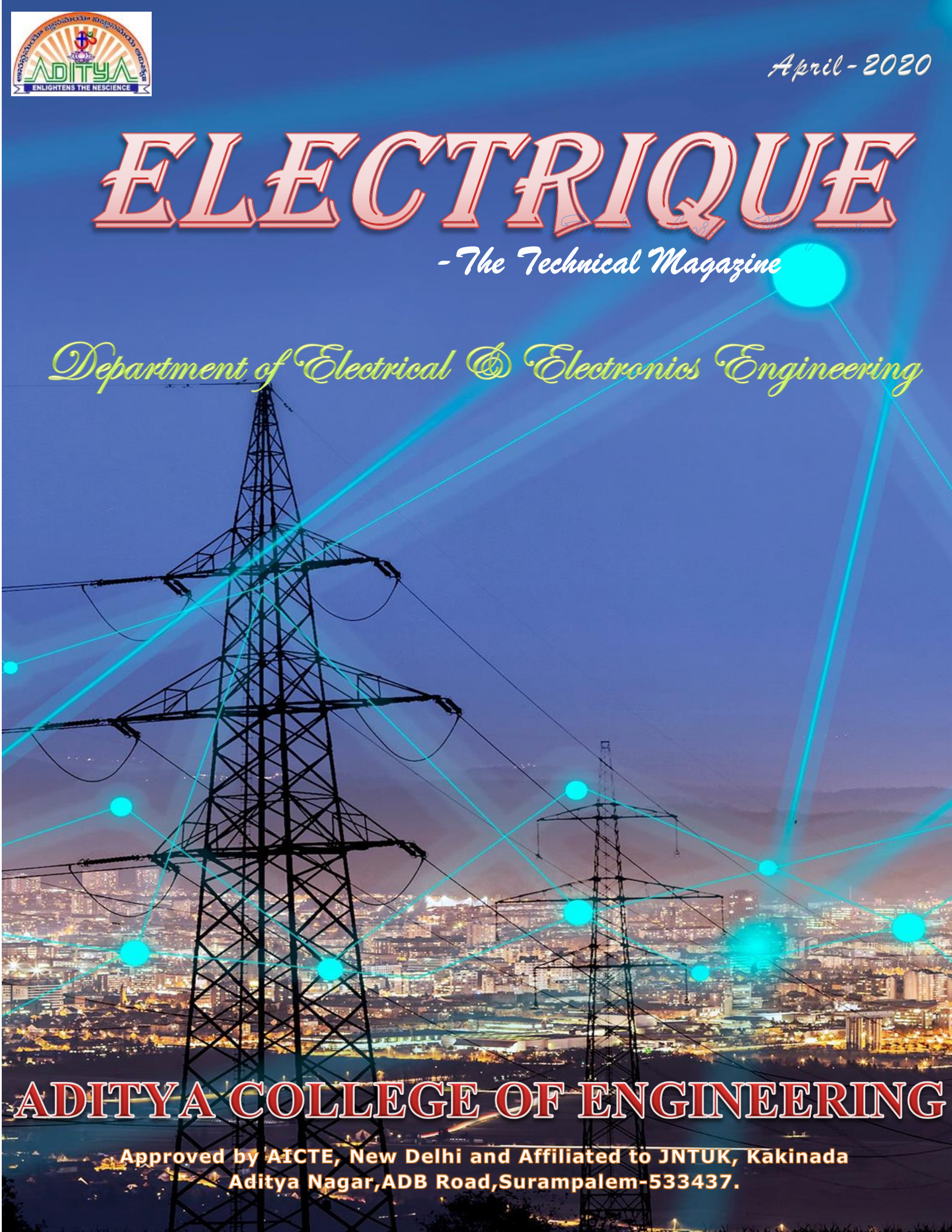
April - 2020

ELECTRIQUE

- The Technical Magazine

Department of Electrical & Electronics Engineering



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VISION

To be a leading department of Electrical Engineering Education and Research

MISSION

To produce quality engineers by providing state of the art engineering facilities

To impart skill based education and enhance knowledge on electric vehicles

To organize professional, cultural and social activities with collaborations

To promote training with institution and industry collaborations

SCINTIST WHO CHANGED THE WORLD

Alessandro Volta

Alessandro Giuseppe Antonio Anastasio Volta (1745 –1827) was a physicist, chemist and a pioneer of electrical science. He is most famous for his invention of the electric battery. He invented 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, unleashing a wave of new discoveries and technologies.

With this invention Volta proved that electricity could be generated chemically and debunked the prevalent theory that electricity was generated solely by living beings. Volta's invention sparked a great amount of scientific excitement and led others to conduct similar experiments, which eventually led to the development of the field of electrochemistry.

Volta was the first person to isolate methane. He discovered methane mixed with air could be exploded using an electric spark: this is the basis of the internal combustion engine. He also discovered "contact electricity" resulting from contact between different metals. He recognized two types of electric conduction.

He wrote the first electromotive series. This showed, from highest to lowest, the voltages that different metals can produce in a battery. He discovered that electric potential in a capacitor is directly proportional to electric charge.

In recognition of Alessandro Volta's contributions to science, the unit of electric potential is called the *volt*.

FACULTY ARTICLES

Power Batteries with Blood

Batteries are practically essential devices but present a whole ho¬st of problems. Over time they can have trouble retaining a charge. Some stop working altogether. Others overheat or leak or even explode. They're also rigid and sometimes bulky. Then how about, instead of your standard AA or lithium, a flexible, incredibly thin battery that could be powered by blood or sweat. The battery is not only as thin as paper; it essentially is paper. At least 90 percent of the battery is made from cellulose, which makes up traditional paper and other paper products [source: RPI]. Aligned carbon nanotubes make up the other 10 percent, give the paper its conductive abilities and also make it black.

