Department Magazine

TELE-ELECTRO

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DHANEKULA INSTITUTE OF ENGINEERING AND TECHNOLOGY::GANGURU

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

OUTLINE

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.

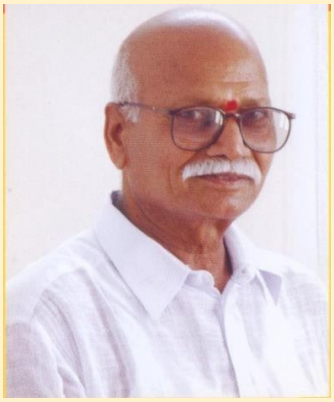
Dhanekula Institute of Engineering and Technology established in the year 2009 at Ganguru, Vijayawada, Krishna (Dist) is the first of its kind educational institution founded by Sri.Dhanekula Ravindranadh Tagore, a living legend who is famous for his versatility and excellence in promoting various agricultural 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 onChip. 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 customised teaching aids to make the courses more relevant, dynamic, interactive and learner-friendly.

FACULTY ARTICLES

Beyond 1 and 0: Engineers boost potential for creating successor to shrinking transistors

Computers and similar electronic devices have gotten faster and smaller over the decades as computer-chip makers have learned how to shrink individual transistors, the tiny electrical switches that convey digital information. Scientists' pursuit of the smallest possible transistor has allowed more of them to be packed onto each chip. But that race to the bottom is almost over: Researchers are fast approaching the physical minimum for transistor size, with recent models down to about 10 nanometers or just 30 atoms wide. "The processing power of electronic devices comes from the hundreds of millions, or billions, of transistors that are interconnected on a single computer chip," said Dr. Kyeongjae Cho, professor of materials science and engineering at The University of Texas at Dallas.

To extend the quest for faster processing speed, the microelectronics industry is looking for alternative technologies. Cho's research, published online April 30 in the journal *Nature Communications*, might offer a solution by expanding the vocabulary of the transistor. Conventional transistors can convey just two values of information: As a switch, a transistor is either on or off, which translates into the 1s and 0s of binary language. One way to increase processing capacity without adding more transistors would be to increase how much information each transistor conveys by introducing intermediate states between the on and off states of binary devices. A so-called multi-value logic transistor based on this principle would allow more operations and a larger amount of information to be processed in a single device. The concept of multi-value logic transistors is not new, and there have been many attempts to make such devices.

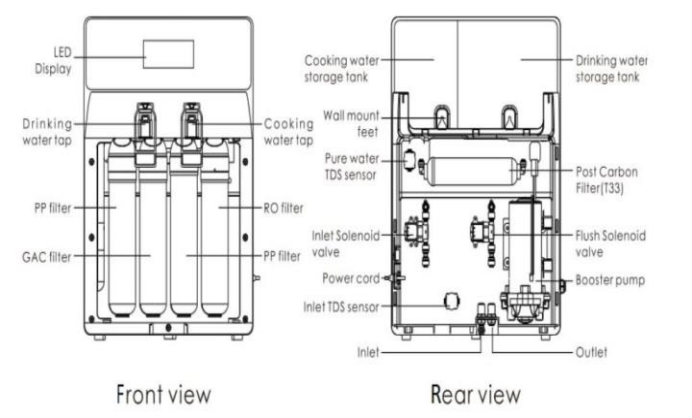
Through theory, design and simulations, Cho's group at UT Dallas developed the fundamental physics of a multi-value logic transistor based on zinc oxide. Their collaborators in South Korea successfully fabricated and evaluated the performance of a prototype device. Cho's device is capable of two electronically stable and reliable intermediate states between 0 and 1, boosting the number of logic values per transistor from two to three or four. Cho said the new research is significant not only because the technology is compatible with existing computer-chip configurations, but also because it could bridge a gap between today's computers and quantum computers, the potential next landmark in computing power. While a conventional computer uses the precise values of 1s and 0s to make calculations, the fundamental logic units of a quantum computer are more fluid, with values that can exist as a combination of 1s and 0s at the same time or anywhere in between. Although they have yet to be realized commercially, large-scale quantum computers are theorized to be able to store more information and solve certain problems much faster than current computers. A device incorporating multi-level logic would be faster than a conventional computer because it would operate with more than just binary logic units. With quantum units, you have continuous values. "The transistor is a very mature technology, and quantum computers are nowhere close to being commercialized," he continued. "There is a huge gap. So how do we move from one to the other? We need some kind of evolutionary pathway, a bridging technology between binary and infinite degrees of freedom.

The technology Cho and his colleagues developed uses a novel configuration of two forms of zinc oxide combined to form a composite nanolayer, which is then incorporated with layers of other materials in a superlattice.The researchers discovered they could achieve the physics needed for multi-value logic by embedding zinc oxide crystals, called quantum dots, into amorphous zinc oxide. The atoms comprising an amorphous solid are not as rigidly ordered as they are in crystalline solids. "By engineering this material, we found

that we could create a new electronic structure that enabled this multi-level logic behavior," said Cho, who has applied for a patent. "Zinc oxide is a well-known material that tends to form both crystalline solids and amorphous solids, so it was an obvious choice to start with, but it may not be the best material. Our next step will look at how universal this behavior is among other materials as we try to optimize the technology.

Mr.S.Chandrasekhar
Assistant Professor , ECE

OCEO: A Smart Water Purifier at Zero Purchase Cost



Quality of drinking water is one thing that we cannot afford to compromise – not one bit. Water-borne diseases like diarrhoea, hepatitis, typhoid and cholera, or illness due to contaminants like arsenic or lead cause large-scale health hazards in India. Reports suggest that over 10,000 lives fell victim to these diseases from 2013 to 2017 in the country. To monitor water quality and reduce contamination, smart sensor-based technologies and filters are used, which often lead to high capital costs for consumers. To address this challenge, Bengaluru-based startup OCEO Water, founded by Mahendra Dantewadiya, Rajeev Krishna, Vikram Gulecha and Hasmukh Gulecha, has designed a technology that detects, purifies, measures and monitors drinking water, for zero upfront or maintenance cost and just Re.1 per litre of water consumed by the user!

The inception

The OCEO team came up with an IoT-enabled water purification-as-a-service solution looking at the heavy upfront and operational costs, maintenance hassles and the needs for improvement of existing water purifier solutions in the market.

Vikram Gulecha says, “Access to safe drinking water is a basic human right – not a privilege. Expenses for existing solutions, however, are very high. Moreover, water quality in India varies every 200 km. Some regions may have higher arsenic content in water, some may have chloride, some may contain iron, and so on. The aim of OCEO is to be able to purify water as per the specific problem existing in an area, as each contaminant requires a different approach for purification”.

How it works

OCEO is an IoT-enabled Smart Water Purifier installed at the user’s location. The backbone of the technology lies in the blend of digital tools, internet-linked sensors, online analytics and report display on the devices. Water coming in from any source (tap, pump, tanker etc.) is first purified in the filter through six broad steps of filtration, carried out by a variety of elements. The six steps include polypropylene filtration, activated carbon filtration, Ultrafiltration (UF), reverse osmosis filtration, filtration through silver impregnated carbon filter and finally, water mineralisation.

“When water is being dispensed, a sensor reads the quality of each drop of water and sends the data to live cloud storage in real-time”, informs Krishna. OCEO communicates to the network through GSM, meaning a SIM card is fitted in the purifier. The data can be accessed as insightful analytics using OCEO’s mobile and web application. In addition, device health can also be verified using analytics. This facilitates predictive maintenance of the device, allowing auto-order of cartridges or filter membranes beforehand. The firm claims the setup is simple enough for users to

change filters and perform operations by themselves (Quick & Easy DIY).

Users can consume any amount of water needed. Keeping in mind an Indian household consumption, OCEO machine are designed optimum to dispense 15 litres of water every hour. OCEO has kept their technology open and is inviting solution developers to join hands in developing new solutions for the increasing water challenges across the globe.

Target audience and purchase model

OCEO's main target audiences are the end consumers from cities as well as semi-urban and rural areas. The most interesting aspect of their offering is the total zero cost deployment model. This means customers do not have to pay anything for the device, installation or even maintenance (including filter membrane replacement). Instead, users have to pay as per consumption, at the rate of Re. 1 per litre. The service has to be availed on a prepaid basis. Users can purchase 'water credits' using the application from OCEO mobile application or website – for instance, they can purchase 200 water credits to consumer 200 litres of water. The unqiue predictive maintenance auto-order fresh replacement membranes based on the incoming water quality and consumption from the device

Challenges during the venture

The main challenge for team OCEO came while trying to understand the needs of the customer and having the ultimate solution for the job that needed to be done. Vikram Gulecha recalls, "It involved figuring out the right solution for customers, the right channels to reach them and the right customer relationships to have. It also entailed figuring out the right price points and cost structures for profitability."

The design method also had to be modified, keeping in mind the usage habits of the customers. "Changing behavior is hard. Traditional design methods are not always enough to effectively tackle complex behavioral challenges at the customer's end. Our team took a unique behavioral approach towards product design, with a lot focus on primary market research", Vikram adds.

Revenue strategy

When asked whether the revenue stream is a challenge, given that the company is baring most of the costs, Dantewadiya answered, "this is more like the business model that airlines use. They lease aircrafts and finance all the services and maintenance. Passengers just pay for their trip. In OCEO too, we are the financier of all the services while consumers can pay only for their consumption".

He believes low-cost water purification options in the market should have been there a long time back. He adds, "The pay-as-you-use model will make drinking water more affordable, and can save consumers up to 80 percent of the expenses per month. It will draw more consumers. So, we are looking into additional revenue streams for the longer run."

They keep their overall cost low by maintaining a direct manufacturer-to-consumer channel, avoiding middlemen. "There would be at least 8-10 levels of middlemen if we planned to take the traditional of distribution. We completely omit this step. Moreover, we do not endorse our product through high-budget TV advertorials! Our customers are our own endorsers. That saves a lot of expense", expresses Hasmukh Gulecha.

Roadmap ahead

Gulecha and his team have a few plans with regards to the OCEO device as well as its distribution and production. They have started off with Bengaluru and are in the process of commercial distribution in Chennai and Hyderabad. They will have technical teams in each of these regions for customer service and support. They plan to expand throughout the nation slowly.

Currently, they are manufacturing their products from China, Taiwan and Korea. However, they have received proposals from multiple state governments to help in setting up their own manufacturing facility within the country. They plan to set up two facilities – one in the northern India and another in the south.

The team is customising OCEO to fit the requirements of big offices too, which includes increasing the water capacity, as offices require much higher water daily. This will open up more

target customer groups for them. Dantewadiya says that overall, OCEO plans to expand and cater the consumers in India first, and once they meet the demands here, they plan to expand globally.

Dr.G.L.Madhumati
Professor & HOD, ECE.

