot Light Emitting Diode" (QD-LED) displays and "Quantum Dot White Light Emitting Diode" (QD-WLED) displays.

4-Quantum Dot Photodetectors (QDPs) can be fabricated either via solution-processing or from conventional single-crystalline semiconductors and they can function as photo catalysts for the light driven chemical conversion of water into hydrogen as a pathway to solar fuel.

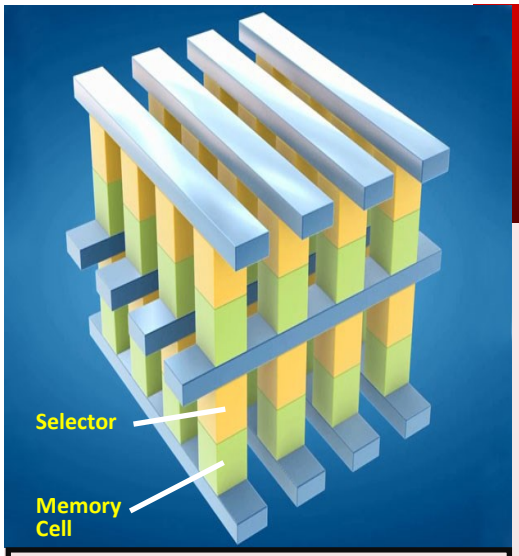
XE-THRU TECHNOLOGY



XE-THRU Module

Xe-Thru Technology is based on the use of Ultra Wide Band (UWB), ultra-low-energy RF pulses to create sensors that can detect tiny motions from a distance or through walls. By ultra -low-energy it means, if you were to use a spectrum analyzer, you would discover that this technology's RF transmissions fall below the noise floor in the environment. The sensors integrate over multiple pulses to extract useful information out of what appears to be noise.

In the not-so distant past, this type of technology would have required a wheelbarrow to move it around and a truck battery to power it, but now you can fit it in a battery-powered handheld unit. At the heart of the system is the X2 SoC (system-on-chip). The folks at Novelda will sell these SoCs to selected customers who have the required level of expertise, but for common people they offer Xe-Thru modules, such as the X2M200 Respiration Monitor and the X2M300 Presence Detector.



An innovative high density design of memory

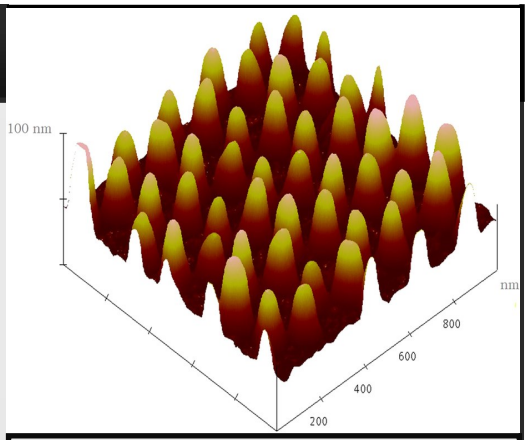
INTEL AND MICRONS "MYTSERY MEMORY"

Intel and Micron announced 3D XPoint ("crosspoint"), a new form of nonvolatile memory that the company says, is 1000 times faster than NAND Flash and ten times denser than DRAM.

A press release on Intel's website touts this as "the first new memory category since the introduction of NAND flash in 1989". But its highly probable that number of companies would disagree with that characterization. There's been plenty of work done on phase-change memory and other companies are pushing hard on resistive RAM. Everspin technologies, a free scale semiconductor spin-off based in Arizona, has been shipping MRAM for years. Engineers have long hoped for a memory that could replace the mix we have now, something that could be fast, dense, cheap, high endurance, and low power.

With a small cell size, fast switching selector, low-latency cross point array, and fast write algorithm, the cell is able to switch states faster than any existing non-volatile memory technologies today.

NANOPILLAR FABRICATION

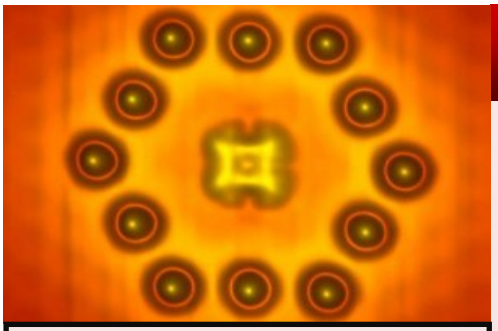


Nanoparticles coated Silicon nanopillar

Nanopillars is an emerging technology within the field of nanostructures. These are pillar shaped nanostructure approximately 10 nanometers in diameter that can be grouped together in lattice like arrays. Each individual nanopillar has a pillar shape at the bottom and a tapered pointy end on top.

The process to create nanopillars starts with anodizing a 2.5 mm thick aluminum foil mold. Anodizing the foil creates pores in the foil, a micrometer deep and 60 nanometers wide. The next step is to treat the foil with phosphoric acid which expands the pores to 130 nanometers. The foil is anodized once more making its pores a micrometer deeper.

Nanopillars have applications in solar panel and high resolution molecular analysis.



The phthalocyanine molecule surrounded by twelve indium atoms on an indium arsenide surface.