The nanotubes are imprinted in the very fabric of the paper, creating what's called a nanocomposite paper. Several sheets could be lumped together to power medical implants, such as pacemakers, artificial hearts or advanced prosthetics. The battery would easily fit under the skin without causing any discomfort. Because the ionic liquid used doesn't freeze or evaporate like water, the battery could be employed at a wide range of temperatures: from -100 degrees Fahrenheit up to 300 degrees Fahrenheit...while many exciting announcements have been made in the field of bio-batteries, it may be some time before we see them replacing nickel-cadmium, lithium-ion or the several other types of traditional batteries. Even so, the small, flexible, long-lasting and environmentally friendly battery technologies discussed here show the great possibilities researchers see in bio-batteries, especially for the field of medicine. With that in mind, scientists seem to be exploring every possible option in bio-battery and fuel-cell technology: One research team even devised a fuel cell that ran off of gin and vodka.

Dr.M. Raveendra
Associate Professor

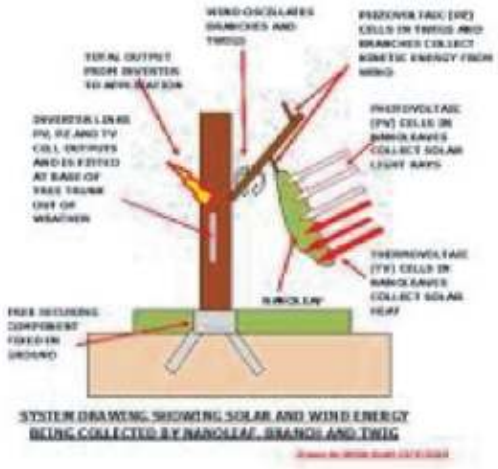
Claytronics

Claytronics is afuture concept concerning reconfigurable robots known as "claytronic atoms" or catoms designed to form much larger scale machines or mechanisms. Catoms also known as "programmable matter" are sub millimeter computers that will eventually have the ability to move around, communicate with each other's, change colour and connect to other c atoms to form different shapes. The forms made up of atoms could morph into tangible 3-D objects that a user can interact with. At Carnegie Mellon, with support from intel the project is known as Claytronics. Current research is exploring the potential of modular reconfigurable robotics and the complex software necessary to control the "shape changing" robots. Claytronics has the potential to greatly affect many areas of daily life, such as telecommunication, human – computer interfaces and entertainment. A claytronic system forms a shape through the interaction of the individual catoms. The catoms would first determine their relative location and orientation.

Using that information they would then form a network in a distributed fashion and organize themselves into a hierarchical structure, both to improve locality and to facilitate the planning and coordination tasks. The goal would then be specified abstractly, perhaps as a series of snap shots or as a collection of virtual deforming forces and then broadcast the catoms. Compilation of the specification would then provide each catom with a local plan for achieving the desired global shape. At this point, the catoms would start to move around each other using generated on board, either magnetically or electro statically, and adhere to each other using, for example nanofibre adhesive mechanism. Finally the catoms on the surface would display an image; rendering the color and texture characteristics of the source object. If the source object begins to move, a concise description of the movements would be broadcast allowing the catoms to update their positions moving around each other.

K.Lakshmi
Assistant Professor

Production of Electricity From the Artificial Nano Trees

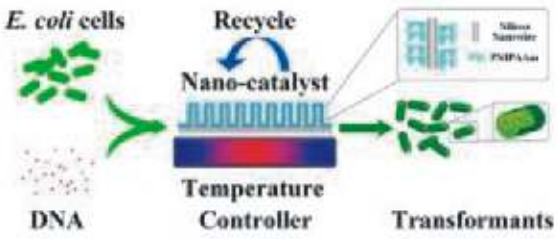


Harvesting energy from the environment responsibly is important, natural trees and plants do this efficiently already for millions of years. Our invention is the mimicking of this ingenious concept also referred to as bio mimicry or bio mimetic. In particular this invention relates to the shape and form of leaves and needles and their incorporated nonmaterial's that allows the Nano leaf to harvest, capture environmental energies like solar radiation, wind and sound and turn this into electricity, the Nano leaves made from a flexible substrate, is exploited on both sides, using a process called thin-film deposition which will incorporated thermo and photovoltaic material for the purpose of converting solar radiation (light and heat) in addition we introduce piezoelectric connective elements that connect/affix the leaf to the plant or tree, this not only allows quick and secure assembly but it also serves for turning wind energy into electricity. Furthermore we intend to get our Nano leaves as close to real as possible, one way to achieve this is to emboss the leaves, creating a three-dimensional leaf surface image, which is beneficial for harvesting and capturing solar radiation.

The invention advances upon all prior art artificial leaves, needles and grasses including water based plants, this method not only foresees an economical and efficient way to harvest solar radiation and wind energy via incorporation of thermo-photovoltaic and piezoelectric materials but also reveals a method for affixing artificial leaves that can harvest and capture solar radiation, wind energy and energy generated from falling rain and hail, providing an aesthetically pleasing and natural looking artificial leaves and needles that can be affixed to trees, plants, shrubs and water based plants. Furthermore the main advantage of these Nano leaves is that these leaves are converting more energy than the solar panels. As far as we concern about the usage of this energy, this electrical energy can be used for driving the car which will reduce the use of the fossil fuels and can be used to enlighten the house.

