Department Magazine

TELE-ELECTRO

Volume4 2019-20

DHANEKULA INSTITUTE OF ENGINEERING AND TECHNOLOGY::GANGURU

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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DHANEKULA
INSTITUTE OF ENGINEERING AND TECHNOLOGY
Approved by AICTE, Affiliated to JNTUK, Kakinada

Accredited By NBA NATIONAL BOARD OF ACCREDITATION For B.Tech CE | EEE | ME | ECE

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DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY::GANGURU

Institute Vision

Pioneering Professional Education through Quality.

Institute Mission

1. Quality Education through state-of-art infrastructure, laboratories and committed staff.
2. Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect.
3. Involving faculty members and students in research and development works for betterment of society.

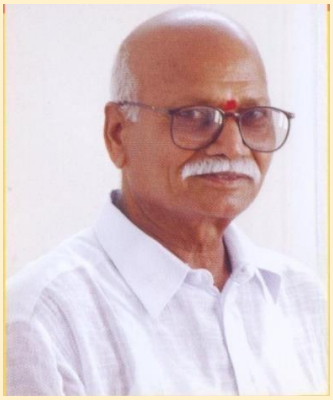
Dhanekula Institute of Engineering and Technology established in the year 2009 at Ganguru, Vijayawada, Krishna (Dist) is the first of its kind educational institution founded by Sri.Dhanekula Ravindranadh Tagore, a living legend who is famous for his versatility and excellence in promoting various agricultural and industrial organizations and known for his love and affection towards the man kind - improving their standard of living with his meticulous, measured efforts. There is no doubt in saying that in future this institution would be the touch-stone of technical expertise in and around the third world countries.

With its global standards it aims at cultivating a learner centered teaching environment imparting engineering education. Education is inseparable from the real life. The purpose of Education is to equip the student with an all-round development in solving the real life situations. We strive to promote rich academic environment with a special focus on innovative methodologies in teaching by giving an exposure to the cutting edge competence to the students in meeting the future employment challenges.

Affiliated to JNTUK, Kakinada and is approved by AICTE, New Delhi, it aims at providing a sound technical knowledge and broad vision to the technocrats of future - as they are prepared for a successful tomorrow. The institution will endeavor to fabricate accomplished and capable engineers proficient enough to face the dynamic changes of the present century. Qualified, experienced and dedicated staff who remain update with latest developments in their fields is an additional asset to the college. Founded in the year 2009, this institution started with B.Tech courses. The institution has been developed with the primary objectives to

- Produce proficient, qualified and socially responsible engineering personnel required to face the challenges of the country in the 21st century.
- Provide an opportunity to the average citizen of India willing to acquire engineering education in different fields at an affordable cost.
- To cultivate skill based learning competing with the national and international institutions like IIT's, IIIT's and NIT's
- Launch different programs in order to integrate educational and developmental activities.
- Serve as a sustained center - imparting engineering education so as to update and upgrade the existing engineering skills.

ABOUT ADMINISTRATIVE TEAM



Dhanekula Ravindranath Tagore
Chairman, DIET.

In recent years, a good deal of anxious attention has been paid, all over the world to the utter significance and direct influence of science and technology on our modern life style. Twentieth century is indeed identified as the age of science and Technology. Moreover, the progress of any country in the contemporary world depends entirely or solely upon the improvement made by it in the field of technology. In this context, engineering education plays a meaningful and substantial character and its role cannot be excluded. We at 'Dhanekula' strive to provide you the best infrastructure and faculty with the sole aim of ushering excellence in engineering education. I firmly believe that any technology is successful only when it is diffused through society-uplifting the world economy raising the percapita income of its people. Thus bringing the world class technology home is the ultimate aim of this institution fostering over all development of the students-moulding them into proficient, qualified and socially responsible engineering personnel.

Dhanekula Bhavani Prasad
Secretary,DIET.

Twenty first century is indeed identified as the age of science and technology and the progress of the country depends entirely or solely upon the improvement made by it in the field of technology. In this context, I strongly hope that this institution with its quality conscious definitely plays a meaningful role in making the students ready for the latest Industrial requirements.

Dr.Ravi Kadiyala
Principal, DIET.

Dhanekula Institute of Engineering & Technology is headed by a dynamic and committed academician **Dr.Ravi Kadiyala**. He did his post graduation in Mechanical Engineering and was awarded Doctorate by Andhra University, Visakhapatnam, for his research in the area of Internal Combustion Engines. This young technocrat has made his mark of life-working with several reputed organization in various designations. Now with the trendsetting 'Dhanekula' again he has started exploring new avenues with his 'thriving team'. Dhanekula Institute of Engineering & Technology, the world class campus offers quality of education for its students to enhance their employability skills and Innovation among the students by inspiring fresh perceptiveness, creative thinking and firm conviction to achieve true success. With an aim to build future for the youth, the college aims to nurture budding talents in the field of engineering and technology as per industry needs.

DIET believes in giving a complete education by concentrating on all the aspects of professional building and we have been continuously in the thought process of improving the quality of teaching by implementing various activities like seminars by eminent personalities ,language development, training in soft skills, communication skills, insisting on student discipline, and enthusing the students by encouraging them to participate in extracurricular activities like sports NSS,NCC apart from their academics. Dhanekula Institute of Engineering & Technology, this institute has been in the process of continuously training the entire faculty to maintain high standards of classroom delivery. Faculty Efforts are also in place for improving the student skills by offering some skill oriented courses for the students. We at DIET believe that honesty, hard work, and discipline together form the ladder for success and try to inculcate these habits in our students.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Vision

Pioneering Electronics and Communication Engineering Education & Research to Elevate Rural Community

Mission

- Imparting professional education endowed with ethics and human values to transform students to be competent and committed electronics engineers.
- Adopting best pedagogical methods to maximize knowledge transfer.
- Having adequate mechanisms to enhance understanding of theoretical concepts through practice.
- Establishing an environment conducive for lifelong learning and entrepreneurship development.
- To train as effective innovators and deploy new technologies for service of society.

At Glance

The Department of Electronics and Communication Engineering, a consistently top-ranked department, is recognized by AICTE, which has a rich heritage and a strong reputation for R&D activities of internationally acclaimed standards, predominantly in the areas of Communications, Signal Processing and Microelectronics. The college has initiated the Department of Electronics and Communication Engineering in the year of 2009 with 60 student's intake and enhanced to 120 students intake in the year of 2011. Presently there are 3 Professors, 3 Associate Professors, 29 Assistant Professors, sufficient number of technicians are working for the department. One of our faculty is currently pursuing Ph.D under JNTUK.

The Department of ECE imparts knowledge and training in Electronic Devices and Circuits, Electromagnetic Fields and Waves, Signal Processing, Switching, Communication Circuits, Networking, VLSI design, Microprocessors, Microcontrollers, Instrumentation, Image Processing, Microwave, Fiber Optics, Satellite, Wireless Communications, Radar and Embedded Systems. The intensive training in these areas makes the students good Electronics and Communication Engineers. They will be readily absorbed in industries, defence and government sectors.

In the near future, the department hopes to extend its research into newer areas like Energy Efficient Networks, Body Area Networks, High Precision Location and Navigation, Green Communication and Computing, Healthcare Informatics. The ECE department also hosts very active student organizations. These include an IETE student branch, The ISSE, ISTE memberships for faculty members. Aiding the student's transition to the professional work environment are well established Co-Op and internship programs at the departmental as well as the college level. Students design, develop, construct, and evaluate a system. Faculty advisors assess the projects based on finished products, written reports, and oral presentations. The laboratory courses give students considerable experience in working closely with others in real world situations and solving open ended design problems. Our Alumni occupy key leadership positions in Industry, Academia, and National Laboratories in the United States and around the world.

Dr.G.L.Madhumati Prof & HOD, ECE DIET.

The Department of Electronics and Communication Engineering is headed by Dr.G.L.Madhumati, did her Ph.D from JNTUH in the field of VLSI Design and did M.Tech (DSCE) from JNTUH, Hyderabad and BE from Shivaji University, Kolhapur. She has totally 23 Years teaching experience in field of engineering. Presently she is working in the area of VLSI Design, Mixed signal VLSI design, Low Power VLSI Design, DSP Architectures and Image processing Architectures, Partial Reconfiguration, System on Chip. This Department offers a wide range of technical courses taught by an experienced and competent faculty. Our team of educators is provided with excellent facilities, resources and customized teaching aids to make the courses more relevant, dynamic, interactive and learner-friendly.

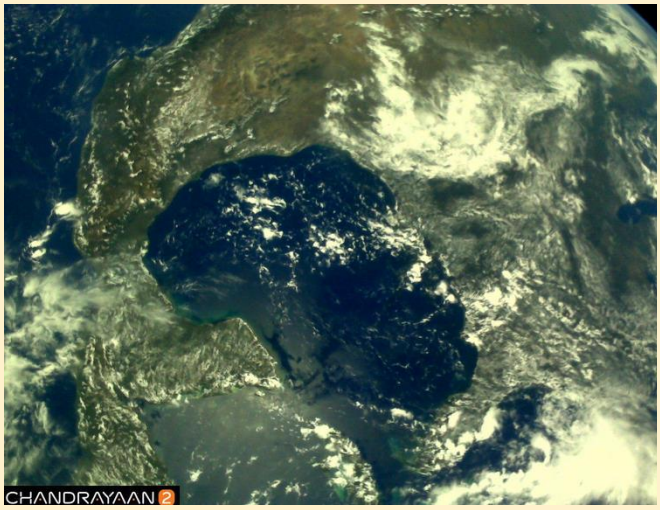
FACULTY ARTICLES

ISRO: Chandrayaan-2

After the launch of Chandrayaan-2, there were several pictures which were claimed to have been taken by it. However, the space agency had denied these claims. India's second moon mission seeking to explore the unchartered Lunar south pole by landing a rover, was launched on July 22. Chandrayaan-2 comes 11 years after ISRO's successful first lunar mission Chandrayaan-1, which scripted history by making more than 3,400 orbits around the moon and was operational for 312 days till August 29, 2009.

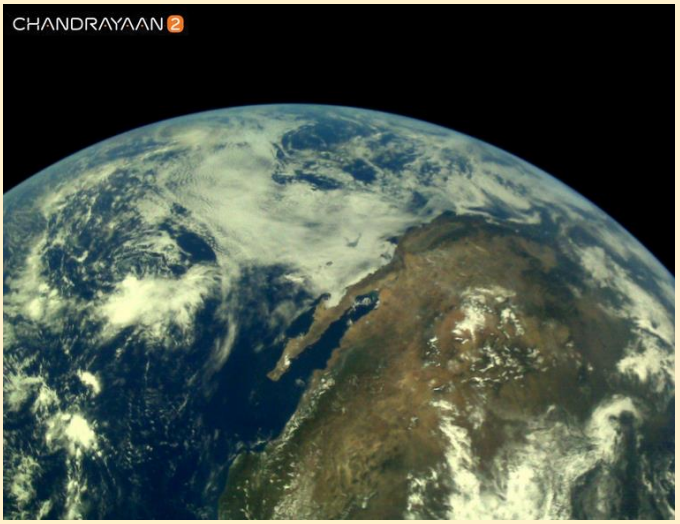
Chandrayaan-2, comprising an orbiter, lander and rover, is slated to land on the Moon, by the first week of September. Scientists would make a soft landing of the lander in the South Pole region of the moon, where no country has gone so far. Billed as the most complex and prestigious mission undertaken by the ISRO since its inception, Chandrayaan-2 will make India the fourth country to soft land a rover on the lunar surface after Russia, the US and China. Space agency ISRO released the first set of pictures of the earth captured by Chandrayaan-2, the country's second moon mission launched a fortnight ago.

The pictures were captured by the L 14 camera on board Chandrayaan-2. The pictures show the earth in different hues.



#ISRO Earth as viewed by **#Chandrayaan2** LI4 Camera on August 3, 2019 17:37 UT

Earth as viewed by **#Chandrayaan2** LI4 Camera on August 3, 2019 17:34 UT



Earth as viewed by **#Chandrayaan2** LI4 Camera on August 3, 2019 17:32 UT

Earth as viewed by **#Chandrayaan2** LI4 Camera on August 3, 2019 17:29 UT

Article By:
Mr.S. Chandrasekhar, Asst.Professor

Electronic design automation(EDA) :Integrated Circuits Design[2]

Electronic design automation (**EDA**), also referred to as **electronic computer-aided design** (**ECAD**), is a category of software tools for designing electronic systems such as integrated circuits and printed circuit boards. The tools work together in a design flow that chip designers use to design and analyze entire semiconductor chips. Since a modern semiconductor chip can have billions of components, EDA tools are essential for their design.

Early days

Before EDA, integrated circuits were designed by hand, and manually laid out. Some advanced shops used geometric software to generate the tapes for the Gerber photoplotter, but even those copied digital recordings of mechanically drawn components. The process was fundamentally graphic, with the translation from electronics to graphics done manually. The best known company from this era was Calma, whose GDSII format survives.

By the mid-1970s, developers started to automate the design along with the drafting. The first placement and routing tools were developed. The proceedings of the Design Automation Conference cover much of this era.

The next era began about the time of the publication of "Introduction to VLSI Systems" by Carver Mead and Lynn Conway in 1980. This ground-breaking text advocated chip design with programming languages that compiled to silicon. The immediate result was a considerable increase in the complexity of the chips that could be designed, with improved access to design verification tools that used logic simulation. Often the chips were easier to lay out and more likely to function correctly, since their designs could be simulated more thoroughly prior to construction. Although the languages and tools have evolved, this general approach of specifying the desired behavior in a textual programming language and letting the tools derive the detailed physical design remains the basis of digital IC design today.

The earliest EDA tools were produced academically. One of the most famous was the "Berkeley VLSI Tools Tarball", a set of UNIX utilities used to design early VLSI systems. Still widely used are the Espresso heuristic logic minimizer and Magic.

Another crucial development was the formation of MOSIS, a consortium of universities and fabricators that developed an inexpensive way to train student chip designers by producing real integrated circuits. The basic concept was to use reliable, low-cost, relatively low-technology IC processes, and pack a large number of projects per wafer, with just a few copies of each projects' chips. Cooperating fabricators either donated the processed wafers, or sold them at cost, seeing the program as helpful to their own long-term growth.

Birth of commercial EDA

1981 marks the beginning of EDA as an industry. For many years, the larger electronic companies, such as Hewlett Packard, Tektronix, and Intel, had pursued EDA internally. In 1981, managers and developers spun out of these companies to concentrate on EDA as a business. Daisy Systems, Mentor Graphics, and Valid Logic Systems were all founded around this time, and collectively referred to as **DMV**. Within a few years there were many companies specializing in EDA, each with a slightly different emphasis. The first trade show for EDA was held at the Design Automation Conference in 1984.

In 1981, the U.S. Department of Defense began funding of VHDL as a hardware description language. In 1986, Verilog, another popular high-level design language, was first introduced as a hardware description language by Gateway Design Automation. Simulators quickly followed these introductions, permitting direct simulation of chip designs: executable specifications. In a few more years, back-ends were developed to perform logic synthesis.

Current status

Current digital flows are extremely modular (*Integrated circuit design, Design closure, and Design flow*). The front ends produce standardized design descriptions that compile into invocations of "cells,", without regard to the cell technology. Cells implement logic or other electronic functions using an integrated circuit technology. Fabricators generally provide libraries of components for their production processes, with simulation models that fit standard simulation tools. Analog EDA tools are far less modular, since many more functions are required, they interact more strongly, and the components are (in general) less ideal.

EDA for electronics has rapidly increased in importance with the continuous scaling of semiconductor technology. Some users are foundry operators, who operate the semiconductor fabrication facilities, or "fabs", and design-service companies who use EDA software to evaluate an incoming design for manufacturing readiness. EDA tools are also used for programming design functionality into FPGAs.

Article By:
Mr.S. Chandrasekhar, Asst.Professor

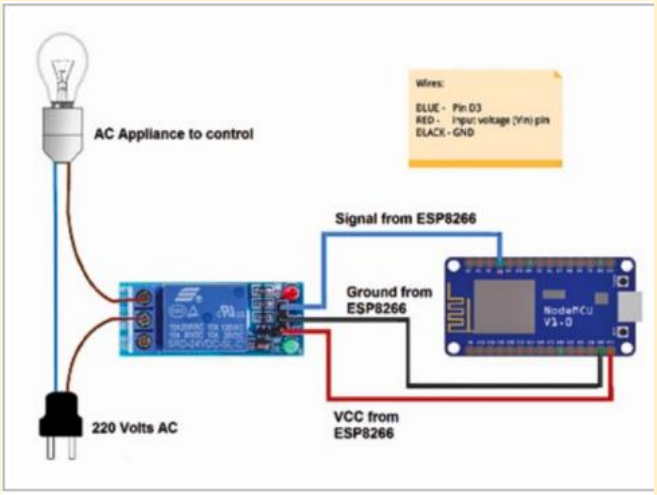
Artificial Intelligence (AI) and Its Applications

AI emphasises on making intelligent machines work and react like human beings, including speech recognition, planning, problem solving and learning. It involves programming intelligence or making computers behave like humans. AI-powered devices try to imitate the natural intelligence of humans, mimicking the cognitive functions that humans use to perform tasks.

There are many definitions of AI and one such definition given on Wikipedia is, “In computer science, AI—which is sometimes called machine intelligence—is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals.”

AI finds application in robotics, virtual assistants, the Internet, finance and economics, exploration and research, healthcare, education, automotive, video games, defence, businesses and on mobile devices. For more on its applications, please refer to ‘The Latest In AI and Its Applications’ article published in January issue.

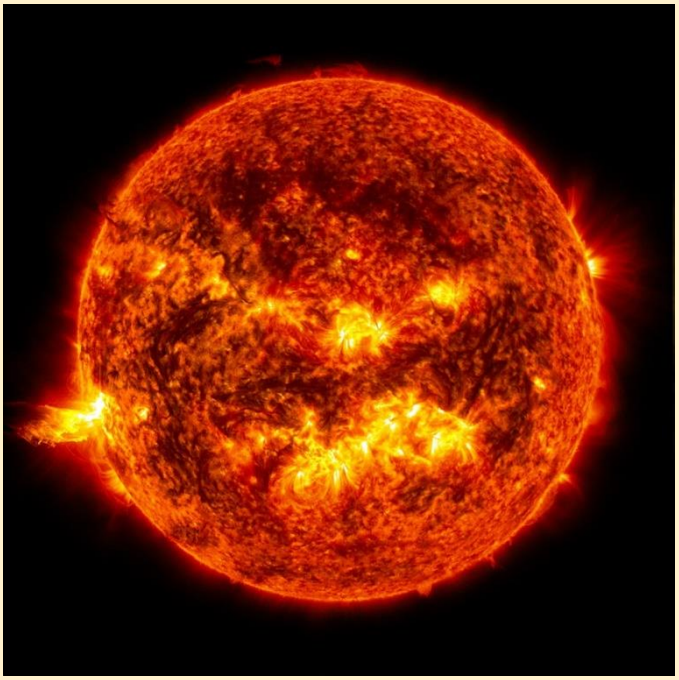
There are many AI-based DIY projects using Arduino, Node MCU and Raspberry Pi available on the Internet.



