Department of Electronics And Communication Engineering

E-SPARSH

Technical Magazine

JUL - DEC 2019

EDITORIAL BOARD

INSTITUTION

Vision of the Institute:
To be a premier center of learning in Engineering and Management education that evolves the youth into dynamic professionals with a social commitment

Mission of the Institute:

M1: To provide quality teaching- learning practices in engineering and management education by imparting core instruction and state-of-the-art infrastructure.

M2: To engage the faculty and students in acquiring competency in emerging technologies and research activities through Industry Institute Interaction.

M3: To foster social commitment in learners by incorporating leadership skills and ethical values through value-based education

DEPARTMENT

Vision of the Department:
To produce technically competent and research oriented Electronics and Communication Engineers to meet the Industrial and Social requirements.

Mission of the Department:

M1: To impart quality technical education in the field of Electronics and Communication Engineering through state-of-the art facilities and effective teaching learning process.

M2: To enrich the faculty and students with research and consultancy skills through Industry-Interaction and Training in Emerging areas of Electronics and Communication Engineering.

M3: To develop lifelong learning, leadership qualities and ethical values in learners to meet the societal and industrial needs.

Program Educational Objectives (PEOs)

PEO-I : Graduates will have the capabilities to analyze, design and develop innovative solutions for the problems in the field of Electronics and Communication Engineering using core competencies.

PEO-II :Graduates will have the ability to engage themselves in research and lifelong learning to achieve professional excellence.

PEO-III : Graduates will have successful career with leadership qualities, ethics and good communication skills in Electronics and Communication Engineering and related fields.

ECE PBRVITS | **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

Program Outcomes (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1 : Graduates will be able to design and analyze Image Processing and communication systems concepts using appropriate tools.

PSO-2 : Graduates will be able to design and develop solutions for real world problems by applying the concepts of VLSI and Embedded systems.

DEPARTMENT PROFILE

The Department of Electronics and Communication Engineering (ECE) was established in the years 1998–99 with an intake of 60 and currently running with an intake of 240. It is 21 years old now and one of the most well-established departments in our Institution. It is also offering one post graduate programme with the specialization of VLSI Design with an intake of 30 students.

The Department is known for its esteemed faculty members who are renowned for their path-breaking contributions in the field of electronics and communications. It is well equipped with laboratories, audio-visual facilities and software tools such as MultiSim, ModelSim, Lab View, HFSS, MATLAB, and Xilinx.

We offer our students an excellent educational experience that combines intellectual rigor and cross-disciplinary breadth. The course contents are periodically updated to introduce new scientific and technological developments. Electronic design, communication technologies, hands-on programming, a research focus, and entrepreneurship skills are all part of our signature educational curriculum. The ECE domain is often regarded as a challenging culmination of hardware and software. Our curriculum focuses primarily on the knowledge and skills that emerging engineers need.

PROFESSOR DESK

Welcome to the Department of ECE at PBR VITS, Kavali. This magazine will be covering activities conducted by E-SPARSH and technical articles written by students. I am confident that all the faculty members and student community involved with this magazine have put their efforts in this in a way that the magazine both entertains and ignites the reader's mind.

I would like to thank the editorial team members for bringing out this magazine regularly. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.

Dr. A. Maheswara Rao,
Professor & HOD, ECE.

1. BUMP TECHNOLOGY

Vision & Goal Behind Bump Technology: The applications and possibilities for bump are enormous. Bump was born as a simple iPhone app for swapping contact information created by our three founders, but as our user base grew, so did our vision. Bump sends contact information, photos and files to another device over the internet. Before activating the transfer, each user confirms what he or she wants to send to the other user. To initiate a transfer, two people physically bump their phones together.

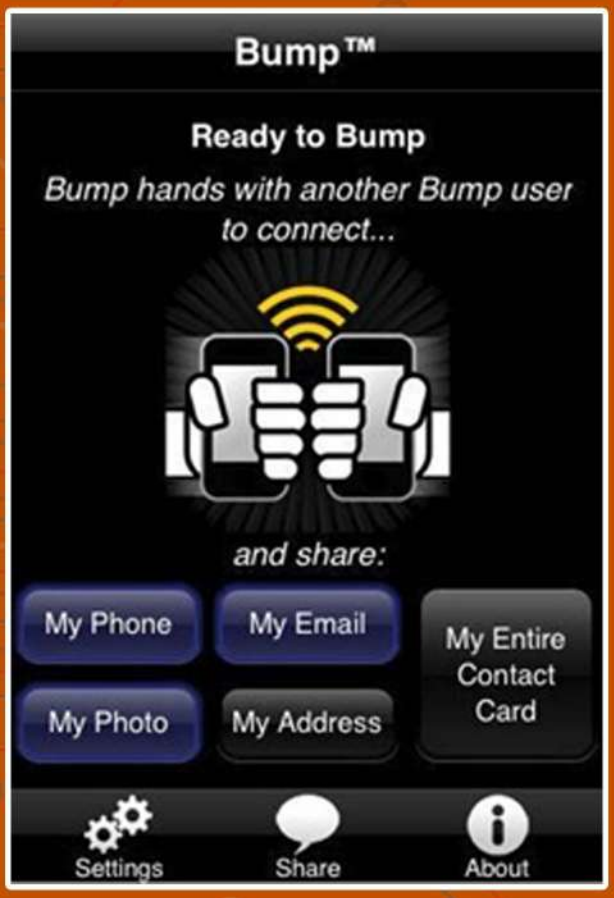
A screen appears on both users' smartphone displays, allowing them to confirm what they want to send to each other. When two users bump their phones, software on the phones send a variety of sensor data to an algorithm running on Bump servers, which includes the location of the phone, accelerometer readings, IP address, and other sensor readings. The algorithm figures out which two phones felt the same physical bump and then transfers the information between those phones. Bump does not use Near Field Communication.