D.TataRao
Assistant Professor

Nanocatalyst



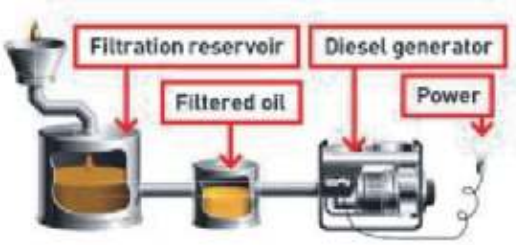
In electro catalytic performance tests at ANL, the platinum/nickel nanoframes when encapsulated in an ionic liquid exhibited a 36-fold enhancement in mass activity and 22-fold enhancement in specific activity compared with platinum nanoparticles dispersed on carbon for the oxygen reduction reaction. These nanoframe electro catalysts, modified by electrochemically deposited nickel hydroxide, were also tested for the hydrogen evolution reaction and showed that catalytic activity was enhanced by an order-of-magnitude over platinum/carbon catalysts, By greatly reducing the amount of platinum needed for oxygen reduction and hydrogen evolution reactions, our

New class of nanocatalysts should lead to the design of next-generation catalysts with greatly reduced cost but significantly enhanced activities."Fuel cells and electrolyzes can help meet the ever-increasing demands for electrical power while substantially reducing the emission of carbon and other atmospheric pollutants. These technologies are based on either the oxygen reduction reaction (fuel cells), or the hydrogen evolution reaction (electrolyzes). Currently, the best electro catalyst for both reactions consists of platinum nanoparticles dispersed on carbon. Though quite effective, the high cost and limited availability of platinum makes large-scale use of this approach a major challenge for both stationary and portable electrochemical applications. We needed to be able to reproduce the outstanding catalytic performance of these materials in nanoparticulates that offered high surface areas."this by transforming solid polyhedral bimetallic nanoparticles of platinum and nickel into hollow nanoframes. The solid polyhedral nanoparticles are synthesized in the reagent oleylamine, then soaked in a solvent, such as hexane or chloroform, for either two weeks at room temperature, or for 12 hours at 120 C. "In contrast to other synthesis procedures for hollow nanostructures that involve corrosion induced by harsh oxidizing agents or applied potential, our method proceeds spontaneously in air,". "The open structure of our platinum/nickel nanoframes addresses some of the major design criteria for advanced nanoscaleelectrocatalysts, including, high surface-to-volume ratio, 3-D surface molecular accessibility, and significantly reduced precious metal utilization.

Ch.U P Kumar
Assistant Professor

STUDENT ARTICLES

Vegawatt



Transforming waste vegetable oils into electricity and heat... Restaurant owners often grabble with what to do with waste oil generated from deep fat fryers. Each year more than 11 billion liters (2.9 billion U.S. gallons) of waste vegetable oil is produced by restaurants, food processing plants and fast food restaurants in the USA. Although there are regulations for proper disposal of the waste oil, most disposal options involve removal and transport of the oil to another location. Vegawatt has come up with a unique system to turn vegetable waste oil into energy at the restaurant. The very first system was just installed at a fish fry restaurant in Dedham. Waste oil recycling and energy creating compact system.

Vega watt is a unique renewable-source energy system that generates electricity and hot water, on-site, for restaurants and foodservice operations by using the waste vegetable cooking oil (WVO) from their fryers as a fuel source. Vegawatt is a 5kW unit that will provide a return of investment (ROI) of only 3 years for operations that dispose of 50 gallons per week of WVO and 2 years for operators disposing of 80 gallons each week. Our generator is fully automated; Through a proprietary process of oil cleansing, preparation and filtration the Vegawatt readies used cooking oil to be burned as a fuel in a diesel generator. Typically restaurants and foodservice operations are either paying for a grease rendering company to take this product away for use in cosmetics, soaps or in animal feed. The Vegawatt requires a footprint of only 12 square feet. It is 6 feet long, 2 feet deep and about 6 feet high. Typically it will be located at the back door or loading dock/delivery area of a restaurant or foodservice facility. It is quiet enough in its operation that you can stand next to it and have a cell phone conversation while the Vegawatt is running. The cost savings are also a function of the cost for electricity and natural gas in the city where the Vegawatt is installed.; Typically restaurants and foodservice operations are either paying for a grease rendering company to take this product away for use in cosmetics, soaps or in animal feed. Sometimes it ends up on landfills. Other companies may use it to make bio-diesel.

K.Samanthakamani
17MH5A0224

Metamorphic Robots

Metamorphic robots are robots able to change their shape without outside help. The robots are composed of a collection of independently controlled robots that can move around on the other robot store form. The image below shows how a module moves. The module labeled S cannot move while another module is moving around it. The moving module wraps itself to another edge of the still module. Then it disconnects from the edge it started at and wraps itself back to hexagon shape. In our definition, every module has the identical structure, motion constraints, and computing capabilities. The modules also have a regular symmetry, so they can be packed without any gaps between them.

A metamorphic system can dynamically reconfigure by the locomotion of modules over their neighbors. Thus they can be viewed as a collection of connected modular robots which act together to perform the given task. The planar metamorphic robots described in this paper consist of hexagonal or square modules. Because of their shape, the modules completely fill the plane without any gaps, their centers forming a regular lattice. Both the hexagonal and square modules are provided with electromechanical coupling mechanisms actuated by D.C. Motors.

What separates metamorphic systems from other reconfigurable robots is that they possess all of the following properties: (1) self-reconfigurability without outside help; (2) a large number of homogeneous modules; and (3) physical constraints ensure contact between modules. the kinematic constraints governing a particular metamorphic robot are addressed. When making motions of the metamorphic robot, we can use not only the degrees of freedom in the joints but also the deformation of the links. In making use of the deformation by the length of the shortest path, this connects both ends of the deformed link.

