Volume 6 Issue 1 December **2017**

AVERA
(Association of Electrical and Electronics Engineering)

PULSE

From the Editorial

The written word has never ceased to withdraw its influence over the educated community. A written word is a record of an event, which will exist forever, long after the grandeur of that event.Presenting you PULSE– one such avatar of the written world, which eliminates the darkness of ignorance by spreading its rays of Knowledge!

PULSE is a Newsletter associated with AVERA– the association of the department of EEE. PULSE aims at presenting to the global community the activities of students and faculty members of EEE department.

This year, Team AVERA has spilt its ink on productive data, for the benefit of the Readers. Flip through the next few pages to experience :

* Vision and Mission of EEE
* Annals of 2017 - Portfolio of achievements
* What's New? - Latest technologies from around the globe
* From Photo gallery
* Test your Grey Cells - Activities for the brain

The Team

"A successful team beats with one heart"

This year, 2017 the team has stepped into office with high hopes and ambitions. With an able guidance of Dr. K. Umamaheshwari, AP(SG), EEE and Mr M.Balaji AP(SS), EEE and a strong leadership under Selvan K. Pradheep Kumar, final year, EEE, and an effective team, the present year was a very productive one. With a clear cut plan and an effective & workaholic team, the present year was a uphill ride for the department of EEE. The year was busy with Guest lectures, events and workshops occupying the calendar.

Vision and Mission of EEE

Vision

Emerge as the world leader for the Electrical and Electronics Engineering Education and research for the application of knowledge to the society.

Mission

The EEE Department believes that every student is a unique and is in a process of continuous growth. In order to foster growth and empowerment, we commit ourselves to provide,

* A stimulating learning environment with A technological orientation to maximize Individual Potential
* Continuous pursuit of quality and excellence
* Appropriate know-how and up-to-date knowledge
* Nurture creativity and ambit for research

AVERA 2017-2018

WORKSHOP ON Embedded System Design

"Embedded" reflects the fact that the component is an integral part of the system. Embedded Systems have be-come such an important part of all applications that their presence is far from obvious to the casual observ-er. Embedded application based pro-jects never loose their shine.

AVERA, the association of Electrical and Electronics Engineering department has conducted a workshop titled, "Embedded Programming" on 10.10.2017 (Tuesday) for second year students of EEE from 9.00 am to 5.00 pm.

The faculty members having expertise in Embedded Programming are identified as resource persons to facilitate the workshop. The information is circulated to students, for collecting the list of students willing to attend the workshop, with the approval from HOD / EEE. The workshop is attended by 20 participants across A, B and C sections of II year. The introductory lecture for the workshop is given by Dr. A. Senthil Kumar, Prof. and Head / EEE Department. The workshop focussed on the PIC16F877A microcontroller. Mr. R. Muthubharathi AP / EEE department conducted the morning session. In the morning session, introduction about the PIC microcontroller is given and the basics of embedded programming are introduced to participants.

All the basics about the PIC and the purpose of the PIC are taught to them. Mr. Dinesh AP / EEE department and Mr. B. Vigneshkumar AP / EEE department conducted the afternoon session. In the afternoon session, the participants are facilitated with hands-on session in embedded programming. The implementation of Home automation through Bluetooth is demonstrated to the students. The participant's feedback reflects that the workshop is very useful for them to improve their programming skills and it also induced their area of interest towards microprocessor and microcontroller.

TECHNICAL QUIZ

An intra-department technical quiz was conducted by AVERA association for II-year students on 4.9.2017. About 100 students participated in the preliminary round out of which 20 students were shortlisted for the second round. The participants were split up into teams comprising of 2 per team and were asked to choose questions from a particular domain. By the end of second round, three teams were se-lected. In the final round each team were asked to answer the logical questions. At last, among the three teams two were selected and given the first and second places. The event was monitored by the staff coordinators of AVERA Dr.K.Umamaheshwari AP(SG) and Mr.M.Balaji AP(SS) .

Dr.A.Senthil Kumar, HOD/EEE Department , appreciates the prize winners at Technical quiz event conducted by AVERA

Participants in Technical Quiz event

UDDESHAH

Uddeshah a national level symposium was conducted on Oct 13 and 14th of this year. Avera also contributed events for two days during the symposium. “SURVIVA” and “GAME OF CIRCUITS” were the two events with huge number of participants and guided by our faculty members Dr.K.Umamaheshwari AP(SG) and Mr.M.Balaji AP(SS)/EEE. The event was very successful with the co-ordination of event co-ordinate faculties Mrs.G.Sophia Jasmine AP/EEE and Mr. M. Prabhuraj AP/EEE. These events were guided by the student event co-ordinators Selvan L.kamalahasan , Executive and Selvi S.M. Nachammai, Secretary-Avera. The winners were awarded with the cash price.

Avera team with staff event co-ordinators Dr.k.Umamaheshwari AP(SG) and Mrs.G.Sophia jasmine, AP Department of EEE

Avera team with staff event co-ordinator Mr.M.Balaji Assistant Professor(SS)/EEE

Inauguration of the event SURVIVA

Price distribution for the winner by Dr.M.Kaliamoorthy Associate Professor/EEE

Interaction is a tool of learning. On 15th September 2017, a set of four final year students interact with the III year students of EEE. They shared their real time experiences regarding their placement activities and they give some ideas about industry's expectation. The students were motivated to start preparing for the placements and get industryready.

Final year students interacting with third year EEE students

FIRST YEAR INAUGURATION

The inaugural function and induction ceremony of the first year students was held on 21st August 2017. At afternoon, the first year students of electrical and electronics engineering had an interaction with the head of the department, faculty members and the team of the AVERA. The inaugural address was given by Dr.A.Senthil Kumar, the head of the department. He delivered a presentation about the assistant professors, faculty members and lab assistants of the department. He introduced the faculty advisors of the first year students. He also explained the rules and regulations of the college to the students and parents. After him, Selvan.K.Pratheep Kumar, the president of AVERA shared his memories and experiences in his college life. He also explained about the facilities in the college and how it could be used by the students. Followed by him, Selvan.R.Deepak Ruban, the vice-president of AVERA and Selvan.C.Barath, the Newsletter Editorial member, AVERA gave the presentation on the co-curricular activities, extra-curricular activities and placement details of the past five years of the EEE department. Finally, the vote of thanks was given by Selvi.T.Dhivya, the Joint secretary of AVERA.

First year students of EEE department for the academic year 2017-2021

Dr.A.Senthil Kumar, HOD/EEE addressed the gathering

ANNALS OF 2017

PROJECT PROPOSALS BY STUDENTS

S.No	Students Name	Guide	Title	Agency	Status
1	M.Arjun S.R.Divyadharini A.Rajarajan	Mr.S.Dinesh	Design of Automated Robot for Garbage Collection and Smart Segregation using Wireless Communication in Beaches	TNSCST	Rs.10000 is Sanctioned
2	M Sivabalakrishnan M Kirubananthasakthi S.Jawahar	Mr.B.Kishore	Device for monitoring kinesiotheraphy in rheumatic patients	TNSCST	Rs.10000 is Sanctioned
3	N.Abirami K.S.Dharsana R.Asvin Ragav	Ms.K.Saranya	Braille Learning System	TNSCST	Applied
4	J.Maheswari A.Joyce Gnana Angel V.Arunkumar	Ms.K.Saranya	Solar Powered Household Waste Segregation	TNSCST	Applied