Functionality:

1. Transmit files, content, photographs, videos, personal or technical data or any other type of information or data (collectively, "Content") which is false, inaccurate, misleading, defamatory, or libelous;
2. Transmit any Content that you have no rights to, or for which transmission by you would constitute infringement of third-party intellectual property rights;
3. Transmit identification documents or sensitive financial information of yourself or any other person;
4. Transmit any viruses, malicious code, Trojan horses, worms, corrupted files, or any other similar software that may damage the operation of another's computer, data or property, or transmit any other harmful or code technology;
5. Bully, intimidate, or harass any User or member of the public;
6. Transmit Content that is obscene, hateful, threatening, pornographic, or that contains nudity or graphic or gratuitous violence;
7. Use the Application, the Bump Services or the Site to do anything fraudulent, unlawful, misleading, malicious, or discriminatory
8. Engage in any unruly, disruptive, unprofessional, or offensive conduct while using the Application, the Bump Services or the Site;
9. Violate any laws, third party rights, or any of our Policies;
10. Engage in unlawful multi-level marketing, such as a pyramid scheme, using the Application, the Bump Services or the Site;

Manufacturing Steps:

- Integrated circuits are created on the wafer
- Pads are metalized on the surface of the chips
- Solder dots are deposited on each of the pads
- Chips are cut
- Chips are flipped and positioned so that the solder balls are facing the connectors on the external circuitry
- Solder balls are then remelted (typically using hot air reflow)
- Mounted chip is "underfilled" using an electrically-insulating adhesive



Reasons for Bump Technologies:

1. Google gets more multitouch capabilities.
2. Bump Top could pave the way for a Google tablet.
3. The Bump Technologies purchase is just one piece of Google's master plan.

RAGHAVI PALLAPU
(16731A0447

2. ECG T-SHIRT

ECG T-shirt was developed with a portable recorder for unobtrusive and long-term multichannel ECG monitoring with active electrodes. A major drawback of conventional 12-lead ECGs is the use of adhesive gel electrodes, which are uncomfortable during long-term application and may even cause skin irritations and allergic reactions. Therefore, we integrated comfortable patches of conductive textile into the ECG T-shirt in order to replace the adhesive gel electrodes.

In order to prevent signal deterioration, as reported for other textile ECG systems, we attached active circuits on the outside of the T-shirt to further improve the signal quality of the dry electrodes. Finally, we validated the ECG T-shirt against a commercial holder ECG with healthy volunteers during phases of lying down, sitting, and walking. The 12-lead ECG was successfully recorded with a resulting mean relative error of the RR intervals of 0.96% and mean coverage of 96.6%. Furthermore, the ECG waves of the 12 leads were analyzed separately and showed high accordance.

The P-wave had a correlation of 0.703 for walking subjects, while the T-wave demonstrated lower correlations for all three scenarios (lying: 0.817, sitting: 0.710, walking: 0.403). The other correlations for the P, Q, R, and S-waves were all higher than 0.9. This work demonstrates that our ECG T-shirt is suitable for 12-lead ECG recordings while providing a higher level of comfort compared with a commercial Holter ECG.

ECG T-shirt for 12-lead measurements with fully active and dry electrodes. A portable 12- lead ECG recorder was developed, which is compatible with the T-shirt To our knowledge, a 12-lead ECG which is compatible with the T-shirt. The system is portable and has a battery life of two days. The relative error of the RR intervals was 0.96% with a mean coverage of 96.6%. The P-wave had a correlation of 0.703 for walking subjects, while the T- wave demonstrated lower correlations for all three scenarios (lying: 0.817, sitting: 0.710, walking: 0.403). The other correlations for the P, Q, R, and S-waves were all higher than 0.9. This work shows that a comfortable ECG T-shirt with active electrodes is suitable for 12-lead ECG recordings.

Conclusion:

ECGs is the use of adhesive gel electrodes, which are uncomfortable during long-term application and. may even cause skin irritations and allergic reactions. Therefore, we integrated comfortable patches. of conductive textile into the ECG T-shirt in order to replace the adhesive gel electrodes. The monitoring T-shirt uses a single lead ECG and movement- reducing hardware to offer more accurate readings during exercise. An ECG is often used alongside other tests to help diagnose and monitor conditions affecting the heart.

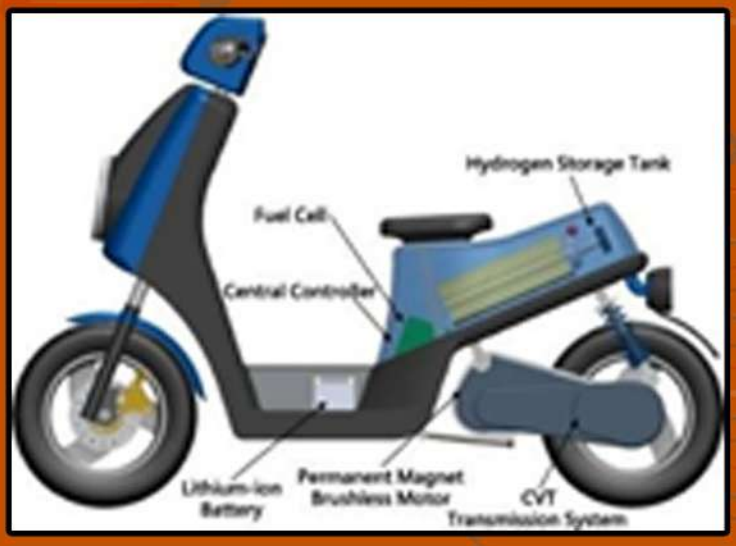
CHIRA DEEPTHI GAJJE
(16731A0479)

3. HYBRID SCOOTER

A Hybrid electric vehicle is a vehicle which relies not only on batteries but also on an internal combustion engine which drives a generator to provide the electricity and may also drive a wheel. It has great advantages over the previously used gasoline engine that drives the power from gasoline only. It is a major source of air pollution. The objective is to design and fabricate a two-wheeler hybrid electric vehicle powered by both battery and gasoline (PETROL). The combination of both the power makes the vehicle dynamic in nature over conventional automobiles.

The vehicle at lower speed act as front wheel drive and at high speed gets switched to rear wheel drive automatically. Component 1 in below Figure shows the attachment of tyre with the hub motor (2). There is no need for any gear reduction since the torque produced is sufficient enough to drive the vehicle. The axel of the motor is connected to the suspension (3). Suspension is connected to the handle which is connected to the main chassis. Accessories such as headlamp (4), display (6) are included as user aid. A microcontroller (7) powered up from battery, performs the switching from electric to internal combustion or vice versa as per the requirement.