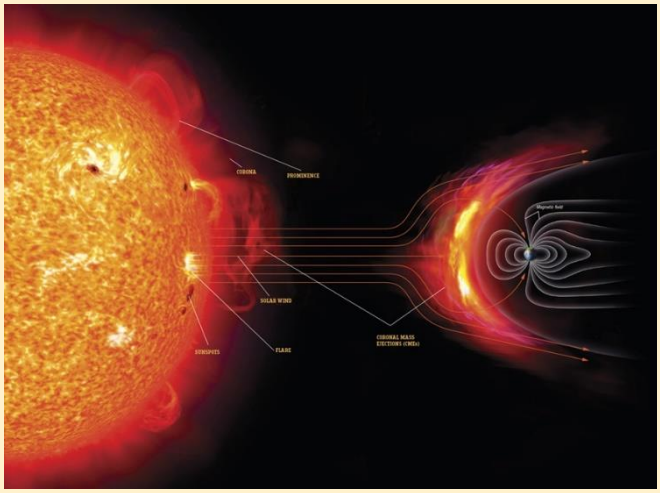
This AI-chatbot is used to control electrical appliances using voice commands from Facebook Messenger. First, add AI rules in Chatfuel by writing all permissible words or phrases a user may use—such as ‘Turn on the light’ or ‘Switch on the light’—for interaction. After the system is connected to the Internet, open the chatbot from Facebook Messenger installed on your cellphone and provide it with instructions using the microphone, to turn the light off or on.

Article By:
Mr.S. Chandrasekhar, Asst.Professor

Our Sun, the Still-mysterious Star That Gives Us Life



The sun has always loomed large, bringing heat and light and life. In ancient times, it was worshipped as a god; now we revere it as our local blob of luminescent hot plasma — a close-up example of the twinkling stars that come out at night. The sun shines thanks to fusion reactions deep in its core, melding hydrogen atoms into helium and releasing photons in the process. That light then spends tens or hundreds of thousands of years bouncing around before it finally escapes the sun’s surface. Life on Earth depends on sunshine — but that dependability belies our star’s complexity. The sun’s outermost visible layer, for instance, is roiled by invisible magnetic fields, which break and reconnect over and over, releasing energy every time. And no one knows why its atmosphere-like corona becomes hotter, not cooler, as you move away from the solar surface. Learning about the sun is something of a Pandora’s box, says NASA heliophysicist Nicola Fox. “We’ll answer these first questions, but we’ll probably answer them with 10 more questions.”



PROMINENCE: A tumultuous loop of plasma — the superhot gas that makes up the sun — that stretches into the corona from the solar surface. Prominences follow the twisted and constantly changing magnetic fields that envelop our star.

CORONA: The outermost part of the sun's atmosphere, it's visible during a total solar eclipse, when the moon blots out the rest of the sun's light.

SOLAR WIND: The invisible flow of charged particles constantly streaming away from the sun along magnetic field lines.

CORONAL MASS EJECTIONS (CMEs): In the sun's corona, billions of tons of plasma can accelerate up to supersonic speeds and blast outward along the solar wind. Why that happens remains a major mystery. These events may be accompanied by a flare.

FLARE: A bright, visible flash that may last minutes or hours; it signals the powerful release of magnetic energy. Flares often occur near sunspots, and they may accompany CMEs.

SUNSPOTS: Cooler, darker areas that look like dots, but are actually enormous (often bigger than Earth). Scientists think they form when magnetic fields intensify on the surface, blocking the outward flow of hot gas. Clusters of sunspots signal increasing magnetic activity.

Stormy Weather

What happens on the sun doesn't stay on the sun. When blobs of charged particles are burped up into the solar wind, they can strike Earth's magnetic fields to create auroras, as well as extreme weather events like geomagnetic storms.

The most powerful known space weather storm struck in 1859, and all things electromagnetic were at risk: Telegraphs spewed sparks, shocking operators and setting nearby papers on fire. If an equally strong storm struck today, it could cause widespread damage to satellites, power grids and electronic devices.

First Glimpse of an Unsolved Mystery

In August 2018, NASA launched the Parker Solar Probe, a mission designed to get closer to the sun than ever before. It's already beaming back surprises. Data from its first orbit, unveiled at a conference in December 2018, showed unexpected patterns in how the sun's plasma flows — something scientists thought they understood. "You could hear audible gasps in the audience," says Fox, Parker's former project scientist. "Now we have to say, 'Why doesn't it look like we thought it would?' ". As Parker continues to beam back reports, researchers like Fox hope to better understand how the corona heats up and accelerates the plasma blobs that can cause big trouble on our little planet.

The Sun's Stats

Size: It's big. The sun measures some 864,000 miles across, so it could fit more than 1.3 million Earths inside.

Temperature: At 15 million kelvins, or 27 million degrees Fahrenheit, the sun's core is its hottest part. But forget about ever seeing it: The human body, along with anything we can build, would vaporize before even reaching the sun's surface, itself a roasting 6,000 K (10,300 F).

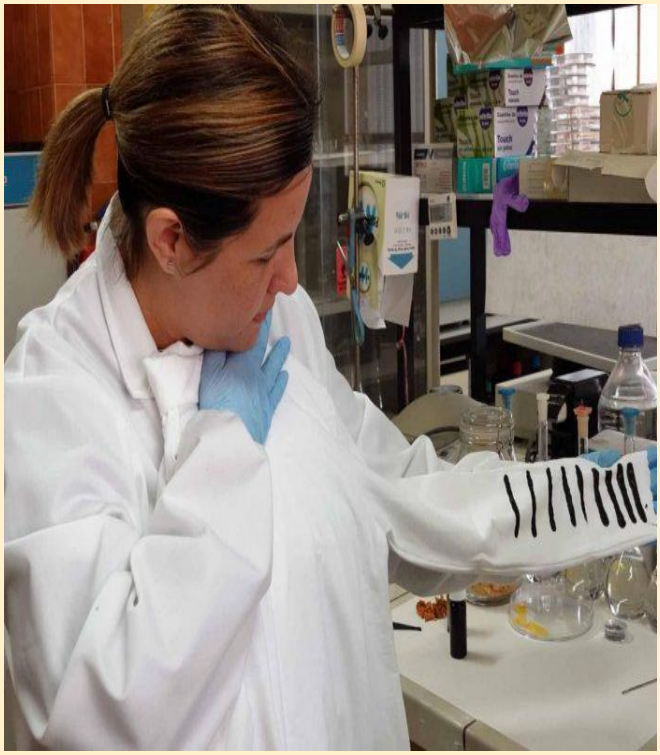
Matter distribution: In terms of the solar system's matter, Earth doesn't matter. The sun alone accounts for 99.8 percent of the stuff in the solar system.

Birth: The sun — along with the rest of the solar system — formed more than 4.5 billion years ago, when a big swirling cloud of gas and dust collapsed under its own gravity.

Death: In 5 billion years or so, the sun will run out of its hydrogen fuel and expand into a type of star called a red giant, likely consuming Earth along the way. Godspeed to any possible descendants!

Article By:
Mr.P.Krishna Reddy., Asst.Professor

T-Shirt Generates Electricity From Body Temperature Difference to Surroundings



Researchers of the Faculty of Science of the University of Malaga (UMA) have designed a low-cost T-shirt that generates electricity from the temperature difference between the human body and the surroundings. Credit: University of Malaga

Researchers of the Faculty of Science of the University of Malaga (UMA) have designed a low-cost T-shirt that generates electricity from the temperature difference between the human body and the surroundings. We are talking about the "e-textile" prototype, developed in collaboration with the Italian Institute of Technology in Genoa (IIT) based on sustainable methods and low-cost materials like tomato skin.

"So far, metals have been the chemical elements commonly used in the fabrication of electronic devices. This project took a step forward, and we have been able to generate electricity by using light and more affordable and less toxic materials", explains José Alejandro Heredia, one of the authors of this project.

The formula is very simple: water and ethanol - a type of ecological alcohol- derived from tomato skin and carbon nanoparticles. A solution that, according to experts, when heated, penetrates and adheres to cotton, thus obtaining electrical properties, like those generated by tellurium, germanium or lead, but from biodegradable materials. "When someone walks or runs, warms up. If such person wore a T-shirt designed with these characteristics, the difference between his/her body and the colder temperature of the surroundings could generate electricity", says Susana Guzmán, another author from the UMA.

"Iron Man" made in UMA

The results of this project, in which the Italian researcher Pietro Cataldi has participated, were **published** in the journal *Advanced Functional Materials*. At present, this group of scientists continues their work on the development of devices that can be incorporated into textile to be able to, for example, generate light to make this T-shirt reflective or even charge a mobile phone without a charger.

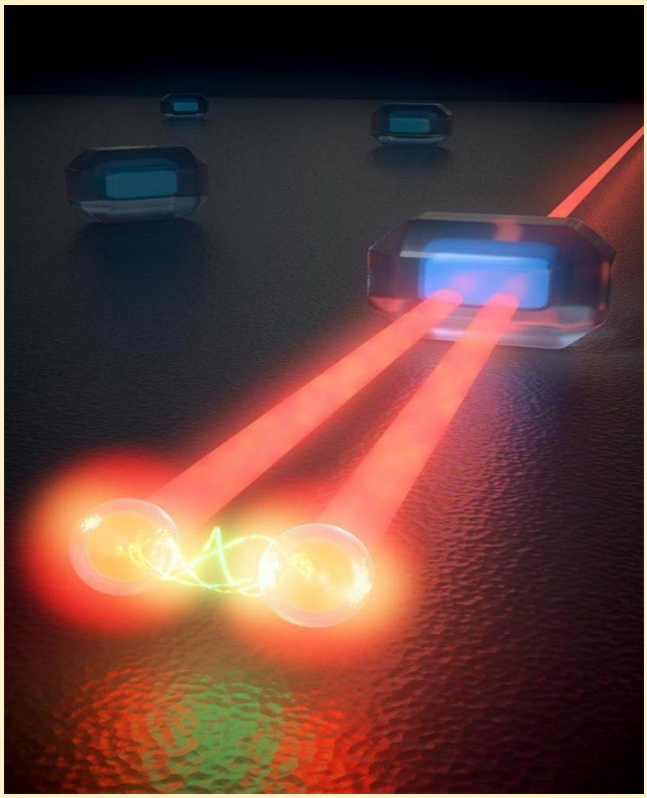
Researchers of the Faculty of Science of the University of Malaga (MA) have designed a low-cost T-shirt that generates electricity from the temperature difference between the human body and the surroundings. Credit: University of Malaga

Other possible applications include biomedicine, thanks to the monitoring of signals of each user, or robotics, because the use of these lighter and more flexible materials enables improvement of robot features.

In a previous study, we were able to create a Wi-Fi antenna from tomato skin and graphene. We are also studying the possibility of incorporating this invention into the "e-textile" T-shirt, which would enable us to be like the superhero Iron Man, who wears a suit with all types of technological devices, and even fly.

Article by:
Mr.S.Chandrasekhar Asst.Prof, ECE

New Technique for Studying Ultrafast Events in Individual Quantum Dots



Upon stimulation, two photons emerge from the quantum dot giving detailed information about the dynamics of the excited charges within the Quantum Dot (QD).

Ultrafast Stimulated Emission Microscopy of Single Nanocrystals

The ability to investigate the dynamics of single particle at the nano-scale and femtosecond level remained an unfathomed dream for years. It was not until the dawn of the 21st century that nanotechnology and femtoscience gradually merged together and the first ultrafast microscopy of individual quantum dots (QDs) and molecules was accomplished. Ultrafast microscopy studies entirely rely on detecting nanoparticles or single molecules with luminescence techniques, which require efficient emitters to work. However, such techniques cause degradation to the sample, as well as, yield little information about the dynamics of the system in the excited state. Only in recent years, the efforts to find an alternative compatible technique to study fast processes in nano-objects came into the spotlight.

Now, ICFO researchers Lukasz Piatkowski, Nicolò Accanto, Gaëtan Calbris, Sotirios Christodoulou, led by ICREA Prof. at ICFO Niek F. van Hulst, in collaboration with Iwan Moreels (Ghent University, Belgium), have published a study in **Science** entitled "Ultrafast stimulated emission microscopy of single nanocrystals," where they report on a technique for studying ultrafast events in individual non-fluorescent nano-objects.

In their study, they took individual QDs and rather than waiting for the QD to spontaneously emit light through photoluminescence, the team used a sophisticated combination of laser pulses to promote individual QDs into excited state and then, force them down, back to the ground state to first: image individual QDs and second: discern the evolution of the excited charges within the entire photocycle.

Dr. Lukasz Piatkowski explains why they used a laser pulse pair to effectively image the dynamics of the QDs: "It is like throwing a ball into a tree; the higher you throw it, the more excited the state. The first laser pulse of the system (photon) throws the first ball (charge in the QD) into the tree. If you are using a photoluminescence technique it is like you are standing below the tree, and you cannot see what is happening inside the treetop or crown. Thus, you will not know whether the ball starts to bounce down the branches, where, when and how is starts to fall down, if it stomps with something on its way, if it gets caught in an intermediate branch, etc. So, in order to see what is happening with the first ball, you need to find another technique that allows you to look into the treetop. The technique we used allowed us to throw a second ball into the tree top (second laser pulse interacting with the QD) to bring the first ball down. Throwing the second ball higher or lower, stronger or weaker, sooner or later after the first ball, we obtain information about the first ball and the structure of the tree (how long it took the balls to fall out, where, how, etc.) ".

In their experiment, the first laser pulse brings individual QD to the excite state. Then, every few hundred femtoseconds, they shot a second laser pulse onto the QD to bring the charges down to ground state, inducing recombination and emission of an extra photon. Hence, for every probe photon they shot into the system, they got two twin photons back. These extra photons allowed the authors not only to image the QDs but also to precisely track the evolution of the excited charges in the QD, unveiling how many charges underwent spontaneous recombination, stimulated recombination and excited state absorption.

Being able to track excited charges at the nanoscale is of fundamental importance in nanotechnology, photonics, and photovoltaics. The results of the study have proven that ultrafast stimulated emission microscopy can be used to study ultrafast processes in

individual chromophoric particles that are otherwise undetectable through fluorescence/photoluminescence techniques. In other words, such study has permitted imaging and studying the dynamics of nano-particles and structures without the need of external fluorescent labels.

As ICREA Prof at ICFO Niek van Hulst remarks, “Significant advances are expected in the future within the field of ultra-fast-nano-regime imaging techniques. The first detection of quantum dots using this approach has been outstanding. We now aim to extend this to molecules and biomolecular complexes, specifically photo-synthetic complexes. We are currently working on 3 and 4 pulse schemes to merge the stimulated emission and luminescence detection of single systems with 2D-spectroscopy.

Article by:
Mr.A.Sivannarayana Asst.Prof, ECE.

Industry 4.0 - the digital transformation of industry and the fourth industrial revolution

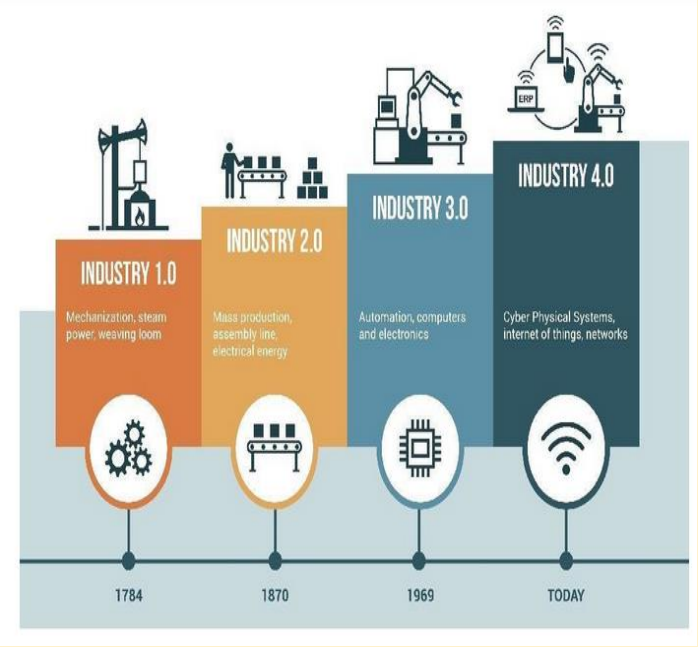
What is Industry 4.0?

Technology has played a major role in transforming the world of industry. The first era of the industry was steam and the first machine was mechanized. The second era was all about electricity, the assembly line and the birth of mass production. The third era of the industry had the advent of computers and the beginning of automation – the robots and machines began to replace human workers on those assembly lines. The next era is on board — “Industry 4.0.”

Industry 4.0 is the most awaited era in the industry, in which computer and automation will come together in an entirely new way. This primarily focuses on the use of large-scale M2M and Internet of Things (IoT) deployments to provide the likes of increased automation, improved communication and monitoring, as well as smart machines that can analyse and diagnose issues without the need for human intervention. Industry 4.0 creates what has been called a smart factory, smart industry, intelligent industry, or smart manufacturing.

Why Industry 4.0?

Industry 4.0 is neither a new form of technology, nor a business ideal, but in fact a revamped approach inspired by new advancements to achieve results that weren't possible 10 years ago.



The first industrial revolution saw Britain move from farming to factory production in the 19th Century. The second spanned the period from the 1850s to World War I and began with the introduction of steel, culminating in the early electrification of factories and the first spouts of mass production. Finally, the third

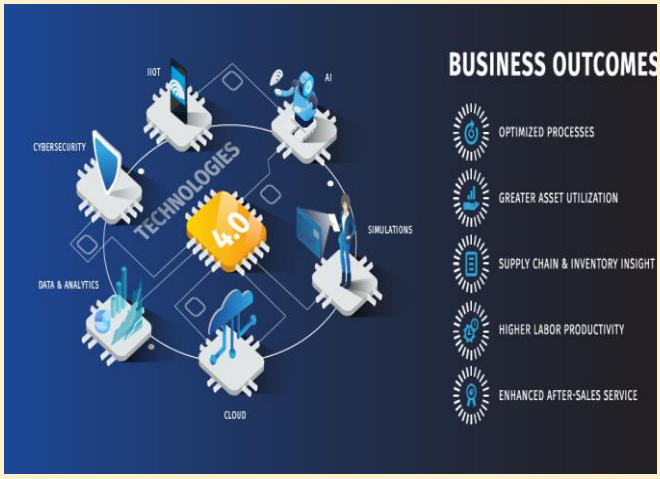
industrial revolution refers to the change from analogue, mechanical, and electronic technology to digital technology that took place from the late 1950s to the late 1970s.

