



ELEKTOR

S V COLLEGE OF ENGINEERING

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EDITORIAL BOARD

Dr. K.SUDHEER
Mr. P.VINOD KUMAR

Yesterday is history
tomorrow is a mystery
but today is a gift.

That is why it is called

PRESENT

- Master Oogway

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 behaviour 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

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.

Strengths of the Department

1. In every semester Department of EEE conducts minimum of two workshops and there guest lecturers in the recent trends in Electrical Engineering to bridge the gap between Academics & Industries, and the students will be guided to do their Major & Minor projects on the same topics.
2. Every faculty member of the department attends a minimum of one faculty development program in every academic year. And most of the faculty members register for NPTEL online courses.
3. Department publishes a newsletter in every six months, which includes the activities that were done in the past two months; fortnight wall magazines based on recent advancements in the field of electrical engineering prepared by students

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 extra-curricular 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 and also the editorials board for bringing out such a nice issue.

Happy Reading.

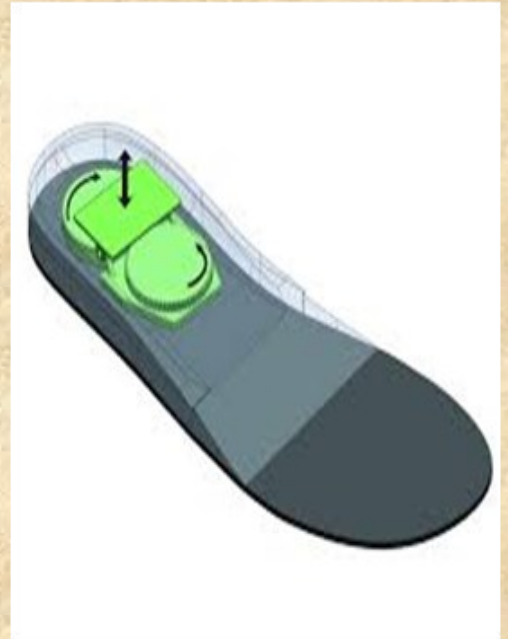
Dr. K. Sudheer, HoD, Dept. of EEE

ARTICLES

SOLEPOWER

Imagine not worrying about losing the charge on your phone, and being able to go anywhere without a charger. Well with Solepower tech's new invention, the Solepower, that's possible. The Solepower is a small device that fits into your shoe and gets its energy from you as you walk.

Solepower charges a small battery, and you can use that energy to charge your phone. Solepower is perfect for many purposes including hiking, traveling, and for people in less advantaged countries who may not have consistent access to elec-



SOCKET

The Soccket is no normal soccer ball; in fact it is quite un-ordinary. This new invention creates energy through soccer. It works by harnessing the kinetic energy exerted when the ball gets kicked it around. Thirty minutes of play equates to three hours of power that is fed to an attachable LED light. The idea for the Soccket came from two young entrepreneurs, Jessica O. Matthews and Julia Silverman.



They realized that soccer is the most popular sport in the world and that there must be a way to harness that kinetic energy and store it for those who live in less industrialized countries.

WORLD'S FASTEST MOTOR

A new motor developed by researchers at ETH Zurich's Department of Power Electronics and marketed by the Swiss company, Celerton, can spin in excess of 1 million revolutions per minute. As a comparison, collapsed stars spin at 60,000 rpms, a blender at about 30,000 and high performance engines at around



10,000 rpms.

The matchbook-sized motor has a titanium shell, ultra-thin wiring and a trade secret iron formulated cylinder. The need for smaller elec-

tronic devices requires smaller holes, which means smaller, faster, more efficient drills.