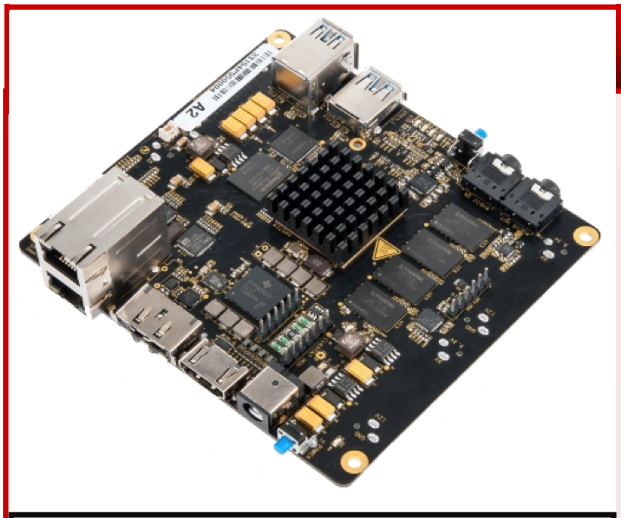
SINGLE ELECTRON TRANSISTOR

An international team has made single-electron transistor – a transistor from a molecule of phthalocyanine and twelve indium atoms. An alternative to 'single electron' transistors made on fabricated quantum dots, which are sensitive to one electron leaving or joining, but typically have hundreds of electrons. This transistor is simple and physically transparent, and its structure is known exactly.

The perfection and reproducibility offered by these transistors will enable researchers to explore elementary processes involving current flow through single molecule at a fundamental level. Understanding and controlling these processes, and the new kinds of behaviour to which they can lead, will be important for integrating molecule-based devices with existing semiconductor technologies.

The Single Electron Transistors (SETs) are efficient charge sensors for reading out spin or charge qubits confined in quantum dots. The single-electron transistor can also be used to detect infrared signals at room temperature. The SET's physical size is quite small and its performance, such as ON-OFF current ratio, improves as its size is reduced. The SET is therefore thought to be a promising device for large scale and low-power integrated circuits. In addition, its current characteristics are unique and much different from those of conventional transistors.

BEAGLEBOARD-X15



Top view of BEAGLEBOARD X15

The BeagleBoard-X15 provides the most flexible processor-based development system with numerous user programmable cores. All of the design materials are released free to the public immediately and manufacturing is gearing up.

The BeagleBoard X15 was unveiled on November 1, 2015. It is based on the TI Sitara AM5728 processor , with dual ARM Cortex-A15 cores clocked at 1.5GHz, the BeagleBoard-X15 provides nearly three times the performance per core of a typical ARM Cortex-A9 processor, two ARM Cortex-M4cores running at 212 MHz and two TI C66x DSP cores running at 700 MHz. The used processor provides USB 3.0 support and has a Power VR Dual Core SGX544 GPU running at 532 MHz.

With the quad-core programmable real-time unit (PRU), BeagleBoard-X15 provides the ability to create software-defined peripherals and extreme low-latency response.

MEDICAL MICROCHIPPING

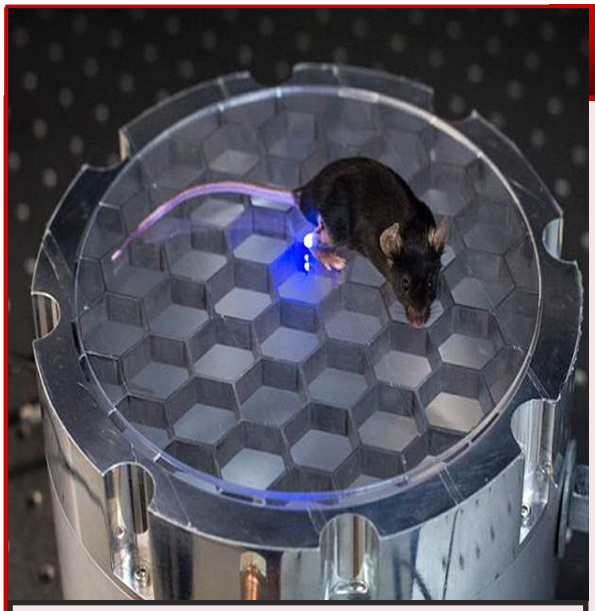
MIT spinout Microchips Biotech partnered with a pharmaceutical giant to commercialize its wirelessly controlled, implantable, microchip-based devices that store and release drugs inside the body over many years.

Professional holding the chip

These are invented by Microchips Biotech co-founders Michael Cima and Robert Langer, David H. Koch Institute Professors. These microchips consist of hundreds of pinhead-sized reservoirs, each capped with a metal membrane, that store tiny doses of therapeutics or chemicals. An electric current delivered by the device removes the membrane, releasing a single dose. The device can be programmed wirelessly to release individual doses for up to 16 years to treat, for example, diabetes, cancer, multiple sclerosis, and osteoporosis.

While its first partnership is for treating chronic diseases, Microchips Biotech will continue work on its flagship product, a birth-control microchip, backed by the Bill and Melinda Gates Foundation, that releases contraceptives and can be turned on and off wirelessly.

NEURAL SWITCH FOR DREAMS



Mouse's body transmiting energy to an implantable device that delivers light to stimulate leg nerves in an optogenetics project.