These robots that can change shape and move without outside intervention are useful in environments where people cannot go. Examples of such situations are out in space, in mines, deep underwater, and in burning buildings. Having many identical modules makes the system more robust and more cost-efficient. If one module breaks down, the whole system can still continue. The modules can be mass-produced cutting down on manufacturing costs

G.Srihari
17mh5A0216

Lightning Protection System

A properly installed lightning protection system is over 98% effective in preventing lightning damage. It is a tried and true method that has been used for over one-hundred years. With the proper lightning protection system you can rest assured that your investments, operations, and personnel will be protected. A Lightning Protection Envelope is a complete system of strike termination devices, conductors, grounding electrodes, interconnecting conductors, surge protective devices, and connectors or fittings. The conductors safely conduct the lightning current to ground, and effective low resistance grounding helps to dissipate the lightning current into the earth. The practical purpose of a lightning protection system is the safeguarding of persons and property from hazards arising from the exposure to the dangers of lightning.

The universally accepted method of protecting your valuable property from potential damage caused by lightning is a correctly designed and professionally installed lightning protection system. Alltec Corporation designs are application specific to meet your needs. The rolling sphere method is the most used method to determine the protection zone for buildings and other facilities. In this method of determining the likely points of lightning strike attachment, the sphere diameter corresponds to the "last strike" radius of selectable sizes of lightning currents, as established by modern scientific testing and investigation. The areas touched by the sphere are deemed to require protection. On tall structures, this can obviously include the sides of the facility. In addition, all possible placements of the sphere must be considered when determining the zone of protection using the rolling sphere method.

Lightning shielding analysis using the rolling sphere method can also be performed using special software. The red dotes indicate the direct lightning strike point corresponding to rolling the sphere with radius 30 meter. This type of computer modeling aids in determining the required number of lightning air terminals or protection measures to prevent direct lightning strikes to any elevated part of the structure. Any available lightning protection standard may be used, with corresponding protection levels, to determine the lightning air terminals required to protect the structure.

Ch.Hemanth
17MH5A0246

Wireless Power Transmission

Would it not be better that your mobile or laptop gets charged without the use of wires? True that it may be the dream of many people especially those who come under the"lazy people" category. But apart from this fact, the wireless power transmission can be loads better than the use of wires.

Wires can be a real messy job if not arranged properly. They may get entangled and lead to various problems. Like you may be disconnecting one appliance but accidently disconnect another because the wires are so much mixed that it is difficult to distinguish between the two wire sources. This may not be a problem at times but at others it can lead to huge errors and mistakes.

Transmission Ways

Power can be transmitted wirelessly in three ways:
Radio Waves: These waves have been found able to transmit milli-watts of power up to a distance of 15 meters. This technology is now being employed to recharge small portable devices which include mobile phones and laptops.

Lasers: The use of laser technology to transmit power wirelessly has so far shown only 15% efficacy. Beams of laser are targeted on photocells which convert the light energy into electrical energy and thus power is produced. So far the application of this means stretches as far as lamps and speakers.

Magnetic Induction: Both radio waves and lasers have applications only for the devices that require small amounts of power to operate. What about those requiring larger amounts of electricity. For such devices magnetic induction is used to transmit the power without using wires.The power loss during such a transmission is as much as 30%.

Although this technology is being looked forward to by many people but there are still some reservations to be settled before this tech is widely applied to applications. Like there is no knowledge so far that how increased exposure to magnetic field can affect. Another issue to be resolved yet is the efficiency of the process. With the current stats much favor is not turned towards this tech and huge amounts of improvement are still required before it is applied at mass level.

V.Sharon
17MH1A0203

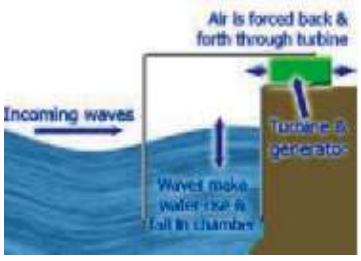
Jelly Fish - A Source of Electricity

Jellyfish are found in every ocean, from the surface to the deep sea. A few jellyfish inhabit freshwater. Large, often colorful, jellyfish are common in coastal zones worldwide. Jellyfish have roamed the seas for at least 500 million years, and possibly 700 million years or more, making them the oldest multi-organ animal. Jellyfish bloom formation is a complex process that depends on ocean currents, nutrients, sunshine, temperature, season, prey availability, reduced predation and oxygen concentrations. Ocean currents tend to congregate jellyfish into large swarms or "blooms", consisting of hundreds or thousands of individuals. Blooms can also result from unusually high populations in some years. Jellyfish are better able to survive in nutrient-rich, oxygen-poor water than competitors, and thus can feast on plankton without competition. Jellyfish may also benefit from saltier waters, as saltier waters contain more iodine, which is necessary for polyps to turn into jellyfish. Rising sea temperatures caused by climate change may also contribute to jellyfish blooms, because many species of jellyfish are relatively betterableto survive in warmer waters. Here the jelly fish has a vitamin called Green flouroscent protein Aequoreavictoria jellyfish harbors a specific protein called Green Fluorescent Protein (GFP) that fluoresces after absorbing UV radiation. This fluorescence reveals to us that this protein does transform energy and re-emits it after absorbing energy from UV radiation. If an efficient design is created, more colours of fluorescing proteins will be able to be incorporated, and thus further increase the efficiency of the dye-sensitized solar cell by expanding the range of spectra that can be absorbed by the cell and transformed into electricity. Already, there are designs of dye-sensitized solar cells that include many colours of dyes together in one array.It mostly finds in artic and antartic regions where there is no sunlight. So we find fire fly which gives sunlight th produce energy