The fourth, then, is the move towards digitization. Industry 4.0 uses the Internet of Things and cyber-physical systems such as sensors to collect vast amounts of data that can be used by manufacturers and producers to analyze and improve their work.

Recent advancements in big data and analytics platforms means that systems can trawl through the huge sets of data and produce insights that can be acted upon quickly. Smart factories, which will be at the heart of Industry 4.0, will take on board information and communication technology for an evolution in the supply chain and production line that brings a much higher level of both automation and digitization. It means machines using self-optimization, self-configuration and even artificial intelligence to complete complex tasks in order to deliver vastly superior cost efficiencies and better quality goods or services.

Technologies of Industry 4.0

Industry 4.0 has made the smart factory reality, thanks in part to the widespread use of digital technologies in formerly manual processes. Connectivity, automation, and optimization are driving the Industry 4.0 digital transformation. But many technologies are working together to realize the full potential of the manufacturing 4.0 movement.



The technologies include

1. **Industrial Internet of Things (IIoT)**
2. **Automation**
3. **Artificial Intelligence**
4. **Big Data & Analytics**
5. **The Cloud**
6. **Cyber security**
7. **Simulations**

How to Get Ready For Industry 4.0 as an Engineer

The Fourth Industrial Revolution mark an era of unprecedented innovations and progressions and it is important for governments to be prepared for Industry 4.0 with productive ecosystems and an agile and robust infrastructure. Here are some steps that the engineers can do to get ready for this new digital world

1. **Engineers may need to become an even more diligent and attentive workforce**
2. **Engineering should seize the opportunity that low production costs will bring**
3. **Shifts in specializations may be in order**
4. **Engineers will have to keep up with the rapid advancements in technology and devices**
5. **The boundaries of communication will be pushed further than ever before**

Article by
Dr. P Pavitra Roy, Professor, ECE.

6G TECHNOLOGIES

6G (sixth-generation wireless) is the successor to 5G cellular technology -- 6G networks will be able to use higher frequencies than 5G networks and provide substantially higher capacity and much lower latency. One of the goals of the 6G Internet will be to support one micro-second latency communications, representing 1,000 times faster -- or 1/1000th the latency -- than one millisecond throughput.

The 6G technology market is expected to facilitate large improvements in the areas of imaging technology and location awareness. Working in conjunction with AI, the computational infrastructure of 6G will be able to autonomously determine the best location for computing to occur; this includes decisions about data storage, processing and sharing.

Advantages of 6G over 5G

6G is expected to support 1 terabyte per second (Tbps) speeds. This level of capacity and latency will be unprecedented and will extend the performance of 5G applications along with expanding the scope of capabilities in support of increasingly new and innovative applications across the realms of wireless cognition, sensing and imaging. 6G's higher frequencies will enable much faster sampling rates in addition to providing significantly better throughput. The combination of sub-mmWave (e.g. wavelengths smaller than one millimeter) and the use of frequency selectivity to determine relative electromagnetic absorption rates is expected to lead to potentially significant advances in wireless sensing solutions.

Additionally, whereas the addition of mobile edge computing (MEC) is a point of consideration as an addition to 5G networks, MEC will be built into all 6G networks. Edge and core computing will become much more seamlessly integrated as part of a combined communications/computation infrastructure framework by the time 6G networks are deployed. This will provide many potential advantages as 6G technology becomes operational, including improved access to artificial intelligence (AI) capabilities.

When to expect 6G

6G is expected to launch commercially in 2030. 6G is being developed in response to the increasingly distributed radio access network (RAN) and the desire to take advantage of the terahertz (THz) spectrum to increase capacity and lower latency. While some early discussions have taken place to define 6G, research and development (R&D) activities will start in earnest in 2020. Many of the problems associated with deploying millimeter wave (MM wave) radio for 5G new radio are expected to be solved in time for network designers to address the challenges of 6G.

What 6G will look like

It's expected that 6G wireless sensing solutions will selectively use different frequencies to measure absorption and adjust frequencies accordingly. This is possible because atoms and molecules emit and absorb electromagnetic radiation at characteristic frequencies and the emission and absorption frequencies are the same for any given substance.

6G will have big implications for many government and industry solutions in public safety and critical asset protection such as:

- Threat detection
- Health monitoring
- Feature and facial recognition
- Decision making (in areas like law enforcement and social credit systems)
- Air quality measurements
- Gas and toxicity sensing

Do we even need 6G?

More than ever before, the sixth generation of cellular wireless communications will integrate a set of previously disparate technologies, including deep learning and big data analytics. The introduction of 5G paves the way for much of this convergence.

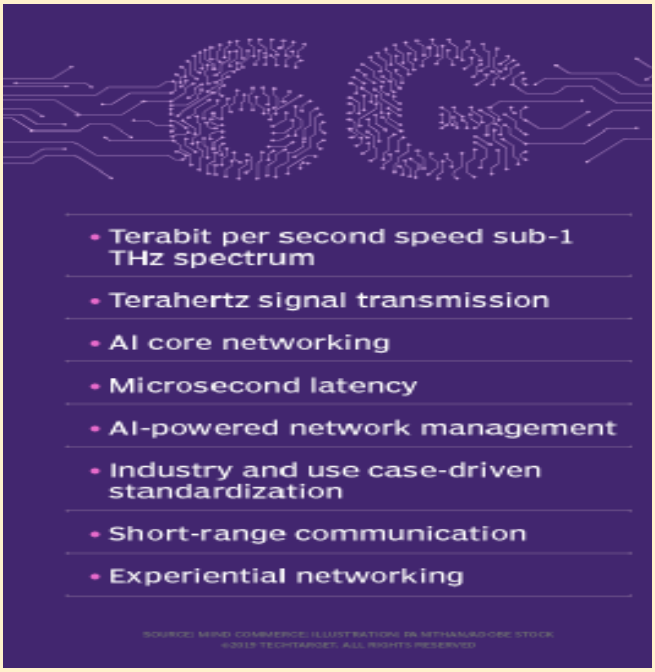
The need to deploy edge computing to ensure overall throughput and low latency for ultra-reliable, low latency communications solutions is an important

driver for 6G, as is the need to support machine-to-machine communication in the internet of things (IoT). Furthermore, a strong relationship has been identified between future 6G solutions and high-performance computing (HPC). While some of the IoT device data will be handled by edge computing resources, much of it will require processing by more centralized HPC resources.

Who is working on it?

The race to 6G will draw the attention of many industry constituents, such as major test and measurement vendor Key sight Technologies who has also indicated a commitment to its development. This may very well make the race to reach 5G supremacy look minor compared to the wait to see which countries can dominate the 6G technology market and its related applications, services and solutions.

- The University of Oulu in Finland is committed to a 6G research initiative referred to as 6Genesis. The project will be conducted for the next eight years and will develop a vision for 2037.



Article by
Dr. P Pavitra Roy, Professor, ECE.

STUDENT CORNER

Google's Fuchsia OS: Everything you need to know[1]

Google's next-gen operating system, Fuchsia, will have Android app support

Android and Chrome OS may be Google's best-known software ventures, but the company is actually working on a third operating system. It's called Fuchsia, and when it was first discovered in 2017, it only popped up as a single command line. Now, however, we know a lot more about the operating system. Fuchsia looks totally different than any other mobile operating system we've seen, including Android, but that could be the point. The fact is that there's currently a ton of mystery surrounding the operating system. We don't know what it's for, if it's aimed at eventually replacing Android, if it's just an experiment by Google, or when we should expect to see the new OS at Google I/O.

UPDATES

Here you'll find the latest news on Fuschia OS. If you're after a more general overview of Google's developing OS, then skip down.

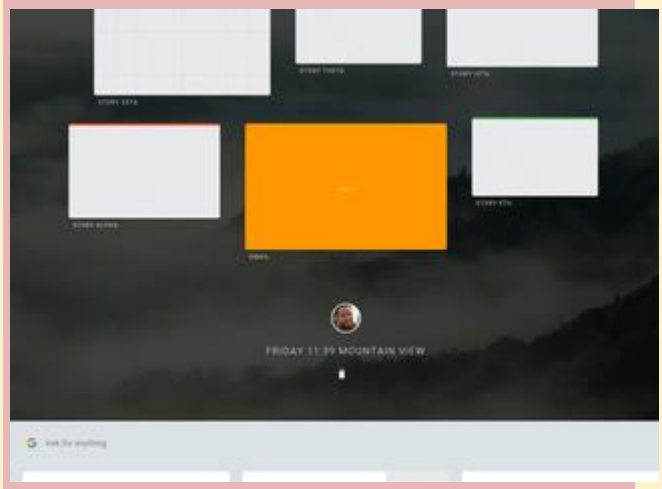
Fuschia confirmed to support Android apps

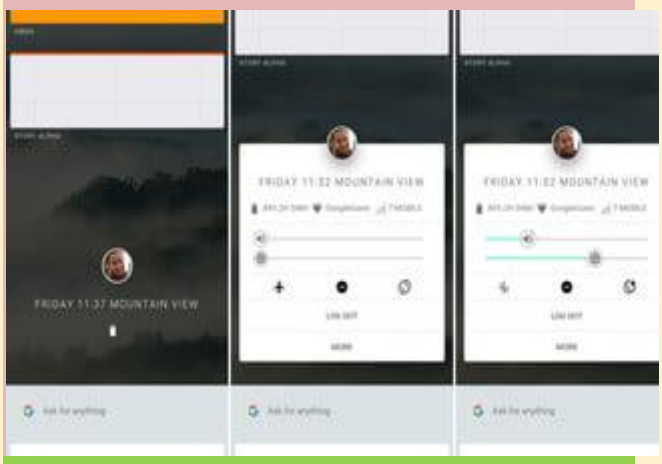
"What will happen to Android?" is one of the major questions asked of Google's Fuschia. It's entirely possible Google intends for Fuschia to replace Android — and that seems even more likely now, as it's seemingly been confirmed Fuschia will support Android apps. The news comes courtesy of news sites that noticed a new file had been added to the Android Open Source Project. The file concerns the addition of a special version of ART to Fuschia. ART — or Android Runtime — would essentially

allow Fuschia to run Android apps, making a theoretical swap over to Fuschia from Android rather more painless.

WHAT EXACTLY IS FUCHSIA?

Fuchsia is a little different from Android and Chrome OS in that it's not based on Linux. Instead, it's based on a new Google-developed kernel called Magenta. According to Google, Magenta is aimed at "modern phones and modern personal computers," so it wouldn't be surprising to one day see Fuchsia appear on our smartphones. Not only that, but Google has even added Apple's programming language, Swift, to the operating system — though we don't know why just yet. Because Fuchsia is written using the Flutter SDK, which runs on Android, chunks of Fuchsia can be run on an Android device. This version of Fuchsia appears to be called Armadillo, and it completely reimagines the home screen. The screen, according to testing by Ars Technica, is basically presented as a big scrolling list, with a profile picture, the date, your city, and a battery icon all placed at the center. Above that, you'll find "Story" cards, or a list of recent apps. Below, you'll see a list of suggestions for you, which acts kind of like Google Now.





You can also drag recent apps around and drop them where you choose to organize and personalize the home screen. If you drop one app on top of another, you'll enter a split-screen mode with up to three apps.According to Hacker News, Travis Geiselbrech, who worked on NewOS, BeOS, Danger, Palm's WebOS, and iOS, and Brian Swetland, who also worked on BeOS and Android, are involved in this project.

WHAT IS FUCHSIA FOR?

The fact is that we just don't know what Fuchsia is being built for just yet. The latest report from Bloomberg posits that Fuchsia is a new attempt to unite the entire Google ecosphere under a single operating system, with the goal for Fuchsia being to run smartphones, smart speakers, laptops — anything that could possibly fit under Google's tech umbrella. According to a certain source, the plan is to have Fuchsia up and running on smart speakers and other smart home devices within the next three years, and then move on to larger devices like laptops, before eventually superseding Android as the world's largest mobile OS.

The idea that Fuchsia would replace Android is one that's been around for a while, and Ars Technica has an interesting take on this. As it notes, Android was built long before the iPhone was released, and was originally intended as an operating system for digital cameras. After the launch of the iPhone, Android was re-purposed for phones, but Google is still stuck to commitments it made with Android many years ago. The company faces a lot of challenges with Android — for example, it struggles to get updates rolled out across the entire ecosystem of devices — and it's possible that Fuchsia would help to solve some of these issues. However, it's likely that abandoning Android is a long way off yet — if it happens at all. Google CEO Sundar Pichai and deputy Hiroshi Lockheimer have yet to sign off on any sort of future plan for Fuchsia, and it's clear that such a change would be an enormous undertaking. Many huge manufacturers like Samsung, HTC, and LG depend on Android for their phones, making this sort of undertaking exceptionally difficult. However, if Google managed to switch to Fuchsia, the move could be huge for the smartphone world. The Flutter SDK used to code Fuchsia has been able to produce code for Android and iOS apps, so developers could build apps in Flutter to work across all smartphone operating systems.

Chances are we won't find out anything new for a while since Fuchsia OS is early in development. Google has tested the new OS on phones, and we know that it's now also testing it on the Pixelbook too and other laptops too. We'll update this article as we hear more.

RUMORED FUCHSIA FEATURES

What advantages could moving to Fuchsia have for Google? Many, as it turns out. As we've already mentioned, Android was originally built to power digital cameras, before being adapted into an OS for touchscreen phones. As a result, much of Android doesn't fit into the future Google sees for smart devices, with voice interaction being particularly

important. Fuchsia would solve many of those issues while opening up more opportunities for Google as a result.
Fuchsia would also have a more robust set of security features than Android, with encrypted user keys being built into the software to tighten security. Fuchsia would also be better than Android at adapting to various different sizes of screen, building toward an interlinked smart future in which Fuchsia powers everything from your doorbell to your toaster. By moving towards Fuchsia, Google can also dump Java and the issues it's had surrounding the legal use of Java. It would also mean that Google could ditch the Linux kernel at the center of Android. Of course, Fuchsia is still deep in early development, and don't be surprised if some of these details change over time. According to Bloomberg's report, there have already been conflicts within Google over Fuchsia's security measures, as they would make it harder for Google's advertising.

TRY OUT FUCHSIA FOR YOURSELF

As of early May, you can actually try out Fuchsia for yourself. SlashGear, in partnership with HotFix Computer Repair, has put together a downloadable Android Package Kit (APK) that you can install on your phone to check out the OS. The APK is kind of like a preview version of a launcher of the alpha version of what's currently dubbed Armadillo. Armadillo is basically the version code name for Fuchsia, which is the operating system — kind of like Nougat, which is the version name, for the OS known as Android.
Head over to HotFixIt to download it for yourself, but before you do keep a few things in mind. Fuchsia is currently in its *very* early days, and as such don't expect to be able to use it as your daily OS. While it should be relatively safe to use on most Android phones, you should generally only download the highly experimental software if you know what you're doing.

Article by Mohammad Ashfaq
IV B.Tech, Sec-B

Neuralink Is Impressive. But How Ethical Is It?[2]

Imagine having the option to stroll into a strip shopping center and have a huge number of infinitesimally fine anodes embedded into your brain, all embedded as fast and as effectively as though you were having LASIK eye medical procedure, and intended to support your mind from a basic cell phone application. Until this week, this was the stuff of sci-fi. However at a launch event recently, the organization Neuralink — established by Elon Musk — asserted they were on track to accomplish this and increasingly throughout the following couple of years. Neuralink's mind-machine interface innovation is profoundly amazing. Utilizing Musk's presently recognizable model of uniting new ability from various fields to quicken the pace of mechanical advancement, the organization has made huge walks in what is attainable. In any case, in spite of the specialized guarantee of remote read-compose mind-machine interfaces, organizations like Neuralink are in threat of getting so enveloped with what they can do, that they dismiss the morals behind what they ought to do

The Ethics of Neurotechnology

As for Musk's making of a neural trim, a term that originates from the sci-fi of Iain M. Banks and depicts a future mind PC interface. Yet, since what's to come is somewhat nearer there are some more considerations on the potential dangers and moral issues encompassing Neuralink. Despite the fact that regardless we're finding how significant our entire body is in impacting our identity, despite everything we think about our cerebrum as the organ that at last characterizes us. This is the place the foundations of our feeling of self and personality lie, where we get and process information, where our astuteness and reason are situated, and where our most profound emotions and desires dwell. This is, to a limited extent, why ethics are so significant in the advancement of capable neurotechnologies. Be that as it may, these advancements additionally accompany social dangers, which further entangles matters. At the point when another innovation can possibly change aggregate conduct, disturb social standards, or undermine set up qualities, there are more extensive moral inquiries around where the limits between "can" and "should" lie. Until this previous week,

these were to a great extent hypothetical inquiries. Essential neurotechnologies have been around for some time — including innovations like cochlear inserts and profound mind incitement and progressively convoluted cerebrum PC interfaces. They are adequately fundamental that they've permitted breathing space for going with discussions around their moral advancement and use.

However, with Neuralink's launch event and going with paper on their basic innovation, these and bigger moral inquiries have taken on another level.

Pushing the Limits of What's Possible

What makes Neuralink's advances so conceivably problematic are their innovative practicality. This isn't vaporware — the tech the organization is chipping away at gives off an impression of being grounded in strong science and building. While the present cutting edge enables constrained quantities of rough anodes to be designed into basic pieces of the brain, Neuralink is creating incorporated arrangements where a huge number of ultrafine, adaptable, read-compose cathodes can be unequivocally embedded into the mind. These are put utilizing bleeding edge exactness apply autonomy, and will, in the end, be remotely controlled from a cell phone application to a battle neurological issue. This, be that as it may, is only a desire for what's waiting to be dealt with. Utilizing the stages they've built up, Neuralink's long haul goals are to upgrade how our minds work by including a third fake preparing layer to them, a simple medical procedure that may take just a couple of hours. In view of current advancement, this aspiration is well inside the limits of plausibility. However, as the late Stan Lee may have watched, with extraordinary power comes incredible duty. Also, this is the place Neuralink and others in the field should ponder how to improve both mindfully and morally.

Ethical Difficulties

As usual, there's a threat of loss of motion by examination when anybody raises the morals of trendsetting innovations like cerebrum machine interfaces. We would all be able to theorize about the potential mental damages of cutting edge brain-computer interfaces, or the risks of brain hacking or mind-jacking. What's more, it's anything but difficult to envision tragic dreams of a future where social conduct is constrained by machines, as we penance self-rule for neural ribbon accommodation.

