



ELEKTOR

S V COLLEGE OF ENGINEERING

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EDITORIAL BOARD

Dr. P.SELVA RAJ
Mr. P.VINOD KUMAR

DESIGN DEPARTMENT

VISHNUVARDHAN
KHEMANTHKUMAR
N PUNEETH KUMAR
T GIRESH

Vision of the Department

To prepare the learners globally competent, dynamic and multi talented young leaders with skill set & knowledge in Electrical and Electronics Engineering field with a focus on higher education, professional practice, research and technical consultancy competence ethical concern.

Mission of the Department

- ◆ To prepare the learners professionally deft and intellectually adept in the field of Electrical and Electronics Engineering with an excellent infrastructure, core values and qualified & experienced teaching faculty.
- ◆ To inculcate skill, knowledge and behavior to cater the dynamic requirements in the field of Electrical and Electronics Engineering.
- ◆ To motivate and prepare the learners for career guidance, placements and higher education with a focus on MoUs with premier institutes and industries.

Program Educational Objectives (PEOs)

PEO1: Solve challenging technological issues in the field of Electrical and Electronics Engineering for the betterment of the living standards of the society as valuable and productive engineers.

PEO2: Improve the efficiency and effectiveness of the existing methodologies by adapting out-of-the-box rationalized thinking.

PEO3: Function ethically and communicate professionally as a team member within multidisciplinary teams.

PEO4: Continue the process of lifelong learning to cater the dynamically changing requirements in the field of Electrical and Electronics Engineering.

About the Department

The Electrical & Electronics Engineering department was started with UG programme in 2007 with an intake of 60. The department has well talented, qualified, experienced & dynamic faculty along with skilled technical supporting staff who spearhead the process of achieving the vision of the department. The department has well equipped labs & infrastructure. It is continuously striving to impart quality education and competitive spirit among students for academic excellence.

Message from Principal

“The mind is not a vessel to be filled, but a fire to be kindled.” Said Plutarch.

I congratulate the staff and students of all faculties who used various mediums of expression to present their ideas. As long as our ideas are expressed and thoughts kindled we can be sure of learning, as everything begins with an idea. I appreciate every student who shared the joy of participation in co-curricular and extracurricular activities along with their commitment to curriculum. That little extra we do, is the icing on the cake.

Do more than care – help

Do more than dream – work.’

Do more than forgive – forget

Do more than be fair – be kind

Do more than believe – practice

‘Do more than belong – participate

Just as our mother earth gives us more and more, ELEKTOR will enable our learners to give and get a little more of learning.

Happy Reading!

Dr. N. Sudhakar Reddy, Principal

Message from HOD

It gives me immense pleasure to pen a few words as prologue to the technical magazine ELEKTOR of the EEE department. This issue is designed to present the write-ups regarding topics related to electrical engineering, self development and the scientists introduction etc which makes the issue resourceful and informative. I congratulate all the contributors all the contributors and also the editorials board for bringing out such a nice issue.

Happy Reading.

Dr. K. Sudheer, HoD, Dept. of EEE

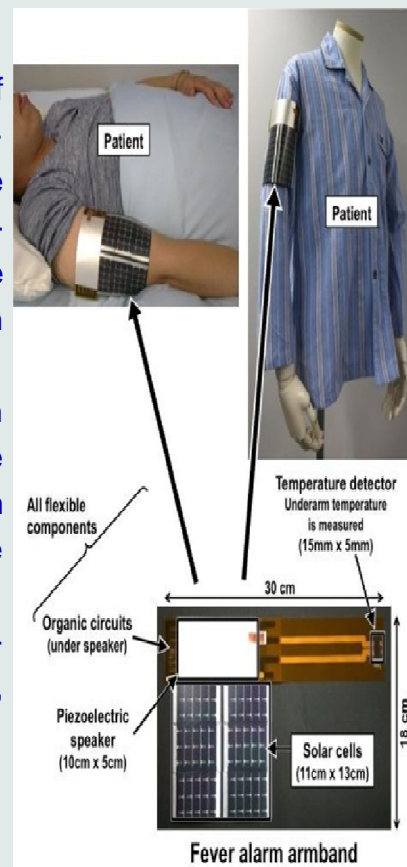
ARTICLES

FEVER ALARM ARMBAND

Researchers have developed a 'fever alarm armband,' a flexible, self-powered wearable device that sounds an alarm in case of high body temperature. The flexible organic components developed for this device are well-suited to wearable devices that continuously monitor vital signs including temperature and heart rate for applications in healthcare settings. The armband is 30 cm long and 18 cm wide, and can be worn either directly on the skin or on top of clothing.