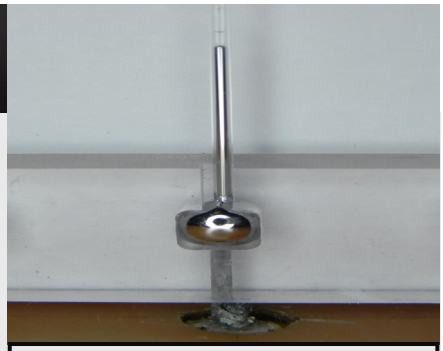
At the flip of a switch, UC Berkeley neuroscientists can send a sleeping mouse into dreamland. The researchers inserted an optogenetic switch into a group of nerve cells located in the ancient part of the brain called the medulla, allowing them to activate or inactivate the neurons with laser light.

When the neurons were activated, sleeping mice entered REM sleep within seconds. REM sleep, characterized by rapid eye movements, is the dream state in mammals accompanied by activation of the cortex and total paralysis of the skeletal muscles, presumably so that we don't act out the dreams flashing through our mind.

In normal mice, these neurons – a subset of nerve cells that release the neurotransmitter Gamma Amino Butyric Acid (GABA), and so are called GABAergic neurons – are most active during waking periods when the mice are eating or grooming, two highly pleasurable activities. Using this genetically engineered strain of mice, the researchers mapped the activity of these neurons in the medulla and then recorded how activating or inactivating the neurons for brief periods affected sleep and waking behavior.

SHAPE SHIFTING ANTENAS

Aiming to find an alternative to conventional antennae which have a limited range due to their fixed form, researchers at North Carolina State University (NCSU) have created a liquid metal-based antenna that will automatically reconfigure itself according to the voltage applied, allowing its device to tune into a larger range of frequencies.



Liquid-Metal Antenna That Shape-Shift Depending on the Voltage

Electrochemically controlled capillarity had been observed in previous experiments, and the NCSU scientists expanded upon these preceding findings, utilizing the principles of capillary action. A positive electrical current will cause the liquid metal to expand, and a negative current will prompt it to contract within the shaped glass reservoir. Liquid metals like eutectic gallium and indium were used in the experiments, with the team finding that they could modify antenna properties — such as frequency — much more dramatically than possible with conventional monopole conductors. In addition, they found that the antenna could tune over a range at least two times greater than systems using traditional, electronic switches.

DIGITAL INDIA

Digital India is an initiative of Government Of India, taken by our present Prime Minister Mr. Narendra Modi to integrate the government departments and the people of India. It aims at ensuring that the government services are made available to citizens electronically by reducing paperwork. The initiative also includes plan to connect rural areas with high-speed internet networks.

Benefits Of Digital India

The Government of India has initiated a giant leap forward to transform the country into a digitally empowered knowledge economy. Digital India will help in leveraging India's Globally acclaimed IT competence for the benefit of 120 Crore Indians.

It will help in reducing corruption, getting things done quickly and will help in reducing paper work.

Some of the facilities which would be available through this initiative are Digital Locker, e-education, e-health, Digital Signature and national scholarship portal.

Impact of Digital India by 2019

Broadband in 2.5 lakh villages, universal phone connectivity

Net Zero Imports by 2020

400,000 Public Internet Access Points

Wi-Fi in 2.5 lakh schools, all universities; Public Wi-Fi hotspots for citizens

Digital Inclusion: 1.7 Cr trained for IT, Telecom and Electronics Jobs

Job creation: Direct 1.7 Cr. and Indirect at least 8.5 Cr.

e-Governance & e-Services: Across government

India to be leader in IT use in services – health, education, banking

Accomplishment of Digital India

Digital India is in the progress mode till the month of November 2015. The Apex Committee is going to analyse its progress very soon. Media reports have also hinted at development of policies for Digital India very soon.

As the part of "Digital India" Indian government has planned to launch Botnet cleaning centres. Government also launched a digital locker under the name "Digi Locker".

Optical fibre cables have been laid out in more than 68000 village panchayats.

DIGITAL INDIA

APPROACH AND METHODOLOGY FOR DIGITAL INDIA

- Ministries / Departments / States would fully leverage the Common and Support ICT Infrastructure established by GoI. DeitY would also evolve/ lay down standards and policy guidelines, provide technical and handholding support, undertake capacity building, R&D, etc.
- The existing/ ongoing e-Governance initiatives would be suitably revamped to align them with the principles of Digital India. Scope enhancement, Process Reengineering, use of integrated & interoperable systems and deployment of emerging technologies like cloud & mobile would be undertaken to enhance the delivery of Government services to citizens.
- States would be given flexibility to identify for inclusion additional state-specific projects, which are relevant for their socio-economic needs.
- e-Governance would be promoted through a centralised initiative to the extent necessary, to ensure citizen centric service orientation, interoperability of various e-Governance applications and optimal utilisation of ICT infrastructure/resources, while adopting a decentralised implementation model.
- Successes would be identified and their replication promoted proactively with the required productization and customisation wherever needed.
- Public Private Partnerships would be preferred wherever feasible to implement e-Governance projects with adequate management and strategic control.
- Adoption of Unique ID would be promoted to facilitate identification, authentication and delivery of benefits.

PM NARENDRA MODI PUSH TO IMPLEMENT NEW TECHNOLOGY FOR "DIGITAL INDIA PROJECT"

German Chancellor Angela Merkel and PM Narendra Modi at the Swiss automation group ABB booth during their visit of the Hannover Messe Industrial Trade Fair in Hanover, Germany

Prime Minister Narendra Modi push to implement new technology and innovation in manufacturing his 'Digital India Programme' initiative, along with German Chancellor Angela. Merkel. On October 06, 2015 Prime Minister Narendra Modi arrived Bengaluru to visit the Bosch facility to discuss to implement new technology for Digital India Programme.