PROJECT PRESENTATION

S.No	Students Name	Guide	Event Title	Status
1	B.Moorthy M.Natramil L.Kamalahasan	Mr.S.Dinesh	SAEINDIA	Won III Place in I round and Qualified for II Round
2	S.Anbarasu S.Tamilselvan E.Sindhu M.Gurusamy	Mr.B.Vigneshkumar AP	Mitsubishi Electric Cup – National Level Automation Competition for Students	Applied
3	R.Pooja S.Kalpana M.Aravindkumar N.K.Gokul Panneer	Mr.R.Muthubharathi	ACC-ARM Challenge 2017 by TVS & ARM University, Bangalore	Selected in Prelims Level
4	B.Kamali P.Kiruba V.Tamilarasu T.Sharan	Mr.R.Muthubharathi		

PLACED STUDENTS AND RECRUITERS

R.BALAJI
V.JANANI
S.M.NACHAMMAI
V.SWETHA
A.ASMITHA
S.AJEETHKUMAR
S.INDUPRIYA
M.SANTHOSHKUMAR
K.MOHAMED AMEERKHAN
M.S.RAGHAVI

S.YOGHASREE
V.THENMOZHI
M.VIGNESHWAR
J.RAGAVI
M.NATRAMIL
S.SANDHIYA
D.KATHIR ESWARAN

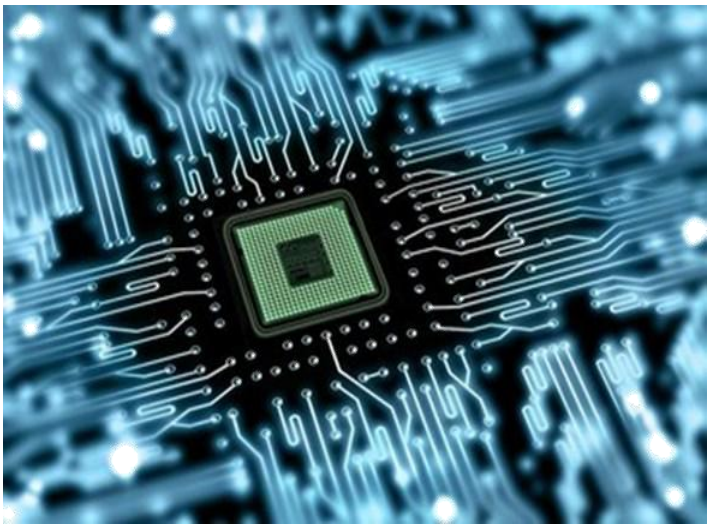
K.ARAVINDHAN

B.MOORTHY
S.TAMILARASI

K.SELVARAJ

SILICON PHOTONICS PIONEER LOOKS TO EASE THE DATA-CENTRE NETWORKING PROBLEM

Those architecting the so called 'mega datacentres' are on red alert, according to Dr Andrew Rickman, CEO of Rockley Photonics. "The industry is on a mad path," he contended. "Moore's Law is proving difficult and costly but, with the right combination of elements, we can break the cycle". Dr Rickman is no stranger to the world of photonics; he founded Bookham Technology in 1988 and saw the company rise to FTSE100 status. Part of Bookham's appeal was its production of developers in his sights.



Where Bookham had telecom in its sights, we can see the market for datacentre technology will be bigger". In his opinion, the basic issue is the amount of data being handled and the speed at which it is being transmitted. "The line rate in network equipment is rising from 1G to 10G to 25G," he said. "And the distance over which electronic signals can be driven is becoming ever shorter; there are a lot of backplane problems. I think there are opportunities to move forward with a combination of silicon photonics and CMOS technology in the same package. Rockley's mission is to develop massively scalable photonics technology."

The use of photonics will, he believes, bring lower cost, more compact datacentres that consume less power.
"Operators are increasing the number of servers in their datacentres," he noted, "and these can benefit from Moore's Law, with more compute capacity for less cost. But the network equipment has two problems. When you double the number of servers you want to connect, the amount of network equipment needed increases by a factor of six. And Moore's Law doesn't help this I/O problem; the more transistors you put on a chip, the more it becomes a bottleneck in terms of the number of connections you can make."

Rockley is looking at the creation of an optimum switch architecture, with the best combination of CMOS and photonics technologies. "We want to create some-thing that can be 'dropped in," he continued, "and which can scale in a linear fashion". He pointed to the number of layers in a network. "We're looking to compress the number of switch layers through an innovative architecture and the introduction of photonics.

networking components based on silicon photonics technology. "We had silicon photonics in high volume production", he noted. "Then the dot com crash came. Bookham was on the right track, but there was massive disruption."

Since then, Dr Rickman has remained involved in the photonics industry, but has had a lower profile. Now, he has come back into the spot-light with Rockley, with solutions to the problems

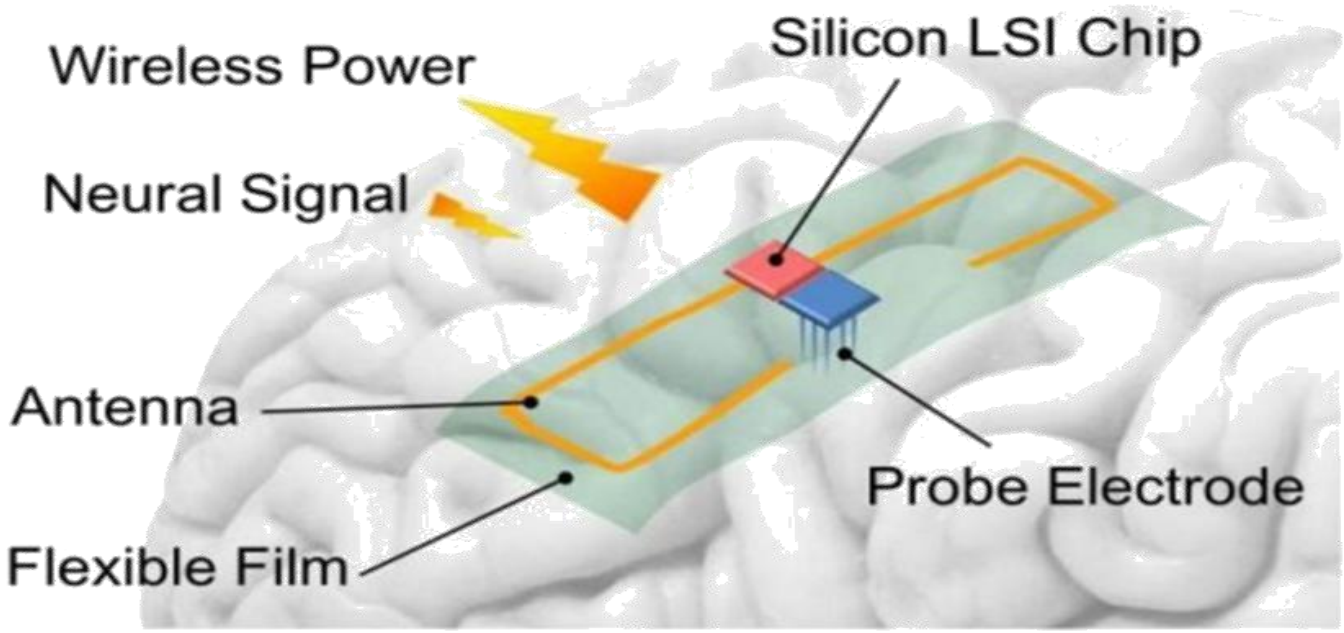
"Building blocks that don't exist any-where else," said Dr Rickman. If you were able to 'take the top off' of one of these devices, you'd see the CMOS element handling packet processing, while the silicon photonics content dealing with switching and transmission. "These devices must be able to communicate within a card, a rack and across a datacentre. If you only produce a photonics device that gets data off the chip, you need to go back into the electronic domain to regenerate the signal and then return to the optical domain.