However, this kind of hypothesis is seldom useful when attempting to explore the scene between an incredible mechanical capacity and its moral and socially capable advancement. Rather, regardless of the impulse to sensationalize and even fictionalize potential dangers, there's an earnest requirement for educated contemplating conceivable issues, and how to explore them. Also, on account of Neuralink, this implies pondering three explicit zones of moral and mindful advancement

Article by:
Gudivendi Uma Maheswara Reddy.
II ECE-B , 188T1A0477

"AI" Is A Tool. The Choice About How Gets Deployed Is Ours[3]

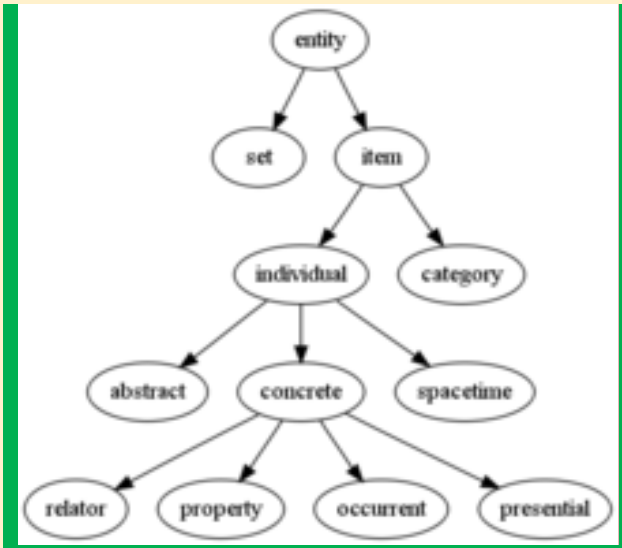
Computer science defines AI research as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. A more elaborate definition characterizes AI as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation."

The overall research goal of artificial intelligence is to create technology that allows computers and machines to function in an intelligent manner. The general problem of simulating (or creating) intelligence has been broken down into sub-problems. These consist of particular traits or capabilities that researchers expect an intelligent system to display. The traits described below have received the most attention.

Reasoning, problem solving

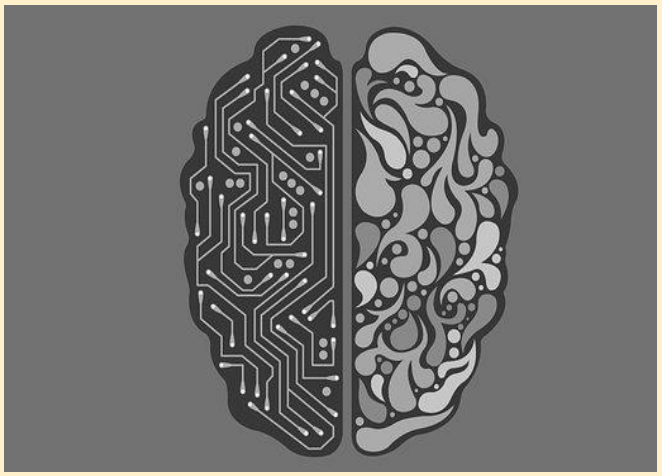
Early researchers developed algorithms that imitated step-by-step reasoning that humans use when they solve puzzles or make logical deductions.[By the late 1980s and 1990s, AI research had developed methods for dealing with uncertain or incomplete information, employing concepts from probability and economics. These algorithms proved to be insufficient for solving large reasoning problems, because they experienced a "combinatorial explosion": they became exponentially slower as the problems grew larger. In fact, even humans rarely use the step-by-step deduction that early AI research was able to model. They solve most of their problems using fast, intuitive judgements.

Knowledge representation

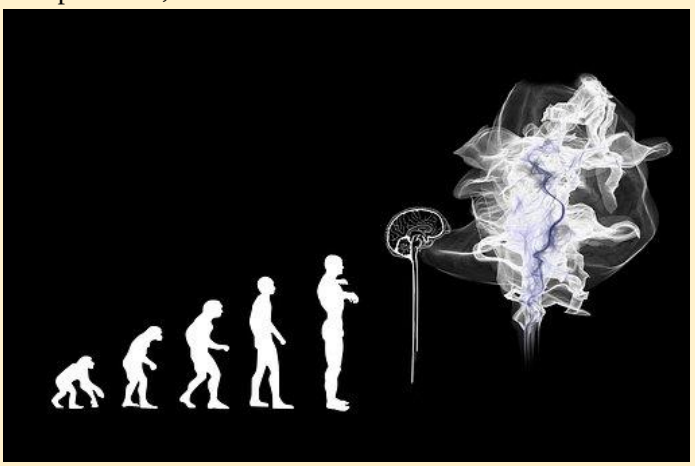


An ontology represents knowledge as a set of concepts within a domain and the relationships between those concepts. *Knowledge representation and Common-sense knowledge*

Knowledge representation and knowledge engineering are central to classical AI research. Some "expert systems" attempt to gather together explicit knowledge possessed by experts in some narrow domain. In addition, some projects attempt to gather the "commonsense knowledge" known to the average person into a database containing extensive knowledge about the world. Among the things a comprehensive commonsense knowledge base would contain are: objects, properties, categories and relations between objects; situations, events, states and time; causes and effects; knowledge about knowledge (what we know about what other people know); and many other, less well researched domains. A representation of "what exists" is an ontology: the set of



objects, relations, concepts, and properties formally described so that software agents can interpret them. The semantics of these are captured as description logic concepts, roles, and individuals, and typically implemented as classes, properties, and individuals in the Web Ontology Language. The most general ontologies are called upper ontologies, which attempt to provide a foundation for all other knowledge by acting as mediators between domain ontologies that cover specific knowledge about a particular knowledge domain (field of interest or area of concern). Such formal knowledge representations can be used in content-based indexing and retrieval, scene interpretation, clinical decisions.



Probabilistic methods for uncertain reasoning

Expectation-maximization clustering of Old Faithful eruption data starts from a random guess but then successfully converges on an accurate clustering of the two physically distinct modes of eruption. Many problems in AI (in reasoning, planning, learning, perception, and robotics) require the agent to operate with incomplete or uncertain information. AI researchers have devised a number of powerful tools to solve these problems using methods from probability theory and economics. Bayesian networks are a very general tool that can be used for a large number of problems, reasoning which is usingthe Bayesian inference algorithm, learning which is using the expectation maximizationalgorithm, planning (using decisionnetworks) and perception (using dynamic Bayesian networks). Probabilistic algorithms can also be used for filtering, prediction, smoothing and finding explanations for streams of data, helping perception systems to analyze processes that occur over time (e.g., hidden Markov models or Kalman filters). Compared with symbolic logic, formal Bayesian inference is computationally expensive. For inference to be tractable, most observations must be conditionally independent of one another.

Article by :
Ajay Kona, II ECE A

Foldable Phones-the future smartphone[4]

Foldable phones might be the strangest and most revolutionary tech of 2019. But how do these things work, and when will we get the chance to buy them?

What Makes These Phones Foldable?

Sure, we had flip phones that were folding back in the '90s and 2000s. But we're in the age of smartphones now, and if you tried to fold your smartphone in half, you'd end up with a broken phone. That is unless your smartphone has a flexible OLED display, a polymer screen, specialized components, and a jointed case. Foldable phones are filled with a ton of revolutionary tech, but the most ground-breaking component that you'll see is the famous, flexible OLED display.

These beautiful, flexible displays are primarily manufactured by Samsung, and they're already in a host of products with which you may be familiar. The Galaxy S7 Edge has a curved OLED display. The iPhone X contains a Samsung OLED display. Sonyhas put out some OLED TV's, and LG produces a line of Signature OLED TV's that are paper-thin and slightly flexible. Manufacturers like Samsung and Royole have been developing OLED displays since about 2011, and these displays have already found their way into a lot of consumer-grade products. Why has it taken so long for foldable phones to become a thing? Well, businesses have had to figure out how to make all of the other components in a phone flexible, too. Glass isn't very flexible, in case you were wondering. As a result, manufacturers have had to develop bendy polymer screens for flexible phones. Powered circuitry andlithium-ion batteries can catch on fire if you flex them back and forth, so manufacturers have had to find a solution for that. Aluminum and plastic phone cases are technically *bendable*, but they'll snap after a couple of folds. See where this is going? Everything that you'd expect to find in a cellphone has to be revolutionized for use in a foldable phone.

Manufacturers like Samsung and Royole have figured out how to make the components in a phone more flexible. Otherwise, they wouldn't be releasing foldable phones. But the technology is still in its early stages. That being said, it's going to take a few years for these devices to become affordable and commonplace. In the meantime, we can only hope that manufacturers come up with a better name for foldable phones. People will inevitably start calling them "phondables" or "flexiphones," and that's just no good.

Foldable Phones Offer Endless Possibilities

So, what are we going to do with foldable phones? It's kind of hard to figure out where this trend is going because manufacturers have already taken the tech down a variety of unique paths. We know that some devices, like the Samsung Galaxy F and the Royole FlexPai, can expand into tablet-sized smartphones, and that's pretty cool. You can use these like regular smartphones when you're walking around, or you can fold them out into tablets when you want to video-chat a friend or get some work done. Phones that double as a tablet could change how we consume media, and they could make it even easier to do work on the go. There are also devices, like the Motorola RAZR 4, that take foldable technology in the other direction.

The Tech Can Get Bent Out of Shape

A lot of the problems with traditional smartphones have been worked out. Their screens are durable, they have tolerable battery life, and they're relatively easy for people to use. But foldable phones will set us back a bit. They have larger screens that require more battery power, they're made of materials that aren't very durable, and they will work differently from the average smartphone. The biggest complaint that you'll hear about these phones is probably going to be their plastic screens. No, they won't shatter like glass, and companies like Royole have gone out of their way to wave around slogans like "say goodbye to broken screens," but that idea is a bit misleading. Remember how iPods had plastic screens that would get scratched and scuffed in your pocket? Yeah, foldable phones are going to have the same problem. And since these phones are foldable, you're not going to have a lot of luck finding a screen protector.

But the screen isn't the only fragile part of a foldable phone. Manufacturers are going to have to stray away from hard

metal or plastic phone cases in favor of materials that can handle being bent hundreds of times a day. The hinges on these foldable phones are going to be serious weak points (they were on flip phones too) because they'll mostly be made from plastic and light metals. The OLED displays on these devices will also be an issue because OLED's can suffer burn-in over time (like a TV), and the organic material that they're made from is very vulnerable to moisture. Battery life, software compatibility, circuitry, and ease-of-use will also be hurdles for these phones. But some people may not be too worried about these smaller issues, and they'll be resolved long before foldable phones reach a consumer-friendly price. If you happen to get your hands on a foldable phone in 2019, then you're going to be shelling out a lot of money for a device that's fragile, clunky, dim, and power-hungry. Remember how wonky the 1st generation iPad was? Yeah, it'll be a little bit like that. But competition promotes technological progress, and these foldable devices (if they become popular) should become comfortable and durable in less than a decade.

You'll Have A Foldable Phone…Eventually

As of this very moment, the only foldable phone that you can buy is the Royole FlexPai, and it costs $1,318. A lot of companies seem to be pushing their flexible phones to the market as fast as possible (alongside 5G), and some companies will set release dates at MWC 2019 on February 25th. It's safe to assume that that the Samsung Galaxy F will come out this year, but we'll know for sure when Samsung holds a press release on February 20th.

Judging by the FlexPai's $1,318 price tag, you aren't going to find any budget foldable phones in 2019. And frankly, the FlexPai doesn't look like a super high-quality device. Videos from CES 2019 show that the FlexPai's screen doesn't fit flush to its body, its plastic-y case doesn't fold flat, and its Water OS awkwardly flips and stutters when the device opens and closes. There's a good chance that a high-quality, flexible phone from a popular manufacturer will run for more than $2000. We may expect these foldable phones from every mobile brand by the end of this year.

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Artificial Intelligence[5]

The modern definition of artificial intelligence (or AI) is "the study and design of intelligent agents" where an intelligent agent is a system that perceives its environment and takes actions which maximizes its chances of success. John McCarthy, who coined the term in 1956, defines it as "the science and engineering of making intelligent machines."

Other names for the field have been proposed, such as computational intelligence, synthetic intelligence or computational rationality. The term artificial intelligence is also used to describe a property of machines or programs: the intelligence that the system demonstrates. AI research uses tools and insights from many fields, including computer science, psychology, philosophy, neuroscience, cognitive science, linguistics, operations research, economics, control theory, probability, optimization and logic.AI research also overlaps with tasks such as robotics, control systems, scheduling, data mining, logistics, speech recognition, facial recognition and many others. Computational intelligence Computational intelligence involves iterative development or learning (e.g., parameter tuning in connectionist systems).Learning is based on empirical data and is associated with non-symbolic AI, scruffy AI and soft computing. Subjects in computational intelligence as defined by IEEE Computational Intelligence Society mainly include: Neural networks: trainable systems with very strong pattern recognition capabilities. Fuzzy systems: techniques for reasoning under uncertainty, have been widely used in modern industrial and consumer product control systems; capable of working with concepts such as 'hot', 'cold', 'warm' and 'boiling'. Evolutionary computation: applies biologically inspired concepts such as populations, mutation and survival of the fittest to generate increasingly better solutions to the problem. These methods most notably divide into evolutionary algorithms (e.g., genetic algorithms) and swarm intelligence (e.g., ant algorithms). With hybrid intelligent systems, attempts are made to combine these two groups. Expert inference rules can be generated through neural network or production rules from statistical learning such as in ACT-R or CLARION. It is thought that the human brain uses multiple techniques to both formulate and cross-check results. Thus, systems integration is seen as promising and perhaps necessary for true AI, especially the integration of symbolic and connectionist models.

Article by:
Goriparthi VVS Nagaraju
II ECE B, 188T1A0477

THE MAGIC IN LIFE

To understand life is to understand the law of nature ,the great cause behind the situations and sometimes the causes are unbelievable and we find no logic in them, here comes the thought of magic. we call it magic for the things we cant believe how this could happen ,but somehow it happens. Magic is mostly adorable by children and that little hearts and minds actually dont know what logic is .It is important to remember that we all have magic in us.

"Be the seeker and maker of everyday magic".

For some people it doesn't make sense they argue there is no magic everything is conceptual, reasonable. science is the magic that works. Those who do not believe in magic will never find it. Few people dance in the trance of magic and their lives always fill with joy and the curiosity. They feel that they are made of stardust and magical things and they wish to come their dreams true. you can't tame the spirit of someone who has magic in their veins.I think we must keep that little place where the magic grows inside of you alive.it is all around, you just need to believe.

"Do the universe a favour, don't hide your magic".

The magic in life is hidden in the emotions ,relations, dreams and experiences people share! humans are kind of strange,infact the starngest ,and that is what keeps the magic alive.when we are happy ,we move to the rythm of sounds and call it dancing.we are in need of energy,we gulp down tiny portions of edible components and call it food.when its night,we look at the sky to see the same stars yet wonder about very different things.we get butterflies in our stomach and skip a heartbeat on seeing that special someone,we call it love. we generate various forms of energy within and call them emotions;someseak love, others spread love! and sometimes tiny drops of sparkling water comes out of our eyes and stroll down our cheeks and we call them tears.In the end,we are all dreamers hoping that those dream catchers.Actually those fancy dreams and wishes hiding in our little hearts.

"Throw the wishes into the night and wait for the stars to catch them".

you are a child of the universe and they say the universe works in mysterious ways.And about you my darling there is such a marvellous magical mysterious way.quit hiding your magic the world is ready for you.just look up and get lost.open your eyes to the beauty that lives in the world all around you.listen carefully to the joy and peace that comes with the sound that surrounds you each day.embrace the diverse sensations that you can feel with the variety of different textures in this world,stop to smell the roses or for that matter ,to smell anything with a rich wonderful,aroma.Taste the delightfulness that this world has to offer with a variety of different foods.pay attention to the magic and the miracles that occur in even the most ordinary lives.create some miacles of your own in order the bring the magic of this world more closely into your heart.The universe is full of magical things.patiently waiting for our senses to grow sharper.

"Magic is something you make ,trust the magic of new beginnings".

By
Namratha.K
Roll No:178T1A0449

AMAZON FOREST FIRE

Why is the Amazon burning?

An unprecedented number of fires have raged throughout Brazil in 2019, intensifying in August. There have been more than 80,000 fires so far this year, the most ever recorded by the country's National Institute for Space Research (INPE). It's a nearly 80 percent jump compared to the number of fires the country experienced over the same time period in 2018. More than half of those fires are taking place in the Amazon.

Experts. say deforestation and a practice called slash-and-burn are to blame for most of the flames. People cut down patches of forest, allow the area to dry out, then set the remains ablaze to make room for agriculture or other development. They might also set fires to replenish the soil and encourage the growth of pastures for cattle.

Deforestation in the Brazilian Amazon rainforest, August 2019

"The Amazon was buying you some time that it is not going to buy anymore".

Why is this a big deal?

Everyone on the planet benefits from the health of the Amazon. As its trees take in carbon dioxide and release oxygen, the Amazon plays a huge role in pulling planet-warming greenhouse gases out of the atmosphere. Without it, climate change speeds up. But as the world's largest rainforest is eaten away by logging, mining, and agribusiness, it may not be able to provide the same buffer

"LETTING THE FOX TAKE OVER THE CHICKEN COOP"

How are the fires being fought?

After weeks of international and internal pressure, Bolsonaro deployed the military to help battle the fires on August 24, sending 44,000 troops to six states. Reuters repond the next day that warplanes were dousing flames.

It's a complex operation. We have a lot of challenges," Paulo Barroso tells *The Verge*.Barroso is the chairman of the national forest fire management committee of the National League of Military Firefighters Corps in Brazil. He has spent three decades fighting fires in Mato Grosso, one of the regions most affected by the ongoing fires. According to Barroso, more than 10,400 firefighters are spread thin across 5.5 million square kilometersin the Amazon and "hotspots" break out in the locations they're unable to cover.

"WE DON'T HAVE AN ADEQUATE STRUCTURE TO PREVENT, TO CONTROL, AND TO FIGHT THE FOREST FIRES"

Barroso contends that they need more equipment and infrastructure to adequately battle the flames. There are 778 municipalities throughout the Amazon, but according to Barroso, only 110 of those have fire departments. "We don't have an adequate structure to prevent, to control, and to fight the forest fires," Barroso says. He wants to establish a forest fire protection system in the Amazon that brings together government entities, indigenous peoples, local communities, the military, large companies, NGOs, and education and research centers. "We have to integrate everybody," Barroso says, adding, "we need money to do this, we have to receive a great investment." Barlow says, "The best fire fighting technique in the Amazon is to prevent them in the first place — by controlling deforestation and managing agricultural activities."

What on Earth do we do about any of this?