ELECTRIC AIRPLANE THAT WON'T NEED A RUNWAY

More than half of all personal air-



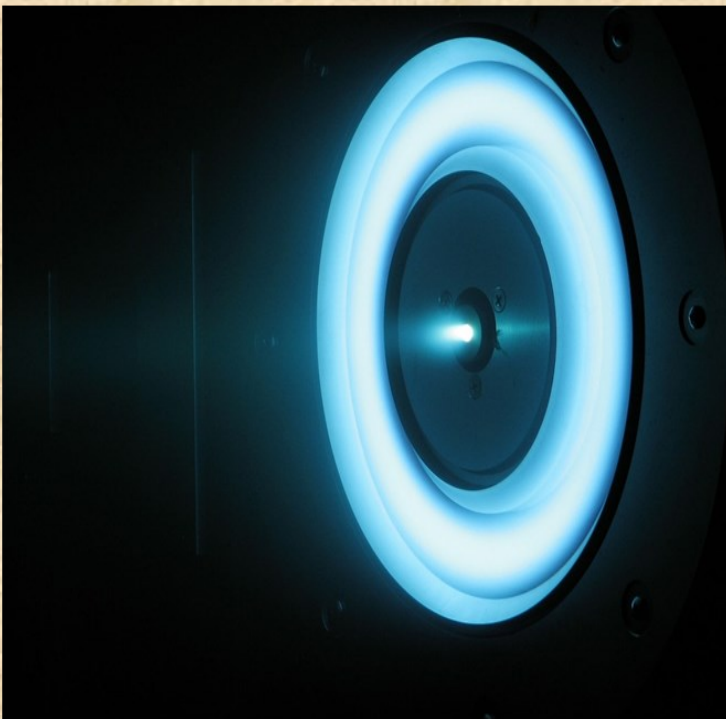
craft accidents occur during takeoffs or landings. That's why inventor and entrepreneur JoeBen Bevirt—known for designing airplane-like wind energy turbines—is intent on making runways obsolete. An electric airplane called S2 that takes off vertically, like a helicopter, and flies aerodynamically, like an airplane.

Supercomputer simulations of a full-scale, 1,700-pound S2 suggest it could fly two people about 200 miles (New York City to Boston) in an hour on 50 kilowatt-hours of electricity, or roughly equivalent to 1.5 gallons of fuel used by a typical two-seat airplane—

which would make the new aircraft about five times more efficient.

ION-THRUSTER ENGINE

Star Trek is said to have inspired several real inventions. It seems NASA's



also decided to take a page from the 1960's TV series with its ion-thruster engine. The engine will use solar electric energy to accelerate xenon ions that provide the thrust. Such engines are said to be far faster and use far less energy than convention solid fuel rockets. The first potential use is for vehicles that will be part of NASA's Asteroid Retrieval Initiative.

PRINTABLE, BENDABLE BATTERIES

A California-based startup has developed a flexible, long-lasting and rechargeable battery that could have wide-reaching applications within



medical devices, wearable sensors and even on-body electronics.

The company intends to achieve this through its zinc-polymer batteries. Zinc-based rechargeable battery technology, (Zinc Poly) enables the production of ultrathin, flexible, high energy density rechargeable batteries for significantly lower cost and without the design limitations of safety concerns of other battery technologies."

The batteries can be printed on sheets by widely-used industrial screen printers, allowing for customizable product designs.

A Transformerless DC-DC Converter With Large Voltage Ratio for MV DC Grids

Abstract:

A transformerless dc-dc converter, which features a large voltage ratio, for medium-voltage dc (MVDC) applications. The proposed converter combines a boost converter with a series-parallel resonant converter which enables soft switching of the power switches and diodes. Further, the power switches and diodes of the proposed converter experience lower voltage stresses compared to the other topologies. The proposed converter is modular and, therefore, permits series and/or parallel connection of multiple units for the desired voltage and/or power ratings. This topic discusses the principles of operation, analysis, and design of the proposed converter. Simulation and experimental results are presented to demonstrate the effectiveness of the proposed converter.

Voltage-Source Control of PV Inverter in a CERTS Microgrid

Abstract:

Microgrids are highly compatible with photovoltaic (PV) sources because of their ability to internally aggregate and balance multiple renewable sources. Traditional grid-connected PV inverter control configurations are basically current sourced and cannot easily control ac voltage or frequency. The PV inverter using the Consortium for Electric Reliability Technology Solutions (CERTS) concepts can control ac voltage and frequency but have a major problem with load transients. During a load transient, the PV microsource becomes overloaded with the possibility of collapsing the dc bus voltage resulting in an ac voltage drop. This topic presents a PV inverter control strategy which enables PV to behave as a voltage source and is capable of maintaining dc bus voltage stability during load transient.