This allows a smaller, more efficient engine to be used. A throttle position sensor (TPS) is a sensor used to monitor the position of the throttle in an internal combustion engine. It consists of a hall sensor. When the accelerator throttle angle changes magnetic field is created and it creates voltage across position 7 sensor terminals



Thus, for various angles, various voltages are obtained. Displacement in the accelerator. The analog voltage generated is converted to digital through ADC and is given to microcontroller. If the speed corresponding to the angle deviation in accelerator is less than 30km/hr then the relay is switched on. The relay switching completes the circuit of the battery, inverter and hub motor; and vehicle is motioned by electric power. If the speed directed by accelerator is greater than 30 km / hr, then the engine is started by closing the circuit of starting motor through a relay. Once the vehicle starts the valve of engine for gasoline intake opens by servo motor.

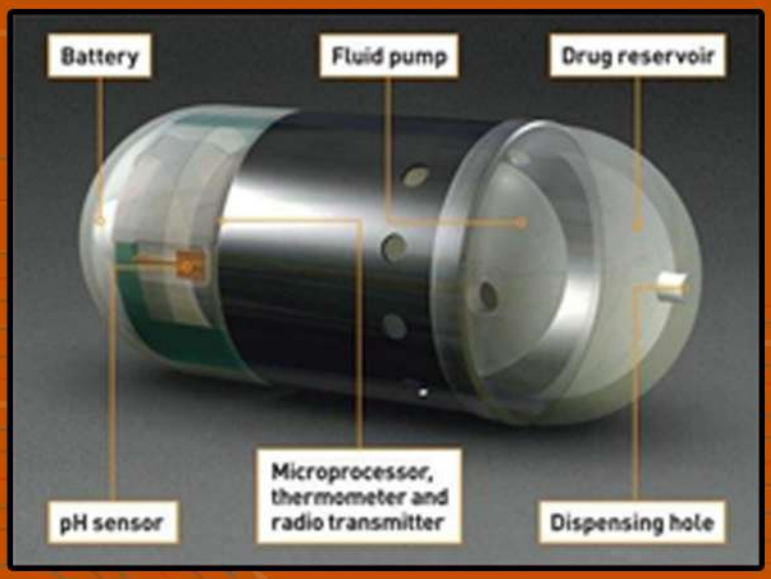
Conclusion:

HEV is a vehicle that uses two sources of power gasoline and battery. For low power application battery drive is used whereas for high power application where power requirement is very high gasoline engine is used. Gasoline drive is most efficient at high speed drive. Thus HEV"s both mode of operation occurs at their maximum efficiency. But in gasoline engine low speed operation is not efficient. Its high-speed mode is only efficient. Therefore, it gives twice the mileage given by a normal vehicle. As this hybrid vehicle emits 50% less emission than normal vehicle it plays an important role for reducing pollution to certain extent without compromising with efficiency.

PAVANI ALURU
(16731A0402)

4. ELECTRONICS PILLS

"Electronic Pills - Collecting Data inside the body" After years of investment and development, wireless devices contained in swallowable capsules are now reaching the market. Israel-based Given Imaging and the researchers at the University of Buffalo in New York have developed ingestible capsules that record data from inside your body. These pills contain sensors or tiny cameras that collect information as they travel through the gastrointestinal tract before being excreted from the body a day or two later. These new electronic inventions transmit information such as acidity, pressure and temperature levels or images of the esophagus and intestine to your doctor's computer for analysis.



Doctors often use invasive methods such as catheters, endoscopic instruments or radioisotopes for collecting information about the digestive tract. So device companies have been developing easier, less intrusive ways, to gather information. Digestive diseases and disorders can include symptoms such as acid reflux, bloating, heartburn, abdominal pain, constipation, difficulty swallowing or loss of appetite.

New electronic inventions "One of the main challenges is determining just what is happening in the stomach and intestines." says Dr. Anish A. Sheth, Director of the Gastrointestinal Motility Program at Yale-New Haven Hospital. Doctors can inspect the colon and peer into the stomach using endoscopic instruments. But some areas cannot be easily viewed, and finding out how muscles are working can be difficult. Electronic pills are being used to measure muscle contraction, ease of passage and other factors to reveal information unavailable in the past.

DEEPTHI VASANTHA LAKSHMI ELINDRA
(16731A0404)

5. WEARABLE PHOTOPLETHYSMOGRAPHY SENSORS

It is important to monitor the perfusion of the circulation. The most important cardiopulmonary parameter is blood pressure, but monitoring it is complicated. A second important parameter is blood flow, which is related to blood pressure. We can monitor the blood perfusion in large vessels using ultrasound devices, but it is not practical to use these routinely. Several devices for monitoring blood perfusion have been developed but, unfortunately, it is difficult to find a practical device.

However, the perfusion of blood flow and blood pressure can be determined easily using a pulse rate monitor. Wearable pulse rate sensors based on photoplethysmography (PPG) have become increasingly popular, with more than ten companies producing these sensors commercially. The principle behind PPG sensors is optical detection of blood volume changes in the microvascular bed of the tissue.