A TRIBUTE TO THE PEOPLE'S PRESIDENT

Perhaps this nation is never going to hear of a person decorated with awards like Bharat Ratna and Padma Bhushan, who spent his last moments to the cause of his life, that is, ***Igniting Minds****. On 27th of July, 2015, India suffered, what may very well be the loss of the decade.* ***Avul Pakir Jainulabdeen Abdul Kalam****, also known as the missile man of India or the people's president, passed away due to a cardiac arrest while giving lecture to the students of IIM-Shillong. The most significant part of his life's story isn't how he died, but how he lived it.*

The journey from a poor but a visionary kid to the 11th president of India wasn't easy, but with his dedication and his zeal, he made it possible. Prior to his term of 5 years as the president, APJ Abdul Kalam significantly contributed in India's first launch of SLV (satellite launch vehicle) and the nuclear tests of Pokharan. He also developed ballistic missiles AGNI and PRITHVI, under the India's missile program. Kalam was honoured with great laurels and awards for his works by both the Government of India and other countries.

These are some of his official contributions to this nation which is known to all, but through his writings and continuous interactions with the youth of India, he let out ***the luminous sparks*** *and his* ***inspiring thoughts*** *and started his mission to morph this nation into a developed one.*

Even after completing his service at ISRO and his term as president, Kalam kept going strong. He served as visiting professor in various esteemed institutions and universities of India. In 2011, he initiated "What can I give movement" involving Indian youth, with main aim to defeat corruption in this country.

Kalam had high hopes from the young minds of India and strongly believed that the coming generation will bring the changes that he saw in his visions. In all of his speeches and books, there is not an ounce of negativity. His life has been nothing but a source of inspiration and motivation for us. His last work, ***INDIA 2020****, is an action plan to convert India into a knowledge superpower and a developed nation by the year 2020. It is almost like he laid out a set of guidelines for us to follow and reach that zenith of excellence which he had set his eyes upon. It is very unfortunate that he is no longer here to guide us, but he has left behind his legacy. Even after his demise, his legacy won't die as long there are people who feel obliged to this nation and realize their duties towards it.*

Let us celebrate the life and death of a man, who was loved and idolized across the globe, who survived all the hardships life offered to him and proved his worth to the world, established himself as a renowned scientist and an inspiring leader. Let us pay tribute to a selfless human who dedicated his life for the development of India, by helping this country transform into the ***India of his dreams.***

"Dream is not that you see in sleep, dream is something that does not let you sleep"

INTERVISTA

- **Tell us about your journey being the Vice Chancellor of MMMUT.**

Prof. Onkar Singh
Vice Chancellor, MMMUT

I came here on December 17, 2013. It was a very difficult job to transform a college which had an operating period of more than five decades into a university. The system had positive as well as some negative aspects. The positive aspects were that the system was fully functional while the negative aspects included the past weaknesses being carried into the new system and there was limited scope for change.

The transformation from a college to university involved a change in mind set. Earlier the government used to take all the important decisions of the college. But now I along with Board of Directors take all those decisions. Earlier the principal of the college used to penetrate in all the little things while the deans were in a supporting role. Now the deans are functional. We have an aggressive base. We have created a development map of five years.

- **A recent research paper of yours has found its way to the academic curriculum of a college in USA. Can you brief us about it?**

For USA, it is a challenge because majority of it is capped with ice. They look at things from quite a distance. They are not myopic like us. They found the research paper beneficial for their country and hence, included in their curriculum.

- **At what position do you wish to see this University by the time you discharge your duties?**

I wish I had tried to add something to the infrastructure of the University. By the time I discharge my duties, I would like the University to have 27 classrooms, 6 laboratories, a Chemical engineering, B. Arch, B. Pharm, Fashion Designing and Hotel Management department and an auditorium of 2000 capacity. Out of these, I would like to achieve the maximum in my remaining three year tenure. We have got a detailed report for energy conservation. We will be soon shifting to renewable energy with the installation of a 100kW solar power plant, solar water heating system in 8 hostels and utilisation of kitchen waste of hostel mess for the generation of biogas plants.

- **Industrial trips organised by an educational institution for students is a very good step in enhancing the knowledge and exposure. What are your views regarding such trips for our University students?**

I am in full favour of organising such trips and have already asked the HODs to do so. I can only provide an enabling environment. Now, it is the responsibility of the students as well as the department to organise such trips. The University is ready to provide the required funding.

- **What would you like to advise your students?**

Students should be demanding as well as patient. They should learn to wait. Do not always be in a complaining mode. Search for opportunities and circumvent. Fix your opportunities and satisfy your family and surroundings.

INTERVISTA

G.S. Tripathi
HOD, ECE

- **How do you think a student can contribute for the betterment of the society?** Students should extend their relations with their faculty members inside as well as outside the class. There should be no communication gap between teachers and students.
- **How is the department-alumni relation for our electronics department?** Our Department maintains a very healthy relation with their alumni. During this year's Alumni Meet, there were 8-10 alumni from varies electronics fields like Rajiv Singh from IBM, A.M. Srivastava from HAL, Kuldeep Singh from BSNL and Rajeev Shukla DIG ITBP, etc.
- **What advice can you give to your students?**
  I believe this new generation is quite smart and apt at everything, so instead of advice I'd like to give them my blessings. Personally, I wish to see more number of students aiming for govt. jobs instead of private jobs.
- **What are the current research and development programs taking place in our department?** There are 5 Ph.D students doing their research in various fields of electronics from our department. Dissertations are going on for M.tech. students. The research Scholars are doing their work very efficiently.