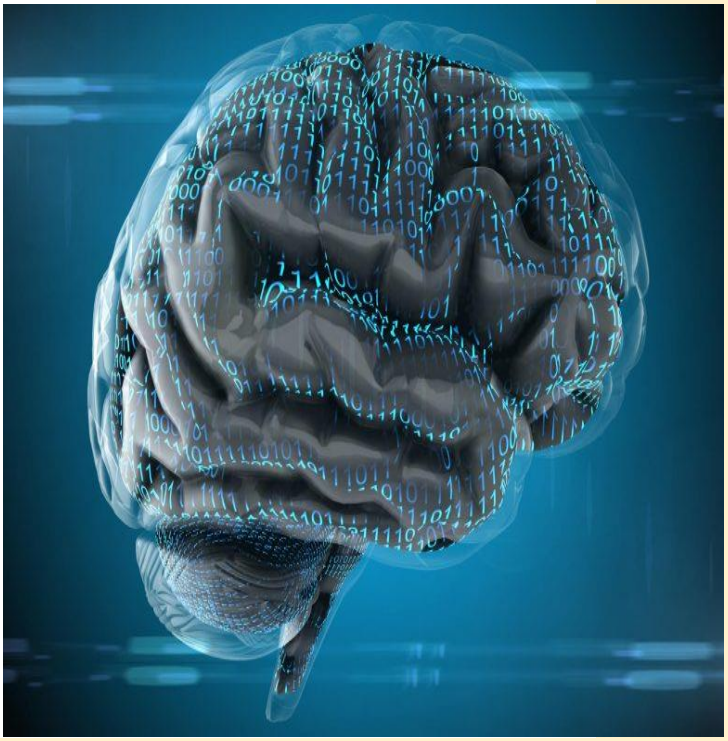
We can still save the Amazon. But it's going to take action on a large scale, and at multiple levels.

According to media reports, countries were in discussions about applying international pressure on the Brazilian government to take action. French President Emmanuel Macron tweeted about the fires, stating that protection of the Amazon needs to be a primary discussion at the upcoming G7 summit.

Other countries in the Amazon basin are already taking action to protect the forests, from establishing more protected areas to helping implement a market for carbon credits that helps keep forests standing.

ByG.Rishitha.
188T1A0415. II ECE A.

How Does Your Brain Make Everyday Decisions?



Hot coffee or cold brew? Pizza or pasta for dinner? These are the decisions that guide our everyday lives. What computations do our brains make when weighing these choices?

At Columbia's Zuckerman Institute, Akram Bakkour, Ph.D., a postdoctoral research scientist in the Shohamy lab, investigates the ways in which our brain incorporates our memories and past experiences into the everyday decision-making process. He and his Zuckerman Institute collaborators, including Principal Investigators Daphna Shohamy, Ph.D., and Michael Shadlen, MD, Ph.D., recently found that the hippocampus, the brain's memory center, plays a central role in this deliberation process.

Article by:
K.Meghana, Roll No:178T1A0452

To See the Invisible – Scientific Astonishment and Two-Photon Vision

It started with scientific astonishment. Why is there a green glow when looking at an infrared emitting device? "Such a strange phenomenon was observed by my colleagues when they installed an imaging device at the Nicolaus Copernicus University in Toruń," says Prof. Wojtkowski. "They came to me sharing this interesting observation that although they use infrared, which should no longer be visible, they still see something; such a weak, greenish light. And why did they look into the assembled device? "Well," laughs the professor, "such human nature and curiosity. Every time you assemble something, you look inside. It's true that it's always risky to look in such device, because the infrared source is the laser, but it's safe to do so while maintaining the laser's power in accordance with the standards."

The scientists' first thought was that the laser was broken and, in addition to infrared (light wavelength similar to that used in old TV remote controls) generated green light. So they dismantled the laser and meticulously checked what could have broken down. They found nothing. Then someone came up with the simple but ingenious idea to put a filter in front of the eye of the observer, which would cut off visible light. They found the correct filters, put them between the laser and the eye and … to their surprise the effect remained. "Our jaws dropped a little because that meant that the device was fine, but something strange was happening in the eye," says the professor. "Fortunately, there was another, very good laser at hand that generated ultra-short pulses of light and could be used to adjust the wavelength, of course in the infrared range. We started to change this length and it turned out that each one evoked a different color effect in the eye — we could perceive various colors! What's more, not weakly, but very clearly." As it happens with such discoveries, it turned out that people had observed it before, but nobody had any idea how to explain it, or they couldn't interpret it correctly.

This unexpected color vision turned out to be two-photon vision. "Luckily, at that time we were being visited by Professor Krzysztof Palczewski, who is a biochemist working in the USA and dealing with vision processes," recalls Professor Wojtkowski. "He was very interested in our discovery. So much so, that he organized a group of experts in various fields (including our team) to explain the mechanism of this vision. Tests were performed on mice, including genetically modified ones. Kasia Komar and Patryk Stremplewski from my team carried out tests on people, because our main expertise is in measurements on living eyes," explains the professor. "After collecting all the results, it turned out that we were dealing with two-photon vision." This involves the retina receiving a portion of energy half as low as the minimum required for the reaction of photosensitive cells, but very concentrated in time and space; and if the impulse is delivered, then the subject, e.g. a human, sees it as if it were twice as high. It's a bit like throwing small plasticine balls onto a board twice, in the same place and time. The imprint of both balls merges on the board into a larger, visible one. You can also imagine being hit on the head with these sorts of balls. We wouldn't feel any one of them singly, but a double portion could give us a bruise. This is what happens in the quantum world, the condition being that you have to throw these balls close enough to themselves and appropriately close to one another in time — so that they basically stick together into larger blobs. Physicists call this the optical non-linear effect. Such effects are known for many materials, but it is not obvious that they can occur

in doses that are safe, e.g. for the eye. “Until we’d dealt with this ourselves, I myself had thought that two-photon absorption in the eye could occur only once (in principle, once in one eye, once in the fellow eye),” laughs the professor, “After which it wouldn’t be possible to see anything. Fortunately, I was wrong.”

On the other hand, in the eye there are a lot of intermediaries between what absorbs photon energy (i.e. retinal cells) and what introduces the image in our brain. Photon absorption in itself does not guarantee that we see something. A number of proteins must react. However, it turns out that this process called phototransduction does take place.

And what can it be useful for? For instance, to check if the eye breaks down. With age or at the outset of a disease, say, macular degeneration (AMD), the effect is poorer. Hence the idea for a new generation of machines for microperimetry, i.e. checking whether we see and what we see at various points on the retina. Researchers thought that perhaps thanks to the two-photon effect, the sensitivity of such devices could be improved, or the threshold of infrared light could be measured. “Thanks to AM2M — a company that is a spinout from the Nicolaus Copernicus University in Toruń, we have already started to produce new microperimetry machines,” the professor says with pride. “There are three in the world right now, and the fourth and fifth and sixth in our country.

What speaks in favor of the new discovery and the devices based on it is also that with age, the human eye becomes more and more turbid and disperses light waves more. Meanwhile, the principle of physics says that the longer the wave, the less it disperses. Infrared will therefore allow for a more thorough examination of the fundus also in people with advanced cataracts or vitreous floaters. Scientists hope that thanks to their device we will detect functional retinal changes, mainly AMD earlier on, but also better understand the process of vision. Indeed, these are the goals of the new MAB (International Research Agenda) working to improve the eyesight of older people.

“As part of our MAB we will try to objectify this process, i.e. move from a little subjective perimetry to objective ophthalmoscopy,” the professor advances to the future, “Using holographic optical tomography. We will analyze functional signals on a principle similar as in tympanometry. This will allow us to determine whether the patient sees and what he sees, without feedback from him, even when he is unconscious or unable to communicate, e.g. after a stroke.”

Article by:
K.Namratha, Roll No:178T1A0449

NASA's MAVEN spacecraft detects mysterious dust cloud on Mars

Atmosphere and Volatile Evolution (MAVEN) mission is seen in this undated artist's concept released September 22, 2014. Reuters NASA's Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft has observed mysterious high-altitude dust cloud and aurora that reaches deep into the Martian atmosphere. The presence of the dust at orbital altitudes from 150 km to 300 km above the surface was not predicted earlier. Although the source and composition of the dust are unknown, there is no hazard to MAVEN and other spacecraft orbiting Mars. So far, no indication of its presence has been seen in observations from any of the other MAVEN instruments. Possible sources for the observed dust include dust wafted up from the atmosphere; dust coming from Phobos and Deimos, the two moons of Mars; dust moving in the solar wind away from the sun; or debris orbiting the sun from comets. However, no known process on Mars can explain the appearance of dust in the observed locations from any of these sources.

Earlier, MAVEN's Imaging Ultraviolet Spectrograph (IUVS) observed what scientists have named "Christmas lights". "What is especially surprising about the aurora we saw is how deep in the atmosphere it occurs - much deeper than at Earth or elsewhere on Mars," added Arnaud Stiepen from the University of Colorado. The source of the energetic particles appears to be the sun. Billions of years ago, Mars lost a global

protective magnetic field like Earth has, so solar particles can directly strike the atmosphere. The electrons producing the aurora have about 100 times more energy than you get from a spark of house current, so they can penetrate deeply in the atmosphere. The findings were presented at the 46th Lunar and Planetary Science Conference in the Woodlands, Texas recently.

Article by:
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Gravity Jet Suit

Richard Browning is a British inventor, entrepreneur and speaker. He founded Gravity Industries Ltd in March 2017, the company behind the Daedalus Mark 1, a jet pack that uses several miniature jet engines to achieve vertical flight. The kerosene engines are rated at 22 kg of thrust each. Browning uses his arms to control the direction and speed of the flight, whilst being shown fuel consumption among other usage data within the head-up display he wears inside the helmet. He achieved a speed of 32.02 miles per hour (51.53 km/h) with the suit during a Guinness World Records attempt for 'Fastest speed in a body controlled jet engine powered suit'.

The Jet suit is of

- Power: 1050 bhp
- Turbines:5
- RPM: 120,000
- Fuel: Jet A1 or Diesel
- Dry weight: 27kg
- Flight time: 5-10 minutes
- Current speed record: 32mph
- Altitude limit: 12,000ft.
- The Gravity Jet Suit has over 1,000 bhp and can reach altitude of 12,000 feet.

- The suit weighs 27 kg without fuel and is powered by five mini jet engines.
- Nine suits are being made available to buy and can be purchased from Selfridges, London for £340,000 ($443,000)
- There are two mini engines on each arm and one on the back allowing you to control your movement just by moving your hands. The fuel is also stored in the backpack and the suit has 1050 bhp in total. The suit took months to develop and many of the parts are 3D printed.
- The estimated Net Worth of Scot Richard Browning is at least $7.09 Million dollars as of 20 December 2018.
- The Martin Jetpack will cost anywhere between $150,000 and $250,000, excluding the cost of premium gas as well as any costs associated with getting a sports license in the U.S., and purchasing the necessary flying equipment.

Working:

A g-suit is an anti-gravity garment worn by fighter pilots. When they are pulling positive G's, the suit inflates and prevents blood from pooling in their feet and legs which would cause them to lose consciousness. NASA astronauts also wear g-suits when they experience Orthostatic Intolerance (OI).

Made off:

The suit weighs on average 6.5 kilograms (14 lb) in total, and its fabric is made out of a special mix of Twaron and Nomex. The counter pressure effect occurs instantaneously without any time delay versus an up to two second delay before reaching full system protection in standard pneumatic, inflatable g-suits.

Article by
G.Rishitha, 188T1A0415, 2nd ECE.

ANDRIOD ROBO

Sophia is a robot with the image of a middle-aged woman, who is actually only two and a half years old. Sophia is a robot with an attractive female face, built so far only to its

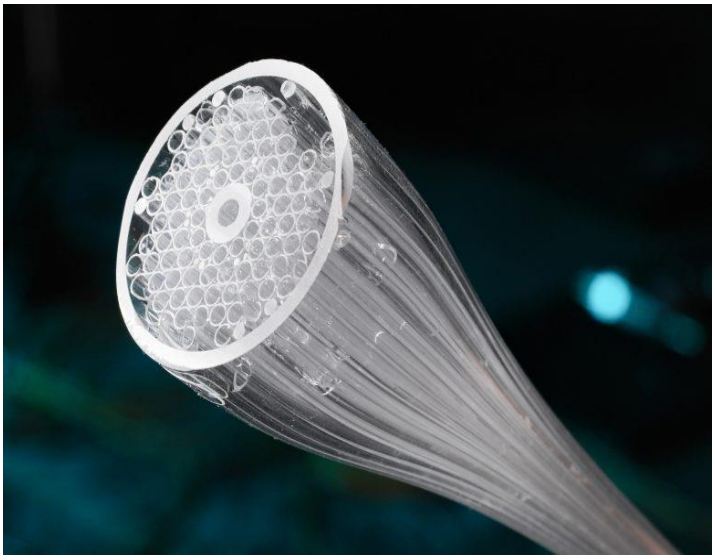
waist. Her eyes are cameras with the ability to recognize faces she has seen before. Her skin is made of a special variety of silicone, which is flexible enough to perform 62 facial expressions she has an electronic synthetic voice system that allows her to speak and gesticulate as she makes her speech.

It is a humanoid machine developed in Hong Kong by the American company Hanson Robotics, and activated from April 19, 2015. The British actress Audrey Hepburn has served as a model to design the face of Sophia, who still lacks lower extremities, which are in the process of being built. The making of Sophia is described and commented, a new humanoid robot that stands out for having been built with the latest advances in Artificial Intelligence (AI) that allow it, for example, to learn and gain experience from its interaction with human beings. Also, its appearance and wide repertoire of facial gestures that it has, significantly brings it closer to the human pattern. The great advances that are currently being achieved in the field of Artificial Intelligence (AI), are really surprising. The fact that a machine manages to learn from experience, accumulates knowledge, and finally makes intelligent decisions according to the circumstances, already speaks of a rudimentary consciousness, or at least of an incipient ability to make judgments and act accordingly.

Its presence has gained notoriety for her presentations in at least a couple of United Nations events and also for having received Saudi citizenship, being the first robot in the world to hold that status. Sophia's particular technological qualities have begun to generate repercussions of various kinds, not only in the academic scientific world, but also ethically, artistically, religiously, morally, politically and economically. From the above, it can be affirmed that Sophia has marked the beginning of a new era, not only robotic but also technological in general, which now allows to see with greater certainty the real emergence of a successor of the human species.

Article by
M.Shiv Sharadh, 178T1A0463, 3rd ECE.

Using Air to Amplify Light in Hollow-Core Optical Fibers



The idea had been going around my head for about 15 years, but I never had the time or the resources to do anything about it." But now Luc Thévenaz, the head of the Fiber Optics Group in EPFL's School of Engineering, has finally made it happen: his lab has developed a technology to amplify light inside the latest hollow-core optical fibers.

Squaring the circle

Today's optical fibers usually have a solid glass core, so there's no air inside. Light can travel along the fibers but loses half of its intensity after 15 kilometers. It keeps weakening until it can hardly be detected at 300 kilometers. So to keep the light moving, it has to be amplified at regular intervals.

Thévenaz's approach is based on new hollow-core optical fibers that are filled with either air or gas. "The air means there's less attenuation, so the light can travel over a longer distance. That's a real advantage," says the professor. But in a thin substance like air, the light is harder to amplify. "That's the crux of the problem: light travels faster when there's less resistance, but at the same time it's harder to act on. Luckily, our discovery has squared that circle."

From infrared to ultraviolet

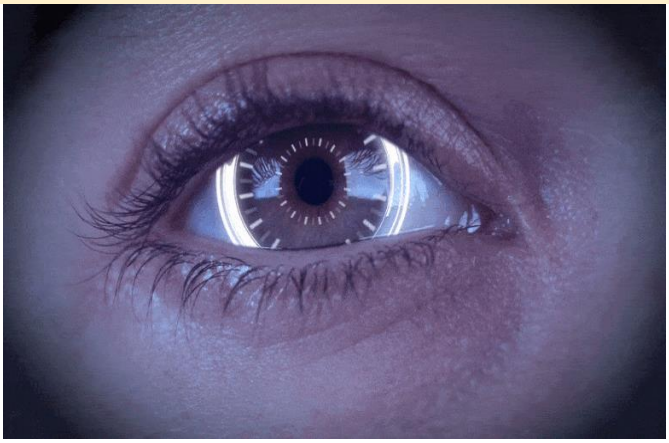
So what did the researchers do? "We just added pressure to the air in the fiber to give us some controlled resistance," explains Fan Yang, postdoctoral student. "It works in a similar way to optical tweezers — the air molecules are compressed and form into regularly spaced clusters. This creates a sound wave that increases in amplitude and effectively diffracts the light from a powerful source towards the weakened beam so that it is amplified up to 100,000 times." Their technique therefore makes the light considerably more powerful. "Our technology can be applied to any type of light, from infrared to ultraviolet, and to any gas," he explains. Their findings have just been published in *Nature Photonics*.

An extremely accurate thermometer

Going forward, the technology could serve other purposes in addition to light amplification. Hollow-core or compressed-gas optical fibers could, for instance, be used to make extremely accurate thermometers. "We'll be able to measure temperature distribution at any point along the fiber. So if a fire starts along a tunnel, we'll know exactly where it began based on the increased temperature at a given point," says Flavien Gyger, PhD student. The technology could also be used to create a temporary optical memory by stopping the light in the fiber for a microsecond — that's ten times longer than is currently possible.

Article by
V. Pravallika Devi (168T1A04A7)
IV-ECE-B

Technology Could Enable Merger of Humans and AI

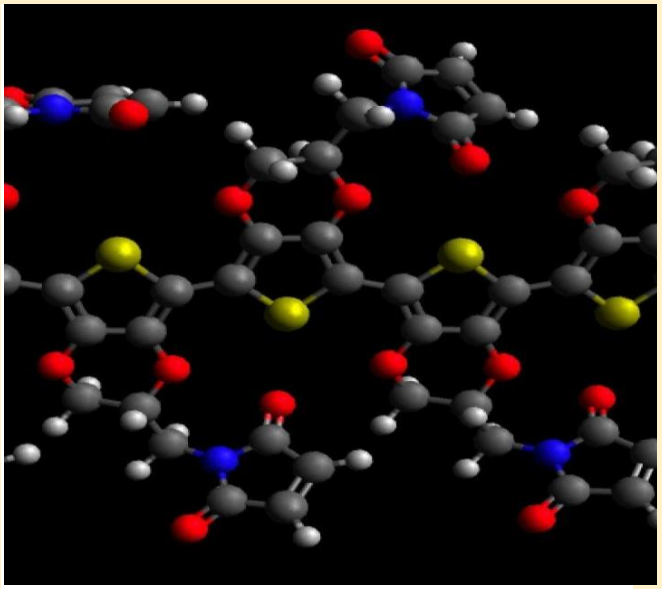


Although true "cyborgs" — part human, part robotic beings — are science fiction, researchers are taking steps toward integrating electronics with the body. Such devices could monitor for tumor development or stand in for damaged tissues. But connecting electronics directly to human tissues in the body is a huge challenge. Now, a team is reporting new coatings for components that could help them more easily fit into this environment.

The researchers will present their results today (Agusut 17, 2020) at the American Chemical Society (ACS) Fall 2020 Virtual Meeting & Expo. ACS is holding the meeting through Thursday. It features more than 6,000 presentations on a wide range of science topics. "We got the idea for this project because we were trying to interface rigid, inorganic microelectrodes with the brain, but brains are made out of organic, salty, live materials," says David Martin, Ph.D., who led the study. "It wasn't working well, so we thought there must be a better way."