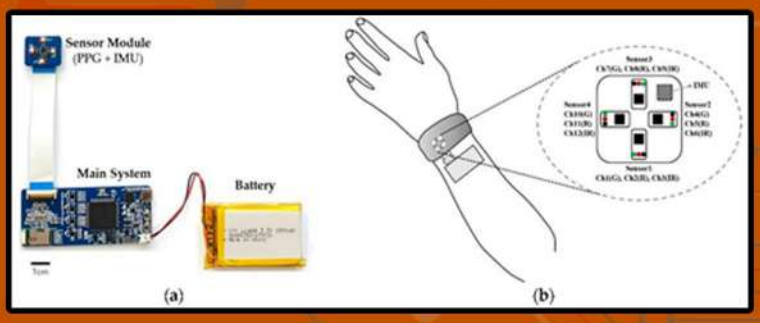
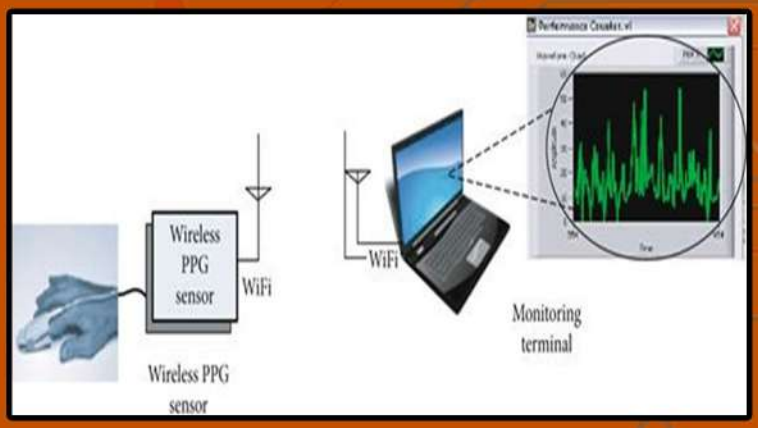


Photo Plethysmography (PPG):
Light travelling though biological tissue can be absorbed by different substances, including pigments in the skin, bone, and arterial and venous blood. Most changes in blood flow occur mainly in the arteries and arterioles (but not in the veins). For example, arteries contain more blood volume during the systolic phase of the cardiac cycle than during the diastolic phase. PPG sensors optically detect changes in the blood flow volume.



Conclusion:
Wearable PPG sensors have become very popular. Although a great deal of progress has been made in the hardware and signal processing, an acceptable wearable PPG sensor device has yet to be developed. Green light sources in PPG sensors minimize motion artifacts.

NAVYA TEJA KARANAM
(16731A0407)

6. HELIO DISPLAY

Helio display images are not holographic although they are free-space, employing a rear projection system in which images are captured onto a nearly invisible plane of transformed air.

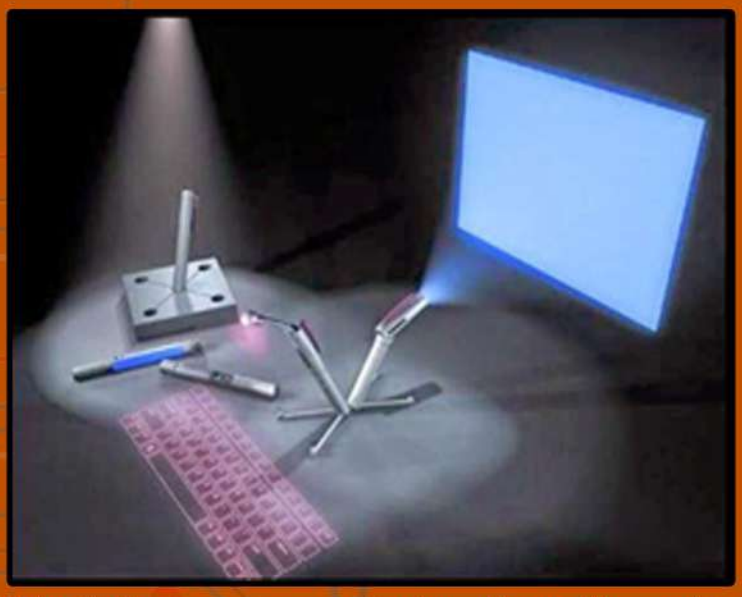
The audience see a floating mid-air image or video. These projected images and video are actually two-dimensional but appear 3D since there is no physical depth reference.

Conventional displays have the benefit of being enclosed in a solid frame or case with lights shining directly towards the audience. Helio display projections are suspended in thin air, so you will notice some waviness to the screen stability and the intensity and clarity of the image is subject to ambient light conditions and optimization of display settings.

The Helio display uses no additives or chemicals, only plain tap water (you can also use distilled water, ionized water or demineralized water if desired). The screen is safe for human interaction and will not cause any harm of any kind.

Above: Images under various ambient light conditions

Requirements:
The Helio display requires a power outlet, and a computer, TV, DVD or alternate video source. The current version of the Helio display projects a 22" to 42" (depending on model) diagonal image that floats above the device. The Helio display system is backward compatible and accepts most 2D video sources (PC, TV, DVD, HDTV, Video game consoles). For connection to a computer, the Helio display uses a standard monitor VGA connection; for TV or DVD viewing, it connects using a standard RGB video cable.



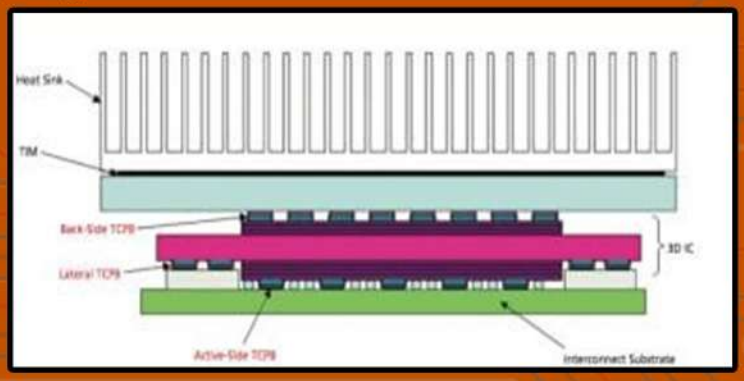
Helio display images are easily viewed in an office environment. Like any computer monitor or TV, images appear brighter the lower the ambient light. Also, just like viewing any computer monitor or TV, viewing a Helio display image in direct sunlight is almost impossible.
The Helio display is interactive, like a virtual touchscreen. A hand or finger can act as a mouse. No special glove or pointing device is required. Just as you use a mouse to move the cursor on a traditional computer monitor, you can use your finger to move the cursor around the Helio display image (see: Images & Videos). The Helio display connects to a computer (at least: Pentium III 400MHZ;25MB free disk space;Win2000/XP) through a USB port.