Spray-on antennas may turn objects into connected technology

The exceptional conductivity of the material enables it to transmit and direct radio waves, even when it is applied in a very thin coating. (Image Source: Drexel University)

Scientists have developed a method for spraying invisibly thin antennas on to flexible materials, an advance that could turn a variety of objects and surfaces into seamless Internet of Things. Researchers from Drexel University in the US used a type of two-dimensional, metallic material called MXene, that perform as well as those being used in mobile devices, wireless routers and portable transducers.

"This is a very exciting finding because there is a lot of potential for this type of technology," said Kapil Dandekar, a professor at Drexel. "The ability to spray an antenna on a flexible substrate or make it optically transparent means that we could have a lot of new places to set up networks – there are new applications and new ways of collecting data that we can't even imagine at the moment," said Dandekar. The study published in the journal Science Advances shows that the MXene titanium carbide can be dissolved in water to create an ink or paint."This technology could enable the truly seamless integration of antennas with everyday objects which will be critical for the emerging Internet of Things," Dandekar said. "Researchers have done a lot of work with non-traditional materials trying to figure out where manufacturing technology meets system needs, but this technology could make it a lot easier to answer some of the difficult questions we've been working on for years," he said. Initial testing of the sprayed antennas suggest that they can perform with the same range of quality as current antennas, which are made from familiar metals, like gold, silver, copper and aluminum, but are much thicker than MXene antennas.

Mr.S.Chandrasekhar
Assistant professor, ECE.

India's PSLV rocket successfully puts into orbit two UK satellites

India on Sunday night successfully put into orbit two British earth observation satellites, NovaSAR and S1-4, in copy book style. Two satellites aboard the Indian rocket – Polar Satellite Launch Vehicle (PSLV) – belonged to Surrey Satellite Technologies Ltd (SSTL), UK. The satellites were put into sun synchronous orbit under commercial arrangement with Antrix Corp Ltd, the commercial arm of the Indian Space Research Organisation (ISRO), the Indian space agency. The total lift off weight of the two satellites was 889 kg.

NovaSAR weighing 445 kg is a S-Band Synthetic Aperture Radar satellite intended for forest mapping, land use and ice cover monitoring, flood and disaster monitoring. S1-4 weighing 444 kg is a high resolution Optical Earth Observation Satellite, used for surveying resources, environment monitoring, urban management and for disaster monitoring. After the successful

launch, ISRO Chairman K Sivan said: “The PSLV rocket preciously placed two of our customer satellites in 583 km orbit. The success will give added energy for industry to make PSLV.”

At 10.08 pm the four staged/engine PSLV-CA rocket, standing 44.4 metres tall and weighing 230.4 tonnes, blasted off from the first launch pad. With the fierce orange flame at its tail lighting up the night skies here, the rocket slowly gained speed and went up and up enthralling the people at the rocket port while the rocket’s engine noise like a rolling thunder adding to the thrill. Just under 18 minutes into the flight, the rocket slung NovaSAR and S1-4 into the orbit.

Mr.Ch.Mohansai Kumar
Assistant professor,ECE

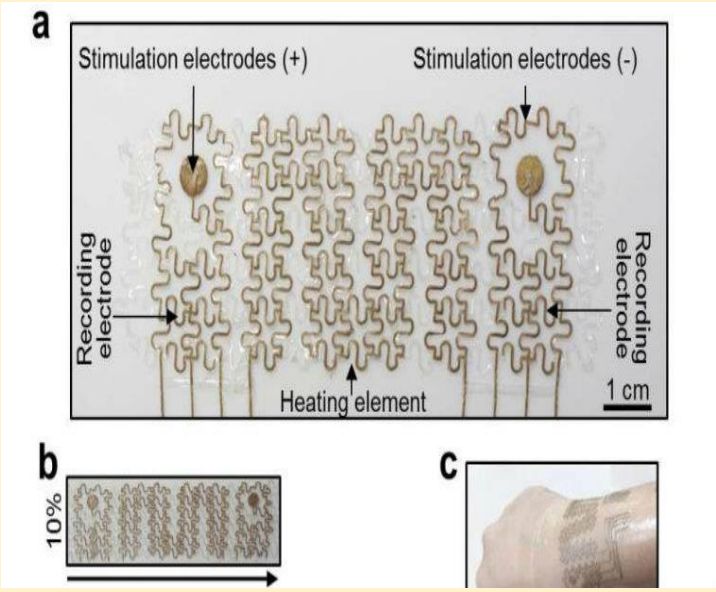
Modern human gripping capabilities evolved 500,000 years ago: Study

Hominins evolved a strong grip similar to modern human hands at least 500,000 years ago, reveals a study of ancient stone tools. The findings demonstrated that without the ability to perform highly forceful precision grips, our ancestors would not have been able to produce advanced types of stone tools like spear points. The technique involves preparing a striking area on a tool to remove specific stone flakes and shape the tool into a pre-conceived design.

This research is the first to link a stone tool production technique known as “platform preparation” to the biology of human hands, said researchers from the Britian’s University of Kent. Platform preparation is essential for making many different types of advanced prehistoric stone tool, with the earliest known occurrence observed at the 500,000-year-old site of Boxgrove in West Sussex (UK).“Hand bones from before 300,000 years ago are rare, particularly when compared to other human fossils such as teeth, so the fact we can study the manipulative capabilities of our early ancestors from the stone tools they produced is incredibly exciting,” said lead author Alastair Key from the varsity.For the study, detailed in the journal PeerJ, the team investigated how hands are used during the production of different types of early stone technology. Using sensors attached to the hand of skilled flint knappers (stone tool producers), the researchers were able to identify that platform preparation behaviours required the hand to exert significantly more pressure through the fingers when compared to all other stone tool activities studied.

Mr.P.Krishna Reddy
Assistant professor,ECE

Wearable electronic mesh can help monitor heart health



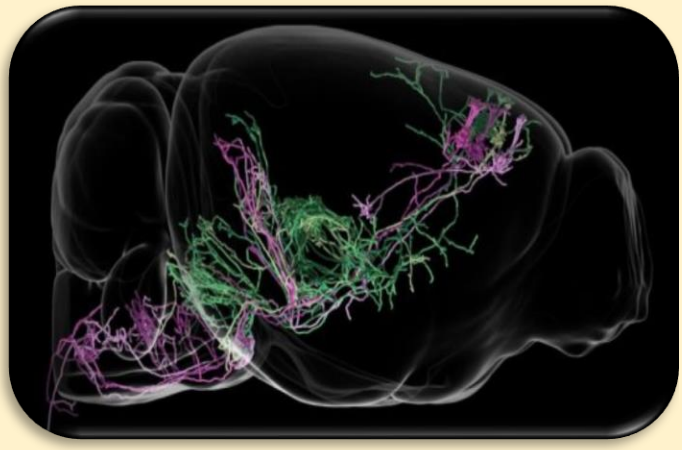
The research team has also produced a customised large mesh that fits the lower part of a swine heart. (Image: Institute for Basic Science)

Scientists have developed a soft mesh that can record signals from the heart and muscles, paving the way for a new generation of flexible wearable health monitoring devices. The implantable device, provides information on muscle and cardiac dysfunctions, and thus could be implemented for pain relief, rehabilitation, and prosthetic motor control. It is the first soft implant that can record the cardiac activity in multiple

points of a swine heart, according to a study published in the journal Nature Nanotechnology. Researchers from the Institute for Basic Science (IBS) in South Korea used the device on human skin to record the electrical activity of heart and muscles, that is electrocardiogram (ECG) and electromyogram (EMG) respectively. Its softness, elasticity and stretchability, allows the device to follow the contours of flexible joints, such as the wrist. Worn on a forearm, it simultaneously monitored EMG signals, and delivered electrical and/or thermal stimulations that could be employed in therapeutic applications.This stretchable and conductive patch is created by gold-coated silver nanowires mixed with a type of rubber, called polystyrene-butadiene-styrene (SBS). Conventional silver wire-based conductive rubbers have had limited biomedical applications because silver is toxic to the body. The gold sheath prevents both silver's leaching, and corrosion caused by air and biological fluids, such as sweat.

Mr.M.Tulasidasu
Assistant professor,ECE

Decoding how brain circuits control behavior



The mouse brain contains roughly 80 million neurons, all packed into a space about the size of a hazelnut. Those cells come in a vast assortment of shapes and sizes, and their connections with one another number in the billions -- at least. The brain depends on this circuitry to interpret information about the world, learn from experiences, and control movements. Nerve cells are intermingled in this tight space to form an intricate network -- making it difficult for scientists to understand which cells are responsible for which tasks. Now, in two papers published October 31, 2018, in the journal *Nature*, researchers at the Howard Hughes Medical Institute's Janelia Research Campus and the Allen Institute for Brain Science have worked out how two types of intermingled nerve cells divide the labor to plan and initiate movements. By integrating cell-by-cell analyses of neurons' shapes, gene activity, and function, the team has teased out which brain cells are responsible for these distinct but closely related jobs. Combining such extensive analyses represents a major technical feat, says Janelia Group Leader Karel Svoboda. It's a new approach to understanding brain function, he says. The work required multiple teams of scientists at multiple institutes teaming up to solve a single problem. Svoboda thinks that this kind of approach will be necessary to help researchers crack the most complex questions in neuroscience.

Charting new neural territory

Around the world, researchers have embarked on efforts to build comprehensive neural maps to uncover truths about the brain. Neuroscientists are exploring the brain's elaborate networks from many different angles, charting cell structures, molecular features, and neural activities. Combining this disparate information to gain insights about brain function remains an outstanding challenge, Svoboda says. At Janelia, one long-term mapping effort involves neuronal anatomy. Scientists on the Mouse Light project team have been determining the precise structure of neurons in the mouse brain -- a massive undertaking that involves painstakingly tracing individual neurons' wiry paths across thousands of images of the brain. Complementary efforts at the Allen Institute are charting cells' gene expression, revealing key similarities and differences between cells and offering hints into cellular function. In the new work, Janelia scientists Mike Economo, Sarada Viswanathan, Loren Looger, Svoboda, and colleagues joined forces with Allen Institute scientists to create complete gene expression profiles of cells within the mouse neocortex. The neocortex is the largest part of the mammalian brain responsible for higher cognitive functions. The team focused on the anterior lateral motor cortex (ALM), an area involved in planning and executing movements. The Janelia and Allen Institute groups have been collaborating for years, Svoboda says. His lab has worked to describe how ALM neurons code information and control

movements, and Allen Institute scientists used new single-cell RNA sequencing technology to analyze the molecular make-up of individual ALM neurons. BosiljkaTasic, Hongkui Zeng, and colleagues at the Allen Institute determined the full set of RNA molecules -- the transcriptome -- present in each of 23,822 neurons from the neocortex. This generated a complete picture of which genes were switched on in every cell -- about 9,000 genes per cell, on average. Within the vast dataset, the researchers identified more than 130 groups of cells that shared transcriptomes.