The device is designed so that the thermal sensor is located between the arm and the body. The organic power supply circuit is located under the piezo film speaker to reduce surface area. Constant monitoring of health indicators such as heart rate and body temperature is the focus of intense interest in the fields of infant, elderly and patient care.

Sensors for such applications need to be flexible and wireless for patient comfort, maintenance-free and not requiring external energy supply, and cheap enough to permit disposable use to ensure hygiene.



THE 'HOVERBOARD' SCOOTER



The self-balancing scooter—generally known as a hoverboard. The device uses a pair of electric gyroscopes (one under each pad) to balance automatically, allowing users to speed forward, backward and around by slightly shifting their body weight.

These self balancing boards use very clever sensors to detect when the rider leans in a certain direction, and, in turn, the electric motors spin the wheels to move in that direction.

Basically, all you do is shift your weight in the desired direction and you will move towards it. Riding one is pretty eerie, as the board seems to “know” where you want to go.

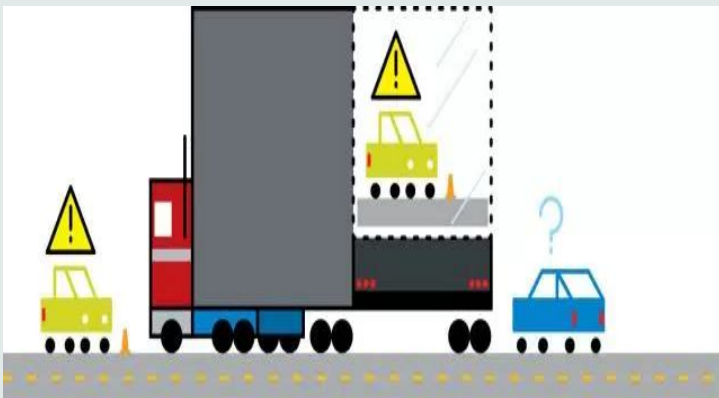
BIONIC EARS

If you're stuck somewhere with unbearable noise, you essentially have two options: plug your ears, or leave. But what if you could isolate the most grating sound and mute it? Or just lower the volume, much as you would on a TV? That's the promise of the Here Active Listening system, a groundbreaking set of earbuds. Unlike hearing aids, which amplify or decrease all noises at once, Here's processor syncs with a smartphone app, so users can handpick which frequencies they want to filter. That means you could stand on a subway platform and have a normal conversation as a train screeches by, or even tune out a crying baby on a plane



THE TRANSPERANT TRUCK

Every year, thousands of people get hurt or die in traffic accidents, in part because their visibility gets blocked by a lumbering vehicle. However, Samsung and ad agency Leo Burnett have partnered on a creative solution: a system that relays video footage from the front of a truck



to four screens on its back, giving drivers a clear view of what's ahead.

HOVERBIKE

The Hoverbike is the result of years worth of R&D. We combined the simplicity of a motorbike and the freedom of a helicopter to create the world's first flying motorcycle. When compared with a helicopter, the Hoverbike is cheaper, more rugged and easier to use – and represents a whole new way to fly. The Hoverbike flies like a quadcopter, and can be flown unmanned or manned, while being a safe

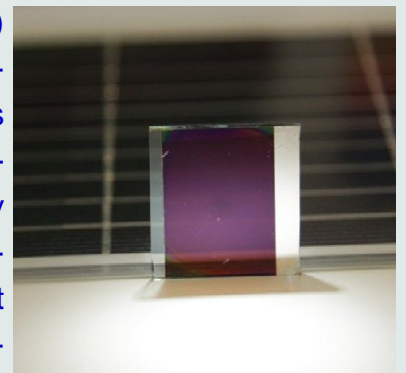


low level aerial workhorse with low on-going maintenance.

SEMITRANSSPARENT SOLAR CELLS

Developing transparent or semitransparent solar cells with high efficiency and low cost to replace the existing opaque and expensive silicon-based solar panels has become increasingly important due to the increasing demands of the building integrated photovoltaics (BIPVs)

systems. The Department of Applied Physics of The Hong Kong Polytechnic University (PolyU) has successfully developed efficient and low-cost semitransparent perovskite solar



cells with graphene electrodes. The power conversion efficiencies (PCEs) of this novel invention are around 12% when they are illuminated from Fluorine-doped Tin Oxide bottom electrodes (FTO) or the graphene top electrodes, compared with 7% of

conventional semitransparent solar cells. Its potential low cost of less than HK\$0.5/Watt, more than 50% reduction compared with the existing cost of Silicon solar cells, will enable it to be widely used in the future.