Y.Ramalakshmi
18MH5A0218

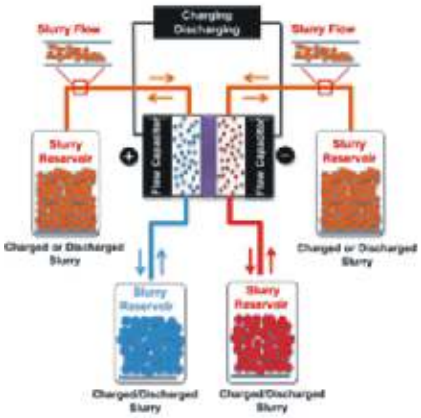
Wave Power

Ocean waves are caused by the wind as it blows across the sea. Waves are a powerful source of energy. The problem is that it's not easy to harness this energy and convert it into electricity in large amounts. Thus, wave power stations are rare. There are several methods of getting energy from waves. one of them works like a swimming pool wave machine in reverse. at a swimming pool, air is blown in and out of a chamber beside the pool, which makes the water outside bob up and down, causing waves. At a wave power station, the waves arriving cause the water in the chamber to rise and fall, which means that air is forced in and out of the hole in the top of the chamber. We place a turbine in this hole, which is turned by the air rushing in and out.The turbine turns a generator. problem with this design is that the rushing air can be very noisy, unless a silencer is fitted to the turbine. The noise is not a huge problem anyway, as the waves make quite a bit of noise themselves A company called Pelamis Wave Power are developing a method of offshore wave energy collection, using a floating tube called "Pelamis". This long, hinged tube (about the size of 5 railway carriages) bobs up and down in the waves, as the hinges bend they pump hydraulic fluid which drives generators



N.Sireesha
17MH5A0233

New Technology for Grid Level Electrical Energy Storage

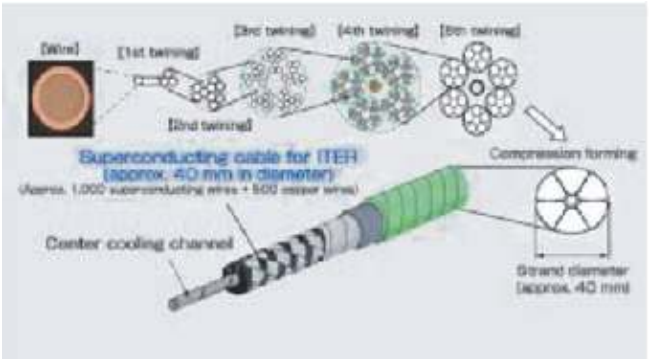


Nowadays, many industrialized nations are shifting to plan towards a sustainable future with efficient use of renewable energy resources. But electrical energy storage is the obstacle preventing more widespread use of renewable energy sources such as wind and solar power due to their unpredictable nature. Batteries store a large amount of energy, but are relatively slow in discharging it and they have a limited lifespan, or cycle-life. whereas on other hand conventional super capacitors, similar to lithium-ion batteries, can provide a high power output with minimal degradation in performance and can rapidly store and discharge energy, but only in small amounts compared to the battery. The Drexel's team of researchers is putting forward a plan to integrate into the grid an electrochemical storage system that combines principles behind the flow batteries and supercapacitors.The "electrochemical flow capacitor" (EFC) consists of an electrochemical cell connected to two external electrolyte reservoirs - a design similar to existing redox flow batteries which are used in electrical vehicles.

This technology is unique because it uses small carbon particles suspended in the electrolyte liquid to create slurry of particles that can carry an electric charge. Uncharged slurry is pumped from its tanks through a flow cell, where energy stored in the cell is then transferred to the carbon particles. The charged slurry canbe stored in reservoirs until the energy is needed. When energy is needed then entire process is reversed in order to discharge the EFC.

Y.Sai Jagadeesh
17MH5A0275

Superconducting Power Cables



Several demonstration projects around the world have been proven technical feasibility of high temperature superconducting power cable systems. These demonstration projects have shown that various cable designs can be implemented to provide reliable service with little maintenance when operated on a continuous basis. High-Temperature Superconducting Cables that utilize the HTS wire can transmit up to 10 times more power than conventional cables or can carry equivalent power at much lower voltages. There are several valuable performance measures for HTS cables that differ from conventional cables and are unique to the superconducting materials, and operating characteristics by critical current and AC loss. Based on this design the manufacture, installation, losses and operating costs of a High-Temperature Superconducting Cable (HTSC) are estimated and compared with conventional cables for a new power link. And it offers the advantages of lower loss, lighter weight and smaller dimensions, as compared to conventional cables. One of the challenging issues in the development of HTS cables is the AC loss calculation and its reduction, which directly affects the power transmission efficiency.