Assistant prof.
G.D. Bharti
Faculty Advisor

- **What are your views about ECE Society?**
  ECE Society aims at bringing out more exposure to its members through various technical, creative events, and seminars for overall personality development. By the efforts of the coordinators and members, it has emerged as one of the most popular and creative society among the students.
- **What advice can you give to ECE Society?**
  The ECES should adopt the concept of change and learning ,increase the number of activities both academic as well as co-curricular and also bring new ideas and innovations.
- **What changes would you like to implement in the department?**

  I would like to add something innovative to the ongoing work/plan/environment with my experience and skills.
- **What are your plans for betterment of electronics and communication engineering department?** For further improvement of electronics and communication engineering department an environment has to be created to make teaching more focused on learning rather than curriculum oriented and by focusing not only on education but also on quality education and practical knowledge.
- **Tell us about the research work going in the department.**
  The research work going well. The research scholars submit their thesis timely. Currently Research is being done in the area of optical communication, Microstrip Antenna, Microstrip Filter, Microstrip Antenna and VLSI.

LOGBAR RING- This device, with Bluetooth Low energy connectivity, lets you control a whole lot of things, from your mobile phone to home appliances or making electronic payments with a wave of a finger. It is meant to be worn on the index finger, and has embedded motion sensors to identify the gesture made by the finger.

VISERA 4K UHD- This 4K surgical endoscopy system offers the benefit of allowing surgeons and medical specialists to examine the internal digestive organs of patients during checkups and surgeries but with the added touch of 4K ultra HD video resolution helping to make the video created much clearer than has previously been available via conventional HD resolution technology.

B.R.O BALL- B.R.O Ball is an indestructible, long-range Bluetooth speaker. It is a floating waterproof Bluetooth speaker that can be fully submerged in water. B.R.O Ball is also super durable, capable of sustaining high-velocity impacts, and is resistant to sand and dirt. It produces loud, high-fidelity sound with bass that resonates through the ball into your hands.

BATBAND HEADPHONE- The new Batband bone conduction headphones, allow users to hear what is going on around them. Audio is transmitted through the bones of the skull, while the ears remain uncovered. The device has three transducers that touch the wearer's head in three different places, which is claimed to guarantee a hi-fidelity to bone-conduction sound experience.

XBOX ONE EITE WIRELESS CONTROLLER- Microsoft described it as "an elite controller for the elite gamer". It is basically the regular Xbox One gamepad turned up to 11, adding new features like four interchangeable paddles around back , Hair Trigger Locks for precise control for shooters, remap able buttons, and completely swappable components.

IPAD PRO **Display-** 12.9-inch; **Resolution-** 2732x2048; **Processor-** A9X chip with 64 bit architecture; **Storage-** 32GB/128GB; **Camera-** 1.2MP/8MP; **OS-** iOS 9; **Connectivity-** wi-fi (802.11a/b/g/n/ac), **Bluetooth-** version4.2 ; **Battery-** 3850 mAh ; **Sensors-** Touch ID, Three-axis gyro , ambient light sensor.

PROSTHETIC HAND- The latest mind-controlled, robotic arm can send sensations of touch directly to the user's brain, according to reports from the US Defence Advanced Research Projects Agency (DARPA). It allows its user to feel things with their robotic hand. In tests, a 28-year-old subject was reportedly able to tell which finger of his prosthetic was being touched with 100 percent accuracy.

NOKIA OZO- A next generation camera purpose driven design and end-to-end workflow solution will enable amazing virtual reality experiences. It looks amazing – a spherical rig, the size of a large cantaloupe, roughly 6 pounds with eight optical image sensors spaced roughly an eye width apart.

HOME AND AWAY ELITE PENDANT- It is a new medical care alert pendant which combines GPS, Cellular voice, and Automatic Fall Detection. Worn around the neck or on the hip, the small two-ounce pendant can summon help 24/7 from anywhere in the USA using the AT&T Wireless network.

LANTRONIX ZANO- This palm-sized quadcopter which weighs just 1.94 oz is a WiFi-enabled drone that features a 5 mega-pixel HD video camera and is designed as a personal photography and HD video capturing platform. And it is all controllable via smartphone by simply tilting your control device.

XPERIA Z5 PREMIUM **– RAM-**3GB; **OS-**Google Android 5.1(lollipop); **Processor-** Qualcomm Snapdragon 810 (MSM8994), 64-bit octa-core processor; **Battery**- 3430 mAh; **Display**- 5.5'' 4K UHD (3840x2160); **Camera**- 5MP/23MP; **Connectivity**- Bluetooth 4.1, Wi-Fi.

Toyota's concept Full Cell Vehicle 'FCV PLUS'- Pictured in Tokyo, Toyota's three- seated exoskeleton car and an electric vehicle with touch screens that turn it into a "digital space". The car becomes a digital space when it is parked. You can use it as a gaming room, movie theatre or you can chat online with your friends.

World's Smallest Magnetic Data Storage- The newly invented unit needs only 12 atoms for storing one bit, that is, 96 atoms for storing one byte. This nano data storage unit was made by placing atom by atom by using a STM (Scanning Tunnelling Microscope) at IBM's Almaden Research Centre in San Jose, California. The storage density of this nano structured memory unit is supposed to be hundred times better than the currently used hard drives.