WEARABLE ENERGY GENERATOR USES URINE TO POWER WIRELESS TRANSMITTER

A pair of socks embedded with miniaturized microbial fuel cells (MFCs) and fueled with urine pumped by the wearer's footsteps has powered a wireless transmitter to send a signal to a PC. This is the first self-sufficient system powered by a wearable energy generator based on microbial fuel cell technology. Microbial



fuel cells (MFCs) use bacteria to generate electricity from waste fluids. They tap into the biochemical energy used for microbial growth and convert it directly into electricity. This technology can use any form of organic waste and turn it into useful energy without relying on fossil fuels, making this a valuable green technology.

60 MINUTES ON THIS BICYCLE CAN POWER YOUR HOME FOR 24 HOURS

People often complain about the high costs of energy and the fact that they “*never have time to workout.*” This invention certainly solves both conundrums. And, most importantly, this free power invention has the potential to lift the 1.3 billion

people who presently live without electricity out of poverty. As Manoj Bhargava, the founder of the Free Electric hybrid bike, shares in the video below, it is possible to generate electricity at home while simply doing a daily workout routine. When an individual pedals the bike, the action drives a flywheel, which turns a generator and charges a battery. This means from just one hour of pedaling, a rural household can be supplied with energy for 24 hours.



COMPACT ELECTRIC BIKE

Here we welcome the world's most compact electrical bike, weighing a tiny 26 pounds and capable of traveling up to 15 miles on just one charge. The A-Bike Electric is the second incarnation of the original A-Bike, which was developed by Alex Kalogroulis. The design allows for the entire bike to collapse in seconds, and can fold to 8.5 x 17.75 x 27.5 inches. A 24v battery can be detached from the bike and charged at home, with an on-board LED system to indicate the charging levels. The wheel's of the A-Bike Electric have been criticised, but the company stress that the dual-chain drive system means the bike powers in an identical fashion to full size models, making for a natural ride.



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**VISHNUVARDHAN
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Circuit Topologies, Modeling, Control Schemes, and Applications of Modular Multilevel Converters

Abstract:

Modular multilevel converters have several attractive features such as a modular structure, the capability of transformerless operation, easy scalability in terms of voltage and current, low expense for redundancy and fault tolerant operation, high availability, utilization of standard components, and excellent quality of the output waveforms. These features have increased the interest of industry and research in this topology, resulting in the development of new circuit configurations, converter models, control schemes, and modulation strategies. This topic presents a review of the latest achievements of modular multilevel converters regarding the mentioned research topics, new applications, and future trends.

Innovative 5-m-Off-Distance Inductive Power Transfer Systems With Optimally Shaped Dipole Coils

Abstract:

5-m-off-distance inductive power transfer systems that have optimally shaped cores in the primary and secondary coils are

proposed. Instead of conventional-loop-type coils for magnetic resonance scheme, magnetic dipole type coils with cores are used for drastic reduction in deployment space and quite long wireless power transfer. An optimized stepped core structure is also proposed, where a strong magnetic field section is so thick that magnetic field density may be even. Thus, the proposed optimized stepped core has only 41% core loss compared with an unoptimized even core but delivers 2.1 times more wireless power for a given amount of core. Experimentally obtained maximum output powers and primary-coil-to-load-power efficiencies for 3, 4, and 5 m at 20 kHz were 1403, 471, 209 W, and 29%, 16%, 8%, respectively.

High Step-Up Converter With Three-Winding Coupled Inductor for Fuel Cell Energy Source Applications

Abstract:

A high step-up converter for fuel cell energy source applications. The proposed high step-up dc-dc converter is devised for boosting the voltage generated from fuel cell to be a 400-V dc-bus voltage. Through the three-winding coupled inductor and voltage doubler circuit, the

proposed converter achieve high step-up voltage gain without large duty cycle. The passive lossless clamped technology not only recycles leakage energy to improve efficiency but also alleviates large voltage spike to limit the voltage stress. Finally, the fuel cell as input voltage source 60–90 V integrated into a 2-kW prototype converter was implemented for performance verification. Under output voltage 400-V operation, the highest efficiency is up to 96.81%, and the full-load efficiency is 91.32%.