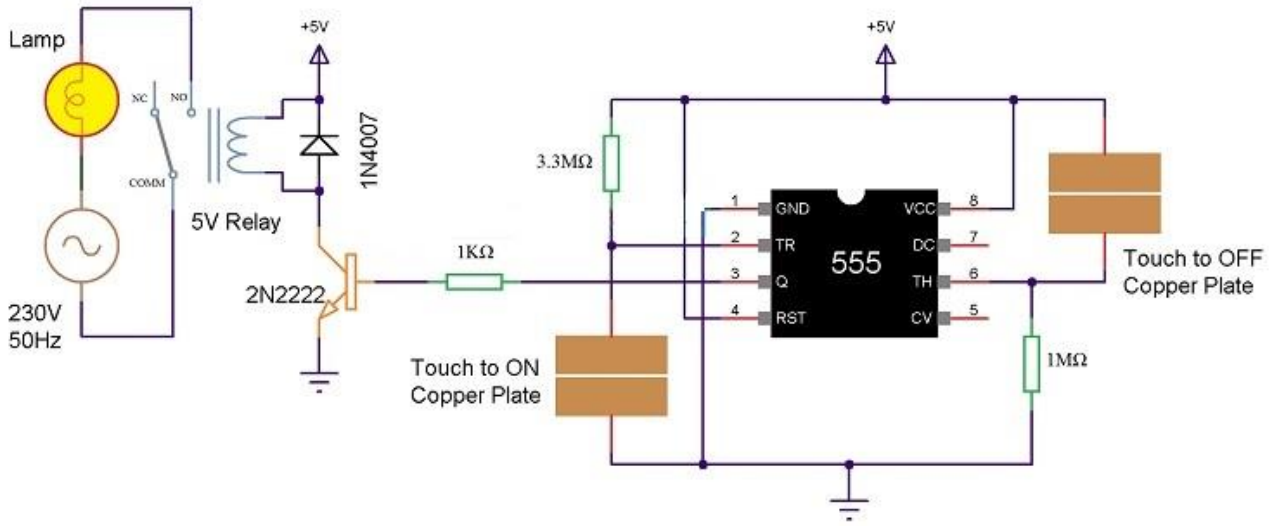
N.SIVAJI
18MH5A0209

PROJECT IDEA

Touch ON and OFF Switch Circuit

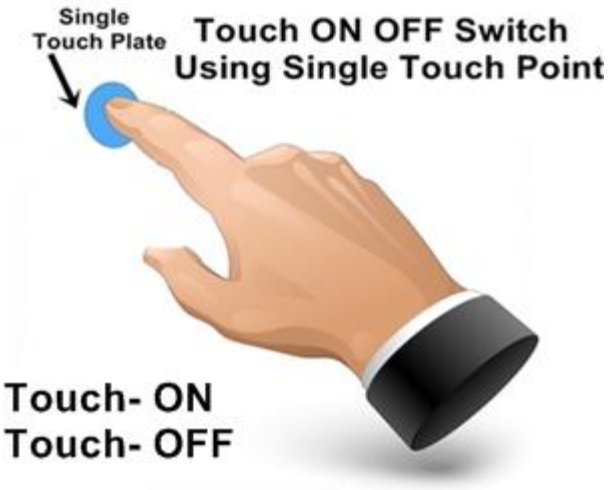
Circuit Diagram

The circuit diagram for the touch ON and OFF switch circuit is given below



Components Required

- 1 x 555 Timer IC
- 1 x 3.3 MΩ Resistor (1/4 Watt
- 1 x 1 MΩ Resistor (1/4 Watt)
- 1 x Bulb with holder (regular or CFL)
- 1 x 5V Relay Module (if relay module is not available, then you need the following components)
- 1 x 5V Relay
- 1 x 2N2222 NPN Transistor
- 1 x 1N4007 PN Junction Diode
- 1 x 1 KΩ Resistor (1/4 Watt)



Principle of the Project

The main principle behind the project lies in the basic functionality of the pins of 555 Timer. We know that 555 Timer has 8 pins namely GND (1), Trigger (2), Output (3), Reset (4), Control Voltage (5), Threshold (6), Discharge (7) and VCC (8).In this, Pins 2 and 6 are used in this project.

Now, we see the basic working of these pins. When Pin 6 i.e. the Threshold pin is held LOW, and if Pin 2 i.e. the Trigger Pin is made LOW, the output of the 555 Timer IC will be HIGH and it stays there. This condition can be used to turn ON the appliance.Now consider Pin 2 is pulled HIGH and if Pin 6 is made HIGH, the output of the 555 Timer IC will be LOW and it stays there. This condition can be used in our project to turn OFF the load or device.

Working of the Project

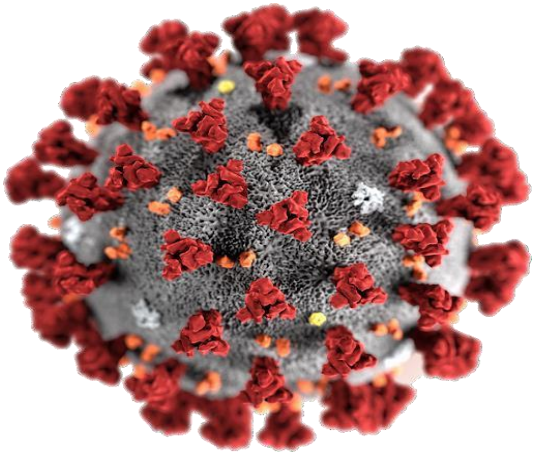
- Connect the circuit as per the circuit diagram and apply the power supply.
- To turn “ON” the device, touch the “ON” plate with your finger and to turn OFF the device , touch the OFF plate.
- When power supply is applied to circuit, the device connected through the relay (we have connected a light bulb) remains OFF. Now, if we observe the circuit diagram, Pin 2 is pulled HIGH and Pin 6 is Pulled LOW.
- When we touch the ON plate, voltage at Pin 2 (Trigger Pin) of the 555 IC becomes LOW. As Pin 6 is already LOW, the output at Pin 3 becomes HIGH.
- Since this is connected to the Relay Module through the Transistor, the Transistor will be turned ON and it in turn activates the Relay. As a result, the device gets switched ON.
- At this point voltage at pin 6 is zero as it pulled LOW by default and voltage at Pin 2 is HIGH.
- Now, when you touch the OFF plate, the Pin 6 is supplied with +5V for a brief time and as a result, the output of the 555 Timer IC will become LOW.
- This will turn off the transistor and also the relay. Hence, the device will be switched OFF.
- This circuit works by turning a relay to “ON” state by pressing a button and when the button is pressed again device changes to “OFF”. It is working similar to a flip-flop.

Applications

- A simple Touch to ON and Touch to OFF Switch Circuit is designed in this project using which, we can turn ON or OFF any device by simply touching the pads.
- By isolating the touch plates from the actual circuit, we can create a nice looking touch controls for our appliances.