"Our approach has powerful photonics which can get anywhere and do that using less power than it takes to push a 25G signal across a couple of inches of PCB track". Rockley has developed its own silicon photonics process, but remains a fabless company. "

-S.Ram Kumar(3rd EEE)

"Our virtues and our failings are inseparable, like force and matter. when they separate, man is no more. " Nikola Tesla

WIRELESSLY SUPPLYING POWER TO BRAIN



Human and animal movements generate slight neural signals from their brain cells. These signals obtained using a neural interface are essential for realizing brain-machine interfaces (BMI). Such neural recording systems using wires to connect the implanted device to an external device can cause infections through the opening in the skull. One method of solving this issue is to develop a wireless neural interface that is fully implantable on the brain. However, the neural interface implanted on the brain surface should be of small size and minimally invasive. Furthermore, it requires the integration of a power source, antenna for wireless communication, and many functional circuits. Now, a research team at the Department of Electrical and Electronic Information Engineering at Toyohashi University of Technology has developed a wafer-level packaging technique to integrate a silicon large-scale integration (LSI) chip in a very thin film of a thickness 10 μm. The approach is realized using flip-chip bonding. The researchers have fabricated a wireless power transmission (WPT) device including a flexible antenna and rectifier chip by using the proposed method.

The first author PhD candidate Kenji Okabe said, "We have investigated how to integrate flexible antenna and high-performance circuits and tried this fabrication method with process conditions obtained through experiments." Assistant Professor Ippei Akita, who is leading the project, said, "Using flexible device technology is a good solution to implement bio-compatible passive devices such as antennas or sensor electrodes. On the other hand, silicon-based integrated circuit technology, which has long history, is suitable for ultra-low power systems with many functionalities. So, we believe that combining these technologies is essential to establish such minimum invasive implantable devices."

The fabricated device is of size 27 mm × 5 mm, and 97% of the device area is composed of a flexible film as the silicon chip has a small area. Therefore, it has sufficient flexibility to fit the shape of the brain surface. In addition, the researchers achieved WPT to the device immersed in saline.

This WPT device can supply electricity to other circuits included in the neural interface. The researchers are trying to integrate more functions (e.g., amplifiers, analog to digital converters, signal processors, and radio frequency circuits) to an LSI chip. This study may contribute to the development of safer BMI systems.

-A. Jeevitha(3rd EEE)

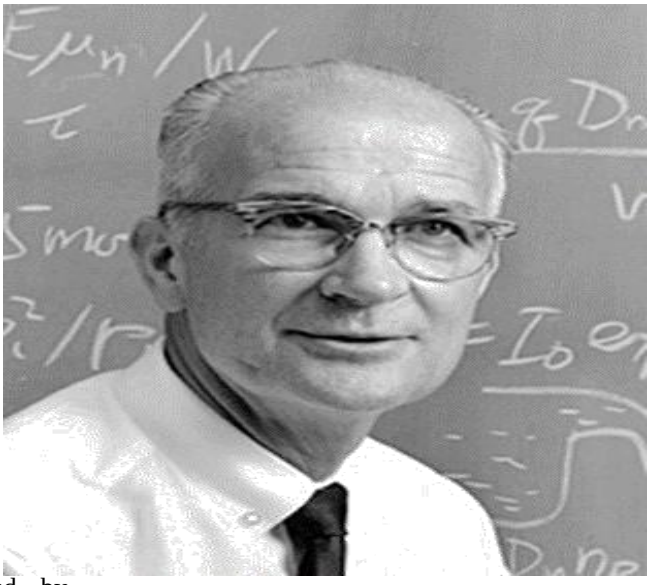
"Mathematics is the language in which God has written the universe." Galileo Galilei

WILLIAM SHOCKLEY

Synopsis:

William Bradford Shockley clearly was one of the brightest scientists of the 20th century, yet he lived a life of noisy desperation.

He was a modern hero taken from one of the ancient Greek tragedies, caught in an age he helped invent. Like Orestes and Oedipus, Shockley was driven by the internal demon of hubris. Unlike Orestes and Oedipus, however, he never found redemption. Yet without him, you would probably be doing something less interesting right now.



Endeavors became clouded by controversy, however, because of his pronouncements on race.

He preached a philosophy of "retrogressive evolution." Stipulating in human evolution that intelligence was genetically transmitted, he deemed blacks genetically inferior to whites and unable to achieve their intellectual level.

Start of Electronic Age:

In 1947, he and two colleagues from Bell Telephone Laboratories, the research arm of American Telephone & Telegraph Company, produced their first semiconductor device. And in 1956 he shared the Nobel Prize with the two, John Bardeen and Walter H. Brattain.

The invention of the transistor became the basis for the electronic age. From it flowed virtually every one of today's devices installed in airliners and cars, calculators and computers, wristwatches and washing machines.

Dr. Shockley left Bell Laboratories in 1954 and founded a semiconductor factory. A rebellion among his employees, who set up their own companies, began the phenomenon near Stanford University known as Silicon Valley.

Dr. Shockley went on to lecture at Stanford in 1958 and served as Alexander M. Poniatoff professor of electrical engineering and applied sciences from 1963 to 1975.

Debate on I.Q. Tests :

His theory on racial differences set off a national argument over the use and applicability of I.Q. tests. Evidence that blacks tend to score lower than whites was discounted by most experts who saw the explanation in cultural and social rather than genetic terms.

Stanford University, which announced the death late yesterday, said Dr.Shockley regarded his work on race more important than his discovery of the transistor. Quoting his wife, the announcement said he continued to sift data and prepare papers on it until a few days before he died.

Dr. Shockley had alienated many of his fellow scientists by straying far beyond his ken. He drew further scorn when he proposed financial rewards for the "genetically disadvantaged" if they volunteered for sterilization.

William Bradford Shockley, who shared a Nobel Prize in physics for his role in the creation of the transistor and earned the enmity of many for his views on the genetic differences between the races, died of cancer of the prostate at his home in California on Saturday. He was 79 years old and lived on the campus of Stanford University.

He was a professor emeritus of electrical engineering at Stanford. In addition, he lectured and wrote extensively. Many of his early

He sued The Atlanta Constitution for a 1980 column likening that suggestion to Nazi experiments in genetic engineering. In 1984 a Federal jury in Atlanta found that he had been libelled but awarded him just $1 in actual damages.

Trial and Error:

The team of Dr.Shockley, Dr.Brattain and Dr.Bardeen started out with the concept of the tubeless radio and proceeded from there by trial and error or, as Dr.Shockley later put it, by "creative-failure methodology."