Design and Implementation of a Single-Stage Driver for Supplying an LED Street-Lighting Module With Power Factor Corrections

Abstract:

A novel single-stage light emitting diode (LED) driver for street-lighting applications with power factor corrections (PFC). The presented driver integrates a modified bridgeless PFC ac–dc converter with a half-bridge-type LLC dc–dc resonant converter into a single-stage conversion circuit topology. The proposed ac–dc resonant driver provides input current shaping, and it offers attributes of lowered switching losses to the soft-switching functions obtained on two power switches and two output-rectifier diodes. The proposed driver features cost effectiveness, high circuit effi-

ciency (>92%), high power factor (>0.99) and low input current total harmonics distortion (<8%). A prototype driver is developed for supplying a 144-W-rated LED street-lighting module with utility-line input voltages ranging from 100 to 120 V, and experimental results demonstrate the functionalities of the proposed LED driver.

Power Controllability of a Three-Phase Converter With an Unbalanced AC Source

Abstract:

Three-phase dc–ac power converters suffer from power oscillation and over current problems in case of the unbalanced ac source voltage that can be caused by grid/generator faults. Existing solutions to handle these problems are properly selecting and controlling the positive- and negative-sequence currents. In this topic, a new series of control strategies which utilize the zero sequence components are proposed to enhance the power control ability under this adverse condition. It is concluded that by introducing proper zero-sequence current controls and corresponding circuit configurations, the power converter can enable more flexible control targets, achieving better performances in the delivered power and load current.

Mega Minds

James C. Maxwell (1831–1879)

James C. Maxwell was a 19th century pioneer in chemistry and physics who articulated the idea of electromagnetism. Born on June 13, 1831, in Edinburgh, Scotland, James C. Maxwell studied at the University of Cambridge before holding a variety of professorship posts. Already known for his innovations in optics and gas velocity research, his groundbreaking theories around electromagnetism, articulated in the famed Maxwell's Equations, greatly influenced modern physics as we know it. Maxwell died in England on November 5, 1879.



Benjamin Franklin (1706–1790)

Benjamin Franklin is best known as one of the Founding Fathers who drafted the Declaration of Independence and the Constitution of the United States. Born in Boston in 1706, Benjamin Franklin helped to draft the Declaration of Independence and the U.S. Constitution, and he negotiated the 1783 Treaty of Paris, which ended the Revolutionary War. His scientific pursuits included investigations into electricity, mathematics and map-making. A printer and writer known for his wit and wisdom, Franklin was a polymath who published *Poor Richard's Almanack*, invented bifocal glasses and organized the first successful American lending library.



Heinrich Hertz (1857 – 1894)

In a series of brilliant experiments Heinrich Hertz discovered radio waves and established that James Clerk Maxwell's theory of electromagnetism is correct. Hertz also discovered the photoelectric effect, so providing one of the first clues to the existence of the quantum world. The unit of frequency, the hertz, is named in his honor. In 1887, as part of his work on electromagnetism, Hertz reported a phenomenon that had enormous implications for the future of physics and our fundamental understanding of the universe. It came to be known as the photoelectric effect. He shone ultraviolet light on electrically charged metal, observing that the UV light seemed to cause the metal to lose its excess charge faster.



Marie Curie (1867–1934)

Marie Curie was a Polish-born French physicist famous for her work on radioactivity and twice a winner of the Nobel Prize. Born Maria Sklodowska on November 7, 1867, in Warsaw, Poland, Marie Curie became the first woman to win a Nobel Prize and the only woman to win the award in two different fields (physics and chemistry). Curie's efforts, with her husband Pierre Curie, led to the discovery of polonium and radium and, after Pierre's death, the further development of X-rays. She died on July 4, 1934.



**PUNEETH
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[Bionic leaf: Researchers use bacteria to convert solar energy into liquid fuel](#)

Date: February 9, 2015

Source: Harvard Medical School

Summary: Solar energy can be harnessed using electricity from photovoltaic cells to yield hydrogen that can be stored in fuel cells. But hydrogen has failed to catch on as a practical fuel for cars or for power. Converting solar energy into liquid fuel could accelerate its adoption as a power source. Harvesting sunlight is a trick plants mastered more than a billion years ago, using solar energy to feed themselves from the air and water around them in the process we know as photosynthesis.

[Big box stores could ditch the grid, use natural gas fuel cells instead](#)

Date: March 4, 2015

Source: DOE/Pacific Northwest National Laboratory

Summary: Natural gas powered solid oxide fuel cells, located at the point of use to produce electricity for facilities the size of big box stores, could provide economic and environmental benefits, with additional research, according to new study. Large facilities like big box stores or hospitals could keep the lights on by using a fuel cell that runs off the natural gas that already flows in pipelines below most city streets.

