



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

# ELEKTOR

S V COLLEGE OF ENGINEERING

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## EDITORIAL BOARD

Dr. K. SUDHEER  
Mr. P. VINOD KUMAR

## DESIGN DEPARTMENT

B. JYOTHEESWAR  
A. VAISHNAVI  
C. VITESH

## SEVEN STEPS TO SUCCESS



- 1) Make a commitment to grow daily.
- 2) Value the process more than events.
- 3) Don't wait for inspiration.
- 4) Be willing to sacrifice pleasure for opportunity.
- 5) Dream big.
- 6) Plan your priorities.
- 7) Give up to go up. — John C Maxwell

## 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 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

## SOLAR-POWERED DEVICE THAT GENERATES ENERGY FOR ELECTRONIC CONTACT LENSES

Researchers from Stanford managed to discover that the light that enters our eyes and helps us see can be also used to generate power for electronics implanted into eyes and electronic contact lenses. They found that near infrared light can serve as a source of energy and data signal for devices. Their latest invention is an implant that is 3mm wide and 30 micrometers thick and which can be used to power electronic contact lenses and other eye implants.

According to IEEE Spectrum the implant developed by Stanford researchers is developed as a series of tiny solar cells. It is implanted behind the retina and is a component part of a system that features a video camera, a pocket PC, used to process the images captured by the camera, and a bright near-infrared LCD display incorporated into video spectacles. *"The pulsed 900-nanometer-wavelength image that shines into the eyes is enough to produce electricity in the chip,"* the IEEE wrote.

The technical part of the new invention is rather sophisticated, but the idea is simple - solar-powered eyes for people who have progressive loss of photoreceptor cells on retina. It is worth mentioning that the latest invention will not provide a completely clear vision - people will be able to recognize faces and read large fonts at best. However, such improvement is better than nothing.



## HELIO TROPIS - SOLAR POWERED FLOWER WITH GLASS PETALS

Energy crisis is one of the most discussed topics not only among politicians but designers as well. The latter often try to focus on aesthetic design of an eco-friendly device that would make people aware about the climate change issue. Having this in mind, Anthony Castronovo decided to design a beautiful solar-powered kinetic sculpture which was commissioned by Beth Deutch and Larry Rubin in Rumson. Their creation, called Heliotropis, resembles a flower and is expected to be completed this year. The flower features built-in solar panels to gather energy from the sun. The generated electricity will be used to make the flower's glass petals move inward and outward.



The two designers are considering using ceramic and glass for their project. Currently they are deciding on the colors of the petals. The main idea of the sculpture is to motivate people to make use of alternative sources of energy.

### WIND TURBINE TURNS INTO WORLD'S BIGGEST CHRISTMAS STAR

The most important feature of a Christmas tree is the star and here we have the largest star in the world developed by Siemens in collaboration with Michael Pendry, an artist from Munich. The star



is composed of 9,000 LED lights that create a magic atmosphere by spinning and illuminating during the night.

It is worth mentioning that the amount of energy it uses is equal to that of a hairdryer. For 12 months Siemens has been working on the revolving star, which today can be observed in Munich. The environmentally-friendly illumination of the Christmas Star is equal to the lighting of 20,000 candles.

The German artist asked Siemens and the Stadtwerke Munchen (Munich City Utilities) to allow him to mount his creation on wind turbines. Now, each blade of the wind turbine, measuring 30 meters, is enriched with 3,000 LED lights. Visitors and local citizens can observe the star between 4:30 p.m. and 0:00 and between 4:53 a.m. and 8 a.m.

### ULTRATHIN BENDABLE LITHIUM-ION BATTERIES

Scientists from Stanford managed to create new ultrathin paper-based lithium-ion batteries. With the help of their latest invention it would be possible to power electronic newspapers. In addition, the bendable batteries could be used to create smart packaging that would allow marketers to get more information about their customers. It would be in-

teresting to note that the batteries are only 300 microns thick. Besides, they are recyclable.

In order to create their latest invention, Stanford materials researchers Liangbing Hu, Hui Wu, Yi Cui, and their teammates used a thin film of carbon nanotubes to cover a solid support and placed a layer of a metal-containing lithium compound on top of the nanotubes.



