



AVANTHI

INSTITUTE OF ENGINEERING & TECHNOLOGY

Approved by A.I.C.T.E., NAAC B++, Affiliated to JNTUGV-Vizianagaram



Department of Electrical & Electronics Engineering

Lakshya

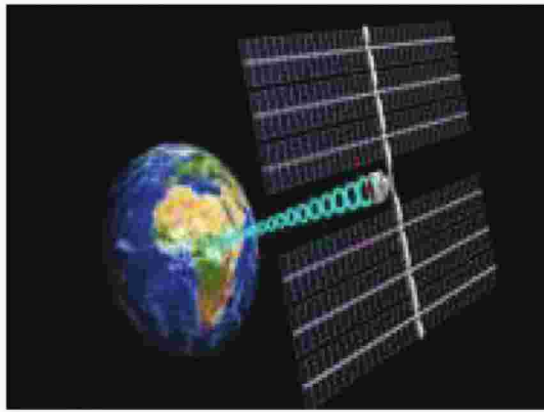
2022-2023

Illuminating The Power of Future Generation...

- ◆ SBSP
- ◆ Automatic Compensation Banks
- ◆ Beta Voltaic cells
- ◆ Electro Signals in Medicine
- ◆ Nano Based Batteries
- ◆ Interesting Facts



Is solar power can be collected in space ?



Space-based solar power (SBSP) is the concept of collecting solar power in outer space and distributing it to Earths. Potential advantages of collecting solar energy in space include a higher collection rate and a longer collection period due to the lack of a diffusing atmosphere, and the possibility of placing a solar collector in an orbiting location where there is no night. A considerable fraction of incoming solar energy (55–60%) is lost on its way through the Earth's atmosphere by the effects of reflection and absorption. Space-based solar power systems convert sunlight to microwaves outside the atmosphere, avoiding these losses and the downtime due to the Earth's rotation, but at great cost due to the expense of launching material into orbit. SBSP is considered a form of sustainable or green energy, renewable energy, and is occasionally considered among climate engineering proposals. It is attractive to those seeking large-scale solutions to anthropogenic climate change or fossil fuel depletion (such as peak oil).

Automatic compensation banks



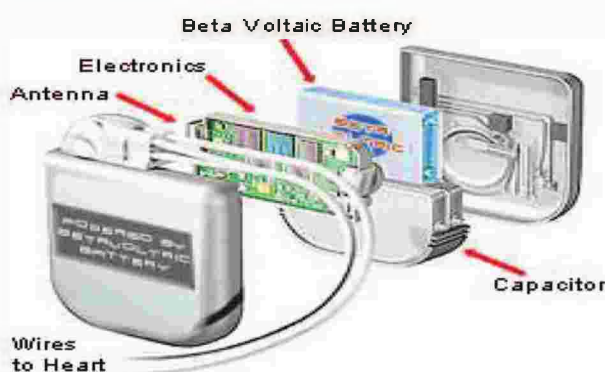
During previous decades manufacturers of automatic compensation banks faced increasing competition worldwide. They were forced to produce as economically as possible. Now, new technologies have been developed compared with the past when capacitors were bigger and heavier. Minimizing capacitors enabled the development of steps (modules containing capacitors) with discharging resistances, fuses, contactors and reactors (if required) assembled in standardized industrial cubicles.



What is the latest trend in electrical engineering?

Wire less power transfer (Witricity)

Now, the transfer range and the efficiency levels are increasing on a startling pace, and hopefully soon (WPT) would be adapted in most of our home applications such as charging Laptop & smart phones. Moreover, scientists have achieved new technologies and techniques for transmitting power wirelessly from a stationary source to a mobile receiver. This means the electric vehicle (EV) can be charged while driving, and it allows the EVs to run forever, without a single stop.