With this PV inverter control configuration, it is shown that the PV microsource can operate as a voltage source in the CERTS microgrid.

Cascaded Two-Level Inverter-Based Multilevel STATCOM for High-Power Applications

Abstract:

A simple static var compensating scheme using a cascaded two-level inverter-based multilevel inverter is proposed. The topology consists of two standard two-level inverters connected in cascade through open-end windings of a three-phase transformer. The dc-link voltages of the inverters are regulated at different levels to obtain four-level operation. The simulation study is carried out in MATLAB/SIMULINK to predict the performance of the proposed scheme under balanced and unbalanced supply-voltage conditions. A laboratory prototype is developed to validate the simulation results. The control scheme is implemented using the TMS320F28335 digital signal processor. Further, stability behavior of the topology is investigated. The dynamic model is developed and transfer functions are derived. The system behavior is analyzed for various operating conditions.

A Voltage-Controlled DSTATCOM for Power-Quality Improvement

Abstract:

A new algorithm to generate reference voltage for a distribution static compensator (DSTATCOM) operating in voltage-control mode. The proposed scheme exhibits several advantages compared to traditional voltage-controlled DSTATCOM where the reference voltage is arbitrarily taken as 1.0 p.u. The proposed scheme ensures that unity power factor (UPF) is achieved at the load terminal during nomi-

nal operation, which is not possible in the traditional method. Also, the compensator injects lower currents and, therefore, reduces losses in the feeder and voltage-source inverter. Further, a saving in the rating of DSTATCOM is achieved which increases its capacity to mitigate voltage sag. Nearly UPF is maintained, while regulating voltage at the load terminal, during load change. The state-space model of DSTATCOM is incorporated with the deadbeat predictive controller for fast load voltage regulation during voltage disturbances. With these features, this scheme allows DSTATCOM to tackle power-quality issues by providing power factor correction, harmonic elimination, load balancing, and voltage regulation based on the load requirement. Simulation and experimental results are presented to demonstrate the efficacy of the proposed algorithm.

The Energy Management and Optimized Operation of Electric Vehicles Based on Microgrid

Abstract:

The regional energy management and optimized operating strategies of electric vehicles (EVs) and battery swapping station (BSS) are proposed in this paper based on smart microgrid according to the effects of the utility grid caused by uncoordinated charging of EVs and BSS. A price-incentive model is utilized to generate the management strategy to coordinate the charging of EVs and BSS to minimize the total cost of EVs and maximize the profit of BSS in grid-connected mode. In islanded mode, based on the power balance between renewable electric sources and loads, the fuzzy control method is applied to produce the service price of EV according to its state of charge. Combined with the interruptible-load scheduling, the energy management and dispatch of EVs and BSS are optimized to minimize the operational cost and maximize the benefit of islanded microgrid. The main optimization problems are formulated as a cost minimizing problem and a profit maximizing one, which are implemented in A Model-

ing Language for Mathematical Programming. The effectiveness of the proposed strategies for the optimized operation of EVs and BSS is validated by case studies. The approach given in this topic also provides ideas about the optimal operation of a future smart grid with the booming of EVs.

Analysis of a Switched Impedance Transformer-Type Non-superconducting Fault Current Limiter

Abstract:

A non superconducting fault current limiter (NSFCL) topology and control strategy. The switched impedance transformer-type NSFCL topology is optimized to protect against short transients and to work in conjunction with other fuses or circuit breakers, hence has the merits of being simple, low cost, and compact. A prototype has been designed and built for a three-phase 600-V_{RMS,L-L} system. It has been tested in a UL certified high-power test lab with 5-A normal current and 100-kA potential fault current.