Afterwards scientists placed the double-layer films on both sides of regular paper. In such a construction the lithium films work as battery electrodes and the nanotube films play the role of current collectors. The role of electrode separator is played by the paper, which is also used as a mechanical support.

### SYSTEM THAT POWERS DEVICES USING FLUORESCENT LIGHTS' ILLUMINATION

Solaroad Technologies Group, LLC has recently presented its latest invention called Cube Tube, which represents an indoor photovoltaic electricity generator that collects the light coming from the fluorescent lights in the office and transforms it into electricity to power computer workstations.

The user can easily clip the CubeTube to walls, desktops and windowsills. Because the device has a cylindrical shape it can collect light that comes from different angles. To get power from the CubeTube it is necessary to plug an electrical device into the base of Solaroad's latest invention.



When the system runs out of energy it automatically switches the standard power grid. The company says that its latest invention is inexpensive, easy to install and pays for itself rather quickly in electrical savings.

**G.Yogesh  
18BF1A0230**

## SOLAR ROAD PANELS

Solar Road Panel is a device that generates electricity by making use of solar energy. The Panel is made of solar cells and glass. Solar Roadways made each solar panel weatherproof, featuring a number of layers, including a transparent road surface layer, an electronics layer with LEDs and solar cells, and a base plate layer used to convey electricity to buildings connected to the roadway.



can significantly contribute to the environment, reducing the level of greenhouse gas emissions by approximately 50 percent.

Probably the biggest advantage of these road panels is that they are self-heating, meaning that neither snow nor ice will gather on their top. The company's latest invention, if applied

## MAGIC FINGER

A group of researchers at Autodesk Research of the University of Alberta and the University of Toronto looks forward to making touch interfaces ubiquitous with the help of their "Magic Finger".

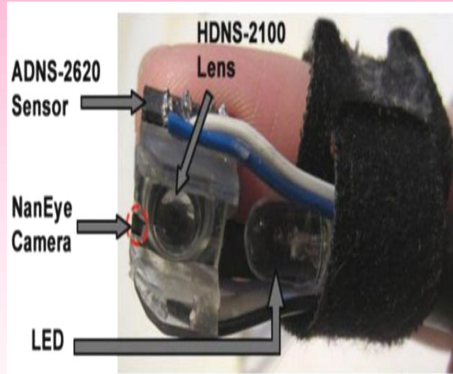
The invention makes it possible to turn virtually any surface into an interface. So far it is just a prototype that requires much work. The device is made from a little Velcro ring that the wearer straps to their fingertip and some wires connecting the "finger" to a box of electronics.



There are also a couple of optical sensors on the ring, one being a low resolution, high-speed sensor that's there to track motion. In addition, the Magic Finger is equipped with a high-resolution camera that can detect up to 32 different types of sur-

face and register 98 percent accuracy.

Thus the gadget can easily recognize that surface it touches and use this data to transform the surface into an interface for devices. It can be programmed to the user's preferences, being able to make non-digital items into digital interfaces. For example, you can mute your smart phone by simply touching the bag it is in.



Besides, the user has the possibility to start an application or send a saved message by touching a certain part of their t-shirt. Various touch commands and gestures can also be applied to

tablet or computer control without touching these devices.

One more interesting feature of the Magic Finger is its ability to recognize artificial textures, i.e. material textures that play the role of QR codes. This feature allows the user to download data from a magazine page by simply touching it.

## HYPERLOOP - ULTRA-FAST SOLAR-POWERED TRAIN

Tesla Motors, has just announced his plans for a brand new eco-friendly vehicle called "Hyperloop" that could bring people from LA to San-Francisco in just 30 minutes.

The next-gen transit system, which would help passengers travel at a speed twice as fast as that of a plane, and 3 to 4



times faster than a bullet train. But what is really impressive is that the entire system will be powered by solar energy.