Role definition

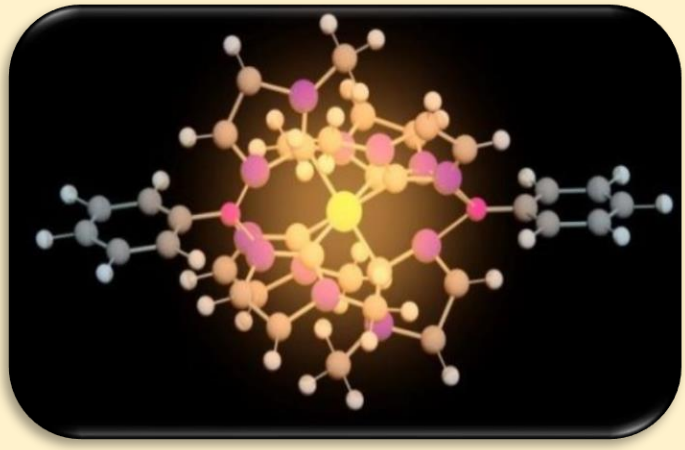
Next, the team correlated their molecular findings with structural information obtained through Janelia's Mouse Light project. The scientists focused on large neurons in the ALM that carry information away from the cortex. Within this subset of neurons, two groups of cells defined by their transcriptomes also shared anatomic features. Their paths to other parts of the brain are distinct, the team discovered. One set connects to the brainstem, where motor neurons that direct the body to carry out actions reside. The second set connects with the thalamus, a sort of central switchboard in the brain. Collectively, these cells have already received attention from neuroscientists because they are particularly vulnerable to neurodegenerative disease. "But it really hasn't been appreciated that these neurons come in discrete flavors and might play different roles," says Economo, a postdoctoral researcher in Svoboda's lab. To tease apart those roles, Economo targeted each cell class individually, manipulating and measuring activity as mice carried out a simple task -- moving in a particular direction at a particular time. One group of neurons, those that connect the ALM to the thalamus, are crucial for planning future movements, the experiments revealed. The other set of neurons, those that connect the ALM to the brainstem, are required to initiate movement. Simply put, the two types of neurons fall into two classes and have distinct behaviors, Svoboda says. "These cell types carry different messages to different brain regions to produce different functions."

By pulling together multiple data streams, he says, the team was able to bring clarity to a complex circuit question. "Scientists can always find ways to divide cells into groups," Tasic adds, but in this case, the groups offer a clear picture of each cell type's role in shaping movement. It's a key step in picking apart the complexity of the cortex. With the functions of more than 100 molecularly defined cell types in the visual cortex and the ALM alone still to be explored, scientists have a lot of complexity left to unravel, Svoboda says. But, he adds, with new research tools in development and large-scale mapping efforts accelerating, this type of neural decoding could soon be ramping up.

Mr.S.Chandrasekhar
Assistant Professor

Brilliant iron molecule could provide cheaper solar energy

For the first time, researchers have succeeded in creating an iron molecule that can function both as a photocatalyst to produce fuel and in solar cells to produce electricity.



The results indicate that the iron molecule could replace the more expensive and rarer metals used today. Some photocatalysts and solar cells are based on a technology that involves molecules containing metals, known as metal complexes. The task of the metal complexes in this context is to absorb solar rays and utilise their energy. The metals in these molecules pose a major problem, however, as they are rare and expensive metals, such as the noble metals ruthenium, osmium and iridium. "Our results now show that by using advanced molecule design, it is possible to replace the rare metals with iron, which is common in the Earth's crust and therefore cheap," says Chemistry Professor Kenneth Wärnmark of Lund University in Sweden. Together with colleagues, Kenneth Wärnmark has for a long time worked to find alternatives to the expensive metals. The researchers focused on iron which, with its six per cent prevalence in the Earth's crust, is significantly easier to source. The researchers

have produced their own iron-based molecules whose potential for use in solar energy applications has been proven in previous studies. In this new study, the researchers have moved one step further and developed a new iron-based molecule with the ability to capture and utilise the energy of solar light for a sufficiently long time for it to react with another molecule. The new iron molecule also has the ability to glow long enough to enable researchers to see iron-based light with the naked eye at room temperature for the first time. "The good result depends on the fact that we have optimised the molecular structure around the iron atom," explains colleague Petter Persson of Lund University. The study is now published in the journal *Science*. According to the researchers, the iron molecule in question could be used in new types of photocatalysts for the production of solar fuel, either as hydrogen through water splitting or as methanol from carbon dioxide. Furthermore, the new findings open up other potential areas of application for iron molecules, e.g. as materials in light diodes (LEDs). What surprised the Lund researchers is that they arrived at good results so quickly. In just over five years, they succeeded in making iron interesting for photochemical applications, with properties largely as good as those of the best noble metals. "We believed it would take at least ten years," says Kenneth Wärnmark. Besides the researchers from Lund University, colleagues from Uppsala University and the University of Copenhagen were also involved in the collaboration.

Mr.Ch. Mohan Sai Kumar Assistant Professor

ISRO satellite launch: Geo Eye over Indian Ocean, internet connectivity in J&K, NE

Indian Space Research Organisation (Isro) on Wednesday launched high throughput communication satellite GSAT-29 from the Satish Dhawan Space Centre at Sriharikota in Andhra Pradesh. The exercise was called GSLV MkIII-D2 mission. The Geosynchronous Satellite Launch Vehicle Mark III (GSLV Mk-III) carried GSAT-29 off the ground on its second developmental flight at 5.08 in the evening. The load carried by GSLV Mk-III included what is being called as Geo Eye to monitor sensitive regions along the borders

All about Isro launch in 10 points

1.GSAT-29 is the 33rd Made-by-India communications satellite. It is a multi-beam and multiband communications satellite. Once operational, GSAT-29 will provide internet connectivity in some of the remotest areas in Jammu and Kashmir, and the Northeast.

2.GSAT-29 is carrying an on-board unique high-resolution camera that is capable of tracking "enemy ships" in the Indian Ocean. This high-resolution on-board camera is being referred to as Geo-Eye. It is expected to aid agencies involved in strategic surveillance.

3.Indian Ocean has lately seen increased activities of major global powers. China has been aggressive in increasing its presence and influence in the Indian Ocean including recent strategic possessions in Sri Lanka, Maldives and Djibouti.

4.GSLV MkIII-D2 is the heaviest rocket of the Isro till date. It would inject the satellite into Geostationary Transfer Orbit (GTO) with required inclination to the equator.

5.GSAT-29 will be placed in its final Geostationary Orbit (GEO) using the on-board propulsion system, and it may take a few days after separation from launcher to reach its orbital slot.

6.GSLV Mk-III is the fifth generation launch vehicle developed by Isro. GSLV Mk-III vehicle is designed to place up to 4,000 kg in GTO. It is equivalent to 10 tons to Low Earth Orbit (LEO) or about twice the capability of GSLV Mk II.

7.GSAT-29 weighs about 3,423 kg and is designed for a mission life of 10 years. ISRO said the satellite carries Ka/Ku-band high throughput communication transponders intended to meet the

communication requirements of users in remote areas.

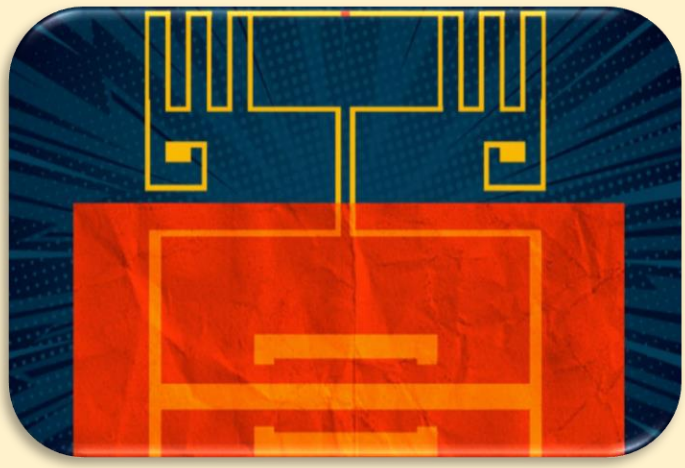
8.In addition, several new technologies such as Q/V-band payload, data transmission through optical communication link will be demonstrated. This will help in realizing future advanced satellites.

9.The GSAT-29 launch is the 67th mission from Sriharikota Island. It is the 23rd launch from the second launch pad. GSLV Mk-III's Tuesday flight is the fifth launch mission of the Isro in 2018.

10.GSLV MkIII is a three-stage heavy lift launch vehicle developed by ISRO. The vehicle has two solid strap-ons as the first stage, a liquid propellant core as second stage and a cryogenic as third stage.

Mr. M.Tulasi Dasu Assistant Professor

Flexible device made by MIT scientists converts Wi-Fi signals into electricity



MIT scientists made a device from flexible, inexpensive materials which could power large-area electronics, wearables, medical devices, and more.

MIT scientists have developed the first fully flexible device that can convert energy from Wi-Fi signals into electricity, paving the way for wirelessly powering everyday electronics without batteries.Devices that convert AC electromagnetic waves into DC electricity are known as "rectennas."The researchers demonstrate a new kind of rectenna, described in a study appearing in the journal Nature, that uses a flexible radio-frequency (RF) antenna that captures electromagnetic waves — including those carrying Wi-Fi — as AC waveforms.The antenna is then connected to a novel device made out of a two-dimensional semiconductor just a few atoms thick. The AC signal travels into the semiconductor, which converts it into a DC voltage that could be used to power electronic circuits or recharge batteries.In this way, the battery-free device passively captures and transforms ubiquitous Wi-Fi signals into useful DC power. Moreover, the device is flexible and can be fabricated in a roll-to-roll process to cover very large areas.

"What if we could develop electronic systems that we wrap around a bridge or cover an entire highway, or the walls of our office and bring electronic intelligence to everything around us? How do you provide energy for those electronics?" said Tomas Palacios, a professor at Massachusetts Institute of Technology (MIT) in the US."We have come up with a new way to power the electronics systems of the future — by harvesting Wi-Fi energy in a way that's easily integrated in large areas — to bring intelligence to every object around us," said Palacios.Promising early applications for the proposed rectenna include powering flexible and wearable electronics, medical devices, and sensors for the "internet of things."

Flexible smartphones, for instance, are a hot new market for major tech firms. In experiments, the researchers' device can produce about 40 microwatts of power when exposed to the typical power levels of Wi-Fi signals (around 150 microwatts).That is more than enough power to light up a simple mobile display or silicon chips.Another possible application is powering the data communications of implantable medical devices, said Jesus Grajal, a researcher at the Technical University of Madrid.For example, researchers are beginning to develop pills that can be swallowed by patients and stream health data back to a computer for diagnostics.