A Hybrid Microgrid With DC Connection at Back to Back Converters

Abstract:

The necessity of an AC or DC microgrid is governed by available micro sources and connected loads. A hybrid structure can ensure a sustainable configuration blending both the forms. In this topic, a hybrid microgrid structure for a grid connected microgrid with DC connection at back to back (B2B) converters is proposed. While a B2B connection between two AC systems could bestow a reliable, isolated and efficient coupling, an extra DC bus connection can facilitate use of the DC micro sources. The DC bus can supply the local DC loads and can also trade part of the power with the AC grids.

Mega Minds

Andre Marie Ampère (1775-1836)

The French physicist and mathematician, Andre Marie Ampère is mainly credited for laying down the basis of electrodynamics (now known as electromagnetism). He was the first person to demonstrate that a magnetic field is generated when two parallel wires are charged with electricity and is also known for inventing the astatic needle, a significant component of the contemporary astatic galvanometer. Ampère, on becoming influenced by Ørsted's discovery performed a series of experiments to clarify the exact nature of the relationship between electric current-flow and magnetism, as well as the relationships governing the behavior of electric currents in various types of conductors. Moreover he demonstrated that two parallel wires carrying electric currents magnetically attract each other if the currents are in the same direction and repel if the currents are in opposite directions.



William Gilbert
(1544-1603)

On the basis of these experiments, Ampère formulated his famous law of electromagnetism known as Ampère's law. This law is mathematical description of the magnetic force between two electrical currents. His findings were reported in the Académie des Sciences a week after Ørsted's discovery. This laid the foundation of electrodynamics. The SI unit of measurement of electric current, the ampere, is named after him.

Luigi Galvani(1737-1798) :

Luigi Galvani was an Italian physician and physicist. One of the early pioneers of bioelectricity, he is known for his extraordinary work on the nature and effects of electricity in an animal tissue, which later led to the invention of the voltaic pile. In 1762, Galvani became a lecturer of anatomy at the University of Bologna. During a random experiment on November 6, 1787, Galvani discovered that a frog muscle could be made to contract by placing an iron wire to the

muscle and a copper wire to the nerve. He built an instrument in which a frog's nerve was attached to an electrode of one metal, and an electrode of a different metal was attached with the frog muscle. He was well aware of the fact that an animal body grew convulsive movements when electricity was applied to it.

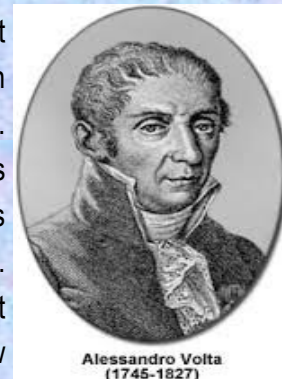


Luigi Galvani
(1737-1798)

The discovery played a historical role in bioelectricity as it proved that electricity was not direct in its action. He established that it did not flow directly from the conductor into the frog muscle but was discharged from the conductor to another element in what he termed as a "metallic arc".

Alessandro Volta (1745-1827) :

Alessandro Volta was a physicist, chemist and a pioneer of electrical science. He is most famous for his invention of the first electric battery, which people then called the "voltaic pile" in 1800. Using his invention, scientists were able to produce steady flows of electric current for the first time. In 1778 – Volta discovered that the *electrical potential* (we now often call this the *voltage*) in a capacitor is directly proportional to electrical charge. In 1794 – At the age of 50, Volta was awarded the Royal Society's top prize – the Copley Medal – for his contributions to scientific understanding of electricity. In 1881, scientists decided that the unit of electric potential would be called the *volt* to recognize Volta's great contributions to electrical science.



Alessandro Volta
(1745-1827)



Smart, eco-friendly new battery made of seeds and pine resin

Source: Uppsala University

Summary: Present-day lithium batteries are efficient but involve a range of resource and environmental problems. Using materials from alfalfa (lucerne seed) and pine resin and a clever recycling strategy, researchers have now come up with a highly interesting alternative.