Helio display can operate as a free-space touchscreen when the equipment is ordered as an interactive unit with embedded sensors in the equipment. The original prototype of 2001 used a PC that sees the Helio display as a pointing device, like a mouse. With the supplied software installed, one can use a finger, pen, or another object as cursor control and navigate or interact with simple content. As of 2010, no computer or drivers are required. The interactive version ("i") of the Helio display contains an embedded processor that controls these functions internally for single touch or multiple touch interactivity using an equipment mounted arrangement but without the IR laser field found on the earlier versions.

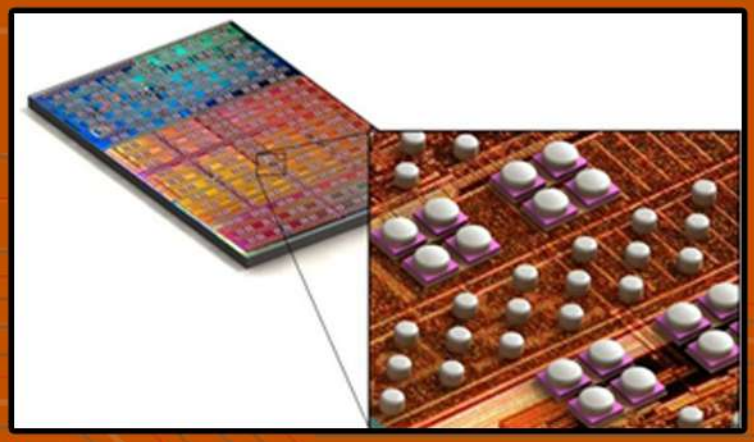
BHARGAVI KARNA
(16731A0408)

7. THE THERMAL COPPER PILLAR BUMP

The Thermal Copper Pillar Bump, also known as the thermal bump or TCPB, is a thermoelectric device made from thin-film thermoelectric material embedded in flip chip interconnects (in particular Copper Pillar Bumps) for use in electronics and optoelectronic packaging, including flip chip packaging of CPU and GPU integrated circuits (chips), laser diodes, and semi-conductor optical amplifiers (SOA). Unlike conventional solder bumps that provide an electrical path and a mechanical structure for connection to the package, thermal bumps act as solid-state heat pumps and add thermal management functionality on the surface of a chip or other electrical component. The diameter of a thermal bump is 238 µm (microns) and they are 60 µm high.



Implementing Thermal Bumps in New Product Designs:
Thermal issues are dominating today's electronic product design landscape as never before. It is easy to see this in Intel's move to a multi-core architecture as a methodology to manage their thermal problems. Of course, less than optimal solutions lead to less than optimal results. Thermoelectric devices (TECs) have been used in the optoelectronics industry for thermal management, but have not found widespread acceptance in electronic product design. General cooling: TECs can be evenly distributed across the surface of a chip to provide an evenly distributed cooling effect or they can be placed to locally cool a hot spot. In the former case, these devices are typically placed in the heat spreader or heat sink to provide cooling in the form of an active heat sink or heat spreader.



Hotspot cooling:
In microprocessors, graphics processors, and other high-end chips, hotspots can occur as power densities vary significantly across a chip. These hotspots can severely limit the performance of the devices. Today this problem has been placed on the back burner through the use of multi-core architecture but it is inevitable that in a few years it will come back.
Precision temperature control:
Since thermoelectric devices can be used to either cool or heat the chip, depending on the direction of the current flow, they can be used to provide precision control of temperature for chips that must operate within specific temperature ranges irrespective of ambient conditions. This is a common problem for many opto-electronic components.
Power generation:
In addition to chip cooling, thermally active devices can also be applied to high heat- flux interconnects to provide a constant, steady source of power for energy scavenging applications. Such a source of power, typically in the mW range, can trickle-charge batteries for wireless sensor networks and other battery-operated systems.
Summary:
A new opportunity exists to begin next generation electronic product design by including chip and module-level thermal management directly into the packaging process. In the same manner that silicon shrinks have made electronic products ubiquitous in our daily lives, so will shrinking the physical scale of thermal management materials

GOTTIPATI MAHESH
(17731A0444)

8. CRYPTOCURRENCY

We have heard about the term "Cryptocurrency", which is blooming in the investment market today. The digital currency is taking the world to a new direction. According to a market research company, around 13,000 different cryptocurrencies exist in the market. Different countries have their different opinions on crypto-currency.
Cryptocurrency: Cryptocurrency is a virtual currency, which means it does not exist physically like an Indian currency. It can be used as a medium of online exchange. The word "Cryptocurrency" is derived from the technique which is used to encrypt the network. There are two ways to gain cryptocurrency. First by online investing, secondly, by mining crypto currency.

Various countries have accepted crypto currency as legal tender whereas some countries had banned and considered crypto as illegal.However, the rules for cryptocurrency are not very clear in India, hence investing could be risky. Although crypto is legal but is not accepted as a legal tender in India.

Some Famous Cryptocurrency: Bitcoin (BTC): Bitcoin is the first cryptocurrency developed in 2009.It is one of the famous crypto currencies. It also makes use of Blockchain technology.

Ethereum (ETC): Vitalik Buterin created Ethereum in 2013. In terms of market capitalization, Ethereum or simply Ether stood second after Bitcoin. Ethereum 2.0, an upgraded series of Ethereum is also implemented.

MAKKINA LAKSHMI NEERAJA
(17731A0446)