"A basic truth that the history of the creation of the transistor reveals," he said, "is that the foundations of transistor electronics were created by making errors and following hunches that failed to give what was expected". This is sited from https://www.nobelprize.org/nobel_prizes/physics/laureates/1956/shockley-bio.html

-S.Logeshwaran (Final EEE)

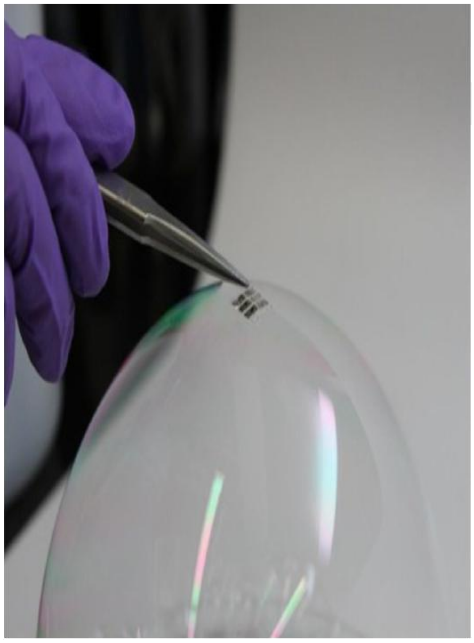
"If the misery of the poor be caused not by the laws of nature ,but by our institution, great is our sin." Charles Darwin

SOLAR CELLS AS LIGHT AS A SOAP BUBBLE

Imagine solar cells so thin, flexible, and lightweight that they could be placed on almost any material or surface, including your hat, shirt, or smartphone, or even on a sheet of paper or a helium balloon. Researchers at MIT have now demonstrated just such a technology: the thinnest, lightest solar cells ever produced. Though it may take years to develop into a commercial product, the laboratory proof-of-concept shows a new approach to making solar cells that could help power the next generation of portable electronic devices. The new process is described in a paper by MIT professor Vladimir Bulovic, research scientist Annie Wang.

In this initial proof-of-concept experiment, the team used a common flexible polymer called parylene as both the substrate and the over coating, and an organic material called DBP as the primary light-absorbing layer. Parylene is a commercially available plastic coating used widely to protect implanted biomedical devices and printed circuit boards from environmental damage. The entire pro-cess takes place in a vacuum chamber at room temperature and without the use of any solvents, unlike conventional solar-cell manufacturing, which requires high temperatures and harsh chemicals. In this case, both the substrate and the solar cell are "grown" using established vapor deposition techniques.

One process, many materials The team emphasizes that these particular choices of materials were just examples,



and that it is the in-line substrate manufacturing process that is the key innovation. Different materials could be used for the substrate and encapsulation layers, and different types of thin-film solar cell materials, including quantum dots or perovskites, could be substituted for the organic layers used in initial tests. But already, the team has achieved the thinnest and lightest complete solar cells ever made, they say.

To demonstrate just how thin and light-weight the cells are, the researchers draped a working cell on top of a soap bubble, without popping the bubble. The researchers acknowledge that this cell may be too thin to be practical -- "If you breathe too hard, you might blow it away," says Jean -- but parylene films of thicknesses of up to 80 microns can be deposited easily using commercial equipment, without losing the other benefits.

Bulovic, MIT's associate dean for in-novation and the Fariborz Maseeh (1990) Professor of Emerging Technology, says the key to the new approach is to make the solar cell, the substrate that supports it, and a protective over coating to shield it from the environment, all in one process. The substrate is made in place and never needs to be handled, cleaned, or re-moved from the vacuum during fabrication, thus minimizing exposure to dust or other contaminants that could degrade the cell's performance.

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A flexible parylene film, similar to kitchen cling-wrap but only one-tenth as thick, is first deposited on a sturdier carrier material -- in this case, glass. Figuring out how to cleanly separate the thin material from the glass was a key challenge, explains Wang, who has spent many years working with parylene.

The researchers lift the entire parylene/ solar cell/parylene stack off the carrier after the fabrication process is com-plete, using a frame made of flexible film. The final ultra-thin, flexible solar cells, including substrate and overcoat-ing, are just one-fiftieth of the thick-ness of a human hair. This is sited from news.mit.edu/2016/ultrathin-flexible-solar-cells-0226

-V.Janani
(final EEE)

"My expectations were reduced to zero when I was 21.Everything since then has been a bonus." Stephen W. Hawking

ULTRA-EFFICIENCY IN 64-BIT COMPUTER

The move to 64-bit:

The Cortex-A35 processor is based on the latest ARMv8-A architecture, and supports both 32-bit and 64-bit computing. Since soft-ware development activity in the 32-bit domain remains strong, legacy support is vital. However, the superior memory- and data-handling capabilities of 64-bit compute deliver clear ad-vantages when challenged by the increasing sophistication of applications. Efficiency when processing large files is also improved.

This allows for faster data manipulation for modern mobile workloads and compute-intensive applications. It also opens the opportunity for applications that address more than 4GBytes of RAM.

To previous generations by incorporating enhance the ARMv8-A architecture supports distinct 32-bit and 64-bit processor execution states. The 32-bit state, known as AArch32, delivers improved 32-bit performance compared elements such as new cryptographic

The currently published benchmarking analysis for Cortex-A35 processor has been done in AArch32 execution state. Several mobile workloads like web browsing and multimedia are very memory intensive, causing large amounts of data movement between memory and the processor. The Cortex-A35 processor is architected to deliver significant improvements in memory performance compared to Cortex -A7 processor.

Connecting users to the web:

For some entry-equipment users, particularly those in developing nations that have little wired infrastructure, a mobile device is the main tool used for accessing the web. Hence a good browsing experience is essential. Figure 2 shows how browsing performance is significantly improved over Cortex-A7 processor. A 16% boost is achieved when testing like-for-like processor configurations clocked at the same frequency, whereas a performance optimised implementation of the Cortex A35 processor running at 2.0GHz delivers 84% better performance than the Cortex A7 processor running at 1.2GHz.

.Video and gaming on the move:

Other important mobile workloads, such as gaming and video or audio playback are not only dependent on moving large quantities of data quickly and efficiently, but also demand high compute performance. Gaming, in particular, places heavy demand on floating-point operations to calculate movements or trajectories.

The ARMv8-A architecture features improvements in the NEON media processing engine that improve both single precision and double-precision floating-point performance. The NEON and floating-point pipelines are also extremely area-efficient. Figure 3 expresses the improvements, relative to Cortex-A7 processor, in integer, floating-point and video performance that are critical for great gaming experiences. The video comparison is done with the NEON engine running video decoding for some popular video formats like MP4. The Geek bench single-core benchmark also shown includes the integer, floating-point. memory-streaming tests, and con-firms an overall 40% improvement for the Cortex-A35 processor com-pared to Cortex-A7 processor.

Performance boost, power savings:

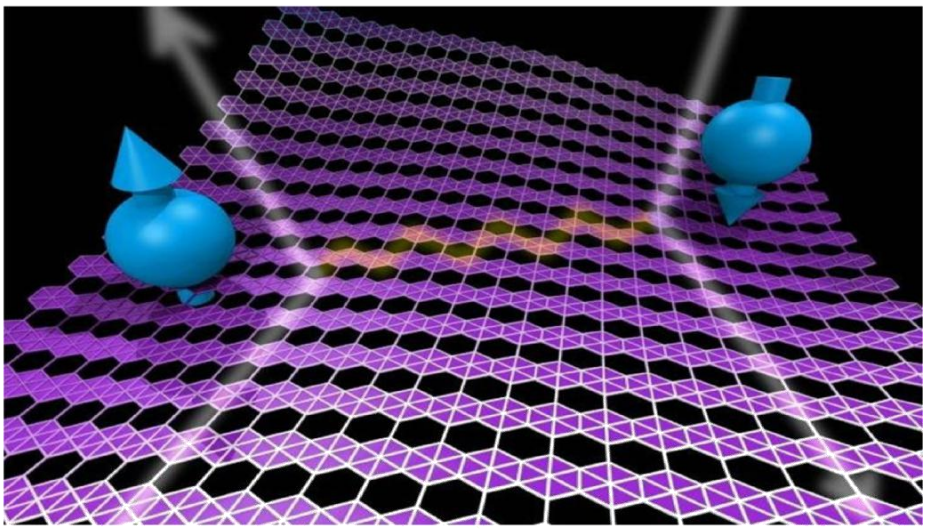
While increased performance is essential to deliver the user experiences expected from next-generation mobiles, designers remain under pressure to stay within a tight power budget allocated to the processor in the SOC platform. Size and cost constraints limit typical power for entry smartphones to under 100 to 150mW per processor core, and careful power management is needed to maximise battery life. The design of Cortex-A35 processor has tackled both dynamic power consumption and idle power management. Changes to the processor's micro architecture, such as the enhanced pipeline, have yielded significant reductions in dynamic power. This is sited from [www.newelectronics.co.uk/electronics-technology/how -to-achieve-ultra-efficiency-in-64-bit-compute/115975/](www.newelectronics.co.uk/electronics-technology/how-to-achieve-ultra-efficiency-in-64-bit-compute/115975/)

- M.Deepak Ruban (3rd EEE)

"Be less curious about people and more curious about ideas."