CURRENT ISSUE

COVID-19 Pandemic in India



The COVID-19 *pandemic in India is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020.*

On 22 March, India observed a 14-hour voluntary public curfew at the instance of the prime minister Narendra Modi. It was followed by mandatory lockdowns in COVID-19 hotspots and all major cities. Further, on 24 March, the Prime Minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion- person population of India.

Government responses

The outbreak has been declared an epidemic in more than a dozen states and union territories, where provisions of the Epidemic Diseases Act, 1897 have been invoked, leading to the temporary closure of educational and commercial establishments. All tourist visas have been suspended, as a majority of the confirmed cases were mainly imports.

January–February

Protective measures were first applied in January. India began thermal screening of passengers arriving from China on 21 January. Initially carried out at seven airports, it was expanded to 20 airports towards the end of January. During February, the screening was extended to passengers from Thailand, Singapore, Hong Kong, Japan and South Korea. Nepal, Vietnam, Indonesia and Malaysia were added to the list towards the end of February. Very few new cases were discovered during February, The Indian Council of Medical Research (ICMR) admitted that airport screening alone was insufficient.

March

Awareness poster released by the Ministry of Health and Family Welfare by early to mid-March, the government had drawn up plans to deal with a worsening of the pandemic in the country. This included seven ministries working together to set up additional quarantine and treatment facilities across the country. States and twenty ministries,including Home, Defence, Railways, Labour, Minority Affairs, Aviation and Tourism,were informed of the containment plan. Plans to avoid a panic-like situation were also made. The Ministry of Textiles was to ensure the availability of protective and medical materials. The Department of Pharmaceuticals was to ensure the availability of essential medicines. The Ministry of Consumer Affairs, Food and Public Distribution was asked to ensure availabilityof essentials.

On 17 March, the Government of India issued an advisory, urging to all Indian states to take social distancing measures as a preventive strategy for implementation till 31 March. A government directive was issued asking all Central Armed Police Forces to get into battle mode; all non-essential leave was cancelled. A COVID-19 Economic Response Task Force was also formed.

Union and state governments set up national and state helpline numbers.

Closedown and curfews

Over the month of March, multiple states across the country began shutting down schools, colleges,public facilities such as malls, gyms, cinema halls and other public places to contain the spread.

- *On 15 March, Ministry of Culture closed all monuments and museums under ArchaeologicalSurvey of India.*
- *On 23 March, Chief Minister of Maharashtra ordered a statewide curfew and closure of stateborders.*

Lockdown

On 22 March, the Government of India announced complete lockdown in 82 districts in 22 states and Union Territories of country where confirmed cases were reported. 80 cities including Delhi, Bengaluru, Chennai, Mumbai, Chandigarh and Kolkata were put under lockdown some states sealed their borders barring inter-state movement.

On 24 March, PM Narendra Modi announced a complete 21-day national lockdown to contain the pandemic. By 6 April, the doubling rate had slowed to six days from earlier figure of three day.

"Success lies in being true to yourself—and living life on your own terms."