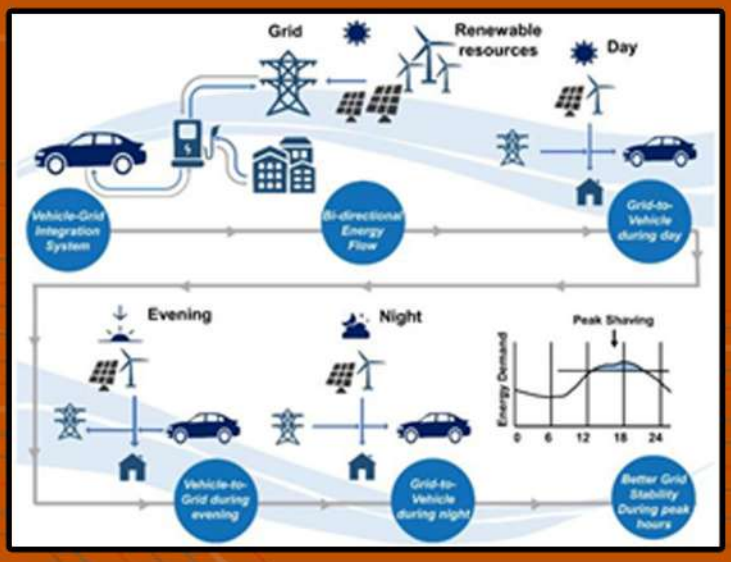
9. VEHICLE-TO-GRID V2G

Electric drive vehicles can be thought of as mobile, self-contained, and-in the aggregate highly reliable power resources. "Electric-drive vehicles" (EDVs) include three types: battery electric vehicles, the increasingly popular hybrids, and fuel-cell vehicles running on gasoline, natural gas, or hydrogen. All these vehicles have within them power electronics which generate clean, 60 Hz AC power, at power levels from 10kW (for the Honda Insight) to 100kW (for GM's EV1).

When vehicle power is fed into the electric grid, we refer to it as "Vehicle-to-Grid" power, or V2G.With the popularization of electric vehicles and the construction of charging stations, the understanding of people to the electric vehicle and the changing station is not only confined to the transportation and the "gas station".

The initial goal of V2G was to provide peak power, that is, the electric vehicle owners charging the vehicles in low load with lower price and discharging the vehicles in peak load with higher price. Then, the vehicle owners can get the profits from the V2G project. The functions of the vehicle in power grid were expanded, and the conclusion was get that benefit of providing peak power is significantly less than providing auxiliary services to the power grid.

The V2G research also was carried out in some of the other countries such as Denmark, Britain and Germany, etc. The below figure schematically illustrates connections between vehicles and the electric power grid.



Electricity flows one-way from generators through the grid to electricity users. from EDVs, or with battery EDVs, the flow is two ways. The control signal from the grid operator (labelled ISO, for Independent System Operator) could be a broadcast radio signal, or through a cell phone network, direct Internet connection, or power line carrier.

In any case, the grid operator sends requests for power to a large number of vehicles. The signal may go directly to each individual vehicle, schematically in the upper right of Fig.

, or to the office of a fleet operator, which in turn controls vehicles in a single parking lot, schematically shown in the lower right of Fig. , or through a third-party aggregator of dispersed individual vehicles' power (not shown). The grid operator also dispatches power from traditional central-station generators using a voice telephone call or a T1 line.

MANNEM HEMALATHA
(17731A0447)

10. SILENT FLIGHT

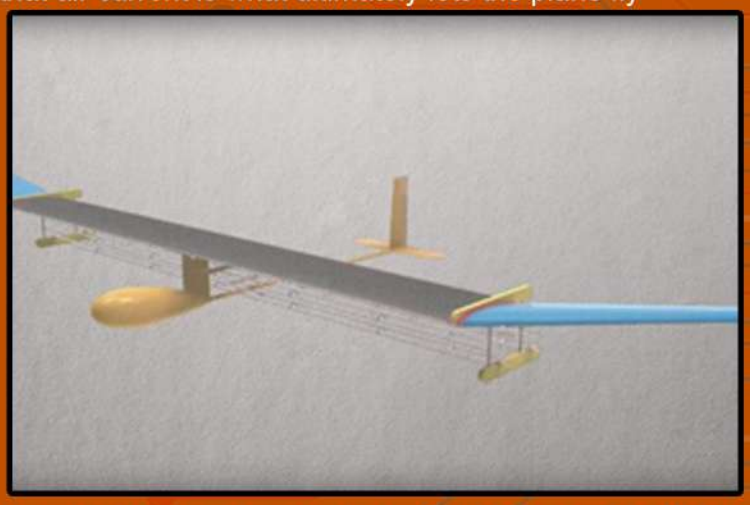
Silent Flight - New Drone is Powered by an Ionic Wind Requiring no Moving Parts.

Most drones today are noisy: The whine of motors and the hum of propellers produces an unavoidable din that instantly telegraphs their presence. By contrast, the small plane that flew across an indoor track on the MIT campus this fall was eerily silent.

Though its furthest flights were obviously powered, you could be forgiven for thinking it was some sort of trick. That's because the plane uses an entirely novel propulsion system, one without even a single moving part. Researchers call it an "ionic wind," and the technology could offer a means of silently powering drones of the future, as well as being a potentially cleaner source of thrust for even larger aircraft.

Ionic Wind: The craft generates thrust with a pair of wires carrying electric current, set one behind the other. The wire in front carries an electric charge of extremely high voltage - 40,000 volts in this case - and it's enough to knock electrons from nitrogen in the air, turning them into charged ions.

The electric field generated between the set of wires then accelerates the ions toward the rear of the plane, and they bump into air molecules along the way, transferring energy to them and creating an air current. The force generated by that air current is what ultimately lets the plane fly



Work Ahead: Achievements aside, though, the system is still far too inefficient for anything more than an extremely lightweight drone plane at the moment. Part of the reason is that ionic wind systems get more efficient at higher speeds, something the 11 mph speed limit of their prototype doesn't allow for. But this is just a proof-of-concept, the researchers emphasize, meant to show that ionic wind technology can indeed independently power an aircraft. Powering commercial aircraft with ionic winds remains a more tenuous possibility.

Propellers and jet engines are far more efficient than ionic winds right now, and the technology would need to advance significantly for it to become a viable option. Still, ionic winds could function as a secondary power source on aircraft once they're aloft, and they could be powered by solar panels. Barrett also sees applications for the technology in the realm of the very small. "Solid state things tend to lend themselves to scaling down quite well," he said at a news conference Tuesday. "There does seem like there's the potential for creating extremely small flight vehicles that could serve purposes that previously haven't been imagined.

PABBATHI GEETHA LAHARI
(17731A0449)

11. WI - FI APPLICATION

Wi-Fi could get much faster thanks to a proposed change in the wireless spectrum... Whether we're sitting in a crowded Starbucks or in your busy home streaming Netflix, you want the Wi-Fi network to be fast. Earlier this week, the FCC suggested a change that could help make that happen: to use a new part of the wireless spectrum that they don't currently have access to.