Traditional microelectronic materials, such as silicon, gold, stainless steel and iridium, cause scarring when implanted. For applications in muscle or brain tissue, electrical signals need to flow for them to operate properly, but scars interrupt this activity. The researchers reasoned that a coating could help.

New "Cyborg"



Molecular model of PEDOT with maleimide; carbon atoms are grey, oxygens red, nitrogens blue, sulfurs yellow and hydrogens white

“We started looking at organic electronic materials like conjugated polymers that were being used in non-biological devices,” says Martin, who is at the University of Delaware. “We found a chemically stable example that was sold commercially as an antistatic coating for electronic displays.” After testing, the researchers found that the polymer had the properties necessary for interfacing hardware and human tissue.

“These conjugated polymers are electrically active, but they are also ionically active,” Martin says. “Counter ions give them the charge they need so when they are in operation, both electrons and ions are moving around.” The polymer, known as poly(3,4-ethylenedioxythiophene) or PEDOT, dramatically improved the performance of medical implants by lowering their impedance two to three orders of magnitude, thus increasing signal quality and battery lifetime in patients. Martin has since determined how to specialize the polymer, putting different functional groups on PEDOT. Adding a carboxylic acid, aldehyde or maleimide substituent to the ethylenedioxythiophene (EDOT) monomer gives the researchers the versatility to create polymers with a variety of functions.

“The maleimide is particularly powerful because we can do click chemistry substitutions to make functionalized polymers and biopolymers,” Martin says. Mixing unsubstituted monomer with the maleimide-substituted version results in a material with many locations where the team can attach peptides, antibodies or DNA. “Name your favorite biomolecule, and you can in principle make a PEDOT film that has whatever biofunctional group you might be interested in,” he says.

Most recently, Martin’s group created a PEDOT film with an antibody for vascular endothelial growth factor (VEGF) attached. VEGF stimulates blood vessel growth after injury, and tumors hijack this protein to increase their blood supply. The polymer that the team developed could act as a sensor to detect overexpression of VEGF and thus early stages of disease, among other potential applications.

Other functionalized polymers have neurotransmitters on them, and these films could help sense or treat brain or nervous system disorders. So far, the team has made a polymer with dopamine, which plays a role in addictive behaviors, as well as dopamine-functionalized variants of the EDOT monomer. Martin says these biological-synthetic hybrid materials might someday be useful in merging artificial intelligence with the human brain.

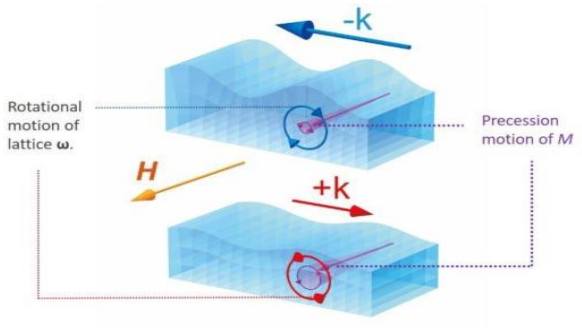
Ultimately, Martin says, his dream is to be able to tailor how these materials deposit on a surface and then to put them in tissue in a living organism. “The ability to do the polymerization in a controlled way inside a living organism would be fascinating.”

Article by
S.Maneesha (178T1A04A2)
III-ECE-B

Scientists Design “Acoustic Diode” – Device Would Allow Sound Waves to Propagate in Only One Direction

In research published in *Science Advances*, a group led by scientists from the RIKEN Center for Emergent Matter Science (CEMS) have used a principle, “magneto-rotation coupling,” to suppress the transmission of sound waves on the surface of a film in one direction while allowing them to travel in the other. This could lead to the development of “acoustic rectifiers”—devices that allow waves to propagate preferentially in one direction, with potential applications in communications technology.

Devices known as “rectifiers,” are extremely important for our technological civilization. The best known are electronic diodes, which are used to convert AC into DC electricity, essentially making electrification possible.

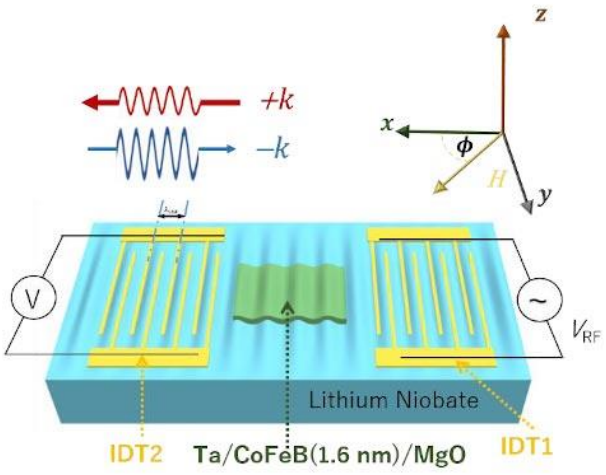


Schematics of the magneto-rotation coupling

In the current study, the group examined the movement of acoustic surface waves—movements of sound like the propagation of earthquakes over the surface of the earth—in a magnetic film. It is known that there is a interplay between the surface acoustic waves and “spin waves”—disturbances in magnetic fields within the material that can move through the material.

Acoustic surface waves can excite spin waves in two different ways. One, magneto-elastic coupling, is very well documented. However, a second, magneto-rotation coupling, was proposed more than forty years ago by Sadamichi Maekawa, one of the authors of the current study, but was not experimentally verified until now.

In the current study, the authors found that the two mechanisms occur at the same time but under different intensities. They found that when the magnetization of the magnetic specimen is rotating in the same direction of the surface acoustic waves, the energy of the acoustic surface waves is more efficiently transferred to the spin waves, increasing the rotation of the magnetization. In fact, the researchers were able to identify a configuration of unidirectional coupling where only the energy of surface acoustic waves in one direction could be transferred to the rotation of the magnetization. They also noticed that this “rectification” effect was more pronounced when the magnetic material contained magnetic anisotropy, meaning there was a preferred direction of internal magnetization even before the application of an external magnetic field.



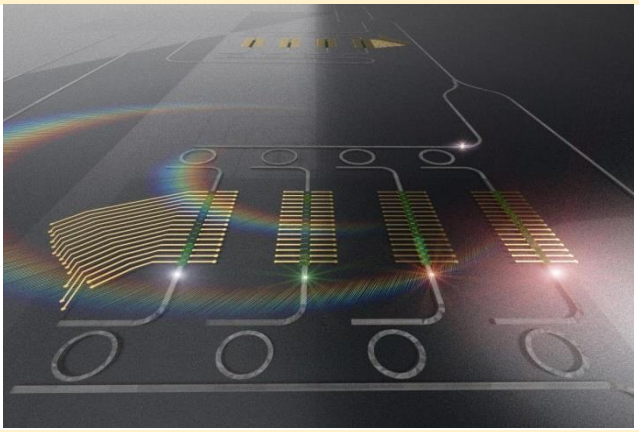
Nonreciprocal propagation of acousto-magnetic waves in Ta/CoFeB/MgO.

According to Mingran Xu of RIKEN CEMS, the first author of the paper, “It was very exciting to show that the phenomenon of magneto-rotation coupling actually takes place, and that it can be used to completely suppress the movement of acoustic energy in one direction.”

Jorge Puebla, also of RIKEN CEMS, says, “We hope that we can use this work to create an “acoustic diode” equivalent to the electronic diodes that are so important. We could relatively easily make a device where the acoustic energy is efficiently transfer in one direction but blocked in the other. This is happening at microwave frequencies, which is the range of interest for 5G communication technology, so surface acoustic waves may be an interesting candidate for this technology.”

Article by
Tirumalasetty Kavya Sri (198T5A0414)
II-ECE-B

Powerful Photon-Based Processing Units Enable Complex Artificial Intelligence



The photonic tensor core performs vector-matrix multiplications by utilizing the efficient interaction of light at different wavelengths with multistate photonic phase change memories.

Using photons to create more powerful and power-efficient processing units for more complex machine learning.

Machine learning performed by neural networks is a popular approach to developing artificial intelligence, as researchers aim to replicate brain functionalities for a variety of applications.

A paper in the journal *Applied Physics Reviews*, by AIP Publishing, proposes a new approach to perform computations required by a neural network, using light instead of electricity. In this approach, a photonic tensor core performs multiplications of matrices in parallel, improving speed and efficiency of current deep learning paradigms.

In machine learning, neural networks are trained to learn to perform unsupervised decision and classification on unseen data. Once a neural network is trained on data, it can produce an inference to recognize and classify objects and patterns and find a signature within the data.

The photonic TPU stores and processes data in parallel, featuring an electro-optical interconnect, which allows the optical memory to be efficiently read and written and the photonic TPU to interface with other architectures.

“We found that integrated photonic platforms that integrate efficient optical memory can obtain the same operations as a tensor processing unit, but they consume a fraction of the power and have higher throughput and, when opportunely trained, can be used for performing inference at the speed of light,” said Mario Miscuglio, one of the authors.

Most neural networks unravel multiple layers of interconnected neurons aiming to mimic the human brain. An efficient way to represent these networks is a composite function that multiplies matrices and vectors together. This representation allows the performance of parallel operations through architectures specialized in vectorized operations such as matrix multiplication.

However, the more intelligent the task and the higher accuracy of the prediction desired, the more complex the network becomes. Such networks demand larger amounts of data for computation and more power to process that data.

Current digital processors suitable for deep learning, such as graphics processing units or tensor processing units, are limited in performing more complex operations with greater accuracy by the power required to do so and by the slow transmission of electronic data between the processor and the memory.

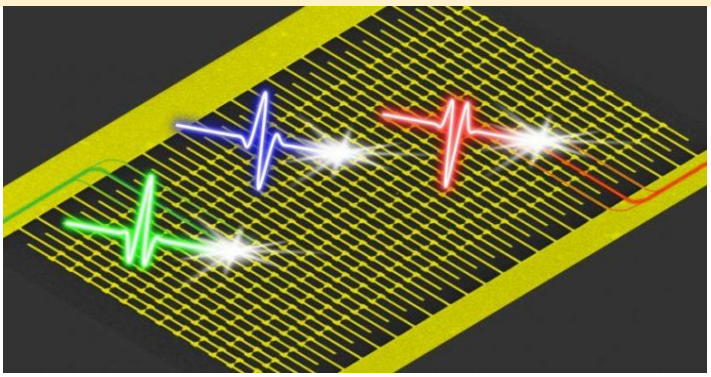
The researchers showed that the performance of their TPU could be 2-3 orders higher than an electrical TPU. Photons may also be an ideal match for computing node-distributed networks and engines performing intelligent tasks with high throughput at the edge of a networks, such as 5G. At network edges, data signals may already exist in the form of photons from surveillance cameras, optical sensors and other sources.

“Photonic specialized processors can save a tremendous amount of energy, improve response time and reduce data center traffic,” said Miscuglio.

For the end user, that means data is processed much faster, because a large portion of the data is preprocessed, meaning only a portion of the data needs to be sent to the cloud or data center.

Article by
Kondapaturu Meghana (178T1A0452)
III-ECE-A

MIT Develops Integrated Lightwave Electronic Circuits



Pseudo-color scanning electron micrograph of the integrated lightwave electronic circuit. Incident ultrafast light waves induce photocurrents in the circuit that encode information about the shape and absolute phase of the light wave.

MIT researchers develop integrated lightwave electronic circuits to detect the phase of ultrafast optical fields.

Light waves oscillate far faster than most sensors can respond. A solar cell, or the infrared photodetector used to receive the signal from the remote in your DVR, can only sense the total energy delivered by the light — it can't pick up the subtle details of the rapidly oscillating electric field the light consists of. Essentially all commercial light sensors suffer from this same problem: They act like a microphone that can tell that a crowd of people are yelling (or whispering), but can't make out any of the individual words.

However, over the past few years, scientists and engineers have been devising clever techniques to sense the light field itself, not just the total energy it delivers. This is difficult because the required timing precision is so short — just a few femtoseconds (a femtosecond is a millionth of a billionth of a second). As a result, the apparatus and expense required for these techniques is huge, and so this work has been limited to a few specialized research laboratories. What is needed to permit wider application of this capability is an approach that is compact, manufacturable, and easy to use.

In a recent publication in the journal *Nature Communications*, MIT Research Laboratory of Electronics postdoc Yujia Yang and his collaborators at MIT, the University of California at Davis, the Deutsches Elektronen-Synchrotron (DESY), and the University of Hamburg in Germany have demonstrated a microchip with nanometer-length-scale circuit elements that act like antennas to collect the electric field of light oscillating at nearly 1 quadrillion times per second. The chip is small, self-contained, and requires only inexpensive electronics for readout.

Their work has the potential to enable new applications in "lightwave electronics" for high-speed signal processing using the electric field waveforms of few-cycle optical pulses. "We see a wide range of new optical and electronic devices that could be based on this technology," says Karl Berggren, MIT professor of electrical engineering and co-author of the work. "For example, this technique could have future impact on applications such as determining the distance to remote astronomical objects, optical clocks critical to GPS technology, and chemical analysis of gases."

To demonstrate operation of the device, the researchers first generated optical pulses using a specialized laser system, designed to make light pulses consisting of just a few optical cycles. They shined the light onto a microchip on which they had fabricated hundreds of tiny antennas patterned out of an ultrathin gold film. To get a strong enough electrical signal, the antennas had to have small gaps between them, each gap only 10 billionths of a meter wide. When the light passed through these narrow gaps, it created huge electric fields that ripped electrons out of one antenna, pulled them through the air, and deposited them on the next antenna. While each antenna on its own contributed only a tiny electrical current, the total signal across the array was substantial, and could easily be measured.

Article by

Fazila Afreen(188T1A0414)

III-ECE-A

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY
GANGURU::VIJAYAWADA – 521 139
Training, Placement & Career guidance Cell
Department of Electronics & Communication Engineering
Academic Year : 2019 - 2020

List of Student Placements:

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
1	VALLABHANENI PRAVALLIKA DEVI	168T1A04A7	ECE	2020	970515658943	TCS	www.tcs.com	08.08.2019	13.09.2019	Assistant System Engineer-Trainee	3.37	OFF
2	VENUTURUMILLI NAGA VENKATA SAI ANURAG	168T1A04B7	ECE	2020	501153513146	TCS	www.tcs.com	08.08.2019	13.09.2019	Assistant System Engineer-Trainee	3.37	OFF
3	YALAMANCHI SAI SREEJA	168T1A04C0	ECE	2020	312451054467	TCS	www.tcs.com	08.08.2019	13.09.2019	Assistant System Engineer-Trainee	3.37	OFF
4	GUNJI CHAITANYA KUMAR	168T1A0435	ECE	2020	872931600451	TCS	www.tcs.com	08.08.2019	13.09.2019	Assistant System Engineer-Trainee	3.37	OFF
5	BODDU ANIRUDH	178T5A0403	ECE	2020	967925567819	TCS	www.tcs.com	08.08.2019	26.09.2019	Assistant System Engineer-Trainee	3.37	OFF
6	SEELAM VAMSI	168T1A0497	ECE	2020	268155283501	TCS	www.tcs.com	08.08.2019	30.09.2019	Assistant System Engineer	3.37	OFF

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
										Trainee		
7	SHAIK NAGURAFIL	168T1A04A0	ECE	2020	837385475536	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
8	SOLIUM LOHITHA	168T1A04A1	ECE	2020	324221941982	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
9	UPPALA VANAJA	168T1A04A5	ECE	2020	400346783959	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
10	VANGA AVINASH REDDY	168T1A04A9	ECE	2020	616127770755	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
11	VANKADARU NAGA PRATHYUSHA	168T1A04B1	ECE	2020	506789352899	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
12	NALLURI MAHITH KUMAR	168T1A04B6	ECE	2020	914037140915	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
13	AKULA ESWAR	168T1A0401	ECE	2020	910867322906	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
14	ALLA VENKATA GOPI HARI KRISHNA	168T1A0403	ECE	2020	352134910482	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
15	BATCHU SAI SIVAKUMAR	168T1A0408	ECE	2020	546335521464	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
16	BUSAM NAGA MAHESH	168T1A0415	ECE	2020	222350220696	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
17	CHIDIPOTHU	168T1A0	ECE	2020	67131299	SHELLPRO	www.shellprot	22.11.20	01.05.20	IT Help		

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
	SINDHUPRIYA	418			9604	TECHNOLOGIES	echnologies.com	19	20	Desk/IT Coordinator	1.4-2.2	ON
18	GANGISETTI MOUNIKA	168T1A0426	ECE	2020	237847727516	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
19	GARLAPATI VENKATA SAI REDDY	168T1A0427	ECE	2020	292987026837	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
20	GORIPARTHI SIVA SANKAR	168T1A0430	ECE	2020	446518934270	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
21	GUNJI CHAITANYA KUMAR	168T1A0435	ECE	2020	872931600451	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
22	KADIMI VENKATA SAI KUMAR	168T1A0441	ECE	2020	412482850752	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
23	KALAPALA RAJESH KHANNA	168T1A0444	ECE	2020	688437518320	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
24	KATAKAMSETTI DILEEP KUMAR	168T1A0449	ECE	2020	446646114237	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
25	KUNCHAM GOUTAMKUMAR	168T1A0460	ECE	2020	336227016463	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
26	KURRA MANI	168T1A0462	ECE	2020	952094321132	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
27	POLUKONDA NAGA BABU	168T1A0488	ECE	2020	689890473070	SHELLPRO TECHNOLO	www.shellprotechnologies.co	22.11.2019	01.05.2020	IT Help Desk/IT	1.4-	ON

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
						GIES	m			Coordinator	2.2	
28	SABBINENI CHANDANA	168T1A0493	ECE	2020	351700298235	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
29	PEDAMALLU BALARAM	178T5A0413	ECE	2020	661293895777	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
30	NELLI DURGA PRASAD	168T1A0478	ECE	2020	238622926802	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
31	ROLLA HARISH PAWAN	168T1A0492	ECE	2020	687663302723	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	22.11.2019	01.05.2020	IT Help Desk/IT Coordinator	1.4-2.2	ON
32	CHIDIPOTHU SINDHUPRIYA	168T1A0418	ECE	2020	671312999604	SNOVASYS	www.snovasys.com	23.11.2019	30.11.2019	Software Trainee Engineer	3.00	OFF
33	UPPALAPATI HANISHA	168T1A04A6	ECE	2020	270921120410	HCL COLLABERA	www.collabera.com	29.11.2019	05.12.2019	Desktop Support Engineer	2.22	OFF
34	VANKADARU NAGA PRATHYUSHA	168T1A04B1	ECE	2020	506789352899	HCL COLLABERA	www.collabera.com	29.11.2019	05.12.2019	Desktop Support Engineer	2.22	OFF
35	ASFIA SHIREEN	168T1A0405	ECE	2020	758040941125	HCL COLLAERA	www.collabera.com	29.11.2019	05.12.2019	Desktop Support Engineer	2.22	OFF
36	KASULA LALITHA DEVI	168T1A0448	ECE	2020	528212936665	HCL COLLABERA	www.collabera.com	29.11.2019	05.12.2019	Desktop Support Engineer	2.22	OFF
37	KOUSALYA ANDY	168T1A0459	ECE	2020	410098733069	HCL COLLABERA	www.collabera.com	29.11.2019	05.12.2019	Desktop Support Engineer	2.22	OFF
38	MADALA SWATHI	168T1A0465	ECE	2020	437443712271	HCL COLLABER	www.collabera.com	29.11.2019	05.12.2019	Desktop Support	2.22	OFF