**J. Krishna Prasad**  
**18BF1A0236**

## **Analysis, Design, and Experimentation on Constant-Frequency DC-DC Resonant Converters with Magnetic Control**

### **Abstract:**

In this paper, a new technique for controlling dc-dc resonant converters is investigated. A variable inductance is used to control and regulate the dc output voltage maintaining constant switching frequency for the half-bridge transistors. The output voltage characteristics of the series resonant and parallel resonant converters under the proposed magnetic control are obtained and analyzed. In order to evaluate the proposed technique, a laboratory prototype for a 48V-input 5V/10A-output 500 kHz parallel resonant converter is presented. A methodology for obtaining the converter dynamic response using a step response test is carried out. From the dynamic response, a compensator for operating the converter at closed loop is developed and tested in the laboratory. The results prove that the proposed technique is suitable for controlling resonant inverters at constant frequency using a low-cost half-bridge inverter.

## **Fast Acting Regenerative DC Electronic Load Based on a SEPIC Converter**

### **Abstract:**

A fast acting regenerative dc electronic load based on the single-ended primary inductor converter (SEPIC) converter has been implemented. A simple multi loop feedback control system has been design

for the SEPIC converter to realize the main function of electronic load. Instead of discharging via resistive load, the output of the converter is connected to rechargeable batteries such that discharged energy can be saved for future use. Circuit implementation of the proposed scheme is presented and experimental results are included to demonstrate the effectiveness of the proposed design.

## **Intelligent Multi agent Control System for Energy and Comfort Management in Smart and Sustainable Buildings**

### **Abstract:**

Smart and energy-efficient buildings have recently become a trend for future building industry. The major challenge in the control system design for such a building is to minimize the power consumption without compromising the customers comfort. For this purpose, a hierarchical multi agent control system with an intelligent optimizer is proposed in this study. Four types of agents, which are switch agent, central coordinator-agent, local controller-agent, and load agent, cooperate with each other to achieve the overall control goals. Particle swarm optimization (PSO) is utilized to optimize the overall system and enhance the intelligence of the integrated building and micro grid system. A Graphical User Interface (GUI) based platform is designed for customers to input their preferences and monitor the results. Two sets of case studies are carried out

and corresponding simulation results presented.

## **A Compact Three-Phase Single-Input/Dual-Output Matrix Converter :**

### **Abstract:**

This paper presents a novel matrix converter with one ac input and two ac outputs. The presented topology is based on the traditional indirect matrix converter, but with its rear ended six-switch inverter replaced by a compact nine-switch inverter. With only three extra switches added, the proposed converter can produce two sets of three-phase ac outputs, whose amplitudes, frequencies, and phases can appropriately be regulated. Features such as sinusoidal input and outputs, unity input power factor and minimum commutation count are all retained by the proposed topology, despite having an additional output. Its modulation is realized by the computationally less intensive carrier-based method, whose unique carrier requirements can easily be managed within a programmable logic device. Mathematical proof for validating sinusoidal input and outputs achieved by this modulation technique is also discussed, before being verified in simulation and experimentally, together with other findings.

## **Level-Shifting Multiple-Input Switched-Capacitor Voltage**

### **Abstract:**

In this paper, a level-shifting voltage-copier circuitry is introduced to convert one or two input voltage levels to eight voltage levels. The voltage copier consists of five kinds of conversion circuits. Each circuit includes only six to seven

electronic components, which can ensure the simplicity and reliability of the voltage copier. A resonant inductor is further added to improve the performance of these circuits. A high-efficiency resonant voltage copier is introduced. Simulation and experimental results verify the performance of the voltage copier and the design method. The circuit family provides a useful method for voltage conversion under multiple-input sources to multiple outputs.

## **Cascade Three-Level AC/AC Direct Converter**

### **Abstract:**

This paper proposes a novel family of cascade three level (TL) ac-ac direct converters based on ac switch cells, which transfer unsteady high ac voltage with distortion into regulated sinusoidal voltage with low total harmonic distortion (THD). The topological family includes buck TL-boost, buck-boost TL, and buck TL-boost TL modes. In order to achieve a reliable TL ac-ac conversion, a double transient voltage feedback control strategy of the output voltage and the voltage across the flying capacitor is introduced in this paper. A 500-VA 220-V  $\pm 10\%$  50-Hz ac/220-V 50-Hz ac prototype is presented with the experimental results to prove that the converters have four improved advantages simultaneously, including lower voltage across power switches, bidirectional power flow, low THD of output voltage, and higher input power factor.