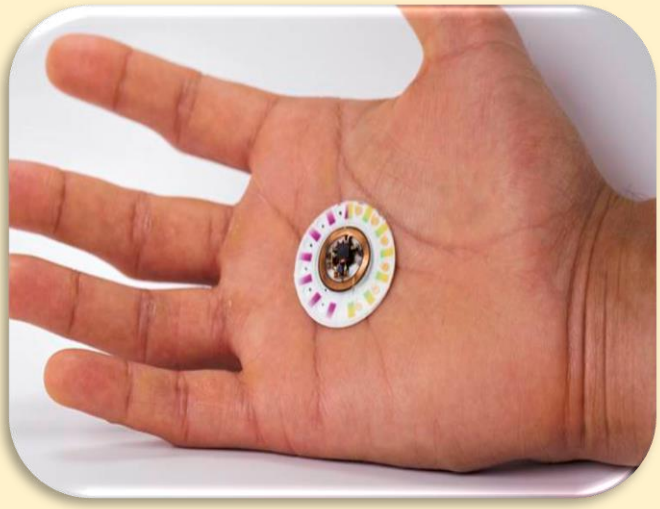
"Ideally you don't want to use batteries to power these systems, because if they leak lithium, the patient could die," Grajal said.It is much better to

harvest energy from the environment to power up these small labs inside the body and communicate data to external computers," he said.

The research provides blueprints for flexible Wi-Fi-to-electricity devices with substantial output and efficiency. The maximum output efficiency for the current device stands at 40 per cent, depending on the input power of the Wi-Fi input.At the typical Wi-Fi power level, the power efficiency of the rectifier is about 30 per cent. For reference, today's best silicon and gallium arsenide rectennas made from rigid, more expensive silicon or gallium arsenide achieve around 50 to 60 per cent.The team is now planning to build more complex systems and improve efficiency

Mr.M.Tulasi Dasu Assistant Professor, ECE

A patch reads sweat to tell you if you're dehydrated, or have diabetes



The patch provides real-time information on the wearer's pH, sweat rate, and levels of chloride, glucose and lactate.

An undated photo provided by John Rogers, a biomedical engineer at Northwestern University, shows a patch that provides real-time information on the wearer's pH, sweat rate, and levels of chloride, glucose and lactate — high levels of which could signal cystic fibrosis, diabetes or a lack of oxygen. (J. Rogers, Northwestern University via The New York Times)

Someday soon, perhaps within a year, you'll be able to slap a soft, stretchy patch on to your arm that tells you if you're dehydrated. Or that your electrolytes are dangerously out of balance. Or even that you have diabetes.Fitness trackers such as Fitbit and Apple Watch already track step counts, heart rate and sleep rhythms. But they tend to be rigid and bulky, and mostly gather mechanical metrics, rather than assess a person's underlying biology.new generation of devices instead aim to analyze sweat for many chemicals at once, producing a real-time snapshot of the wearer's health or fitness. These devices also fit intimately against the skin, and are comfortable for anyone, from premature babies to the elderly. One version is already being advertised by Gatorade.The latest advance in this technology, described Friday in the journal Science Advances, provides real-time information on the wearer's pH, sweat rate, and levels of chloride, glucose and lactate — high levels of which could signal cystic fibrosis, diabetes or a lack of oxygen."It fits into a broader trend that you're seeing in medicine, which is personalized, tailored approaches to treatment and delivery of care," said John Rogers, a biomedical engineer at Northwestern University in Illinois and the key architect of the device.Technology like this has been anticipated for years, but the field has accelerated rapidly. Some similar devices in development are soft. Some use electric sensors to read chemicals. Others rely on colorimetrics, in which the intensity of the color in the readout matches the concentration of the chemical being monitored. The new device delivers all of that in a battery-free and wireless form."This looks like the first version in which they integrated all of it in one device," said Martin Kaltenbrunner, an engineering professor at Joannes Kepler University Linz, in Austria, who was not involved in the research. "The level of technology that is in this paper is very, very advanced."The new device has minuscule holes at its base into which sweat naturally flows. From there, a complex network of valves and microchannels, each roughly the width of a human hair, route the sweat into tiny reservoirs. Each reservoir contains a sensor that

reacts with a chemical in the sweat, such as glucose or lactate.

"That's basically it," Rogers said. "There's nothing that penetrates the skin, and there's no power supply that's driving flow."The device relies on the same technology that smartphones use to send wireless payments; the phone can both deliver power through this wireless coupling,and receives data back. Alternatively, the data could be sent to a reader attached to a treadmill or elsewhere in a fitness room.The system is versatile and could be set up to track the same chemical, or several chemicals, over time, such as the level of lactate in a runner as a marathon progresses. Because the device is waterproof and molded to the body, it also could be used by swimmers.Eventually, the device would fill up with sweat — not so hygienic — but the channel system can be easily separated from the electronics and swapped out, giving the device a longer life span. "This approach is especially nice, this modular construction of sensors," Kaltenbrunner said.To be marketed at large scale, any sweat-based sensor would need to be manufactured at a low cost. Many teams are focused on this goal because of the potential of the devices to transform health care, Kaltenbrunner said. "If I have to go to the clinic once a day to have my data collected, I wouldn't really do it," Kaltenbrunner said. "But it just means wearing a patch and being able to self-monitor myself, then eventually this barrier will be reduced."Rogers' team has begun testing the technology as a way to screen for cystic fibrosis, a rare genetic condition. Doctors already look at chloride concentrations in sweat to identify children with the condition, but they typically use a rigid, uncomfortable device that straps tightly onto the child's arm for a one-time measurement.

In 2017, another team described a flexible, wearable sensor that also analyzes chloride in sweat to screen for cystic fibrosis. But that sensor is battery-powered,and does not capture separate volumes of sweat as Rogers' device does."Really what is needed is big data for human health," said Ali Javey, a member of the team that proposed the earlier sensor and a professor of electrical engineering and computer science at the University of California, Berkeley. The device invented by Rogers "is really important," Javey said, because it is "comfortable to wear, has different sensing modalities and is robust."Rogers' team has been testing their device with children who have cystic fibrosis at Lurie Children's Hospital of Chicago. It is in the late stages of a clinical trial,and plans to apply for approval from the Food and Drug Administration.A much bigger market for sensors lies in helping the approximately 30 million people with diabetes in the United States track their glucose levels. The most advanced diabetes sensor, approved by the FDA in 2017, is a soft skin patch coupled to a small reader, and relies on tiny needles that pierce the skin to monitor blood glucose.The ideal device would not involve needles or draw blood. To use sweat instead, however, scientists first need to learn more about it — how sweat rates vary among individuals, how different biochemicals make their way into sweat, and how well those levels reflect blood glucose."We need to take a step back and be careful to think about how we can make sense of what we're measuring," said Carlos Milla, Javey's collaborator and a professor of pediatrics at Stanford University.The new study underscores Milla's concern. The device measured glucose in sweat, but the results suggested that this was not a good proxy for glucose in the blood. The sweat glucose levels reflect blood glucose from 30 to 60 minutes earlier, too long of a delay to help diabetics."It's indicating this might not be as simple as one might have initially hoped," Rogers said. He added that sweat glucose might be more helpful as a metric in screening for diabetes rather than for real-time monitoring of glucose levels.

Mr.S.Chandrasekhar , Asst.Professor, ECE.

Biodegradable sensor can monitor blood flow in arteries

This new sensor could let doctors keep tabs on a healing vessel from afar, creating opportunities for earlier interventions. (Representational Image Stanford scientists have developed a biodegradable, battery-free sensor that can monitor the flow of blood through an artery,

helping doctors assess the success of blood vessel surgery.

Researchers first tested the sensor in an artificial setting where they pumped air through an artery-sized tube to mimic pulsing blood flow.

The device does not need to be removed and can warn a patient's **doctor** if there is a blockage, researchers said."Measurement of blood flow is critical in many medical specialties, so a wireless biodegradable sensor could impact multiple fields including vascular, transplant, reconstructive and cardiac surgery," said Paige Fox, assistant professor at Stanford University in the US."As we attempt to care for patients throughout the Bay Area, Central Valley, California and beyond, this is a technology that will allow us to extend our care without requiring face-to-face visits or tests," said Fox.Monitoring the success of surgery on blood vessels is challenging as the first sign of trouble often comes too late. By that time, the patient often needs additional surgery that carries risks similar to the original procedure. This new sensor could let doctors keep tabs on a healing vessel from afar, creating opportunities for earlier interventions.The sensor wraps snugly around the healing vessel, where blood pulsing past pushes on its inner surface. As the shape of that surface changes, it alters the sensor's capacity to store electric charge, which doctors can detect remotely from a device located near the skin but outside the body.That device solicits a reading by pinging the antenna of the sensor, similar to an ID card scanner. In the future, this device could come in the form of a stick-on patch or be integrated into other technology, like a wearable device or smartphone.The researchers first tested the sensor in an artificial setting where they pumped air through an artery-sized tube to mimic pulsing blood flow.Surgeon Yukitoshi Kaizawa, a former postdoctoral scholar at Stanford, also implanted the sensor around an artery in a rat. Even at such a small scale, the sensor successfully reported blood flow to the wireless reader.The researchers are now finding the best way to affix the sensors to the vessels and refining their sensitivity. They are also looking forward to what other ideas will come as interest grows in this interdisciplinary area.

Mr.P.Krishna Reddy, Asst.Professor,ECE.

NASA's Opportunity rover mission on Mars comes to end

This infographic highlights NASA's twin robot Geologists, the Mars Exploration Rovers (MER) Spirit and Opportunity.

One of the most successful and enduring feats of interplanetary exploration, NASA's Opportunity rover mission is at an end after almost 15 years exploring the surface of Mars and helping lay the groundwork for NASA's return to the Red Planet.
The Opportunity rover stopped communicating with Earth when a severe Mars-wide dust storm blanketed its location in June 2018. After more than a thousand commands to restore contact, engineers in the Space Flight Operations Facility at NASA's Jet Propulsion Laboratory (JPL) made their last attempt to revive Opportunity Tuesday,

to no avail. The solar-powered rover's final communication was received June 10.

"It is because of trailblazing missions such as Opportunity that there will come a day when our brave astronauts walk on the surface of Mars," said NASA Administrator Jim Bridenstine. "And when that day arrives, some portion of that first footprint will be owned by the men and women of Opportunity, and a little rover that defied the odds and did so much in the name of exploration."

Designed to last just 90 Martian days and travel 1,100 yards (1,000 meters), Opportunity vastly surpassed all expectations in its endurance, scientific value and longevity. In addition to exceeding its life expectancy by 60 times, the rover traveled more than 28 miles (45 kilometers) by the time it reached its most appropriate final resting spot on Mars -- Perseverance Valley.

"For more than a decade, Opportunity has been an icon in the field of planetary exploration, teaching us about Mars' ancient past as a wet, potentially habitable planet, and revealing uncharted Martian landscapes," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate. "Whatever loss we feel now must be tempered with the knowledge that the legacy of Opportunity continues -- both on the surface of Mars with the Curiosity rover and InSight lander -- and in the clean rooms of JPL, where the upcoming Mars 2020 rover is taking shape."

The final transmission, sent via the 70-meter Mars Station antenna at NASA's Goldstone Deep Space Complex in California, ended a multifaceted, eight-month recovery strategy in an attempt to compel the rover to communicate.

"We have made every reasonable engineering effort to try to recover Opportunity and have determined that the likelihood of receiving a signal is far too low to continue recovery efforts," said John Callas, manager of the Mars Exploration Rover (MER) project at JPL.