Edge to cloud IoT (Internet of Things) development solution launched- Mentor Graphics has unveiled what it believes to be the embedded industry's first customisable edge to cloud IoT solution. Called the Mentor IoT solution, the package comprises a customisable IoT gateway system design kit, a cloud backend and runtime solutions on which to build IoT edge devices.

Full-Scale Architecture For a Quantum Computer in Silicon- Australian scientists have designed a 3D silicon chip architecture based on single atom quantum bits, which is compatible with atomic-scale fabrication techniques providing a blueprint to build a large scale quantum computer.

Scientists Paint Quantum Electronics With Beams Of Light- A team of scientists from the University of Chicago and the Pennsylvania State University have accidently discovered a new way of using light to draw and erase quantum-mechanical circuits in a unique class of materials called Topological Insulators. The electrons in topological insulators have unique quantum properties that many scientists believe will be useful for developing spin-based electronics and quantum computers.

Liquid Cooling Moves Onto the Chip For Denser Electronics- Combined with connection technology that operates through structures in the cooling passages, the new technology could allow development of denser and more powerful integrated electronic systems that would no longer require heat sinks or cooling fan on top of the integrated circuits.

More efficient semiconductor characterisation- A research team led by Matthew Grayson, associate professor at Northwestern's McCormick School of Engineering, has created a mathematical method claimed to make semiconductor characterisation more efficient, more precise, and simpler. By flipping the magnetic field and repeating one measurement, the method is said to quantify whether or not electrical conductivity is uniform across the entire material.

Internet of Things (IoT) Policy 2016-20

The IoT policy was drafted keeping government's thrust on convergence of IT and electronics and an estimate that global IoT sector will consist of almost 50 billion projects with market size touching $373 billions by 2020.

The IoT policy has been divided into 5 segments namely– R&D, lab/assembly/system integrations, device and hardware manufacturing, software applications and analytics, and IoT hubs infrastructure.

Aim: "To capture at least 10 percent($1.5 billion) of the Indian IoT market and eventually become an Internet of Things Hub."

Employment Generation: According to official reports, this shall create direct employment to at least 50,000 in IoT verticals, promote 10 IoT hubs with private participation, attract about 100 IoT companies to setup their facilities and development centers.

ELECTRONICS DEVELOPMENT FUND

"An ecosystem of change is what we are experiencing in India. However, the digital profile of India will remain incomplete unless we address the need of electronics manufacturing."

-Ravi Shankar Prasad, Union Minister (Comm. & Information Technology)

Electronics Development Fund (EDF) is an initiative of Department of Electronics & Information Technology to devise a "fund of funds" to participate in "daughter funds" which in turn will promote innovations, R&D and product development within the country in the specified field of electronics, Nano-electronics and IT.

Recently, the govt. along with Canbank Venture Capital Fund has provided a 10,000 crore fund to boost electronics manufacturing. This gives new wings to the budding start-ups in the electronics industry.

ELECTROPRENEUR PARK

This initiative is the subset of govt.'s 'Make in India' mission aligned with its entrepreneurial and innovation focus. A major step towards realizing the vision of transforming India into a Electronic System Design & Manufacturing (ESDM) nation, The Electropreneur Park will support 50 start-ups in ESDM space and is expected to create 5 global companies over a period of 5 years. The park focuses on

- IP creation and product development to increase domestic value in Electronics field.
- Integration of academia, industry, govt. and other incubation eco-system elements.

ELECTRONIC DICE

An electronic dice is a classic project for those getting interested in electronics. A timer, counter and a few LEDs make a circuit that can also add a new twist to some old boring board games.