# Mega Minds

## Georg Ohm (1787-1854):

Georg Simon Ohm, more commonly known as Georg Ohm, was a German physicist, best known for his "Ohm's Law", which implies that the current flow through a conductor is directly proportional to the potential difference (voltage) and inversely proportional to the resistance. The physical unit of electrical resistance, the Ohm, also was named after him.



In 1888 Bell was one of the founders of the National Geographic Society. In 1897, he became its second president. The unit of sound intensity, the bel, more usually seen as the smaller unit, the decibel, was named after Bell: it was conceived of in the Bell Laboratories.

## Hans Christian Oersted (1777-1851)

Hans Christian Oersted was a Danish physicist and chemist who revolutionized the arena of electromagnetism by discovering that the electric currents can produce magnetic fields. His 1820 discovery of piperine, the pungent component that causes the hotness of pepper, and his 1825 formulation of metallic aluminum, are considered significant contributions in the history of chemistry.



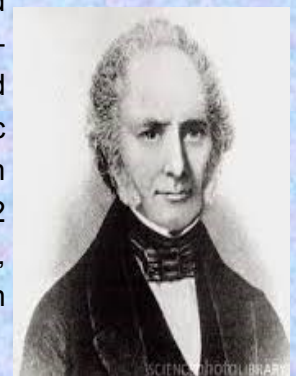
## Thomas Edison (1847-1931):

Inventor Thomas Edison created such great innovations as the electric light bulb and the phonograph. A savvy businessman, he held more than a 1,000 patents for his inventions. Thomas Edison rose from humble beginnings to work as an inventor of major technology. Setting up a lab in Menlo Park, some of the products he developed included the telegraph, phonograph, electric light bulb, alkaline storage batteries and Kinetograph .



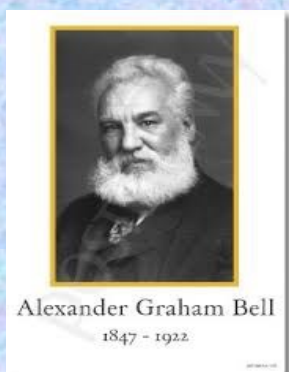
## William Sturgeon (1783-1850) :

English electrical engineer who devised the first electromagnet capable of supporting more than its own weight. This device led to the invention of the telegraph, the electric motor, and numerous other devices basic to modern technology. Sturgeon built an electric motor in 1832 and invented the commutator, an integral part of most modern electric motors.



## Alexander Graham Bell(1847-1922) :

Alexander Graham Bell invented the telephone. Remarkably, he only worked on his invention because he misunderstood a technical work he had read in German. His misunderstanding ultimately led to his discovery of how speech could be transmitted electrically.







## **Theory explains how new material could improve electronic shelf life**

**Date:** July 21, 2021

**Source:** University of Texas, Dallas

**Summary:** Engineers have discovered that the new material graphene conducts heat about 20 times faster than silicon, making it an option as a semiconductor material that could produce quieter and longer-lasting computers, cell phones and other devices.

## **Artificially structured metamaterials may boost wireless power transfer**

**Date:** August 12, 2021

**Source:** American Institute of Physics (AIP)

**Summary:** More than one hundred years after the pioneering inventor Nikola Tesla first became fascinated with wireless energy transfer, the spread of mobile electronic devices has sparked renewed interest in the ability to power up without plugging in. Now researchers have proposed a way to enhance the efficiency of wireless power transfer systems by incorporating a lens made from a new class of artificial materials.

## **Wearable electronics: Transparent, lightweight, flexible conductor could revolutionize electronics industry**

**Date:** September 27, 2021

**Source:** University of Exeter

**Summary:** The most transparent, lightweight and flexible material ever for conducting electricity has just been invented. Called GraphExeter, the material could revolutionize the creation of wearable electronic devices, such as clothing containing computers, phones and MP3 players. GraphExeter could also be used for the creation of 'smart' mirrors or windows, with computerised interactive features. Since this material is also transparent over a wide light spectrum, it could enhance by more than 30% the efficiency of solar panels.