Opportunity landed in the Meridiani Planum region of Mars on Jan. 24, 2004, seven months after its launch from Cape Canaveral Air Force Station in Florida. Its twin rover, Spirit, landed 20 days earlier in the 103-mile-wide (166-kilometer-wide) Gusev Crater on the other side of Mars. Spirit logged almost 5 miles (8 kilometers) before its mission wrapped up in May 2011.

From the day Opportunity landed, a team of mission engineers, rover drivers and scientists on Earth collaborated to overcome challenges and get the rover from one geologic site on Mars to the next. They plotted workable avenues over rugged terrain so that the 384-pound (174-kilogram) Martian explorer could maneuver around and, at times, over rocks and boulders, climb gravel-strewn slopes as steep as 32-degrees (an off-Earth record), probe crater floors, summit hills and traverse possible dry riverbeds. Its final venture brought it to the western limb of Perseverance Valley.

More Opportunity Achievements

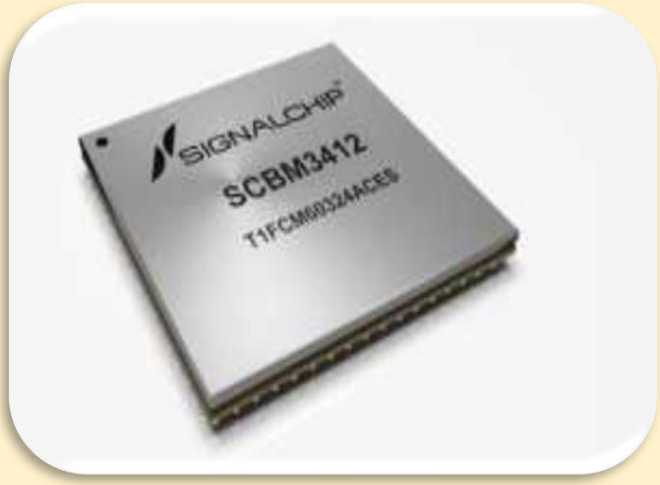
Set a one-day Mars driving record March 20, 2005, when it traveled 721 feet (220 meters). Returned more than 217,000 images, including 15 360-degree color panoramas. Exposed the surfaces of 52 rocks to reveal fresh mineral surfaces for analysis and cleared 72 additional targets with a brush to prepare them for inspection with spectrometers and a microscopic imager. Found hematite, a mineral that forms in water, at its landing site. Discovered strong indications at Endeavour Crater of the action of ancient water similar to the drinkable water of a pond or lake on Earth.All of the off-roading and on-location scientific analyses were in service of the Mars Exploration Rovers' primary objective: To seek out historical evidence of the Red Planet's climate and water at sites where conditions may once have been favorable for life. Because liquid water is required for life, as we know it, Opportunity's discoveries implied that conditions at Meridiani Planum may have been habitable for some period of time in Martian history. "From the get-go, Opportunity delivered on our search for evidence regarding water," said Steve Squyres, principal investigator of the rovers' science payload at Cornell University. "And when you combine the discoveries of Opportunity and Spirit, they showed us that ancient Mars was a very different place from Mars today, which is a cold, dry, desolate world. But if you look to its ancient past, you find compelling evidence for liquid water below the surface and liquid water at the surface."

All those accomplishments were not without the occasional extraterrestrial impediment. In 2005 alone, Opportunity lost steering to one of its front wheels, a stuck heater threatened to severely limit the rover's available power, and a Martian sand ripple almost trapped it for good. Two years later, a two-month dust storm imperiled the rover before relenting. In 2015, Opportunity lost use of its 256-megabyte flash memory and, in 2017, it lost steering to its other front wheel. Each time the rover faced an obstacle, Opportunity's team on Earth found and implemented a solution that enabled the rover to bounce back. However, the

massive dust storm that took shape in the summer of 2018 proved too much for history's most senior Mars explorer. "When I think of Opportunity, I will recall that place on Mars where our intrepid rover far exceeded everyone's expectations," Callas said. "But what I suppose I'll cherish most is the impact Opportunity had on us here on Earth. It's the accomplished exploration and phenomenal discoveries. It's the generation of young scientists and engineers who became space explorers with this mission. It's the public that followed along with our every step. And it's the technical legacy of the Mars Exploration Rovers, which is carried aboard Curiosity and the upcoming Mars 2020 mission. Farewell, Opportunity, and well done." Mars exploration continues unabated. NASA's InSight lander, which touched down on Nov. 26, is just beginning its scientific investigations. The Curiosity rover has been exploring Gale Crater for more than six years. And, NASA's Mars 2020 rover and the European Space Agency's ExoMars rover both will launch in July 2020, becoming the first rover missions designed to seek signs of past microbial life on the Red Planet.

Mr.S.Chandrasekhar
Assistant Professor , ECE

India's first indigenous semiconductor chips for 4G/LTE and 5G NR modems



Secretary, Telecom, Aruna Sundararajan said that Data Security is the paramount concern in the World today and India cannot remain secure in terms of data, unless it manufactures its own chips. She was speaking after unveiling of India's first Indigenous Semiconductor Chips by Bengaluru based semiconductor company Signalchip for 4G/LTE and 5G NR MODEMs in New Delhi. Terming the launch of the Chip as tremendously significant, Sundarajan said that India is just breaking into the elite club of the world and this will have huge implications for India's data security and data sovereignty, besides the positive economic implications. She informed that at present only 8 companies and a few countries can design and build semiconductor chips and launch of Indigenous Chip is in a real sense Make in India for the World. She said, the pioneering work will lead to a whole new architecture of tower building mainly in the light of emission complaints and growing environmental concerns. Sundararajan said that when US and China are battling it out for the core ICT technology, India cannot lag behind, She said, even the high powered Committee formed by the Government of India and headed by Stanford University professor A.J. Paulrajto outline a road map for 5G telecom services has suggested breaking into the IPRs of 5G. She said, the launch of a world class product by Signalchip is start of the Third Wave, after Software and IndiaStack as First and Second wave. She also congratulated the Founder and CEO of Signalchip Himanshu Khasnis and CEO of global company ZOHO, SridharVembu for joining together to write India's most amazing success story. The RF sections cover all LTE/5G-NR bands upto 6GHz. These chips also support positioning using India's own satellite navigation system, NAVIC. The Agumbe series builds up on SCRF1401: India's first RF transceiver chip for high performance wireless standards like 3G/4G and WiFi, created by Signalchip in 2015.

Dr.G.L.Madhumati
Professor & HOD, ECE.

STUDENT ARTICLES

Heart of next-generation chip-scale atomic clock

Physicists at the National Institute of Standards and Technology (NIST) and partners have demonstrated an experimental, next-generation atomic clock ticking at high "optical" frequencies that is much smaller than usual, made of just three small chips plus supporting electronics and optics. Described in *Optica*, the chip-scale clock is based on the vibrations, or "ticks," of rubidium atoms confined in a tiny glass container, called a vapor cell, on a chip. Two frequency combs on chips act

like gears to link the atoms' high-frequency optical ticks to a lower, widely used microwave frequency that can be used in applications. The chip-based heart of the new clock requires very little power (just 275 milliwatts) and, with additional technology advances, could potentially be made small enough to be handheld. Chip-scale optical clocks like this could eventually replace traditional oscillators in applications such as navigation systems and telecommunications networks and serve as backup clocks on satellites.

"We made an optical atomic clock in which all key components are microfabricated and work together to produce an exceptionally stable output," NIST Fellow John Kitching said. "Ultimately, we expect this work to lead to small, low-power clocks that are exceptionally stable and will bring a new generation of accurate timing to portable, battery-operated devices." The clock was built at NIST with help from the California Institute of Technology (Pasadena, Calif.), Stanford University (Stanford, Calif.) and Charles Stark Draper Laboratories (Cambridge, Mass.). Standard atomic clocks operate at microwave frequencies, based on the natural vibrations of the cesium atom -- the world's primary definition of the second. Optical atomic clocks, running at higher frequencies, offer greater precision because they divide time into smaller units and have a high "quality factor," which reflects how long the atoms can tick on their own, without outside help. Optical clocks are expected to be the basis for a future redefinition of the second.

In NIST's original chip-scale atomic clock, the atoms were probed with a microwave frequency. Commercial versions of this clock have become an industry standard for portable applications requiring high timing stability. But they require initial calibration and their frequency can drift over time, resulting in significant timing errors. Compact optical clocks are a possible step up. Until now, optical clocks have been bulky and complex, operated only as experiments by metrological institutions and universities. Optical ticks in rubidium have been studied extensively for use as frequency standards and are accurate enough to be used as length standards. NIST's rubidium vapor cell and the two frequency combs are microfabricated in the same way as computer chips. This means they could support further integration of electronics and optics and could be mass produced -- a path toward commercially viable, compact optical clocks. NIST's chip-based optical clock has an instability of 1.7 x 10?13 at 4,000 seconds -- about 100 times better than the chip-scale microwave clock. The clock works like this: The rubidium atoms' tick at an optical frequency in the terahertz (THz) band. This ticking is used to stabilize an infrared laser, called a clock laser, which is converted to a gigahertz (GHz) microwave clock signal by two frequency combs acting like gears. One comb, operating at a THz frequency, spans a broad enough range to stabilize itself. The THz comb is synchronized with a GHz frequency comb, which is used as a finely spaced ruler locked to the clock laser. The clock thus produces a GHz microwave electrical signal -- which can be measured by conventional electronics that is stabilized to the rubidium's THz vibrations.

P,Nandini Devi, Roll No:168T1A0481,III ECE-B

New way to beat the heat in electronics

Flexible insulator offers high strength and superior thermal conduction

A nanocomposite invented at Rice University's Brown School of Engineering promises to be a superior high-temperature dielectric material for flexible electronics, energy storage and electric devices.

The nanocomposite combines one-dimensional polymer nanofibers and two-dimensional boron nitride nanosheets. The nanofibers reinforce the self-assembling material while the "white graphene" nanosheets provide a thermally conductive network that allows it to withstand the heat that breaks down common dielectrics, the polarized insulators in batteries and other devices that separate positive and negative electrodes.The discovery by the lab of Rice materials scientist Pulickel Ajayan is detailed in *Advanced Functional Materials*.

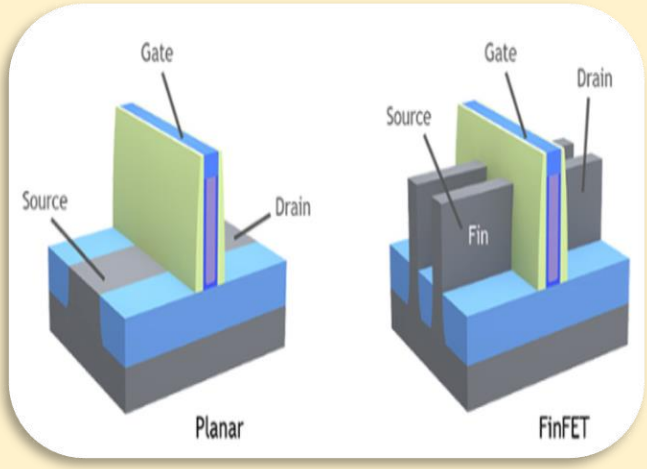
Dielectrics must be thin, tough, flexible and able to withstand harsh environments. "Ceramic is a very good dielectric, but it is mechanically brittle," Rahman said of the common material. "On the other hand, polymer is a good dielectric with good mechanical properties, but its thermal tolerance is very low." Boron nitride is an electrical insulator, but happily disperses heat, he said. "When we combined the polymer nanofiber

with boron nitride, we got a material that's mechanically exceptional, and thermally and chemically very stable," Rahman said.