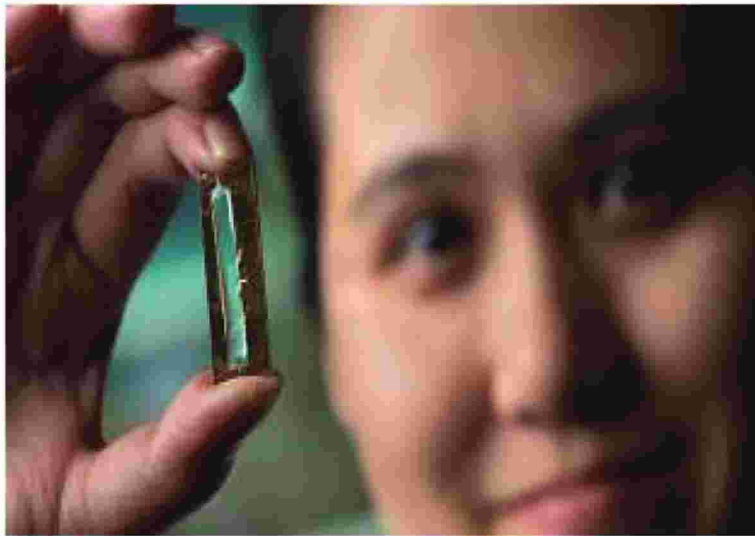
Betavoltaic devices, also known as **betavoltaic cells**, are generators of electric current, in effect a form of battery, which use energy from a radioactive source emitting beta particles (electrons). A common source used is the hydrogen isotope, tritium. Unlike most nuclear power sources, which use nuclear radiation to generate heat, which then is used to generate electricity (thermoelectric and thermionic sources), betavoltaics use a non-thermal conversion process;



converting the electron-hole pairs produced by the ionization trail of beta particles traversing a semiconductor.

Betavoltaic power sources (and the related technology of alphavoltaic power sources) are particularly well-suited to low-power electrical applications where long life of the energy source is needed, such as implantable medical devices or military and space applications.¹

Are you being lazy to cycle the normal batteries in life time?



New gel coating makes rechargeable nanowire batteries last forever

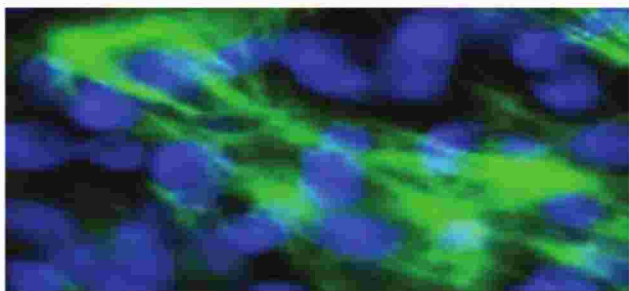
Most of the work being done on batteries is about increasing the capacities and charging time, but researchers at the University of California, Irvine have developed a battery that addresses another pain point. The system designed by doctoral candidate Mya Le Thai can be cycled hundreds of thousands of times without wearing out, which could lead to a battery that never needs to be replaced.

The experimental battery is composed of gold nanowires, which have been a favorite topic of study for energy researchers. These structures, which are thousands of times thinner than a human hair, have extremely high conductivity and surface area, making them ideal for the transfer and storage of electrons. The problem has always been that gold nanowires wear out quickly when used in conventional lithium-ion systems.

Thai tested the battery when encased in gel, and found that it completed 200,000 discharge cycles in the space of a few months with no loss of capacity. Many devices have moved to embedded batteries that are not user-replaceable. With most other components entirely solid-state, the battery is often the first thing to wear out. You can either pay to have the cell replaced or just throw the phone away. A battery that doesn't wear out could lead to less e-waste and happier consumers. Give it a few years, and maybe this technology will be suitable for commercialization.



Electrons started conduction in medicine!!



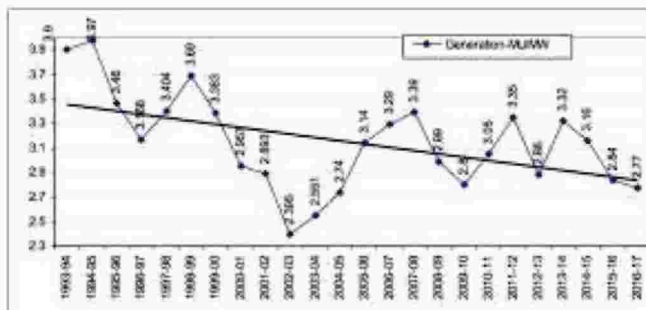
Using electrical signals to train the heart's muscle cells

Electrical stimulation of human heart muscle cells engineered from human stem cells aids their development and function, researchers have demonstrated for the first time. They used electrical signals, designed to mimic those in a developing heart, to regulate and synchronize the beating properties of nascent cardiomyocytes, the cells that support the beating function of the heart