Thinking of it like the congested highway we use to drive to work suddenly getting new lanes, or getting an entirely new highway to commute on-things hopefully start moving quicker. "It will give people faster Wi-Fi, basically," says Anthony Rowe, an associate professor of electrical and computer engineering at Carnegie Mellon University and a member of the institute's CyLab.

Right now, many routers work on two different frequencies—either 2.4 GHz or 5 GHz. The 2.4 band (it's one small swath of frequencies in that neighborhood) has a reputation for traveling further, but offering slower speeds, mostly due to congestion and interference. The 5 GHz band is known for not going quite as a far distance wise, but providing faster speeds, so those episodes of The Good Place don't need to buffer; there's more bandwidth in what's actually three different frequency segments in that frequency region.

What the FCC proposed is opening up a big new part of the spectrum-the 6 GHz region-for WIFI. It's not a done deal yet, but after a public commenting period and then another vote, it could be. Some of the primary opposition voices claim the new deal will favor large companies with licenses that could hurt smaller providers. All these radio waves, regardless of frequency, are travelling at the speed of light, so the real reason we could hopefully download the Bourne trilogy quickly before our next long plane flight isn't the exact frequency number—it's the bandwidth available.

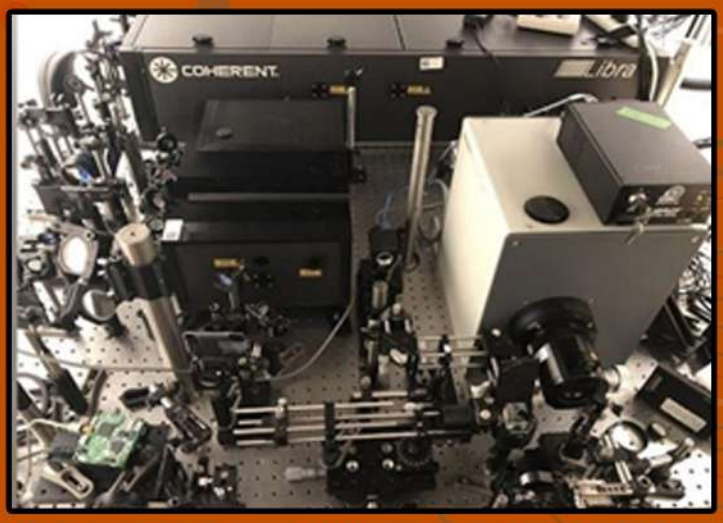
RAVURI YASWANTH
(17731A0455)

12. FASTEST CAMERA

Fastest Camera - Lasers move at 10 Trillion frames per second... Previously, the fastest video cameras in the world had framerates of one-one-hundred billionth of a second. That was fast — A hundred-billionth of a second is just enough time for a beam of light to travel the length of a sesame seed. But it wasn't fast enough.

Researchers working with advanced lasers had developed a technique called "temporal focusing" where a laser pulse could be made to fire over incredibly short, compressed periods of time. The whole beam of light would rush out all at once, and researchers knew that temporally focused lasers behaved differently from lasers emitted over longer periods of time.

But the existing cameras were just too slow to study them. There were some ways to get around this problem in other ultra-fast experiments. Researchers would sometimes run the same experiment over and over in front of the same, too-slow camera until it had collected enough different frames of action to string together into a single, complete movie.



T-CUP splits the image of the laser into two devices: a motion recorder and a camera that makes a single exposure of the scene. The movie camera captures the scene at the screaming edge of what's possible for it to see. The still camera makes a single, smeared shot of the laser's whole motion. Then, a computer combines the data from the two cameras, using the smeared image from the still camera to fill in the gaps in the movie.

Things we need: For interconnection of devices we need, first those devices whose output is as per our interest, such as in the above case, a sensor, a data accumulator or a data acquisition system, a data processor such as Big Data or equivalent and a good internet connection.

SI DURGA HARI VARA PRASAD
(17731A0456)

13. BUBBLE POWER

Sono fusion is technically known as acoustic inertial confinement fusion. In this we have a bubble cluster (rather than a single bubble) is significant since when the bubble cluster implodes the pressure within the bubble cluster may be greatly intensified. The center of the gas bubble duster shows a typical pressure distribution during the bubble duster implosion process.

This large local liquid pressure 1000 bar) will strongly compress the interior bubbles with in the cluster, leading to conditions suitable for thermonuclear fusion. More over during the expansion phase of the bubble duster dynamics, coalescence of some of interior bubbles is expected, and this will lead to the implosion of fairly large interior bubbles which produce more energetic implosions

The apparatus consists Of a cylindrical Pyrex glass flask 100 mm in high and 65mm in diameter. A lead-zirconate-titanate ceramic piezoelectric crystal in the form of a ring is attached to the flasks outer surface. When a positive voltage is applied to the piezoelectric ring, it contracts; when the voltage is removed, it expands to its original size.

The flask is then filled with commercially available deuterated acetone (C 3 D 6 0), in which 99.9 percent of the hydrogen atoms in the acetone molecules are deuterium (this isotope Of hydrogen has one proton and one neutron in its nucleus). Also, the deuterated fluid can withstand significant tension (stretching) without forming unwanted bubbles.

The substance is also relatively cheap, easy to work with, and not particularly hazardous.

KOONI PALLAVI
(18731A0484)

14. GRAVITY LIGHT

When you hear the phrase "alternative energy," chances are your mind goes to windmills and solar panels, or perhaps fields of corn. The Gravity lamp is powered by the falling motion of some weights, also known as gravity. It's an interesting idea, using a (presumably) limitless resource like the pull of gravity to generate power. And while the Gravity lamp requires some advances in technology before it becomes a viable product, the concept is worth checking out. In this article, we'll get into the Gravity lamp and see what makes it glow, and we'll find out why a gravity-powered lamp may be an alternative energy gadget to keep an eye out for.

A person attaches five 10-brassbound weights to a ball screw near the top of the lamp. The platform immediately starts dropping along the screw, which is aligned along the length of the lamp. As the platform makes its way down the screw, the screw spins.