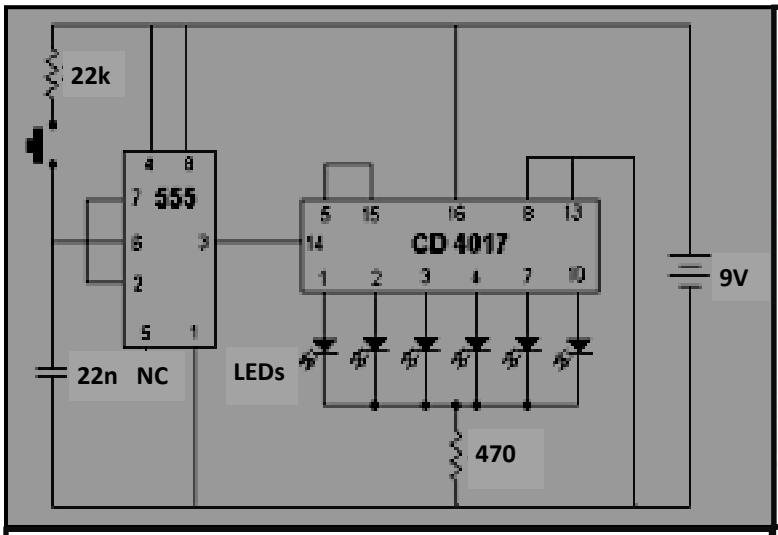


Figure-1: Circuit diagram of electronic dice

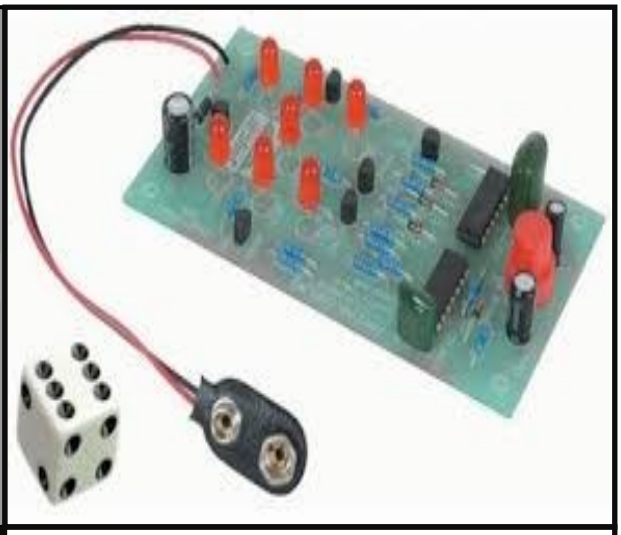


Figure-2: Electronic Dice

COMPONENTS REQUIRED

4017 IC, IC 555 timer, LEDs (same/different colour), 2 Resistors, Capacitor, 9V Battery, Battery clip, Wires, Breadboard.

COST

4017 IC-Rs 43, LED-Rs 4, 9V Battery- Rs 15, Battery Clip-Rs 2, Breadboard- Rs 100, Resistor- Re 1, Capacitor -Rs 20, IC 555- Rs 10. **TOTAL– Rs 216**

CONSTRUCTION:

IC-555 timer, IC-4017, 6 LEDs, 470 ohm resistor, 22k ohm resistor, 22n farad capacitor and a 9 volt battery are connected using connecting wires as shown in figure-1. The circuit can be implemented on a breadboard or a PCB (printed circuit board). Figure-2 shows a electronic dice implemented on a PCB.

OPERATION:

The circuit resembles the main functions of a normal dice which makes it significant in generating numbers by chance from 1 to 6. The indication is shown on the LEDs D1 to D6 which also correspond to the dice numbers 1-6, once the push button switch S1 is pushed and left running. The movement of the light on LED matches the dice movement. Once the LED turns ON, it will remain ON for ten seconds and will eventually fade afterwards, then wait for the next movement. In order to replicate the real dice, the light needs to stop in one of the six LEDs that will turn ON, since each LED is a representation of one side of a dice. After releasing the press on S1, the LEDs turn ON in sequence where one will remain ON.

VISION OF DEPARTMENT

The Electronics and Communication Engineering Department is having vision to create a state of art to groom professionally competent engineers to excel in Communication, Digital hardware, IT, Microelectronics, Network programming and interacting with Industries .The department has mission to offer the state of art technical education in the field of ECE having objectives of **:**

- Improving the quality of teaching and learning process.
- Creating conducive atmosphere in department for the students.
- Creating technical awareness among the students through special lectures from resource persons through industrial visit & in-plant training.

ONGOING PROJECTS:

Sr.No.	Title	Name of PI	Funding Agency
01.	Design of SRAM	Dr. R.K. Chauhan	AICTE, New Delhi

The department is facilitated with several laboratories like DSP lab, CAD lab/VLSI lab, Antenna lab etc. having the software like MATLAB, IE3D, VISUAL TCAD, MSIM(H-SPICE), etc. and hardware like Microprocessor (8085,8086,6800), Microcontroller(8057), A-D Converter , etc.

Newly proposed labs:

- Advanced Communication lab
- Optoelectronic lab
- Embedded lab
- Advanced VLSI lab

Texas Instruments has setup its laboratory in our electronics and communication engineering department.

The recent publication of department are :

1**.** Y. Prajapati , J.P.Saini ,B.S.Rai , Pooja Lohia "*Enhancement of single mode operation in coaxial optical waveguide using DB boundary condition*," Infrared Physics &Technology , Elsevier.vol-67, pp-462-466,2014.

2**.** Vimal Kumar Mishra and R.K.Chauhan," *Impact of Ge Substrate on Drain Current of trigate N-FinFET*", IEEE International Conference on Advances in Computing Communication and Informatics (ICACCI) pp-1976-1980,Sept-2014.

Our former head of department Shri. R.K Prasad passed away due to sudden heart breaking demise on 4th February 2016.

G.S. Tripathi has been appointed as our new head of department.

"Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world."

Justifying its adage- "Passing knowledge from seniors to juniors", the ECE Society organised Verilog HDL classes for second year students. A paper presentation event INCEPTION'16 was held in succession. In a 3-day event EXPLORA'16, students participated with great zeal, vigour and enthusiasm in G.K. Quiz, C Quiz, Quantico, Electromaniac, Map-e-Chart, Roll the Reel, Pic-tales, Group Discussion, Just a Minute. All the events were the amalgam of learning as well as expressing themselves. Quantico was the new member of the family which very well made its place in the hearts of the audience.