CROSSWORD PUZZLES

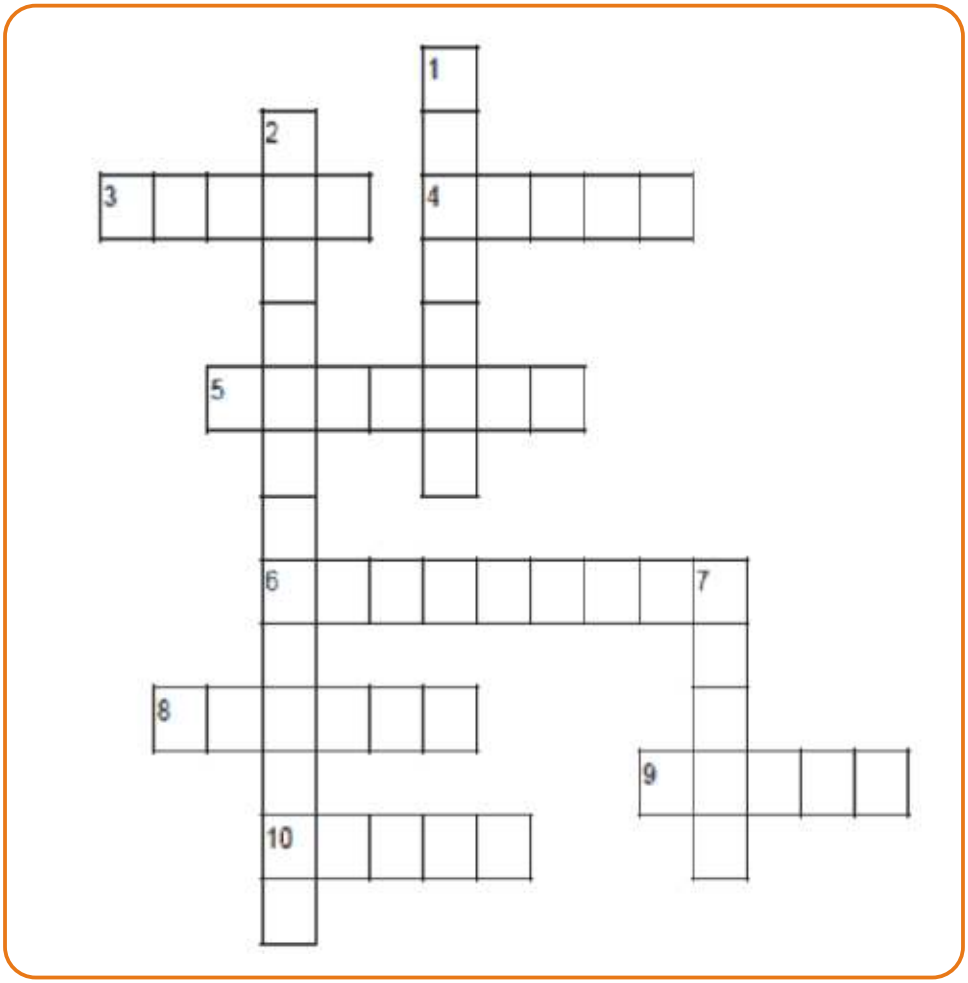
Electric Motors

ACROSS

3. There is a magnetic_____ around a magnet.
4. When LIKE poles come together they....
5. When OPPOSITE poles come together they....
6. An ability to attract or charm
8. When an object becomes magnetized and exerts magnetic force it's called a _____
9. The earth has a North and _____ pole
10. The _____ is a giant magnet

DOWN

1. He invented the first electric motor (Last Name)
2. _____Is a magnet that work with electricity and can be switched on or off
7. A small compact engine



RIDDLES

1) What word, when written in capital letters are the same forwards backwards and upside down?
2) Two boys play checkers. They play 5 games, they win the same amount. How?
3) What is that when you take away the whole, you still have some left?
4) There is a common English word that is nine letters too long. Each time you remove a letter from it, it still remains an English word, from nine letters right down to a single letter. What is the original word and what are the words that it becomes after removing one letter at a time?
5) There is only one ten letter word in the English language which can be typed using only the top row of the keys on a type writer (or keyboard) what is it?
6) The day before yesterday I was 25 and the next year I will be 28.This is true only one day in a year. What day is my birthday?
7) What mathematical symbol can be placed between 5 and 9 to get a number greater than 5 and smaller than 9?
8) What can you break but not touch ?
9) Say my name and I disappears what am I?
10) What kind of pet always stays on the floor?

ANSWERS

1) NOON
2) They did not play each other
3) wholesome
4) startling
5) Type writer
6) Born on Dec 31st and spoke about it on January 1st
7) Decimal – 5.9
8) Promise
9) Silence
10) Orpit

FROM BOOKS TO CANVAS

Ch. Jahnavi Bindu
-IVEEE

P.Sivaparvathi
-IVEEE

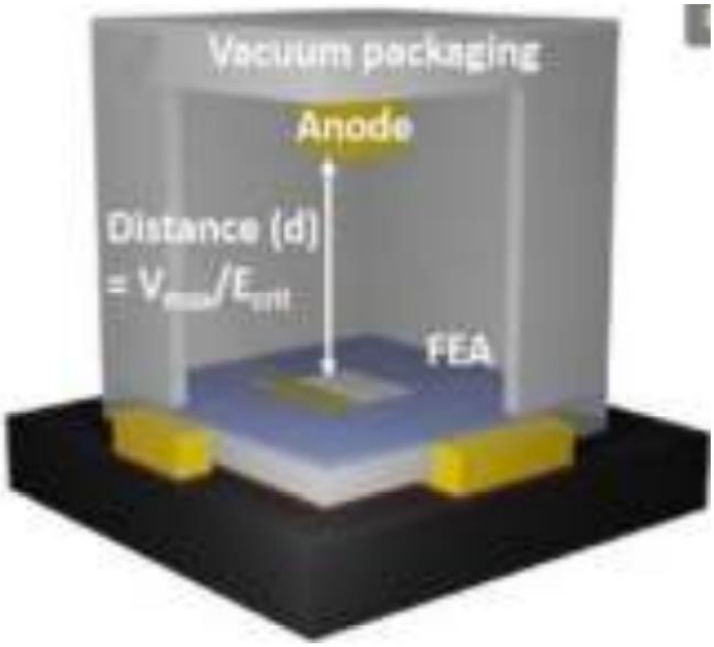
R. Manikanta
-III EEE

P.Shanti
-III EEE

Inventions in the Field of Electrical & Electronics Engineering

High Frequency Power Si Vacuum Transistor

A MIT-led team described the first Si vacuum transistor operating at ~40 kV and with the potential to have a semiconductor-like footprint. Such a high voltage level is normally reserved for wide-band gap materials like SiC and GaN. The proof-of-concept device consists of a gated field emission array or FEA (i.e., an electron source), a vacuum drift region and a metal anode. Electrons are emitted from the gated field emission array into the vacuum through tunneling, travel through it and are collected at the anode. The vacuum determines the transport properties and the high-voltage isolation. Using this technology as a baseline, the researchers will provide intrinsic benchmarks for vacuum transistors. They say the high critical electric field and unbounded carrier velocity of these devices can lead to compact, high-performance vacuum devices able to outperform solid-state devices on all metrics, making them suitable for a range of high-power and high-frequency applications, and also as next-generation X-ray sources.



IMPORTANT WEBSITES

- http://www.electrical4u.com
- www.allaboutcircuits.com
- www.powerstream.com
- www.ciruitlab.com
- www.ieee.org
- www.falstad.com
- www.pcbheaven.com
- www.electrical-engineering-portal.com
- www.electronics.wisc-online.com
- www.allaboutcircuits.com
- www.gutenburg.com
- www.guruengineers.com
- www.electro-tech-online.com
- Http://www.infocobuild.com/education/audio-video-courses/electronics/electronics-and-electrical-engineering.html

SUGGESTED REFERENCES

- ELECTRICAL ENGINEERING BY JB GUPTHA
- ELECTRICAL ENGINEERING BY GALGOTIA
- ELECTRICAL INDIA
- POWER TODAY MAGAZINE
- ELECTRICITY TODAY (TRANSMISSION AND DISTRIBUTION) MAGAZINE

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