This converts the downward motion of gravity (acting on the weights) into the rotational motion needed to spin the gear near the bottom of the lamp. The spinning gear in turn spins a generator a rotor/stator assembly that converts the rotational motion into electricity. The electricity powers 10 LED bulbs, which light up and illuminate the acrylic housing of the lamp

KOTA MAHESH
(18731A0485)

15. MONEY PAD - FUTURE WALLET

Money in the 21st century will surely prove to be as different from the money Of the current century as our money is from that Of the previous century. Just as fiat money replaced specie-backed paper currencies, electronically initiated debits and credits will become the dominant payment modes, creating the potential for private money to compete with government-issued currencies.

Just as everything is getting under the shadow of "e" today we have paper currency being replaced by electronic money or e-cash Hardly a day goes by without some mention in the financial press of new developments in "electronic money" In the emerging field of electronic commerce, novel buzzwords like smartcards, online banking, digital cash, and electronic checks are being used to discuss money. But how are these brand-new forms of payment secure? And most importantly, which of this emerging secure electronic money technology will survive into the next century?

Bluetooth is universal for short-range wireless voice and data communication. It is a Wireless Personal Area Network (WPAN) technology and is used for exchanging data over smaller distances. This technology was invented by Ericson in 1994. It operates in the unlicensed, industrial, scientific, and medical (ISM) band from 2.4 GHz to 2.485 GHz. Maximum devices that can be connected at the same time are 7. Bluetooth ranges up to 10 meters. It provides data rates up to 1 Mbps or 3 Mbps depending upon the version. The spreading technique that it uses is FHSS (Frequency-hopping spread spectrum). A Bluetooth network is called a Pico net and a collection of interconnected Pico nets is called scatter net.

These are some of the tough questions to answer but here's a solution, which provides a form of security to these modes of currency exchange using the "Biometrics Technology". The Money Pad introduced here uses the biometrics technology for Finger Print recognition. Money Pad is a form of credit card or smartcard, which we name so.

Every time the user wants to access the Money pad, he has to make an impression of his fingers which will be scanned and matched with the one in the hard disk of data base server. If the finger print matches with the used he will be allowed to access and use the Pad otherwise the Money Pad is not accessible.

Thus, providing a form of security to the ever- lasting transaction currency of the future "e-cash" Money Pad - A form of credit card or smart card similar to floppy disk, which is introduced to provide, secure e-cash transactions.

PENUMACHA SAI KEERTHIKA
(18731A0495)

TECHNICAL QUIZ

1. The early effect in a bipolar junction transistor is caused by
A. fast turn-on B. fast turn-off
C. large collector-base reverse bias
D. large emitter-base forward bias

2. MOSFET can be used as a
A. voltage controlled capacitor
B. current controlled capacitor
C. voltage controlled inductors
D. current controlled inductor

3. Thermal runaway is not possible in FET because as the temperature of FET increases
A. the mobility decreases
tB. the transconductance increases
C. the drain current increases
D. none of the above

4. A source follower using an FET usually has a voltage gain which is
A. greater than +100
B. slightly less than unity but positive
C. exactly unity but negative D. about -10

5. A differential amplifier has a differential gain of 20,000. CMRR=80 dB. The common mode gain is given by
A. 2 B. 1 C. 1/2 D. 0

6. At room temperature the current in an intrinsic semiconductor is due to
A. holes B. electrons
C. ions D. holes and electrons

7. Work function is the maximum energy required by the fastest electron at 0 K to escape from the metal surface.
A. True B. False

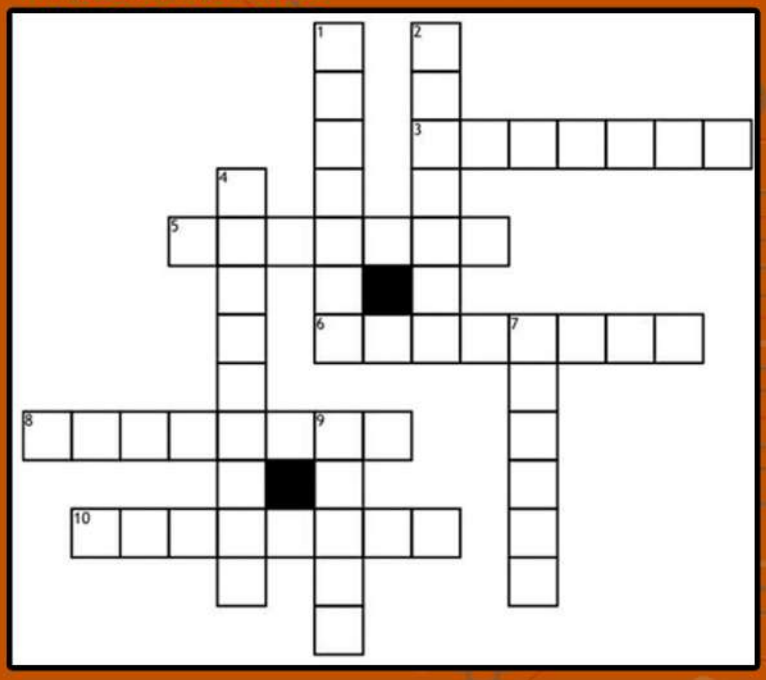
8. The most commonly used semiconductor material is
A. silicon B. germanium
C. mixture of silicon and germaniumD.none of the above

9. In which of these is reverse recovery time nearly zero?
A. Zener diode B. Tunnel diode
C. Schottky diode D. PIN diode

10.A transistor has a current gain of 0.99 in the CB mode. Its current gain in the CC mode is
A.100 B.99 C.1.01 D.0.99

PREMIKA GHANTASALA
(16731A0405)

CROSS WORDS



Across

3. What is current measured in?
5. What is another name for potential difference?
6. A light bulb is a type of?
8. Conventional current flows from positive or negative?
10. A voltmeter must always be connected in?

Down

1. What is current measured with?
2. What are pushed around the circuit by the battery?
4. A battery gives electrons energy.
7. An ammeter must always be connected in?
9. What is potential difference measured in?

MOHINI SRI PENTYALA
(16731A0419)