Marie Curie

FLAT BORON - A SUPERCONDUCTOR



Rice theoretical physicist Boris Yakob son and his co-workers published their calculations that show atomically flat boron is metallic and will transmit electrons with no resistance. The work appears this month in the American Chemical Society journal Nano Letters. The hitch, as with most superconducting materials, is that it loses its resistivity only when very cold, in this case between 10 and 20 kelvins (roughly, minus-430 degrees Fahrenheit). But for making very small superconducting circuits, it might be the only game in town.

The basic phenomenon of superconductivity has been known for more than 100 years, said Evgeni Penev, a research scientist in the Yakob son group, but had not been tested for its presence in atomically flat boroninto it."

Electrons with opposite momenta and spins effectively become Cooper pairs; they attract each other at low temperatures with the help of lattic."It's well-known that the material is pretty light because the atomic mass is small," Penev said. "If it's metallic too, these are two major prerequisites for superconductivity. That means at low temperatures, electrons can pair up in a kind of dance in the crystal."

"Lower dimensionality is also helpful," Yakobson said. "It may be the only, or one of very few, two-dimensional metals. So there are three factors that gave the initial motivation for us to pursue the research. Then we just got more and more excited as we got e vibrations, the so called "phonons," and give the material its superconducting properties, Penev said. "Superconductivity becomes a manifestation of the macroscopic wave function that describes the whole sample. It's an amazing phenomenon," he said.

It wasn't entirely by chance that the first theoretical paper establishing conductivity in a 2-D material appeared at roughly the same time the first samples of the material were made by laboratories in the United States and China. In fact, an earlier paper by the Yakob son group had offered a road map for doing so.

That 2-D boron has now been produced is a good thing, according to Yakob son and lead authors Penev and Alex Kutana, a postdoctoral researcher at Rice. "We've been working to characterize boron for years, from cage clusters to nanotubes to planer sheets, but the fact that these papers appeared so close together means these labs can now test our theories," Yakobson said.

"In principle, this work could have been done three years ago as well," he said. "So why didn't we? Because the material remained hypothetical; okay, theoretically possible, but we didn't have a good reason to carry it too far.

"But then last fall it became clear from professional meetings and interactions that it can be made. Now those papers are published. When you think it's coming for real, the next level of exploration becomes more justifiable," Yakobson said.

Boron atoms can make more than one pattern when coming together as a 2-D material, another characteristic predicted by Yakobson and his team that has now come to fruition. These patterns, known as polymorphs, may allow re-searchers to tune the material's conductivity "just by picking a selective arrangement of the hexagonal holes," Penev said. Penev suggested that isolating 2-D boron between layers of inert hexagonal boron nitride (aka "white graphene") might help stabilize its superconducting nature. This is sited from www.phys.org/news/2016-03-flat-boron-superconductor.html

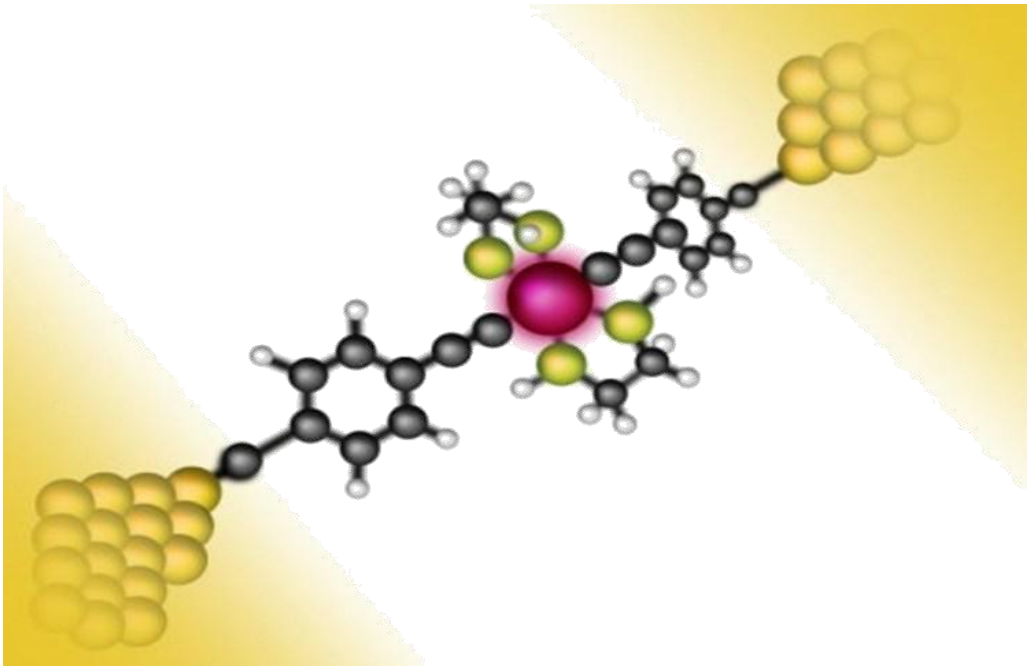
-B.Moorthy(Final EEE)

"Experimentaion is the elast arrogant method of gaining knowledge. The experimenter humbly asks a question of nature. " Issac Asimov

THE SWITCH MOLECULE

New kind of switch can be altered in a targeted manner using a single electron.

In electronics, nothing works without transistors: they are the fundamental building blocks on which the logic circuits in our computer chips are based. They usually consist of silicon crystals, doped with other types of atom. One Swiss/Austrian research team (TU Wien, the University of Vienna, the University of Zurich, IBM Zurich) has now succeeded in developing a transistor that functions in a fundamentally different manner and consists solely of a single molecule. Instead of three electrodes, as in a conventional transistor, this switch molecule only requires two. The new nano switch has now been presented in the specialist journal "Nature Nanotechnology".



Zero or one:

"The key feature of a transistor is that it can assume two different states," ex-plains Robert Stadler from the Institute of Theoretical Physics at TU Wien (at the start of the project he was still working at the Department of Physical Chemistry at the University of Vienna). De-pending on which state the transistor is in, it either allows current to flow or not. A conventional transistor made of silicon crystals therefore has three contacts: the current is supplied by one of these, and is able to flow into the second one; whether this actually happens or not depends on the voltage applied at the third contact, which is known as the 'gate contact'. In order to accommodate ever more transistors in an ever smaller area, transistors have continued to reduce in size over the last few decades. This has drastically improved efficiency in electronics, but does, however, bring with it ever greater technical problems. With conventional silicon technology, physical limitations are en-countered as a result. "With extremely small crystals you no longer have sufficient control over the electronic proper-ties, particularly if only a small number of dopants remains and the gate's insulating layer allows increasingly more leakage," explains Stadler. "However, if you switch from crystals to organic molecules at the nano scale, you then have new opportunities to change the transport characteristics."