The 12-to-15-micron-thick material acts as an effective heat sink up to 250 degrees Celsius (482 degrees Fahrenheit), according to the researchers. Tests showed the polymer nanofibers-boron nitride combination dispersed heat four times better than the polymer alone. In its simplest form, a single layer of polyaramid nanofibers binds via van der Waals forces to a sprinkling of boron nitride flakes, 10% by weight of the final product. The flakes are just dense enough to form a heat-dissipating network that still allows the composite to retain its flexibility, and even foldability, while maintaining its robustness. Layering polyaramid and boron nitride can make the material thicker while still retaining flexibility, according to the researchers. "The 1D polyaramid nanofiber has many interesting properties except thermal conductivity," Rahman said. "And boron nitride is a very interesting 2D material right now. They both have different independent properties, but when they are together, they make something very unique."

M.Jyothsna Sai Lakshmi, 168T1A0475, III ECE-B

FinFET Technology



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

There are a number of subtly different forms of trigate transistor structure that are being described as finFETs. The architecture typically takes advantage of self-aligned process steps to produce extremely narrow features that are much smaller than the wavelength of light generally used to pattern devices on a silicon wafer. It is possible to create very thin fins - of 20nm in width or less - on the surface of a silicon wafer using selective-etching processes, although they typically cannot currently be made less than 20nm to 30nm because of the limits of lithographic resolution. The fin is used to form the raised channel. The gate is then deposited so that it wraps around the fin to form the trigate structure. As the channel is extremely thin the gate has much greater control over the carriers within it but, when the device is switched on, the shape limits the current through it to a low level. So, multiple fins are used in parallel to provide higher drive strengths.

Originally, the finFET was developed for use on silicon-on-insulator (SOI) wafers. Recent developments have made it possible to produce working finFETs on bulk silicon wafers and improve the performance of certain parameters. The steep doping profile used to control leakage into the bulk substrate has a beneficial impact on DIBL, although increased doping has a negative impact on variability.

A drive strength tunable FinFET, a method of drive strength tuning a FinFET, a drive strength ratio tuned FinFET circuit and a method of drive strength tuning a FinFET, wherein the FinFET has either at least one perpendicular and at least one angled fin or has at least one double-gated fin and one split-gated fin.

It transistors have been shown to offer comparable or better performance than finFETs. However, the relative compatibility of the bulk-silicon finFET with existing wafer fabrication processes and today’s wafer-supply chain favors the finFET for high-volume IC production at 22nm and below.

FinFETs have key advantages over planar bulk devices. They exhibit more drive current per unit area than planar devices, largely because the height of the fin can be used to create a channel with a larger effective volume but still take advantage of a wraparound gate.

The added performance capability of FinFETs can be used to achieve higher frequency numbers compared to bulk for a given power budget or lower power. The power reduction can come from two sources: reduced need for wide, high-drive standard cells; and the ability to operate with a lower supply voltage for a given amount of leakage.

The FinFET is a technology that is used within ICs. FinFETs are not available as discrete devices. However FinFET technology is becoming more widespread as feature sizes within integrated circuits fall and there is a growing need to provide very much higher levels of integration with less power consumption within integrated circuits.

Shaik Rizwana, 158T1A0488, IV ECE B.

System on Chip (SoC)

A system on a chip or system on chip (SoC) is an integrated circuit (also known as a "chip") that integrates all components of a computer or other electronic system. These components typically (but not always) include a central processing unit (CPU), memory, input/output ports and secondary storage – all on a single substrate or microchip, the size of a coin.[1] It may contain digital, analog, mixed-signal, and often radio frequency signal processing functions, depending on the application. As they are integrated on a single substrate, SoCs consume much less power and take up much less area than multi-chip designs with equivalent functionality. Because of this, SoCs are very common in the mobile computing (such as in Smartphones) and edge computing markets.[2][3] Systems on chip are commonly used in embedded systems and the Internet of Things.

Systems on Chip are in contrast to the common traditional motherboard-based PC architecture, which separates components based on function and connects them through a central interfacing circuit board.

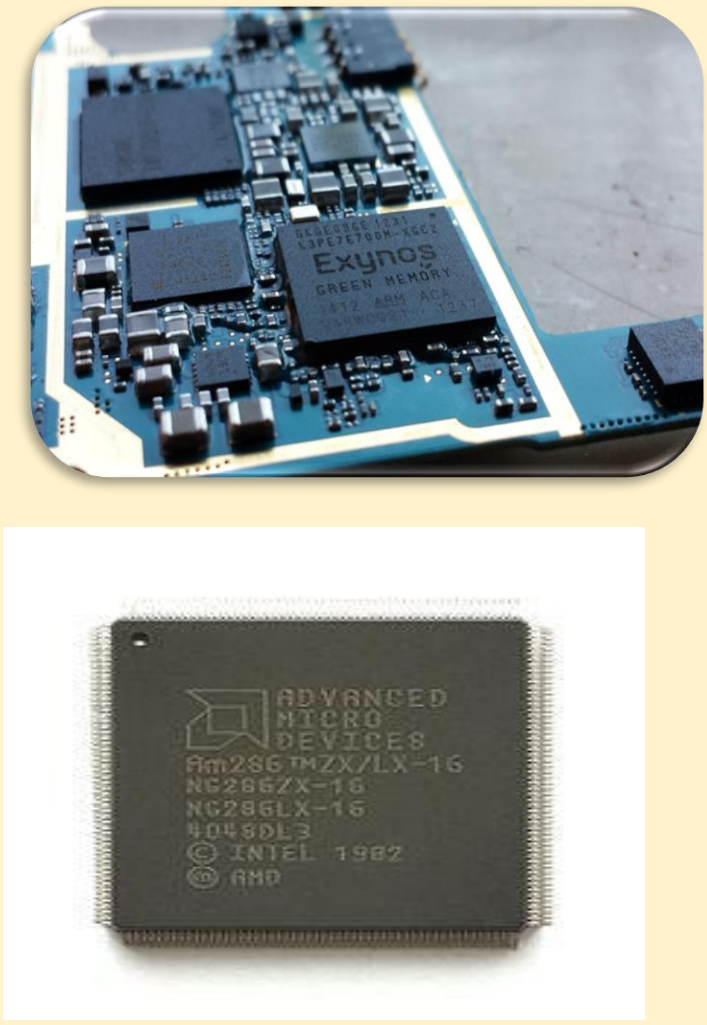


Fig: a. Exynos 4 Quad (4412) *System on a Chip*AMD b. Am286ZX/LX, SoC based on Intel 80286

Whereas a motherboard houses and connects detachable or replaceable components, SoCs integrate all of these components into a single integrated circuit, as if all these functions were built into the motherboard. An SoC will typically integrate a CPU, graphics and memory interfaces, hard-disk and USB connectivity, random-access and read-only memories and secondary storage on a single circuit die, whereas a motherboard would connect these modules as discrete components or expansion cards.

More tightly integrated computer system designs improve performance and reduce power consumption as well as semiconductor die area needed for an equivalent design composed of discrete modules, at the cost of reduced replaceability of components.

By definition,SoC designs are fully or nearly fully integrated across different component modules. For these reasons, there has been a general trend

towards tighter integration of components in the computer hardware industry, in part due to the influence of SoCs and lessons learned from the mobile and embedded computing markets. Systems-on-Chip can be viewed as part of a larger trend towards embedded computing and hardware acceleration.
An SoC integrates a microcontroller or microprocessor with advanced peripherals like graphics processing unit (GPU), Wi-Fi module, or one or more coprocessors.[4] Similar to how a microcontroller integrates a microprocessor with peripheral circuits and memory, an SoC can be seen as integrating a microcontroller with even more advanced peripherals. For an overview of integrating system components, see system integration.

K.Namratha, 158T1A0462, IV ECE B

5G Mobile Wireless Technology

The 5G mobile cellular communications system provides a far higher level of performance than the previous generations of mobile communications systems.

The new 5G technology is not just the next version of mobile communications, evolving from 1G to 2G, 3G, 4G and now 5G.

Instead 5G technology is very different. Previous systems had evolved driven more by what could be done with the latest technology. The new 5G technology has been driven by specific uses ad applications.

5G has been driven by the need to provide ubiquitous connectivity for applications as diverse as automotive communications, remote control with haptic style feedback, huge video downloads, as well as the very low data rate applications like remote sensors and what is being termed the IoT, Internet of Things.

5G standardisation

The current status of the 5G technology for cellular systems is very much in the early development stages. Very many companies are looking into the technologies that could be used to become part of the system. In addition to this a number of universities have set up 5G research units focussed on developing the technologies for 5G

In addition to this the standards bodies, particularly 3GPP are aware of the development but are not actively planning the 5G systems yet.

Many of the technologies to be used for 5G will start to appear in the systems used for 4G and then as the new 5G cellular system starts to formulate in a more concrete manner, they will be incorporated into the new 5G cellular system.

The major issue with 5G technology is that there is such an enormously wide variation in the requirements: superfast downloads to small data requirements for IoT than any one system will not be able to meet these needs. Accordingly a layer approach is likely to be adopted. As one commentator stated: 5G is not just a mobile technology. It is ubiquitous access to high & low data rate services.

5G cellular systems overview

As the different generations of cellular telecommunications have evolved, each one has brought its own improvements. The same will be true of 5G technology.

- ***First generation, 1G:*** These phones were analogue and were the first mobile or cellular phones to be used. Although revolutionary in their time they offered very low levels of spectrum efficiency and security.
- ***Second generation, 2G:*** These were based around digital technology and offered much better spectrum efficiency, security and new features such as text

messages and low data rate communications.

- ***Third generation, 3G:*** The aim of this technology was to provide high speed data. The original technology was enhanced to allow data up to 14 Mbps and more.
- ***Fourth generation, 4G:*** This was an all-IP based technology capable of providing data rates up to 1 Gbps.

Any new 5th generation, 5G cellular technology needs to provide significant gains over previous systems to provide an adequate business case for mobile operators to invest in any new system.

Facilities that might be seen with 5G technology include far better levels of connectivity and coverage. The term World Wide Wireless Web, or WWWW is being coined for this.

For 5G technology to be able to achieve this, new methods of connecting will be required as one of the main drawbacks with previous generations is lack of coverage, dropped calls and low performance at cell edges. 5G technology will need to address this.