S. No	Name of the Student	ID Card Number	Disciplin e	Year of passi ng	Aadhar Number	Name of the Employer	Website	Date of interv iew	Date of appoin tment letter/j ob offer	Designatio n	Pack age (in Lak hs)	ON/OFF Campus
						A				Engineer		
39	MADIVADA KRISHNA SRI PRIYANKA	168T1A0 466	ECE	2020	69513355 1393	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
40	MALLADI UHANJALI	168T1A0 468	ECE	2020	22719091 4617	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
41	MOHAMMED NADEEM	168T1A0 474	ECE	2020	34497841 0307	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
42	MUNAGALA JYOTHSNA SAI LAKSHMI	168T1A0 475	ECE	2020	31517593 9903	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
43	SHAHEDA SULTANA	168T1A0 498	ECE	2020	68480679 4165	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
44	PASUPULETI VARSHA RAMYASRI	168T1A 0483	ECE	2020	7178309 00792	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
45	VEERANKI PHANI	168T1A 04B3	ECE	2020	5643575 11350	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
46	VANKADARU ALEKHYA	168T1A 04B0	ECE	2020	7953955 12083	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
47	MAMILLAPALLI SNEHA	168T1A 0469	ECE	2020	4683884 09342	HCL COLLABER A	www.collabera .com	29.11.20 19	05.12.20 19	Desktop Support Engineer	2.22	OFF
48	P. VARSHA RAMYA SRI	168T1A0 483	ECE	2020	71783090 0792	RAAM GROUP	www.raamgro up.in	16.12.19 –	24.12.20 19	BUSINESS TRAINEE	2.40	ON

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
								17.12.19				
49	JONNALAGADDA RAVI TEJA	168T1A0439	ECE	2020	566662130569	RAAM GROUP	www.raamgroup.in	16.12.19 – 17.12.19	24.12.2019	BUSINESS TRAINEE	2.40	ON
50	KASANI RAMA KRISHNA	168T1A0447	ECE	2020	783995175222	RAAM GROUP	www.raamgroup.in	16.12.19 – 17.12.19	24.12.2019	BUSINESS TRAINEE	2.40	ON
51	PILLA BHAVANI	168T1A0486	ECE	2020	407020260450	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	-	31.01.2020	IT Help Desk Engineer /IT Coordinator	1.4 – 2.2	ON
52	PASUPULETI VARSHA RAMYASRI	168T1A0483	ECE	2020	717830900792	SHELLPRO TECHNOLOGIES	www.shellprotechnologies.com	-	31.01.2020	IT Help Desk Engineer /IT Coordinator	1.4 – 2.2	ON
53	YARA HARISH KUMAR	178T5A0419	ECE	2020	978045614397	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
54	SANIKOMMU SRI KRISHNA TEJA	168T1A0496	ECE	2020	365499530029	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
55	G. SIVA SANKAR	168T1A0430	ECE	2020	518413692112	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
56	BUSAM NAGA MAHESH	168T1A0415	ECE	2020	222350220696	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
57	ALLA VENKATA GOPI HARI KRISHNA	168T1A0403	ECE	2020	352134910482	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
58	KASANI RAMA KRISHNA	168T1A0447	ECE	2020	783995175222	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
59	PEDAMALLU BALARAM	178T5A0413	ECE	2020	661293895777	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
60	MOHAMMED GHOUSE MOHIDDIN	168T1A0473	ECE	2020	808202051722	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
61	NOOR	168T1A0	ECE	2020	33889057	Surya Tech	www.suryatec	25.11.20	20.12.20	Trainee	1.97	ON

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	MOHAMMAD	479			2030	Solutions	hsolutions.in	19	19	Engineer		
62	LAKSHMAN REDDY BADAM	168T1A0463	ECE	2020	404541870550	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
63	SHAIK KHAJI MALAN	168T1A0499	ECE	2020	998822002995	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
64	MOHAMMED NADEEM	168T1A0474	ECE	2020	344978410307	Surya Tech Solutions	www.suryatechsolutions.in	25.11.2019	20.12.2019	Trainee Engineer	1.97	ON
65	MALLADI UHANJALI	168T1A0468	ECE	2020	227190914617	Wipro Technologies	www.wipro.com	-	20.02.2020	Project Engineer	3.5	OFF
66	KOTHURU NAVYA SREE	168T1A0457	ECE	2020	287478479135	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
67	DITTAKAVI SIRISHA	168T1A0425	ECE	2020	793331165920	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
68	KANDRU HEMASRI	168T1A0445	ECE	2020	202113473248	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
69	KOMMURU RAJESH	168T1A0454	ECE	2020	679118493482	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
70	KAKARLA JAMIDA	168T1A0443	ECE	2020	301117738595	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
71	GUNTURU RAMYA SRI	168T1A0436	ECE	2020	961936610221	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
72	GUDALA BINDU PALLAVI	168T1A0432	ECE	2020	759534724129	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
73	KAKUMANU DEEPTHI	178T5A0405	ECE	2020	402253957365	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
74	GOPI PRAVALLIKA	178T5A0404	ECE	2020	844460146946	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
75	KONDAVEETI RAMYA KUMARI	168T1A0456	ECE	2020	489945889802	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
76	SHAIK KHAJI MALAN	168T1A0499	ECE	2020	998822002995	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
77	VELALA ANIL KUMAR	168T1A04B5	ECE	2020	465955856638	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
78	VISWANADHAPALLI SAI TEJA	168T1A04B8	ECE	2020	614507019154	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
79	SHAIK NAGURAFIL	168T1A04A0	ECE	2020	837385475536	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
80	NALLURI MAHITH KUMAR	168T1A0477	ECE	2020	812015031457	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
81	KUNDETI BALA VARA PRASAD	168T1A0461	ECE	2020	396209166901	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support Associate	1.4-1.8	OFF
82	MURALA VENKATA	168T1A0476	ECE	2020	486388908146	Tech Mahindra	www.techmahindra.com	29.02.2020	29.02.2020	Customer support	1.4-1.8	OFF

S. No	Name of the Student	ID Card Number	Discipline	Year of passing	Aadhar Number	Name of the Employer	Website	Date of interview	Date of appointment letter/job offer	Designation	Package (in Lakhs)	ON/OFF Campus
	MANIKANTA									Associate		
83	MADDALI AMARNADH	178T5A0407	ECE	2020	565476060129	Sunrise Lifts Pvt Ltd	www.sunriselifts.com	11.03.2020	11.03.2020	Elector Technician - Trainee	1.20	ON
84	ATLURI HARI BABU	168T1A0407	ECE	2020	637142471723	Sunrise Lifts Pvt Ltd	www.sunriselifts.com	11.03.2020	11.03.2020	Elector Technician - Trainee	1.20	ON
85	KONDAPALLI LOKESH	168T1A0455	ECE	2020	895873651366	Sunrise Lifts Pvt Ltd	www.sunriselifts.com	11.03.2020	11.03.2020	Elector Technician - Trainee	1.20	ON
86	HASAN ALI MIRZA	168T1A0437	ECE	2020	751049874242	Sunrise Lifts Pvt Ltd	www.sunriselifts.com	11.03.2020	11.03.2020	Marketing Executive	1.20	ON
87	DANDAMUDI KIRANMAI	168T1A0421	ECE	2020	674514255384	Sunrise Lifts Pvt Ltd	www.sunriselifts.com	11.03.2020	11.03.2020	Front Office Executive	1.20	ON
88	VALLABHANENI PRAVALLIKA DEVI	168T1A04A7	ECE	2020	970515658943	CTS PVT LTD	www.cognizant.com	-	29.06.2020	Programmer Analyst Trainee	4.5	OFF
89	GUNJI CHAITANYA KUMAR	168T1A0435	ECE	2020	872931600451	CTS PVT LTD	www.cognizant.com	-	29.06.2020	Programmer Analyst Trainee	4.5	OFF
90	MALLADI UHANJALI	168T1A0468	ECE	2020	227190914617	CTS PVT LTD	www.cognizant.com	-	29.06.2020	Programmer Analyst Trainee	4.5	OFF

FDPs Organized

Faculty Development Program (FDP) on ASIC and FPGA Design using Mentor Graphics EDA Tools by Siddartha B D Application Engineer-ISG

List of Faculty participated in FDP's

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
1	Nagaraju Neela	12-05-2020 to 17-05-2020	Advanced Antenna Design Using HFSS	Santhiram Engineering College,Nandyal
2	Nagaraju Neela	24-05-2020 to 29-05-2020	Artificial Intelligence	Chalapathi Institute of Technology and Brain O Vision Solutions India Pvt.Ltd
3	Nagaraju Neela	10-05-2020 to 15-05-2020	Online Teaching Etiquette and Best Practices	Santhiram Engineering College, Nandyal
4	Nagaraju Neela	20-05-2020 to 24-05-2020	Recent Trends in VLSI and Embedded Auto Industry	CMR Technical Campus, Hyderabad
5	Nagaraju Neela	20-05-2020 to 25-05-2020	Speech Processing Applications & Challenges	SANTHIRAM ENGINEERING COLLEGE, Nandyal
6	Mahalaxmi Rentapalli	29-05-2020 to 02-06-2020	Recent Trends and Future Applications in Electronics and	MLR Institute of Technology, Hyderabad.

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
			Communication Technologies	
7	Mahalaxmi Rentapalli	19-05-2020 to 23-05- 2020	RECENT COMMUNICATION TOOLS AND ITS APPLICATION	St. Martin's Engineering College, Dhulapally, Secunderabad.
8	Dr Pavithra Roy Patibandla	04-11-2019 to 16-11-2019	Technology Adoption and Implementation Towards a Smart Society	Velagapudi RamaKrishna Engineering College, Vijayawada, Andhra Pradesh
9	Mr. Veera Swamy	04-11-2019 to 16-11-2019	Technology Adoption and Implementation Towards a Smart Society	Velagapudi RamaKrishna Engineering College, Vijayawada, Andhra Pradesh
10	Dr G L Madhumati	11-05-2020 to 16-05-2020	Innovation to Academicians	Ramachandra College of Engineering
11	Dr G L Madhumati	18-05-2020 to 20-05-2020	National Level Faculty Development Program on Tools for Online Classroom Post Covid-19	P.B Siddhartha College of Arts & Science, Vijayawada
12	Dr G L Madhumati	25-05-2020 to 29-05-2020	Need For An IP-Equipped Ecosystem For the Future	IPCurate Labs and Swarnandhra College of Engineering & Technology
13	I Pavani Prapurna	19-05-2020 to 23-05-2020	Recent Communication Tools and Its Application	St. Martin's Engineering College, Dhulapally, Secunderbad
14	Krishna Reddy Papana	10-05-2020 to 15-05-2020	Online Teaching Etiquette and Best Practices	Santhiram Engineering College, Nandyal, Kurnool.
15	Krishna Reddy Papana	07-05-2020	Research Methodology - Methods & Best Practices	SANTHIRAM ENGINEERING COLLEGE, Nandyal
16	Krishna Reddy Papana	27-04-2020 to 1-05-2020	Design, Implementation and Verification in VLSI	Sandeepani School of Embedded System Design, Bangalore

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
17	Mr Sivannarayana	4-11-2019 to 15-11-2019	Mixed Signal Design	VVIT
18	Chandrasekhar Savalam	20-04-2020 to 23-04-2020	Data Science and Machine learning using python	KONERU LAKSHMAIAH EDUCATION FOUNDATION
19	Chandrasekhar Savalam	11-05-2020 to 16-05-2020	INNOVATION TO ACADEMICIANS	RAMACHANDRA COLLEGE OF ENGINEERING, ELURU
20	Mr.ChandraSekhar	17-04-2020	Developing FPGA-accelerated cloud applications with SDAccel: Practice	Online
21	Mr.ChandraSekhar	16-04-2020	Developing FPGA-accelerated cloud applications with SDAccel: Theory	Online
22	Mr.ChandraSekhar	08-05-2020	Electric Power Systems	Online
23	Mr.ChandraSekhar	16-04-2020	FPGA computing systems: Background knowledge and introductory materials	Online
24	Mr.ChandraSekhar	07-05-2020	Introduction to Communication Science	Online
25	Mr.ChandraSekhar	29-04-2020	Introduction to Programming with MATLAB	Online
26	Mr.ChandraSekhar	9-04-2020	Programming for Everybody (Getting Started with Python)	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
27	Mr.ChandraSekhar	15-05-2020	Sensors and Sensor Circuit Design	Online
28	Mr.ChandraSekhar	27-04-2020	VLSI CAD Part I: Logic	Online
29	Mr.ChandraSekhar	18-05-2020	VLSI CAD Part II: Layout	Online
30	Mr.ChandraSekhar	24-04-2020	Wireless Communications for Everybody	Online
31	Mr.ChandraSekhar	19-04-2020	AI For Everyone	Online
32	Mr.Chandra Sekhar Savalam	15-04-2020	Introduction to OpenCL on FPGAs	Online
33	Kodali Radha	24-04-2020	AI For Everyone	Online
34	Kodali Radha	01-05-2020	Introduction to Electronics	Online
35	Kodali Radha	30-05-2020	Introduction to the Internet of Things and Embedded Systems	Online
36	Mr.Nagaraju Neela	13-04-2020	AI For Everyone	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
37	Mr.Nagaraju Neela	12-05-2020	Digital Signal Processing	Online
38	Mr.Nagaraju Neela	16-04-2020	Introduction to OpenCL on FPGAs	Online
39	Mr.Nagaraju Neela	14-04-2020	Neural Networks and Deep Learning	Online
40	Mr.Nagaraju Neela	18-04-2020	Programming for Everybody (Getting Started with Python)	Online
41	Mr.Nagaraju Neela	12-05-2020	Sensors and Sensor Circuit Design	Online
42	Mr.Nagaraju Neela	24-04-2020	Stochastic processes	Online
43	Mr.Nagaraju Neela	25-04-2020	Wireless Communications for Everybody	Online
44	Y Naga Prasanthi	25-04-2020	AI For Everyone	Online
45	Y Naga Prasanthi	04-05-2020	Introduction to Electronics	Online
46	Y Naga Prasanthi	29-04-2020	Introduction to the Internet of Things and Embedded Systems	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
47	P Pavithra Roy	01-05-2020	AI For Everyone	Online
48	P Pavithra Roy	04-05-2020	Introduction to the Internet of Things and Embedded Systems	Online
49	P Pavithra Roy	04-05-2020	Wireless Communications for Everybody	Online
50	Mr.P Veera Swamy	15-04-2020	AI For Everyone	Online
51	Mr.P Veera Swamy	17-04-2020	Introduction to the Internet of Things and Embedded Systems	Online
52	Mr.P Veera Swamy	28-04-2020	Introduction to OpenCL on FPGAs	Online
53	Mr.P Veera Swamy	25-04-2020	Programming for Everybody (Getting Started with Python)	Online
54	Mr.P Veera Swamy	11-05-2020	Sensors and Sensor Circuit Design	Online
55	Mr.P Veera Swamy	25-04-2020	Wireless Communications for Everybody	Online
56	Mr.P Veera Swamy	28-04-2020	FPGA computing systems: Background knowledge and introductory materials	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
57	Mr.Venkateswara Rao Manikonda	26-04-2020	AI For Everyone	Online
58	Mr.Venkateswara Rao Manikonda	27-05-2020	Cloud Computing Basics (Cloud 101)	Online
59	Mr.Venkateswara Rao Manikonda	27-05-2020	Introduction to Electronics	Online
60	Mr.Venkateswara Rao Manikonda	14-05-2020	Sensors and Sensor Circuit Design	Online
61	Mr.Venkateswara Rao Manikonda	11-05-2020	Wireless Communications for Everybody	Online
62	I Pavani Prapurna	30-05-2020	Plastic Electronics	Online
63	Mr.A Sivanarayana	18-04-2020	AI For Everyone	Online
64	Mr.A Sivanarayana	24-04-2020	Introduction to the Internet of Things and Embedded Systems	Online
65	Mr.A Sivanarayana	27-04-2020	Wireless Communications for Everybody	Online
66	Mr.P Ramakrishna	31-05-2020	AI For Everyone	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
67	Mr.P Ramakrishna	31-05-2020	Sensors and Sensor Circuit Design	Online
68	R Mahalaxmi	02-05-2020	Introduction to Electronics	Online
69	R Mahalaxmi	25-04-2020	AI For Everyone	Online
70	R Mahalaxmi	20-05-2020	Plastic electronics	Online
71	Mr.Y Ramakrishna	04-05-2020	Wireless Communications for Everybody	Online
72	Mr.Y Ramakrishna	18-04-2020	Introduction to the Internet of Things and Embedded Systems	Online
73	Mr.Y Ramakrishna	15-04-2020	AI For Everyone	Online
74	K L Sowjanya	16-05-2020	Introduction to OpenCL on FPGAs	Online
75	K L Sowjanya	14-05-2020	Programming for Everybody (Getting Started with Python)	Online
76	K L Sowjanya	15-05-2020	FPGA computing systems: Background knowledge and introductory materials	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
77	Mr.P Veera Swamy	05-04-2020	Introduction to Python: Master Python Basics in Only 2 Hours	Online
78	Mr.P Veera Swamy	05-04-2020	Learn Python From Scratch: Basics and Projects for Practice	Online
79	Mr.P Veera Swamy	01-01-2020	Hands-on training on Solar Study Lamp Assembly	Online
80	Mr.K Siva Nagendra	14-05-2020	Hardware Description Languages for FPGA Design	Online
81	Mr.K Siva Nagendra	10-06-2020	AI For Everyone	Online
82	Mr.Mohammed Abdul Aziz	18-04-2020	Introduction to the Internet of Things and Embedded Systems	Online
83	Mr.Mohammed Abdul Aziz	27-04-2020	AI For Everyone	Online
84	Mr.Venkata Seshagiri Rao Kosaraju	25-05-2020	Cloud Computing Basics (Cloud 101)	Online
85	Mr.P krishna Reddy	15-04-2020	Introduction to the Internet of Things and Embedded Systems	Online
86	Mr.P krishna Reddy	16-05-2020	Sensors and Sensor Circuit Design	Online