From molecule to transistor:

At the University of Zurich, chemists have therefore synthesised organometallic molecular structures endowed with individual metal atoms of iron, ruthenium or molybdenum. These designer molecules, which are only around two and a half nanometres long, are then carefully connected using two gold contacts at the IBM research lab in Rüschlikon before voltage can be applied to them.

For one of the molecule types tested, which has a molybdenum atom placed at its core, some quite remarkable properties were observed: similarly to a silicon transistor, this molecule switches back and forth between two different states, which differ by three orders of magnitude as regards their conductivity. Complex computer simulations were required in order to understand the underlying process; these were carried out by Robert Stadler and his doctoral student Georg Kastlunger at the Vienna Scientific Cluster (VSC). This allowed the mechanism to be decoded at a quantum physical level. This is sited from https://www.sciencedaily.com/releases/2015/11/151130135017.html

-S.M.Nachammai
(Final EEE)

"Truth is never found in simplicity, and not in the multiplicity and confusion of things." Sir Issac Newton

SELF-HEALING SENSOR BRINGS 'ELECTRONIC SKIN' CLOSER TO REALITY

Scientists have developed a self-healing, flexible sensor that mimics the self-healing properties of human skin. Incidental scratches or cuts to the sensors "heal" themselves in less than one day. Flexible sensors have been developed for use in consumer electronics, robotics, health care, and space flight. Future possible applications could include the creation of 'electronic skin' and prosthetic limbs that allow wearers to 'feel' changes in their environments. One problem with current flexible sensors, however, is that they can be easily scratched and otherwise damaged, potentially destroying their functionality. Researchers in the Department of Chemical Engineering at the Technion -- Israel Institute of Technology in Haifa (Israel), who were inspired by the healing properties in human skin, have developed materials that can be integrated into flexible devices to "heal" incidental scratches or damaging cuts that might compromise device functionality. The advancement, using a new kind of synthetic polymer (a polymer is a large molecule composed of many repeated smaller molecules) has self-healing properties that mimic human skin, which means that e-skin "wounds" can quickly "heal" themselves in remarkably short time -- less than a day.

A paper outlining the characteristics and applications of the unique, self-healing sensor has been published in the current issue of *Advanced Materials*.

"The vulnerability of flexible sensors used in real-world applications calls for the development of self-healing properties, can extend applications of the self-ties similar to how human skins heals," healing sensor to areas of the world with said self-healing sensor co-developer extreme climates. From sub-freezing Prof. Hossam Haick. "Accordingly, we cold to equatorial heat, the self-healing have developed a complete, self-healing sensor is environment-stable.

device in the form of a bendable and The healing polymer works quickest, stretchable chemi resistor where every said the researchers, when the tempera-part -- no matter where the device is cut temperature is between 0 degrees C and 10 degree Celsius or scratched -- is self-healing.", when moisture condenses and is The new sensor is comprised of a self- then absorbed by the substrate. Condensation makes the substrate swell, allow healing substrate, high conductivity electrodes, and molecularly modified gold in the polymer chains to begin to flow nanoparticles. "The gold particles on top freely and, in effect, begin "healing." of the substrate and between the self -healing electrodes are able to "heal" cracks that could completely disconnect resistor still has high sensitivity to touch, electrical connectivity," said Prof. Haick. Once healed, the polymer substrate tested in demanding stretching and the self-healing sensor demonstrates send ending tests .resistivity to volatile organic compounds Another unique feature is that the electrode-(VOCs), with detection capability down resistance increases after healing to tens of parts per billion. It also demon- and can survive 20 times or more cuts superior heal ability at the extreme ting/healing cycles. temperatures of -20 degrees C to 40 degrees C. This is sited from https://www.innovationtoronto.com/2015/11/self-healing-sensor-brings-electronic-skin-closer-to-reality/

-T.Divya(3rd EEE)

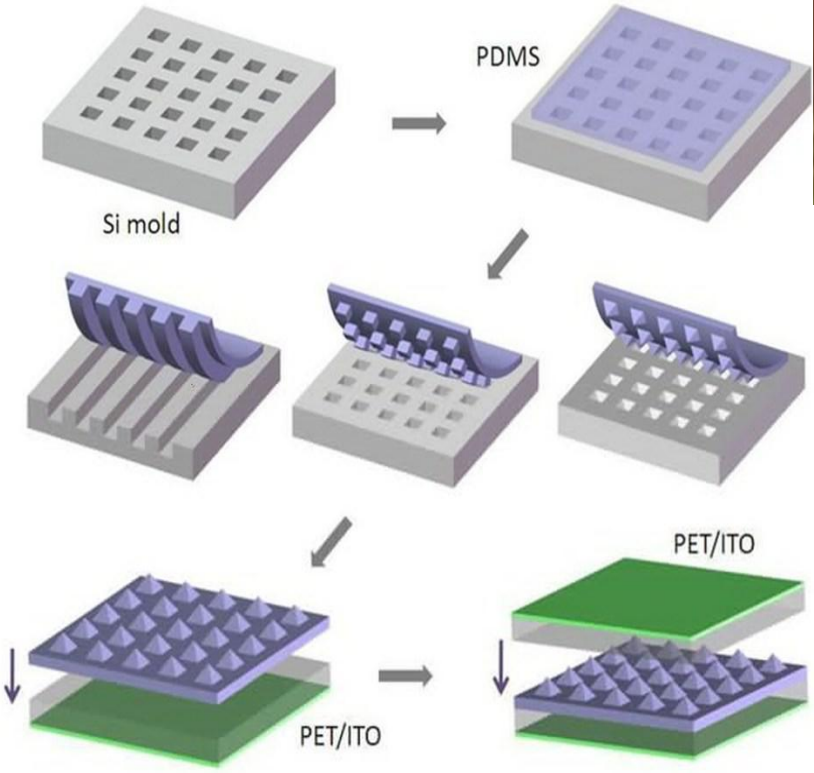
"As far as Mathematics refers to reality, they are not certain ; and as far as they are certain, they do not refer to reality." Albert Einstein

SMART PHONES COULD GENERATE OWN

A transparent material that can be attached to a smartphone's touch screen could help the device generate electricity whenever anyone taps it, researchers in China say.

Touch screens are now found on most cell phones and tablet computers. Using touch screen typically involves finger taps and scientists at Lanzhou University in China reasoned that the mechanical energy could be converted into electricity to charge the phone batteries which could significantly ex-tend the working time of these portable devices.

The researchers developed a new material based on a transparent silicone rubber known as PDMS. Scientists embedded wires in this rubber that were made of Lead Zirconate Titanate that were only 700 nanometres or a billionth of a meter wide. This is about 140 times thinner than the average width of a human hair. As the rubber solidified, the researchers used electrical fields to align the nanowires in the rubber in columns. This alignment helped set both the material's electrical and visual properties.
Whenever such nanowires are bent - for instance, whenever anyone taps on the material – they generate electricity, a phenomenon known as piezoelectricity. By making sure the nanowires are lined up with one another, the researchers helped ensure that they would react to finger taps in unison, generating as much energy from the motions as possible. When the material is viewed head-on, these incredibly narrow wires are largely invisible and the material can look mostly transparent. As such, the nanowires can harvest taping energy on a screen without influencing the screen's normal working. In addition, when the material is viewed from an angle, the nanowires interfere with light rays, which



means that anything seen through the material at that angle will look blurry. As such, the material can also help protect a user's privacy by preventing anyone nearby from being able to peek at someone else's smartphone screen.