5G requirements

As work moves forwards in the standards bodies the over-riding specifications for the mobile communications system have been defined by the ITU as part of IMT2020.The currently agreed standards for 5G are summarised below:

Suggested 5G Wireless Performance	
Parameter	**Suggested Performance**
Peak data rate	At least 20Gbps downlink and 10Gbps uplink per mobile base station. This represents a 20 fold increase on the downlink over LTE.
5G connection density	At least 1 million connected devices per square kilometre (to enable IoT support).
5G mobility	0km/h to "500km/h high speed vehicular" access.
5G energy efficiency	The 5G spec calls for radio interfaces that are energy efficient when under load, but also drop into a low energy mode quickly when not in use.

Suggested 5G Wireless Performance	
Parameter	**Suggested Performance**
5G spectral efficiency	30bits/Hz downlink and 15 bits/Hz uplink. This assumes 8x4 MIMO (8 spatial layers down, 4 spatial layers up).
5G real-world data rate	The spec "only" calls for a per-user download speed of 100Mbps and upload speed of 50Mbps.
5G latency	Under ideal circumstances, 5G networks should offer users a maximum latency of just 4ms (compared to 20ms for LTE).

5G communications system

The 5G mobile cellular communications system will be a major shift in the way mobile communications networks operate. To achieve this a totally new radio access network and a new core network are required to provide the performance required.

- ***5G New Radio, 5G NR:*** 5G new radio is the new name for the 5G radio access network. It consists of the different elements needed for the new radio access network. Using a far more flexible technology the system is able to respond to the different and changing needs of mobile users whether they be a small IoT node, or a high data user, stationary or mobile.
- ***5G NextGen Core Network:*** Although initial deployments of 5G will utilise the core network of LTE or possibly even 3G networks, the ultimate aim is to have a new network that is able to handle the much higher data volumes whilst also being able to provide a much lower level of latency.

5G technologies

There are many new 5G technologies and techniques that are being discussed and being developed for inclusion in the 5G standards.

These new technologies and techniques will enable 5G to provide a more flexible and dynamic service.

The technologies being developed for 5G include:

- ***Millimetre-Wave communications:*** Using frequencies much higher in the frequency spectrum opens up more spectrum and also provides the possibility of having much wide channel bandwidth - possibly 1 - 2 GHz. However this poses new challenges for handset development where maximum frequencies of around 2 GHz and bandwidths of 10 - 20 MHz are currently in use. For 5G, frequencies of above 50GHz are being considered and this will present some real challenges in terms of the circuit design, the technology, and also the way the system is used as these frequencies do not travel as far and are absorbed almost completely by obstacles. Different countries are allocating different spectrum for 5G.
- ***Waveforms :*** One key area of interest is that of the new waveforms that may be seen. OFDM has been used very successfully in 4G LTE as well as a number of other high data rate systems, but it does have some limitations in some circumstances. Other waveform formats that are being discussed include: GFDM, Generalised Frequency Division Multiplexing, as well as FBMC, Filter Bank Multi-Carrier, UFMC, Universal Filtered MultiCarrier. There is no perfect waveform, and it is possible that OFDM in the form of OFDMA is used as this provides excellent overall performance without being too heavy on the level of processing required.
- ***Multiple Access:*** Again a variety of new access schemes are being investigated for 5G technology. Techniques including OFDMA, SCMA, NOMA, PDMA, MUSA and IDMA have all been mentioned. As mentioned above it appears that the most likely format could be OFDMA
- ***Massive MIMO with beamsteering:*** Although MIMO is being used in many applications from LTE to Wi-Fi, etc, the numbers of antennas is fairly limited. Using microwave frequencies opens up the possibility of using many tens of antennas on a single equipment becomes a real possibility because of the antenna sizes and spacings in terms of a wavelength. This would enable beams to be steered to provide enhanced performance.
- ***Dense networks:*** Reducing the size of cells provides a much more overall effective use of the available spectrum. Techniques to ensure that small cells in the macro-network and deployed as femtocells can operate satisfactorily are required. There is a significant challenge in adding huge numbers of additional cells to a network, and techniques are being developed to enable this.

These are a few of the main techniques being developed and discuss for use within 5G.

5G timeline & dates

5G is developoing rapidly and it needs to meet some demanding timelines. Some trial deployments have occurred and some of the first real deploymets are anticipayed in 2020.

Many countries are rushing to deply 5G as effective communications enable economimc growth and are seen as an essential element of modern day life and industry.

M.Jyothsna Sai Lakshmi, 168T1A0475, III ECE-B

Bluetooth 5 is setting the stage for the future

Of smart home. Of audio. Of the IoT

Bluetooth is revolutionizing how people experience the IoT. Bluetooth 5 continues to drive this revolution by delivering reliable IoT connections and mobilizing the adoption of beacons, which in turn will decrease connection

barriers and enable a seamless IoT experience. Bluetooth 5 offers the flexibility to build IoT solutions based on feature need- range, speed and security can be adjusted for a variety of environments and end products. The increased speed of Bluetooth 5 lays the groundwork for the next generation of Bluetooth audio, and the increased range will deliver reliable IoT connections that make full-home, building, and outdoor use cases a reality.

Bluetooth 5 is ubiquitous

Bluetooth is unique in its ubiquity. No other wireless technology can match the install base of Bluetooth technology, with well over 10 billion devices. Bluetooth 5 includes updates that help reduce potential interference with other wireless technologies to ensure Bluetooth devices can coexist within the increasingly complex global IoT environment.

Bluetooth 5 delivers all of this while maintaining its low-energy functionality and flexibility for developers to meet the needs of their device or application.

Bluetooth 5 continues to power the IoT but with additional features that better enable industrial automation and whole home coverage by addressing challenges like range and download speeds. Bluetooth 5 is driving the beacon revolution, with improved location awareness and smarter technology that collects data to provide personalized experiences for the end user. Higher speed enables more responsive, high-performance devices. Increased broadcast message size increases the data sent for improved and more context relevant solutions.

Bluetooth 5 continues to drive the revolution of how people experience the IoT, with the simple, secure connectivity you expect.

Bluetooth 5 is doing more with Bluetooth

Security Bluetooth adheres to U.S. federal security regulations, ensuring that all Bluetooth devices are capable of meeting and exceeding strict government security standards.

Low Energy The power-efficiency of Bluetooth with low energy functionality makes it perfect for devices that run for long periods on power sources, such as coin cell batteries or energy-harvesting devices. Bluetooth 5 offers the option of increased range or speed, and it's always low energy.

Coexists with other technologies Bluetooth 5 also includes updates that help reduce potential interference with other wireless technologies to ensure Bluetooth devices can coexist within the increasingly complex global IoT environment.

P,Nandini Devi, Roll No:168T1A0481,III ECE-B

Placements in ECE for the AY 2018-19

S. No	Name of the Student	ID Card Number	Branch	Name of the Employer	Date of Interview	Date of appointment letter/job offer	Designation	Package (LPA)
1	Bhanu Sai Sankar	158T1A0410	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
2	Y.Akhila	158T1A0405	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
3	P.Manikanta	158T1A0401	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
4	K.Bhanu Satya Sai	158T1A0412	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
5	G.Abhinay	158T1A0403	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
6	M.Kranthi Kumar Reddy	158T1A0439	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
7	S.Rohith	158T1A0474	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
8	Jeevan Koutilya.K	158T1A0432	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
9	B.Krishna	168T5A0401	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
10	Venkata Adi N Immadi	168T5A0405	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
11	Md.Afrid	168T5A0410	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
12	Y.Naveen Sai	158T1A0463	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
13	B.Sai Krishna	158T1A0480	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
14	Asish Kumar.M	158T1Ao402	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
15	Golla Venkata Shanmukh	158T1A04B0	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
16	P.Harnadh Rahul	158T1A04A4	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
17	K.Venkata Anantha Ram	158T1A04A7	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
18	K.Venkata Sai Kumar	158T1A04A8	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
19	P.Venkata Suresh	158T1A04B1	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
20	K.Lakshmi Prasanna Devi	158T1A0442	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
21	Jahnavi.G	158T1A0430	ECE	CINIF Technologies	31/07/2018	31/07/2018	Trainee Engineer	3.60
22	Guvvala Abhinay	158T1A0403	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
23	K. Venkata Anantha Ram	158T1A04A7	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
24	M.S. S. L. Ganesh	148T1A0487	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
25	Parepalli Haranadh Rahul	158T1A04A4	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
26	G. Jahanavi	158T1A0430	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20

27	Kanulla Lakshmi Prasanna Devi	158T1A0442	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
28	Y. Naveen Sai	158T1A0463	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
29	Bethamcharla Sai Krishna	158T1A0480	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
30	K. B Satya Sai	158T1A0412	ECE	IBeON INFOTECH	21/08/2018	30/08/2018	Desktop Support Engineer Position	2.20
31	Chigurupati Naga Nikitha,	158T1A0459	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
32	Nafia Afreen,	158T1A0457	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
33	Haranadh Rahul Parepalli,	158T1A04A4	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
34	Jahnavi Guvvala,	158T1A0430	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
35	Husnaa Sultana,	158T1A0428	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
36	Sravya Nukala,	158T1A0493	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
37	Samatha Devarapalli,	158T1A0484	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
38	Gumpalli Rushitha,	158T1A0476	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
39	Venkata Sai Kumar.K	158T1A04A8	ECE	Path Front	22/08/2018	22/08/2018	Technology - Specialist	3.00
40	Deepika Challa	158T1A0419	ECE	TCS	9/10/2018	09/10/2018	Assistant System Engineer-Trainee	3.36
41	Meghana Uppalapati	158T1A0451	ECE	TCS	9/10/2018	09/10/2018	Assistant System Engineer-Trainee	3.36
42	Jahnavi Guvvala	158T1A0430	ECE	Veda IIT(SoCtronics)	15-10-2018	15-10-2018	Engineer Trainee	3.40
43	T.N.S Chandrika	158T1A0460	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
44	L.Kaivalya	158T1A0444	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
45	Ch.Saranya	158T1A0487	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
46	K.Roopa	158T1A0475	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
47	M.Anirudh	168T5A0411	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
48	Harika	158T1A0427	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
49	Anusha	158T1A0407	ECE	veetechnologies	17-12-2018	06-01-2019	Medical Coder Trainee	2.16
50	Batchu Bharat	158T1A0413	ECE	V Soft	03-01-2019	03-01-2019	Java Developer	2.40
51	Thota.N.S.Chandrika	158T1A0460	ECE	TALENTIO	03-01-2019	10-01-2019	Training Specialist(Verbal trainer)	3.0
52	Parepalli.Rahul	158T1A04A4	ECE	TALENTIO	03-01-2019	10-01-2019	Training Specialist(Aptitude trainer)	3.0
53	Ch.Harika	158T1A0427	ECE	HCL	09.01.2019	10-02-2019	Software Developer	3.5
54	Y.Naveen Sai	158T1A0463	ECE	Amazon Effive India Pvt ltd	28.01.2019	06-02-2019	CRM	2.6
55	Sita Chowdary.K.N	158T1A0465	ECE	Amazon Effive India	28.01.2019	06-02-2019	CRM	2.6