Columbia Engineering researchers have shown, for the first time, that electrical stimulation of human heart muscle cells (cardiomyocytes) engineered from human stem cells aids their development and function. The team used electrical signals, designed to mimic those in a developing heart, to regulate and synchronize the beating properties of nascent cardiomyocytes, the cells that support the beating function of the heart. The study, led by Gordana Vunjak-Novakovic, The Mikati Foundation Professor of Biomedical Engineering and a professor of medical sciences (in medicine), is published online January 19 in *Nature Communication*

"We've made an exciting discovery," says Vunjak-Novakovic. "We applied electrical stimulation to mature these cells, regulate their contractile function, and improve their ability to connect with each other. In fact, we trained the cell to adopt the beating pattern of the heart, improved the organization of important cardiac proteins, and helped the cells to become more adult-like."

Crisis in hydro power generation 2018 !!!



India's hydro generation drops to below 10% for the first time

For the first time in independent India's history, hydropower generation from large hydropower projects in India in 2016-17 year fell below 10% of total electricity generation and is likely to go further down in years to come. It is well known that hydropower generation as proportion of total power generation has been going down. However, this proportion is generally seen in terms of installed capacity (measured in Mega Watts), and not actual generation (measured as Million or Billion Units^[1]).

As per recently released figures by India's premier technical body on power issues, Central Electricity Authority, the power generation from large hydropower projects (CEA only reports large hydro generation) in 2016-17 was 122.38 BU, when total power generation in India (including renewables generation of 81.97 BU, but excluding Bhutan imports of 5.62 BU) was 1236.39 BU, hence hydropower generation in 2016-17 was 9.90%, for the first time going below 10% of total generation. In previous year (2015-16), the proportion was 10.39% (hydropower generation of 121.38 BU compared to total power generation (including renewable generation of 65.78 BU but excluding Bhutan imports of 5.24 BU) of 1168.36 BU).



Under leadership of Shri Kiran Kumar, ISRO is spearheading the initiative of promoting space technology based tools in governance and development in various Ministries/Departments. He is the driving force towards conceptualising innovative space applications, setting up of space technology cells in the Union Ministries and strengthening of capacity building mechanism for enhancing the role of space applications in G-governance initiatives. He is the man behind maximising the use of GAGAN enabled location based services.

- **Shri A S Kiran Kumar**

- **Education**

- B.Sc. with Honours (Physics), 1971, Bangalore University
M.Sc. (Physics), 1973, Bangalore University with specialisation in Electronics
M Tech in Physical Engineering, 1975, Indian Institute of Science, Bangalore

- **Date of Birth**

October 22, 1952 at Hassan, Karnataka

- **National Recognition**

Padma Shri Award Gandhi Peace Prize 2014 to ISRO

- **Positions Held**

- ✓ 1998 - 2006 -- Group Director (Principal Investigator, Chandrayaan-1), Electro-Optics Sensor Development
- ✓ 2004 -- Associate Project Director, Cartosat-2 Satellite Payload
- ✓ 2006 -- Deputy Director, Sensors Development Area, Space Applications Centre
- ✓ 2008 -- Group Director (Principal Investigator, Chandrayaan-1), TMC/ HySI Instruments, Space Applications Centre
- ✓ 2009 -- Associate Director, Space Applications Centre



- ✓ 2012 -- Director, Space Applications Centre
- ✓ 2015 -- Secretary, Department of Space, Chairman, Space Commission and Chairman, ISRO

Main Motto of an Electrical Engineer !!



- We wanted to find out what duties you should expect to have if you work in this field. We perused job listings on [Indeed.com](https://www.indeed.com) to find out. Here are some:
- "Evaluate electrical products, components, and applications by designing and conducting research programs"
- "Ensure global standards are being met"
- "Conduct performance, reliability, and compliance testing"
- "Assist with equipment and process troubleshooting"
- "Select electrical engineering consultants when needed to support projects and manage their activities to ensure consistent criteria, cost effective designs, and timely delivery"

"Work with a cross-functional team to develop and optimize current and next generation inertial measurement units and system"

Interesting facts

1. Electricity was introduced to Ethiopia in 1896 after Emperor Menelik II ordered two newly invented electric chairs as a form of humane capital punishment and realized they were useless in his country without electricity.
2. Benjamin Harrison, the 23rd president of the US, was the first president to have electricity in the White House but he never touched any light switches because he was too scared of getting electrocuted.
3. Ore trains in Sweden traveling down to the coast generate five times the amount of electricity they use, powering nearby towns and the return trip for other trains.
4. Water doesn't actually conduct electricity. Impurities in water is what makes it conduct electricity.
5. Ocean thermal energy conversion is a technology that was invented at the end 19th century. It has the potential to satisfy twice the global electricity demand without affecting the temperature of the ocean or the world's environment.