In experiments, tapping on the material generated an electrical current of 0.8 Nano amperes or about one-millionth of the electricity used by a hearing aid. The scientists noted that the results of future research could help their material generate more cur-rent to efficiently recharge the batteries of mobile devices. This is sited from https://www.livescience.com/53565-touch-screen-coating-generates-electricity.html

-U.Danusha(Final EEE)

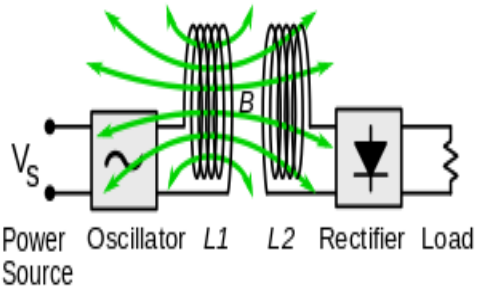
WIRELESS POWER TRANSFER

Wireless power transfer (**WPT**), **wireless power transmission**, **wireless energy transmission**, or electromagnetic power transfer is the transmission of electrical energy without wires. Wireless power transmission technologies use time-varying electric, magnetic or electromagnetic fields. Wireless transmission is useful to power electrical devices where interconnecting wires are inconvenient, hazardous, or are not possible.

Wireless power techniques mainly fall into two categories, non-radioactive and radioactive. In near field or non-radioactive techniques, power is transferred by magnetic fields using inductive coupling between coils of wire, or by electric fields using capacitive coupling between metal electrodes. Inductive coupling is the most widely used wireless technology; its applications include charging handheld devices like phones and electric toothbrushes, RFID tags, and chargers for implantable medical devices like artificial cardiac pacemakers, or electric vehicles.

Electromagnetic coupling, (*strongly coupled magnetic resonance*) is a form of inductive coupling in which power is transferred by magnetic fields between two resonant circuits (tuned circuits), one in the transmitter and one in the receiver Each resonant circuit consists of a coil of wire connected to a capacitor, or a self-resonant coil or other resonator with internal capacitance. The two are tuned to resonate at the same resonant frequency. The resonance between the coils can greatly increase coupling and power transfer, analogously to the way a vibrating tuning fork can induce sympathetic vibration in a distant fork tuned to the same pitch.

Nikola Tesla first discovered resonant coupling during his pioneering experiments in wireless power transfer around the turn of the 20th century, but the possibilities of using resonant coupling to increase transmission range has only recently been explored. In 2007 a team led by Marin Soljačićat MIT used two coupled tuned circuits each made of a 25 cm self-resonant coil of wire at 10 MHz to achieve the transmission of 60 W of power over a distance of 2 meters (6.6 ft) (8 times the coil diameter) at around 40% efficiency.



In capacitive coupling (electrostatic induction), the conjugate of inductive coupling, energy is transmitted by electric fields[7] between electrodes such as metal plates. The transmitter and receiver electrodes form a capacitor, with the intervening space as the dielectric. An alternating voltage generated by the transmitter is applied to the transmitting plate, and the oscillating electric field induces an alternating potential on the receiver plate by electrostatic induction, which causes an alternating current to flow in the load circuit.

Capacitive coupling has only been used practically in a few low power applications, because the very high voltages on the electrodes required to transmit significant power can be hazardous, and can cause unpleasant side effects such as noxious ozone production. In addition, in contrast to magnetic fields electric fields interact strongly with most materials, including the human body, due to dielectric polarization. Intervening materials between or near the electrodes can absorb the energy, in the case of humans possibly causing excessive electromagnetic field exposure. However capacitive coupling has a few advantages over inductive coupling. The field is largely confined between the capacitor plates, reducing interference, which in inductive coupling requires heavy ferrite "flux confinement" cores. Also, alignment requirements between the transmitter and receiver are less critical. Capacitive coupling has recently been applied to charging battery powered portable devices and is being considered as a means of transferring power between substrate layers in integrated circuits.

In atmospheric plasma channel coupling, energy is transferred between two electrodes by electrical conduction through ionized air. When an electric field gradient exists between the two electrodes, exceeding 34 kilovolts per centimetre at sea level atmospheric pressure, an electric arc occurs. This atmospheric dielectric breakdown results in the flow of electric current along a random trajectory through an ionized plasma channel between the two electrodes. An example of this is natural lightning, where one electrode is a virtual point in a cloud and the other is a point on Earth. Laser Induced Plasma Channel (LIPC) research is presently underway using ultrafast lasers to artificially promote development of the plasma channel through the air, directing the electric arc, and guiding the current across a specific path in a controllable manner.[94] The laser energy reduces the atmospheric dielectric breakdown voltage

and the air is made less insulating by superheating, which lowers the density (of the filament of air

This new process is being explored for use as a laser lightning rod and as a means to trigger lightning bolts from clouds for natural lightning channel studies, for artificial atmospheric propagation studies, as a substitute for conventional radio antennas, for applications associated with electric welding and machining, for diverting power from high-voltage capacitor discharges, for directed-energy weapon applications employing electrical conduction through a ground return path, and electronic jamming.

Inductive power transfer between nearby wire coils was the earliest wireless power technology to be developed, existing since the transformer was developed in the 1800s. Induction heating has been used since the early 1900s With the advent of cordless devices, induction charging stands have been developed for appliances used in wet environments, like electric toothbrushes and electric razors, to eliminate the hazard of electric shock. One of the earliest proposed applications of inductive transfer was to power electric locomotives. In 1892 Maurice Hutin and Maurice Leblanc patented a wireless method of powering railroad trains using resonant coils inductively coupled to a track wire at 3 kHz The first passive RFID (Radio Frequency Identification) technologies were invented by Mario Cardullo (1973) and Koelle et al (1975) and by the 1990s were being used in proximity cards and contactless smartcards.

The proliferation of portable wireless communication devices such as mobile phones, tablet, and laptop computers in recent decades is currently driving the development of mid-range wireless powering and charging technology to eliminate the need for these devices to be tethered to wall plugs during charging. The Wireless Power Consortium was established in 2008 to develop interoperable standards across manufacturers. Its Qi inductive power standard published in August 2009 enables high efficiency charging and powering of portable devices of up to 5 watts over distances of 4 cm (1.6 inches) The wireless device is placed on a flat charger plate (which can be embedded in table tops at cafes, for example) and power is transferred

from a flat coil in the charger to a similar one in the device.

In 2007, a team led by Marin Soljačić at MIT used a dual resonance transmitter with a 25 cm diameter secondary tuned to 10 MHz to transfer 60 W of power to a similar dual resonance receiver over a distance of 2 meters (6.6 ft) (eight times the transmitter coil diameter) at around 40% efficiency. In 2008 the team of Greg Leyh and Mike Kennan of Nevada Lightning Lab used a grounded dual resonance transmitter with a 57 cm diameter secondary tuned to 60 kHz and a similar grounded dual resonance receiver to transfer power through coupled electric fields with an earth return circuit over a distance of 12 meters (39 ft). This is sited from https://en.wikipedia.org/wiki/wireless_power_transfer

- R.Abinessh (Final EEE)

Test Your Grey Cells

TRICKY PUZZLES

Questions:

1. A poor woman and a rich woman are talking about music.
   The poor woman says she has studied music and can name a song with any name in it.
   The rich woman says "OK, if you can find a song with my son's name in it, I will give you a thousand dollars. His name is Demarcus-Jabari."
   The poor woman gives her answer and is instantly $1,000 richer.
   What was her answer?
2. A criminal gets to pick his punishment by choosing among three rooms.
   The first is full of burning fires, the second is full of assassins with loaded guns, and the third is full of lions that haven't eaten in 3 years. Which room is the safest choice?
3. 1 is 3.
   3 is 5.
   5 is 4.
   4 is 4.