				Pvt ltd				
56	B.Sai Krishna	158T1A0480	ECE	Amazon Effive India Pvt ltd	28.01.2019	06-02-2019	CRM	2.6
57	I.Venkata Adi Narayana	168T5A0405	ECE	Amazon Effive India Pvt ltd	28.01.2019	06-02-2019	CRM	2.6
58	Aadikoti Veera Sai Manikanta Padamata	158T1A0401	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
59	Meghana Uppalapati	158T1A0451	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
60	Sri Pravallika Minnikanti	158T1A0494	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
61	Srihitha Marrivada	158T1A0495	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
62	Alla Sai Chandrika	158T1A0479	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
63	Janardhana Anusha	158T1A0407	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
64	Venkata Ananthram Karicherla	158T1A04A7	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
65	Yenuga Naveen Sai	158T1A0463	ECE	CTS	20.01.2019	26-02-2019	Programmer Analyst Trainee	3.4
66	A Vinay	158T1A04B5	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
67	Burri Rajesh	168T5A0403	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
68	N Subhash	168T5A0412	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
69	Harsha Vardhan.Koneru	168T5A0408	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
70	M Anirudh	168T5A0411	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
71	Sk Ibrahim	168T5A0417	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
72	M Vikas	158T1A04B4	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
73	Kolluri Vinay	158T1A04B6	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
74	Sk Sameer	158T1A0489	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
75	Vanacharla Rajesh	158T1A0473	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
76	J V S S Chandra Malli Karjuna	158T1A04A3	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
77	Komma Ajay Krishna	158T1A0404	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
78	Mandava Vamsi Krishna	158T1A04A5	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
79	Kalluri Venkatesh	158T1A04B2	ECE	Surya Tech Ltd	27.02.2109	08.03.2019	Trainee Engineer	2.6
80	Y.Seshu Babu	168T5A0421	ECE	GAMMA PROCESS HUB INDIA LTD	16.03.2019	18.03.2019	Sales Executive	1.1
81	B.RAJESH	168T5A0403	ECE	GAMMA PROCESS HUB INDIA LTD	16.03.2019	18.03.2019	Sales Executive	1.1

82	HARSHA VARDAN	168T5A0408	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
83	SAI KUMAR NAIDU	158T1A04A9	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
84	KALYAN SHOURY	148T1A0430	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
85	RAVI TEJA	168T1A0413	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
86	SK.SAMEER	158T1A0489	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
87	IBRAHIM	168T5A0417	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
88	SESHU BABU	168T5A0421	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
89	VAMSI KRISHNA	158T1A04A5	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
90	VENKATESH	158T1A04B2	ECE	Noveau Medicament Pvt Ltd	20.03.2019	29.03.2019	Medical Representative	2.4
91	BURRI RAJESH	168T5A0403	ECE	Valeo Espana Sau	30-03-2019	30.03.2019	Electronics Engineer	EUR €65000
92	YALAGANDULA SESHU BABU	168T5A0421	ECE	Valeo Espana Sau	30-03-2019	30.03.2019	Electronics Engineer	EUR €65000
93	L.Kaivalya	158T1A0444	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
94	T.Chandrika	158T1A0460	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
95	K.Namratha	158T1A0462	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
96	N.Sravya	158T1A0493	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
97	P Manasa	158T1A0447	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
98	K Monika	158T1A0456	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
99	K.Bhanu Tejasri	158T1A0411	ECE	NTT DATA	08-05-2019	08-05-2019	Help desk Associate	2.0
100	BATCHU BHARAT	158T1A0413	ECE	NTT DATA	08-05-2019	21-05-2019	Help desk Associate	2.0

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DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

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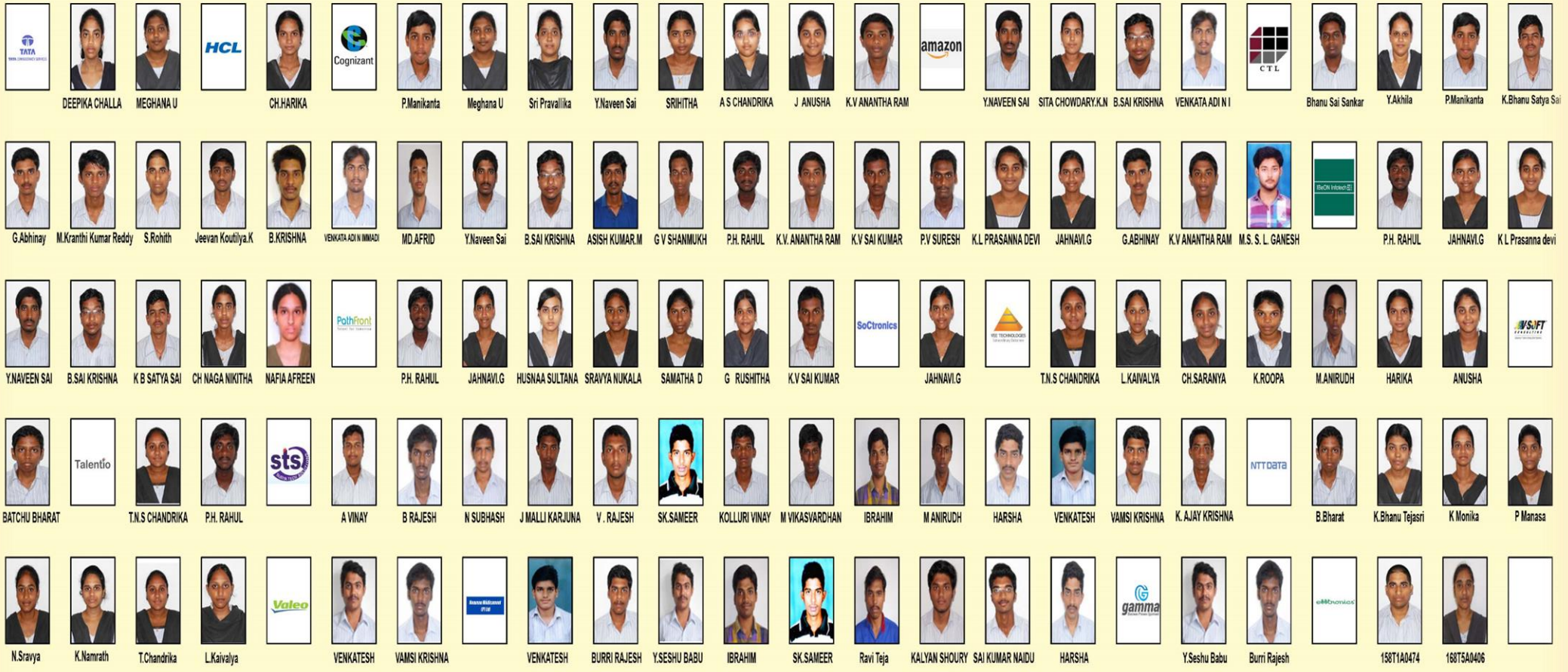
DEPARTMENT OF ECE

TRAINING, PLACEMENT & CAREER GUIDANCE CELL

WORDS REALLY FAIL TO EXPRESS OUR JOY AT THE NEWS OF YOUR SELECTION FOR THE REPUTED ORGANISATIONS RANGING FROM NATIONAL REPUTATION AND INTERNATIONAL RECOGNITION. YOUR SELECTION WAS HOWEVER, NO SURPRISE BECAUSE YOUNG AND TALENTED TECHNOCRATS OF YOUR CALIBER AND SUPERIOR INTELLIGENCE WERE BOUND TO FARE EXCELLENTLY.



List of Faculty participated in FDP's /Workshops/Seminars/Short term Programs

S.No	Name of the Faculty/ Staff	Date	Institution	Topic
1	Mr V Subba Raju	26-5-2018 to 31-5-2018	NIT Warangal	IOT and its use perspective
2	Mr S Chandra Sekhar	22-10-2018 to 26-10-2018	IIT Bombay	Nano Fabrication Technologies
3	Mr A Sivannarayana	21-11-2018 to 26-11-2016	NIT Warangal	Information Theory-Coding Applications
4	Ms K Radha	17-11-2018	VRSEC	VLSI Design and Challenges
5.	Mr A Sivannarayana	15-3-2019	DIET Ganguru	Moodle Learning Management System, IIT Bombay
6.	P.Krishna Reddy	15-3-2019	DIET Ganguru	Moodle Learning Management System, IIT Bombay
7.	V.Subba Raju	15-3-2019	DIET Ganguru	Moodle Learning Management System, IIT Bombay
8.	Dr.P.Pavithra Roy	15-3-2019	DIET Ganguru	Moodle Learning Management System, IIT Bombay
9.	Dr.G.L.Madhumathi	15-3-2019	DIET Ganguru	Moodle Learning Management System, IIT Bombay

List of Faculty Publications: Journals

S.No.	Title of paper	Name of the author/s	Name of Journal	Year of publication/ ISBN/ISSN number
1	10T SRAM -V_{DD} pre-charge using read port for low Switching power and low RBL leakage	Mr S Chandra Sekhar	International Journal of Research	2018 e-ISSN: 2348-6848, P-ISSN:2348-795X
2.	Carry skip adder -high speed operating under wide range of supply logic at different levels	Mr S Chandra Sekhar	International Journal of Scientific Development and Research	2018 ISSN:2455-2631
3.	Satellite Image Resolution Enhancement based on Dual Domain Filtering	Mr M Tulasidasu	International Journal of Engineering and Technology	2018 ISBN:7(2.7)(2018) 466-469
4.	An Efficient Tree structure 32-bit Brent-Kung Adder for Reducing Time Delay and Memory Utilization	Mrs.Y. Naga Prasanthi	Journal of Semiconductor Devices and Circuits	2018 2455-3379

List of Faculty Publications: Conferences

S.No.	Title of paper	Name of the author/s	Name of Journal	Year of publication/ ISBN/ISSN number
1.	A Novel feature of increased safety during car crashes	Mr S Chandra Sekhar	Second International Conference on Inventive Systems and Control	2018 978-1-5386-0806-7

Industrial Visits

Industrial visit to Radar Station, Machilipatnam

Student Workshops & Guest Lectures

C Programming Workshop under APPSC for IV ECE Students

IOT with Python Programming Under APSSDC Workshop for III ECE Students

PCB Designing Workshop

Guest Lecture on Latest Trends in VLSI Design

Dhanush 2K18 Celebrations

Dhanush 2K18 has conducted on 14th and 15th of December 2018. The department of ECE has conducted poster presentation, technical Quiz, Project exhibition and circuit hunt along with the college level events. The technical fest gives the opportunity to students to exhibit their academi9c and circular talents.

Dhanush-2k18 Poster

Digi Key Event

Project Exhibition and Circuit Hunt events

Group Photo of Staff with outgoing students of 2017-18

Faculty of ECE Greeting Chairman in the eve of New year 2019

Faculty of ECE Greeting Principal in the eve of New year 2019

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY: GANGURU
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