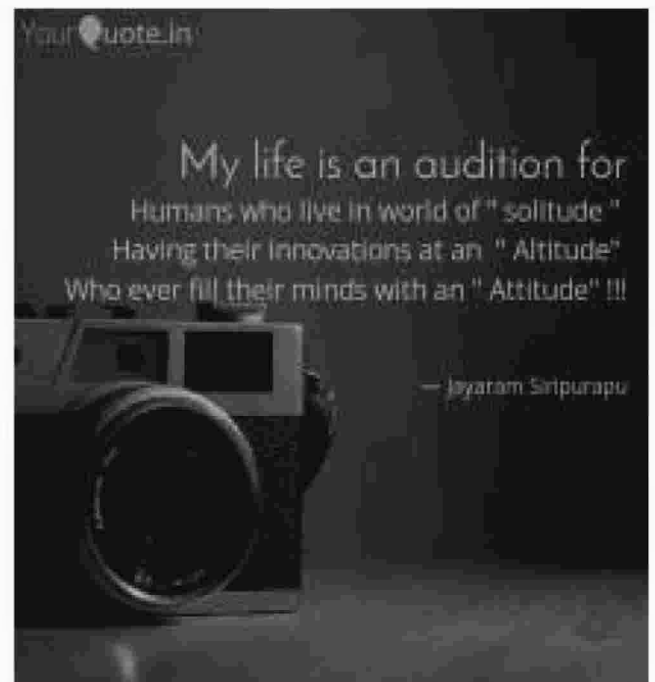


Electrical Word Search

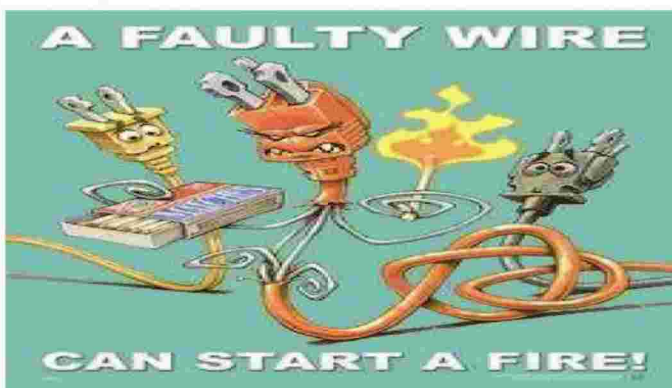
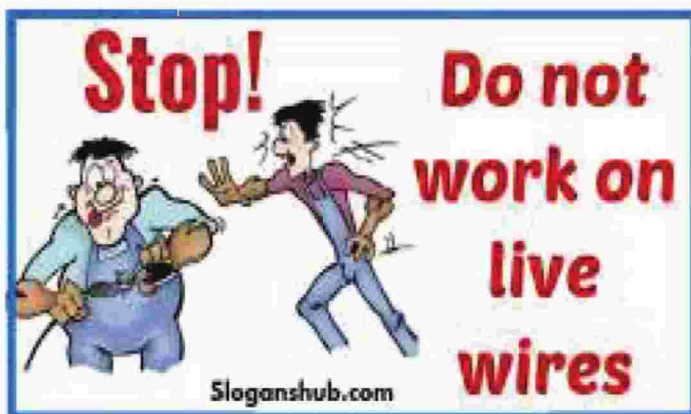


LIGHT
VOLTMETER
BATTERY
AMMETER
ELECTRICITY
ENERGY
BULB
WIRE
COMPONENT
CURRENT
CHARGE
VOLTS
CIRCUIT
AMPS
SWITCH

Play this puzzle online at : <http://thewordsearch.com/puzzle/87939/>



Think safety first



V Purna Durga Prasad-IV EEE

I Sai Ram-III EEE

L Sruthi Pavani-II EEE

A Arjun Rao-HOD-EEE

B Anand Swaroop-Asst Professor

K Priyaswi-Asst Professor