   What is 7?
4. The following equation is wrong: 101 - 102 = 1
   Move one numeral to make it correct.
   Move one line to make it correct. (Caution: Tricks!)

Answers

:

1.Happy Birthday

2The Third Room.
The Lions will be dead by now

3. 7 is 5.
Because "seven" has 5 letters.

4.Move the numeral 2 half a line up to achieve $101-10^2 = 1$
Move one of the lines that makes the "=" over to the "-" to make: 101 = 102 - 1

BRAIN TEASERS

Questions:

1. Give the place value of 5 in the number 254,879.
2. What word in the English language uses all five vowels plus Y in alphabetical order and uses each one only once?
3. What has a spine but no bones?
4. When I'm young I'm tall
   When I'm old I'm short
   When I'm alive I glow
   Because of your breath I die

   What am I?

5. A man walked all day long but only moved 2 feet. How is this possible?

Answers:

1.50000

2. Facetiously, which means not seriously.

3.A Book

4.A Candle

5. He only has two feet with which to move!

STUDENT ACTIVITIES

NO. OF STUDENTS PARTICIPATED IN INTER-COLLEGIATE EVENTS (SYMPOSIUM, WORKSHOP, TRAINING, CONFERENCE)

S.No	Roll No	Name of the student	Event Title	Event Venue	Date of Participation
1	15BEE033	K.Jeeveth	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
2	15BEE009	C.Barath	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
3	15BEE056	B.Kamali	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
4	15BEE076	M.Aravindkumar	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
5	15BEE080	V.Tamilarasu	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
6	15BEE024	T.Sharan	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
7	15BEE084	S.Kalpana	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
8	15BEE042	P.Kiruba	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
9	15BEE078	R.Pooja	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
10	15BEE064	N.K.GokulPanneer	ARM student design Challenge	ARM University, Adcom 2017 at IIT Bangalore	08.09.2017 to 10.09.2017
11	16MAE006	R.B.Rajeshkumar	Training program on Smart Grid Technologies	PSNA College of Engg& Tech, Dindigul	21.09.2017 to 22.09.2017
12	16MAE001	D.Saravana Kumar	Training program on Smart Grid Technologies	PSNA College of Engg& Tech, Dindigul	21.09.2017 to 22.09.2017
13	16BEE054	Senathipathi.P	GEEK-O-ZONE	Coimbatore Institute of technology, Coimbatore	15.09.2017
14	15BEE073	Gayathri. S. K	Value Added course on CMOS analog ICdesign and layout techniques usingCADENCE EDAtool tool	ASIC Centre, MCET	28.06.2017 to 30.06.2017
15	15BEE073	Gayathri. S. K	Training program on Energy Management	IAEMP, MCET	04.08.2017 to 05.08.2017

NO. OF STUDENTS PRESENTED PAPERS

S. No.	Roll No	Name of the Student	Paper Title	Venue	Date of Presentation
1	16BEE050	SivaAlagappan.M	Renewable Energy Sources	Bannari Amman Institute of Technology, Sathy	07.09.2017 to 09.09.2017
2	16BEE056	Vijay.C.V	Renewable Energy Sources	Bannari Amman Institute of Technology, Sathy	07.09.2017 to 09.09.2017
3	14BEE026	DineshKumar.S	Solar Powered Kitchen Chimney	International Journal of Innovative and Emerging Research in Engineering	August 2017 Edition

NO. OF STUDENTS CLEARED BEC EXAM

S. No.	Roll No	Name of the Student	Score	Exam type	Date of Examination
1	15BEE098	J.Aravind Raj	143	B1	March 2017
2	15BEE009	C.Barath	147	B1	March 2017
3	15BEE064	N.K.GokulPanneer	152	B1	March 2017
4	15BEE087	J.Jayani	168 (C Grade)	B2	March 2017
5	15BEE006	A.Karthiswar	165 (C Grade)	B2	March 2017
6	15BEE030	M.Kavitha Rani	169 (C Grade)	B2	March 2017
7	15BEE042	P.Kiruba	153	B1	March 2017
8	15BEE101	Manimozhi.M	162 (C Grade)	B2	March 2017
9	15BEE026	R.Nevetha	170 (C Grade)	B2	March 2017
10	15BEE078	Pooja.R	160 (C Grade)	B2	March 2017
11	15BEE034	SubharnaShri.N	160 (C Grade)	B2	March 2017
12	15BEE048	P.UmaMaheshwari	173 (B Grade)	B2	March 2017
13	15BEE035	K.Varcini	150	B1	March 2017
14	15BEE036	M.Vigneshwaran	161 (C Grade)	B2	March 2017
15	15BEE063	V.Abinaya	168 (C Grade)	B2	March 2017

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Mr M.Balaji-Faculty Advisor

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2. N.Seebhasri	**(IV/B)**
3. S.Anish	**(III/A)**
4. R.Pooja	**(III / B)**
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		1.AKSHAY S.SHAJI 2.LOGANATHA SANJEEV.C	II Yr

Vision of the institute:

We develop a globally competitive workforce and entrepreneurs.

Mission of the institute:

Dr.Mahalingam College of Engineering and Technology, Pollachi endeavours to impart high quality, competency based technical education in engineering and technology to the younger generation with the required skills and abilities to face the challenging needs of the industry around the globe. This institution is also striving hard to attain a unique status in the international level by means of infrastructure, start-of-the-art computer facilities and techniques.

Vision of the department:

Emerge as the world leader for the Electrical and Electronics Engineering education and research for the application of knowledge to the society.

Mission of the department:

The EEE Department believes that every student is a unique and is in a process of continuous growth. In order to foster growth and empowerment, we commit ourselves to,

- Provide a stimulating learning environment with a technological orientation to maximize individual potential.
- Continuous pursuit of quality and excellence.
- Provide appropriate know-how and up-to-date knowledge.
- Nurture creativity and ambit for research.

Programme Educational Objectives

PEO1. Actively apply technical and professional skills in engineering practices to face industrial challenges around the globe.

PEO2. Own their professional and personal development by continuous learning and apply to create new knowledge.

PEO3. Conduct themselves in a responsible, professional and ethical manner supporting sustainable economic development, which enhances the quality of life

Programme Outcomes

PO1 : Apply the knowledge of Mathematics, Science and Engineering to solve problems in the field of Electrical and Electronics Engineering

PO2 : Identify, formulate/model, analyze and solve complex problems in the field of Electrical and Electronics Engineering

PO3 : Design an Electrical/Electronic System/Component, or Process to meet specific purpose with due consideration for economic, environmental, social, political, ethical, health and safety issues

PO4 : Design and conduct experiment, analyze and interpret data to provide valid conclusions in the field of Electrical and Electronics Engineering

PO5 : Apply appropriate techniques and modern tools for design and analysis of Electrical/Electronic systems with specified constraints

PO6 : Apply contextual knowledge to provide engineering solutions with societal, professional & environmental responsibilities

PO7 : Provide sustainable solutions within societal and environmental contexts for problems related to Electrical and Electronics Engineering

PO8 : Comply with code of conduct and professional ethics in engineering practices

PO9 : Work effectively as an individual or as a member/leader in multi-disciplinary team to find solutions for engineering problems

PO10 : Communicate effectively to engineering community and society with proper aids and documents

PO11 : Demonstrate knowledge and understanding of the engineering and management principles to manage projects in multidisciplinary environment

PO12 : Recognize the need for, and have the ability to engage in independent and lifelong learning

Program Specific Outcome (PSOs)

PSO1 : Design and analyze systems associated with industrial control, power and automotive industries.

PSO2 : Develop products to cater the societal and industrial needs considering recent