## **TV as thin as a sheet of paper? Printable flexible electronics just became easier with stable electrodes**

**Date:** July 19, 2021

**Source:** Georgia Institute of Technology

**Summary:** Researchers have introduced what appears to be a universal technique to reduce the work function of a conductor. Their use in printable electronics can pave the way for lower cost and more flexible devices. Imagine owning a television with the thickness and weight of a sheet of paper. It will be possible, someday, thanks to the growing industry of printed electronics. The process, which allows manufacturers to literally print or roll materials onto surfaces to produce an electronically functional device, is already used in organic solar cells and organic light-emitting diodes (OLEDs) that form the displays of cellphones.

## **Kitchen gadget inspires scientist to make more effective plastic electronics**

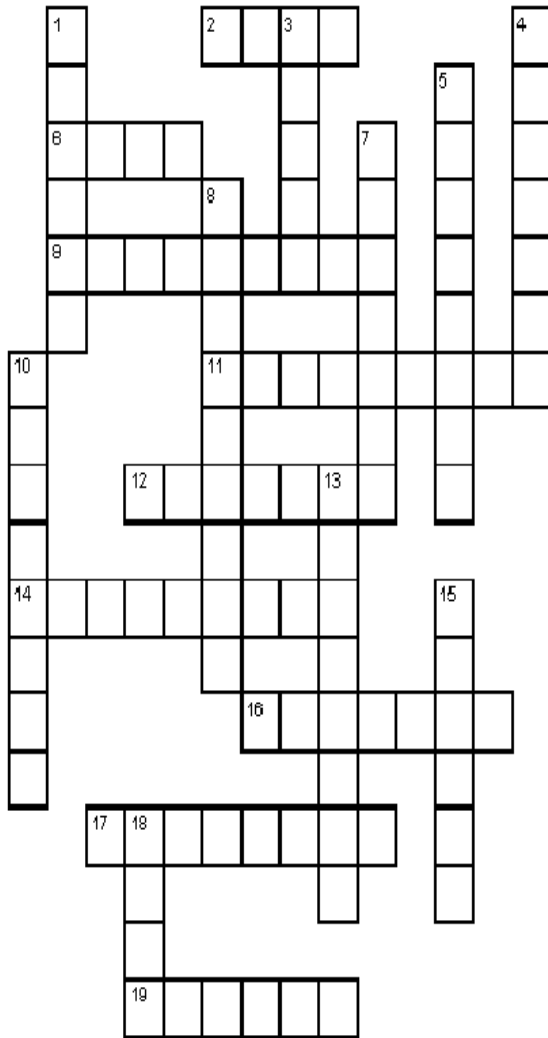
**Date:** Oct 28, 2021

**Source:** Rutgers University

**Summary:** One day in 2010, Rutgers physicist Vitaly Podzorov watched a store employee showcase a kitchen gadget that vacuum-seals food in plastic. The demo stuck with him. The simple concept -- an airtight seal around pieces of food -- just might apply to his research: developing flexible electronics using lightweight organic semiconductors for products such as video displays or solar cells. "Organic transistors, which switch or amplify electronic signals, hold promise for making video displays that bend like book pages or roll and unroll like posters



# IGNITE YOURSELF



## Across:

2. A safety device that break a circuit when too much current is flowing.
6. The unit that current is measured in (for short).
9. A material that doesn't conduct electricity well.
11. A material that conducts electricity will.
12. The flow of electrons through a material is called electric \_\_\_\_\_.
14. An electric discharge from the sky to the ground during a storm.
16. A voltage supply used in flashlights and many toys.
17. The charge on a proton.
19. A device that will open or close a circuit.

## Down:

1. Kind of electricity resulting from a build up of charged particles.
3. A type of circuit where current by passes most resistance and large, dangerous currents flow.
4. A switch that open a circuit when too much current is flowing.
5. A device that resists the flow of electricity in a circuit.
7. A path through which electric current flows.
8. Electricity is the movement of \_\_\_\_\_ through a conductor.
10. A circuit with more than one path through which electrons can flow.
13. The charge on an electron.
15. A circuit with only one path through which electrons flow.
18. The unit that resistance is measured in.

L. SUDHAKAR  
18BF1A0262

**Why, when birds sit on transmission lines or current wires don't get shock?**

**Ans:** Its true that if birds touch the single / one line (phase or neutral) they don't get electrical shock. If birds touch 2 lines then the circuit will be closed and they get electrical shock.