[Artificial muscles get graphene boost](#)

Date: May 21, 2015

Source: Korea Advanced Institute of Science and Technology

Summary: Researchers have developed an electrode consisting of a single-atom-thick layer of carbon to help make more durable artificial muscles. They are hoping to make a robot that can walk and jump on water like a water strider. Ionic polymer metal composites (IPMCs), often referred to as artificial muscles, are electro-active polymer actuators that change in size or shape when stimulated by an electric field. IPMCs have been extensively investigated for their potential use in robotics inspired by nature, such as underwater vehicles propelled by fish-like fins, and in rehabilitation devices for people with disabilities.

[Renewable energy from evaporating water](#)

Date: June 16, 2015

Source: Columbia University

Summary: Scientists report the development of two novel devices that derive power directly from evaporation -- a floating, piston-driven engine that generates electricity causing a light to flash, and a rotary engine that drives a miniature car. An immensely powerful yet invisible force pulls water from Earth to the top of the tallest redwood and delivers snow to the tops of the Himalayas.

[Beyond the Lithium Ion: Significant Step Toward a Better Performing Battery](#)

Date: April 17, 2015

Source: University of Illinois at Chicago

Summary: Researchers have taken a significant step toward the development of a battery that could outperform the lithium-ion technology used in electric cars such as the Chevy Volt. They have shown they can replace the lithium ions, each of which carries a single positive charge, with magnesium ions, which have a plus-two charge, in battery-like chemical reactions, using an electrode with a structure like those in many of today's devices.

[Density of lithium storage materials increased](#)

Date: March 16, 2015

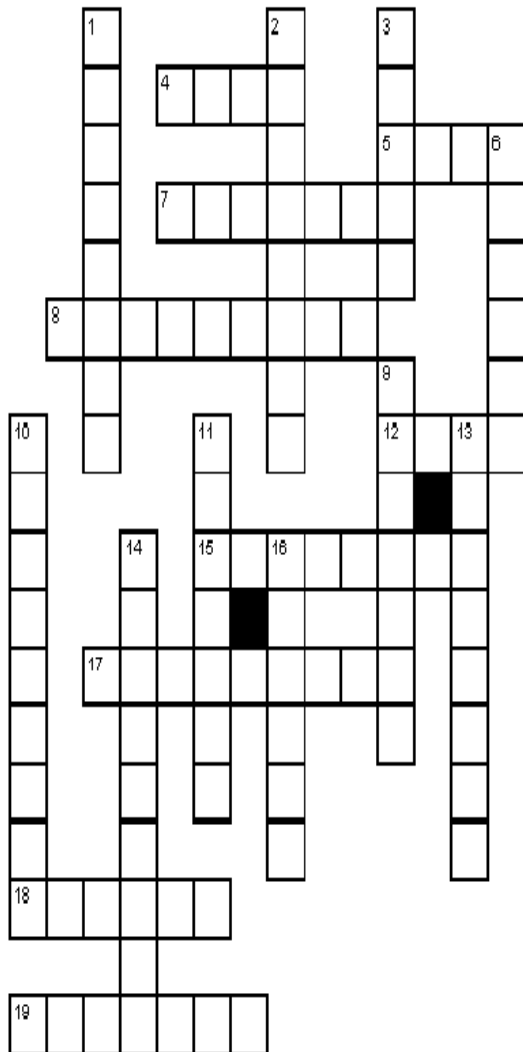
Source: Karlsruhe Institute of Technology

Summary: Scientists have pushed the limits to further development of lithium ion batteries: The researchers developed a new cathode material based on a new storage principle, as a result of which energy storage densities can be increased beyond those of systems known so far.



IGNITE YOURSELF

CROSS WORDS ON CIRCUITS



Across:

4. A safety device that break a circuit when too much current is flowing. (4)
5. The unit that resistance is measured in. (4)
7. A switch that open a circuit when too much current is flowing. (7)
8. An electric discharge from the sky to the ground during a storm. (9)
12. The unit that current is measured in (for short). (4)
15. A device that resists the flow of electricity in a circuit. (8)
17. A material that doesn't conduct electricity well. (9)
18. A device that will open or close a circuit. (6)
19. The flow of electrons through a material is called electric _____. (7)

Down

1. The charge on a proton. (8)
2. The charge on an electron. (8)
3. A type of circuit where current by passes most resistance and large, dangerous currents flow (5)
6. A circuit with only one path through which electrons flow. (6)
9. A voltage supply used in flashlights and many toys. (7)
10. Electricity is the movement of _____ through a conductor. (9)
11. A path through which electric current flows. (7)
13. A circuit with more than one path through which electrons can flow. (8)
14. A material that conducts electricity will. (9)
16. Kind of electricity resulting from a build up of charged particles. (6)