Fuel cells developed for increased airplane efficiency

Source: Washington State University

Summary: Researchers have developed the first fuel cell that can directly convert fuels, such as jet fuel or gasoline, to electricity, providing a dramatically more energy-efficient way to create electric power for planes or cars. The researchers also have used gasoline to power their fuel cell and envision someday using it to power cars. Vehicles powered in this way could use existing gas stations, rather than having to develop a hydrogen-based infrastructure.

Jet-fueled electricity at room temperature: Fuel cell can run without high heat

Source: University of Utah

Summary: Engineers have now developed the first room-temperature fuel cell that uses enzymes to help jet fuel produce electricity without needing to ignite the fuel. These new fuel cells can be used to power portable electronics, off-grid power and sensors.

Development of an advanced system of fuel cell co-generation of heat and power (micro-CHP)

Source: Basque Research

Summary: A micro-CHP system is a small heat engine that provides all the power for a home: heating, ventilation, air conditioning and electricity. Many times, the electricity generated can be sold to the grid using the natural gas that gets to the houses. Scientists are working on a system that consists of two parts: a reactor to produce heat and hydrogen from natural gas, and a fuel cell that converts hydrogen to electricity.

Scientists create renewable fossil fuel alternative using bacteria

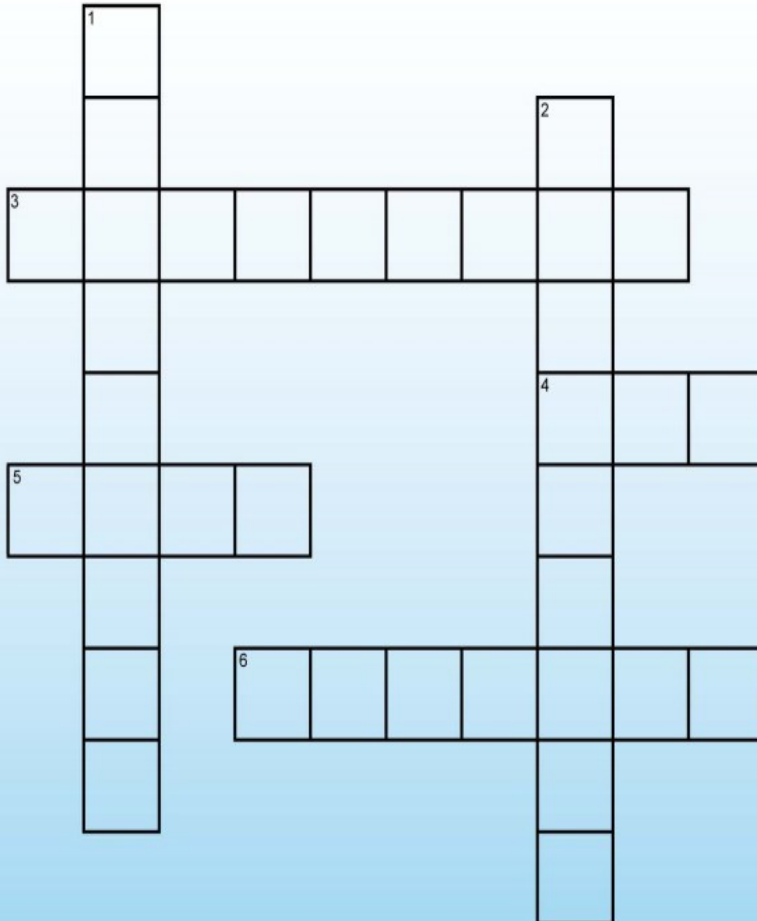
Source: Imperial College London

Summary: Researchers have engineered the harmless gut bacteria *E.coli* to generate renewable propane. The development is a step towards commercial production of a source of fuel that could one day provide an alternative to fossil fuels. Propane is an appealing source of cleaner fuel because it has an existing global market.



IGNITE YOURSELF

Conductors & insulators



Crossword clues

1. Frayed electrical cords are (9)
2. A metal paper clip is a (9)
3. An item that doesn't conduct electricity is called an (9)
4. If you receive an electric shock you could (3)
5. It is (4) that the human body can be a conductor of electricity
6. Electrical wires are coated in (7)