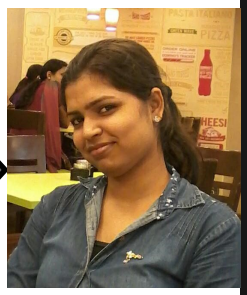
WINNERS OF EXPLORA'16

EVENT	WINNERS	BRANCH
Group Discussion	Kaanad Wanchoo	ME (1st year)
Just a Minute	Manisha Mishra	ME (1st year)
Quantico	Narendra Kumar Mishra	EC (1st year)
	Alok Kumar	EC (1st year)
	Abhishek Verma	EC (1st year)
Map-e-Chart	Shweta Singh	EC (1st year)
	Richa Srivastava	EC (1st year)
	Shivangi Yadav	CS (1st year)
Pic-tales	Somiya Bhandari	EC (1st year)
	Srishti Lalchandani	EC (1st year)
	Yash Mishra	EC (1st year)
	Yash Raj Pal	EC (1st year)
	Shubham Gupta	EC (1st year)
Roll the Reel	Ojasi	ME (1st year)
	Shubham Pandey	CS (1st year)
	Aditya Gupta	EC (1st year)
	Vishal Dwivedi	ME (1st year)
	Varun Prakash Tiwari	ME (1st year)
G.K. Quiz	Tanmay Kumar	EC (1st year)
	Somiya Bhandari	EC (1st year)
C Quiz	Shardul Singh	CS (2nd year)
	Shivendra Singh	CS (2nd year)
Electromaniac	Saurabh Singh	EC (1st year)
	Satyajeet Kunwar	EC (1st year)

FACULTIES OF Verilog HDL

SHUBHAM CHAND
ECE, 3rd year

SHESHA SINGH
ECE, 3rd year



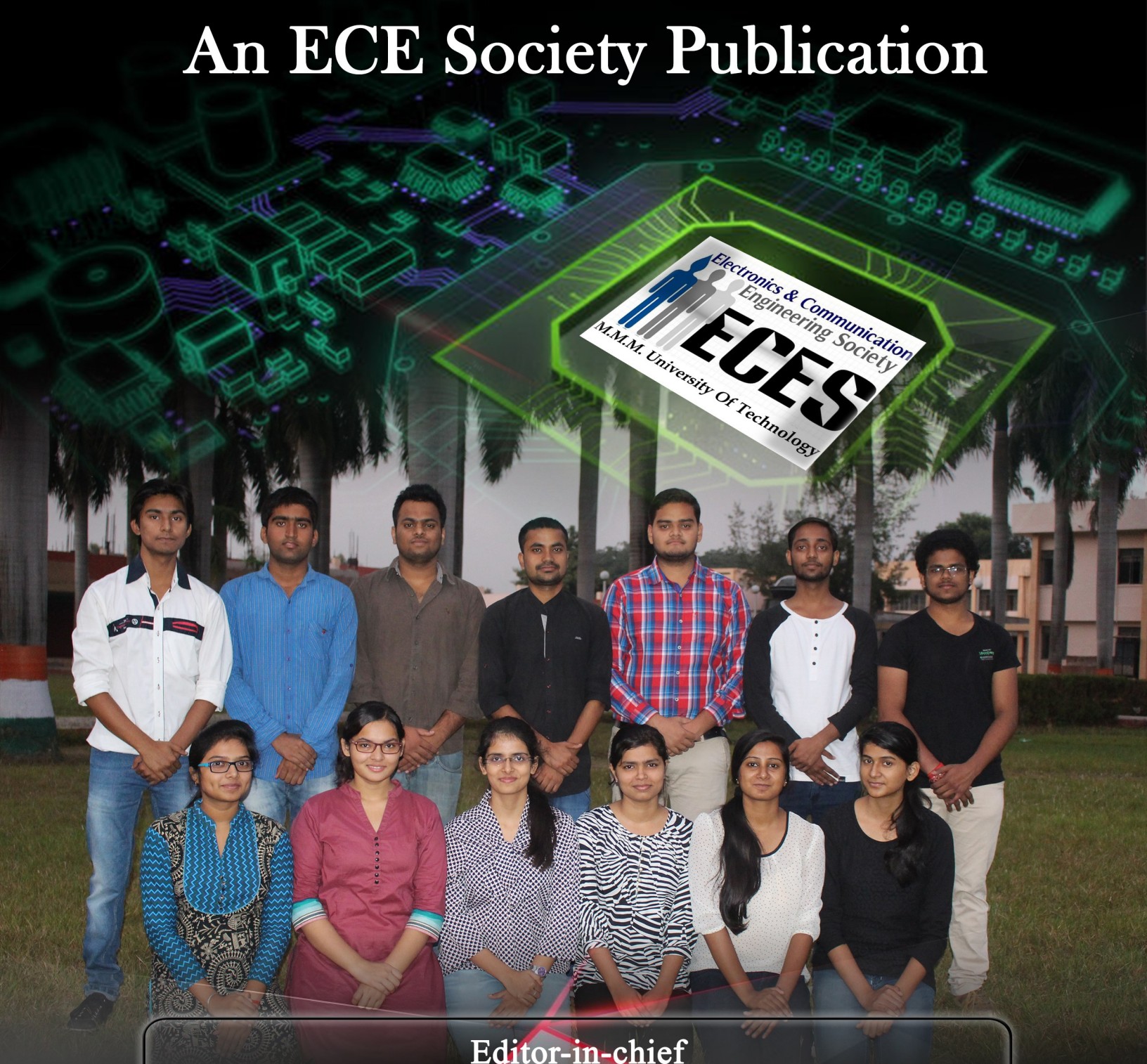
AKSHAY GUPTA
ECE, 3rd year

EVENTS AT A GLANCE

Verilog HDL classes	August 17, 2015 to September 5, 2015
Verilog HDL Test	October 1, 2015
Opening Ceremony	January 9, 2016
Inception'16	January 10, 2016
Explora'16	February 5,6,7, 2016

SOCIETY '16

An ECE Society Publication



* FROM TOP RIGHT CORNER IN CLOCKWISE DIRECTION