S. No	Name of the Faculty	Date	Name of the Program	Host Institution
87	Mr.P krishna Reddy	17-04-2020	AI For Everyone	Online
88	Mr.P krishna Reddy	15-04-2020	Introduction to Programming with MATLAB	Online
89	Mr.P krishna Reddy	17-04-2020	Programming for Everybody (Getting Started with Python)	Online
90	Mr.P krishna Reddy	25-04-2020	Wireless Communications for Everybody	Online

List of Faculty participated in Workshops/Seminars/Webinars

Sl No	Name of the Staff / Faculty	Degree	Institution	Topic
1	Mr S Chandrasekhar	Mtech	KONERU LAKSHMAIAH EDUCATION FOUNDATION	Artificial Intelligence & Machine Learning-Challenges, Opportunities and Emerging Applications
2	Mr S Chandrasekhar	Mtech	KONERU LAKSHMAIAH EDUCATION FOUNDATION	Machine Learning Techniques for detection and classification
3	Mr S Chandrasekhar	Mtech	KONERU LAKSHMAIAH EDUCATION FOUNDATION	Examination reforms to complement OBE requirements"
4	Mr S Chandrasekhar	Mtech	Easwari engineering college	Variable Frequency Drives – Cutting Edge Technology
5	Mr S Chandrasekhar	Mtech	Acropolis Institute of Technology and Research, Indor	The vision and goals with core values of IEEE
6	Mohammed Abdul Aziz	Mtech	KONERU LAKSHMAIAH EDUCATION FOUNDATION	Artificial Intelligence & Machine Learning-Challenges, Opportunities and Emerging Applications
7	Mohammed Abdul Aziz	Mtech	KONERU LAKSHMAIAH EDUCATION FOUNDATION	Machine Learning Techniques for detection and classification

Sl No	Name of the Staff / Faculty	Degree	Institution	Topic
8	Mohammed Abdul Aziz	Mtech	KONERU LAKSHMAIAH EDUCATION FOUNDATION	Examination reforms to complement OBE requirements"
9	Mohammed Abdul Aziz	Mtech	CSIR,CSIR-NPL	Online Interactive Session for School Teachers on Importance of Metrology in Day To Day Life
10	Mohammed Abdul Aziz	Mtech	Marathwada Mitramandal's INSTITUTE OF TECHNOLOGY (MMIT),	NAAC Awareness Programme
11	I Pavani Prapurna	Mtech	PSIT, Kanpur	The semiconductor revolution
12	Mrs K L Sowjanya	Mtech	CoreEL Technologies and Xilinx	Analog IC Design Using Mentor EDA Tools
13	Mr N Nagaraju	Mtech	CBIT	AIM FOR E-ATM
14	Mr N Nagaraju	Mtech	CoreEL Technologies and Xilinx	Analog IC Design Using Mentor EDA Tools
15	Mr N Nagaraju	Mtech	Sri Vasavi Institute of Technology	5G Technology & Its applications
16	Mr N Nagaraju	Mtech	PSCMRCET	Touching Sky Without Fear" (UAV - Unmanned Aerial Vehicle
17	Mr N Nagaraju	Mtech	IETE,MUMBAI	FUTURE OF AI
18	Mr N Nagaraju	Mtech	GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE & P.G. COURSES	Computational Electromagnetic techniques for different RF Microwave and Millimeter-wave Application
19	Dr G L Madhumati	PHD	JNTUA college of Engineering,Ananatapuramu	VLSI circuits analog and digital design perspective
20	Mr P.Krishna Reddy	MTECH	JNTUA college of Engineering,Ananatapuramu	VLSI circuits analog and digital design perspective
21	Mr P.Krishna Reddy	MTECH	SATYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY	Image Processing Application using Xilinx Vivado on Zynq SoC
22	Mr P.Veeraswamy	MTECH	Sri Vasavi Institute of Technology	5G Technology & Its applications

List of Faculty Publications: Journals

S. No.	Faculty /Staff name	Paper / Book title	Events / Journals / Publisher	National/ International	DOI	Citations	Impact Factor (SCI)

S. No.	Faculty /Staff name	Paper / Book title	Events / Journals / Publisher	National/ International	DOI	Citations	Impact Factor (SCI)
1	Mr P.Rama Krishna	Smart Driving with Drowsiness and Alert System	A Journal of Composition Theory	International	19.18001.AJCT	0	5.7
2.	Mr S.Chandra Sekhar	Design and analysis of gray to binary converter using quantum cellular automata (QCA)	TEST Engineering and Management	International	_	0	_
3.	Dr P.Pavithra Roy	Gravitational Search algorithm based probabilistic neural networks for spectrum sensing in cognitive radio networks	International Journal of Advanced Science and Technology	International	_	0	_
4	Dr P.Pavithra Roy	Cognitive radio network for robust spectrum sensing using neural networks	International Journal of Advanced Science and Technology	International	_	0	_
5	Dr P.Pavithra Roy	spectrum sensing in cognitive radio networks using particles swarm optimization algorithm	International Journal of Advanced Science and Technology	International	_	0	_
6.	Dr P.Pavithra Roy	An enhanced probabilistic based hybrid neural network for spectrum sensing in cognitive radio networks	International Journal of Advanced Science and Technology	International	_	0	_
7	Mr M.Venkateswara Rao	Analysis of CPW-FED modified dual Z shaped reconfigurable array antenna for automotive communications	TEST Engineering and Management	International	_	0	_
8.	K.Radha	Steerable roger antenna for 5G applications	International Research Journal of Engineering and Technology	International	_	0	7.529
9.	Mrs K.Radha	Effective network interface architecture for fault-tolerant mechanism network-on-chip	International Journal of innovative Technology and Exploring Engineering	International	10.35940/ijitee.L3949.1081219	0	_

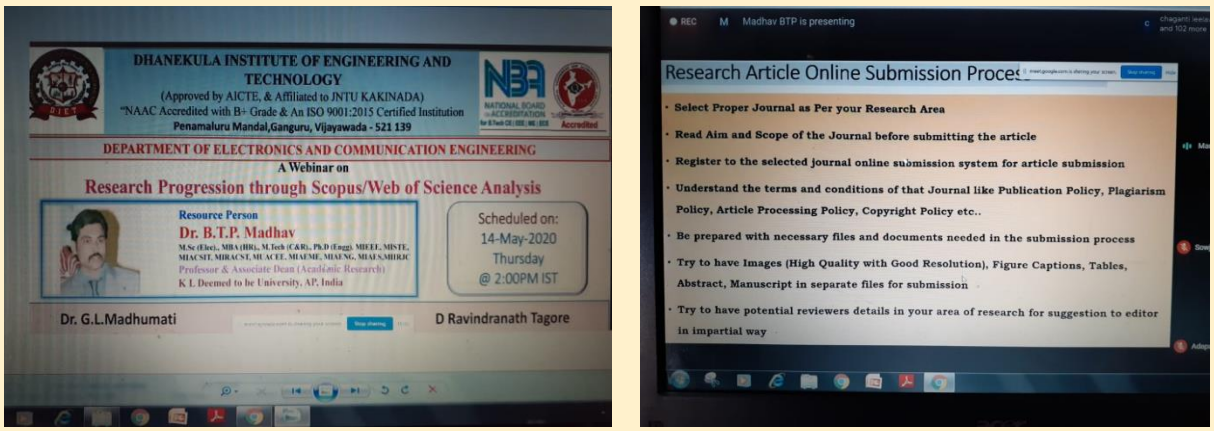
List of Faculty Publications: Conferences

Sl. No	Title of Paper	Name of the Author/s	Name of the Conference
1	Spectrum sensing in cognitive radio networks using particle swarm optimization algorithm	Dr. P Pavitra Roy	ICGPTPG-2019 under TEQIP-1.3
2	Enhanced probabilistic based hybrid neural network for spectrum sensing in cognitive radio network	Dr. P Pavitra Roy	ICGPTPG-2019 under TEQIP-1.3
3	Robust spectrum sensing in cognitive radio using neural networks	Dr. P Pavitra Roy	ICGPTPG-2019 under TEQIP-1.3
4	Gravitational search algorithm based PNN for spectrum sensing in cognitive radio networks	Dr. P Pavitra Roy	ICGPTPG-2019 under TEQIP-1.3

Seminars Conducted

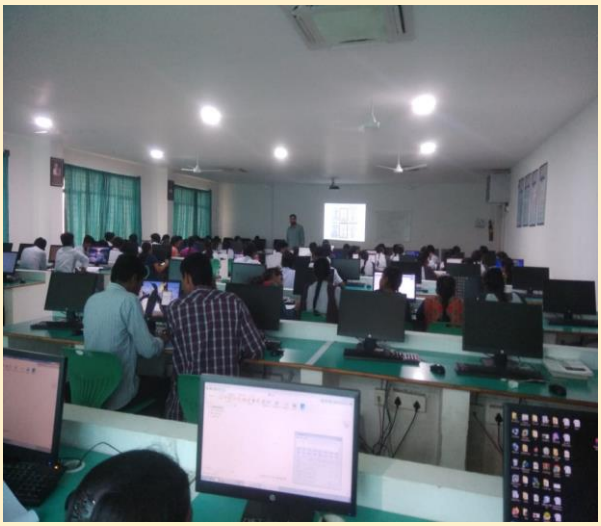
Seminar on Nano Satellite Design named as “CUBESAT” by Dr.Praveen Naidu, Associate Professor from V R Siddhartha Engineering College, Vijayawada

Webinar Conducted



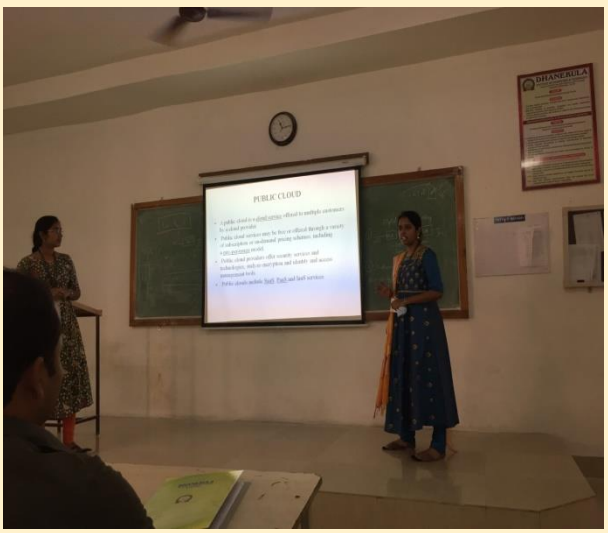
Webinar on Research Progression through Scopus/WoS by Dr. B.T.P Madhav, Professor, KL University, Vijayawada.

Nano Satellite workshop



Python workshop

Association Activities



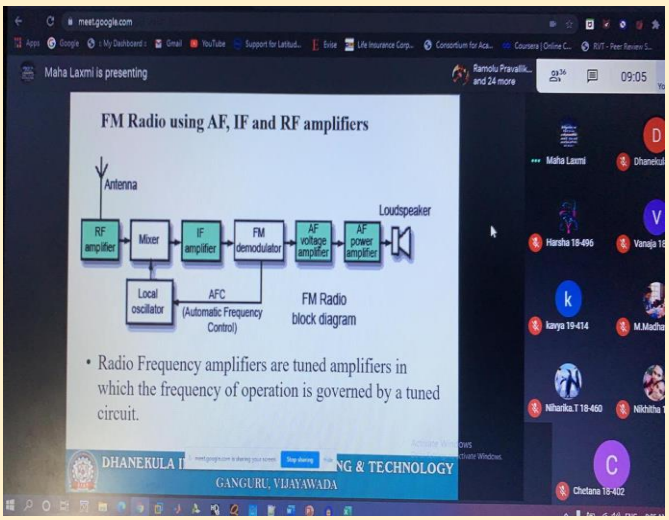
Industrial tour

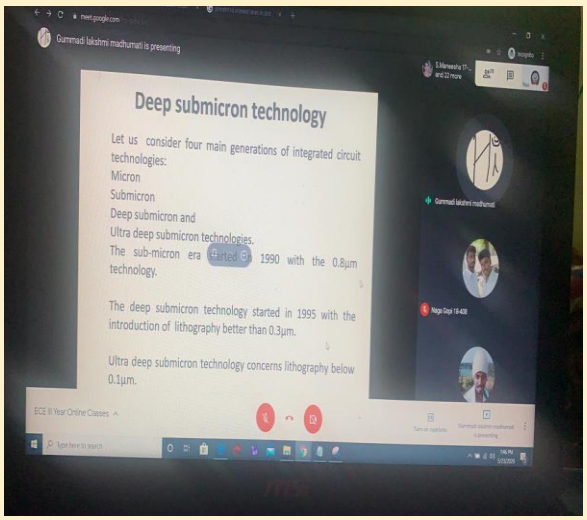
The Industrial Visit is conducted on 28th & 29th January 2020 to the Doordarshan Kendra, Vijayawada

The Industrial Visit is conducted on 11th & 12th February 2020 to the Dr. NTTPS, Vijayawada

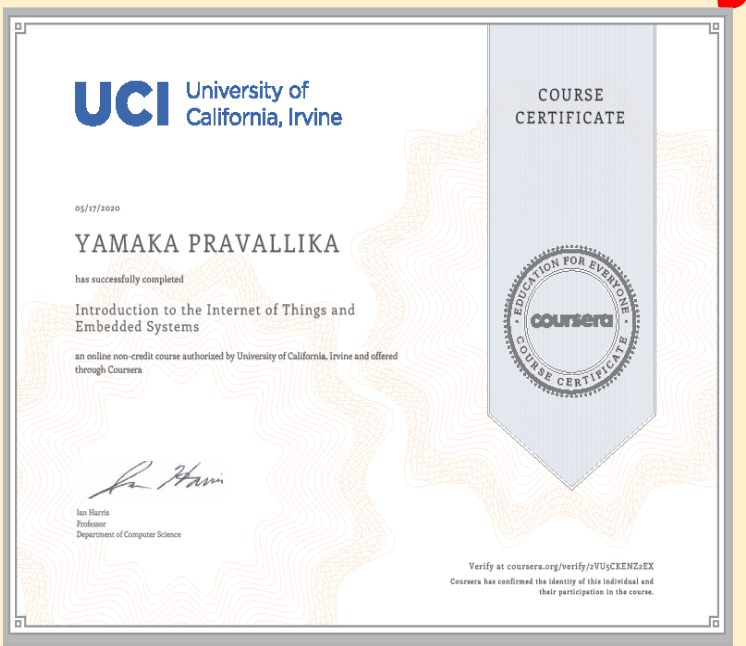
Parents meet

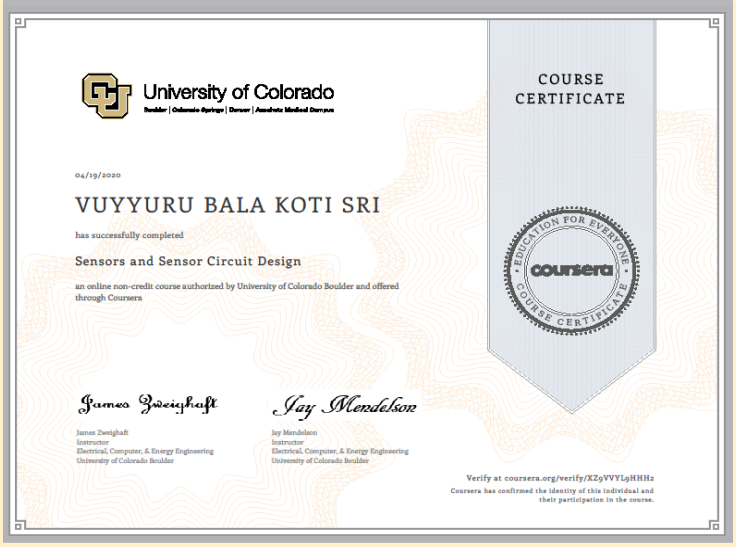
Online classes

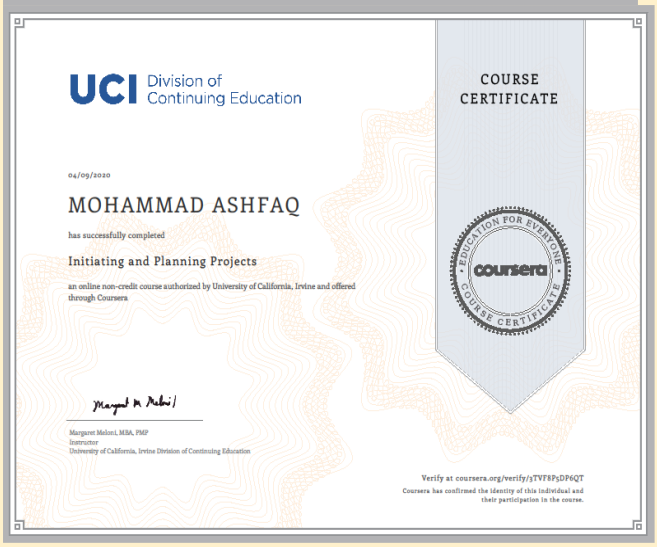




Certifications by Students







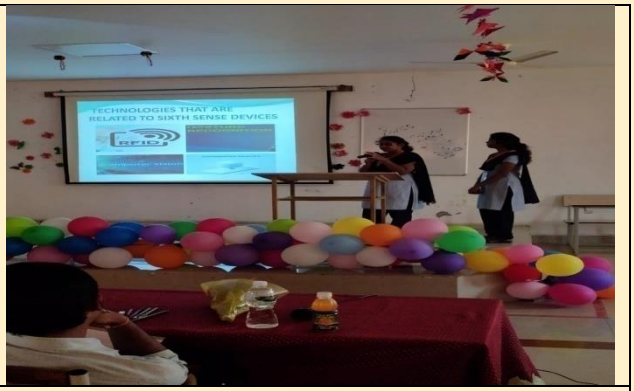
Dhanush-2K19

Technical Fest plays an important role in the college curriculum. It is one such event where young brains get to showcase their skills and compete with others to find the best. It is not just about the competitions but also an event where a lot of those new ideas are seen live and learn more and be inspired. Such inspiring events that happen every year in the college will guide engineers to dream bigger and make those dreams come true.

Dhanush 2K19 has conducted on 20th and 21st of December 2019. The department of ECE has conducted Paper Presentation, Technical Quiz, Tech Trix, Theme Ballet (Poster Presentation), Tech Pic, Circuit Maker, Racing Fever and e-Quest along with the college level events. The technical fest gives the opportunity to students to exhibit their academic and co-circular talents.

Paper Presentations

ECE HOD Honouring the Chief Guest



Students Presenting their Paper

	
Students Presenting their Paper	**Chief Guest Evaluating the Papers**

Racing Fever

Instructions given by Volunteers

Faculty, volunteers and participants

Students Participation in event

Principal sir visit the event

TMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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