

# SPECTRA

VOL. 1  
YEAR: 2022

DEPARTMENT OF ELECTRICAL ENGINEERING  
DREAM INSTITUTE OF TECHNOLOGY



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## **Susmita Sarkar**

### **CHAIRPERSON**

DREAM INSTITUTE OF TECHNOLOGY ASPIRES TO BUILD A STRONG TECHNICAL FOUNDATION FOR NEW AGE ENGINEERING STUDENTS. WE IMPART SKILL-BASED INDUSTRY DRIVEN KNOWLEDGE OVER AND ABOVE UNIVERSITY DEFINED CURRICULUM. THIS WILL HELP TO DEVELOP THE BROAD TECHNICAL OUTLOOK REQUIRED FOR STUDENTS TO SURVIVE IN THIS COMPETITIVE MARKET. WE ALWAYS ENCOURAGE COLLABORATION BETWEEN STUDENTS AND FACULTIES, RECIPROCITY AND COOPERATION AMONG STUDENTS, ACTIVE LEARNING, PROMPT FEEDBACK AND EXPERIENTIAL LEARNING BEYOND CLASSROOM. DREAM INSTITUTE OF TECHNOLOGY IMPARTS EFFECTIVE LEARNING SKILLS THAT HELPS STUDENT TO ACCURATELY REMEMBER INFORMATION LEARNT, RECALL THEM AT THE RIGHT POINT OF TIME AND UTILIZE THEM EFFECTIVELY IN A WIDE VARIETY OF SITUATIONS.

WE ENCOURAGE STUDENTS TO ATTEND THEIR CLASSES IN THE COLLEGE REGULARLY, SO THAT THEY CAN BUILD UP THE HABIT OF ATTENDING THE WORKPLACES PUNCTUALLY. BESIDES KNOWLEDGE, DISCIPLINE IS VERY MUCH ESSENTIAL FOR EVERY INDIVIDUAL TO SUCCEED PROFESSIONALLY. AT DREAM INSTITUTE OF TECHNOLOGY, DISCIPLINE IS MAINTAINED ON A PRIORITY BASIS WITHIN THE COLLEGE CAMPUS. EVERY STUDENT IN OUR INSTITUTE IS MADE TO UNDERSTAND THAT THERE CAN BE NO SHORT-CUT TO SUCCESS. I FEEL PRIVILEGED TO BE A PART OF THIS INSTITUTION AND HOPE TO FUEL THE INTELLECTUAL ENERGIES OF ALL OUR STUDENTS WITH THE SUPPORT OF DEDICATED ASSISTANT PROFESSOR MEMBERS OF OUR INSTITUTE.







## **Prof. (Dr.) Dipankar Sarkar**

**PRINCIPAL**

**INDIA IS A FAST EMERGING DESTINATION FOR CUTTING-EDGE RESEARCH & DEVELOPMENT. INDIA IS PRESENTLY IN NEED OF LARGE TALENT POOL NOT ONLY IN INFORMATION TECHNOLOGY BUT ALSO IN OTHER FIELDS LIKE NANOTECHNOLOGY, AGRICULTURAL SCIENCE, MANUFACTURING ETC. OUR STUDENTS MUST BE EQUIPPED TO MEET THESE UPCOMING CHALLENGES. "DREAM INSTITUTE OF TECHNOLOGY" HAS BECOME ONE OF THE LEADING ENGINEERING INSTITUTIONS IN WEST BENGAL AS WELL AS IN INDIA. WITHIN A SHORT SPAN OF TIME THE INSTITUTE HAS CREATED A NICHE FOR ITSELF BY PROVIDING LUCRATIVE CAREER OPPORTUNITIES WITH ESTEEMED RECRUITERS LIKE TCS, CAPGEMINI, INFOSYS, RELIANCE, ACCENTURE, WIPRO- SPECTRA MIND, SATYAM COMPUTERS, COGNIZANT, ETC.**

**WE HAVE WELL-EQUIPPED COMPUTER LABS, CENTRAL COMPUTER CENTER AND DEPARTMENTAL LABS TO EQUIP STUDENTS AS QUALITY ENGINEERS NOT ONLY IN THE CORE SECTORS BUT ALSO IN THE FIELD OF SOFTWARE ENGINEERING. DREAM INSTITUTE OF TECHNOLOGY, A STATE-OF-THE-ART ENGINEERING INSTITUTE PROVIDES WELL-EQUIPPED WORKSHOPS AND ADVANCED LEARNING RESOURCES.**

**FROM A MODEST BEGINNING IN JULY 2006, THE DREAM INSTITUTE OF TECHNOLOGY MADE A PLEDGE TO CREATE THE IDEAL ENVIRONMENT FOR YOUNG, FRESH, TALENTS TO REALIZE AND OPTIMIZE THEIR POTENTIALS. WE FACILITATE STUDENTS TO DEVELOP A SYMBIOTIC RELATIONSHIP BETWEEN THE COMMUNITY, SOCIETY, AND THE INSTITUTION. WE ARE AT WORK IN UNISON TO ENSURE A TREMENDOUS VALUE-ADDITION AMONG OUR STUDENTS DURING THEIR FOUR YEARS' OF STAY WITH US. AT THE SAME TIME, WE ARE ALSO CONFIDENT TO ENSURE THAT THE ALUMNI OF OUR COLLEGE ALWAYS FEEL PROUD OF THEIR INSTITUTION OF CHOICE IN THE DAYS AHEAD OF US.**





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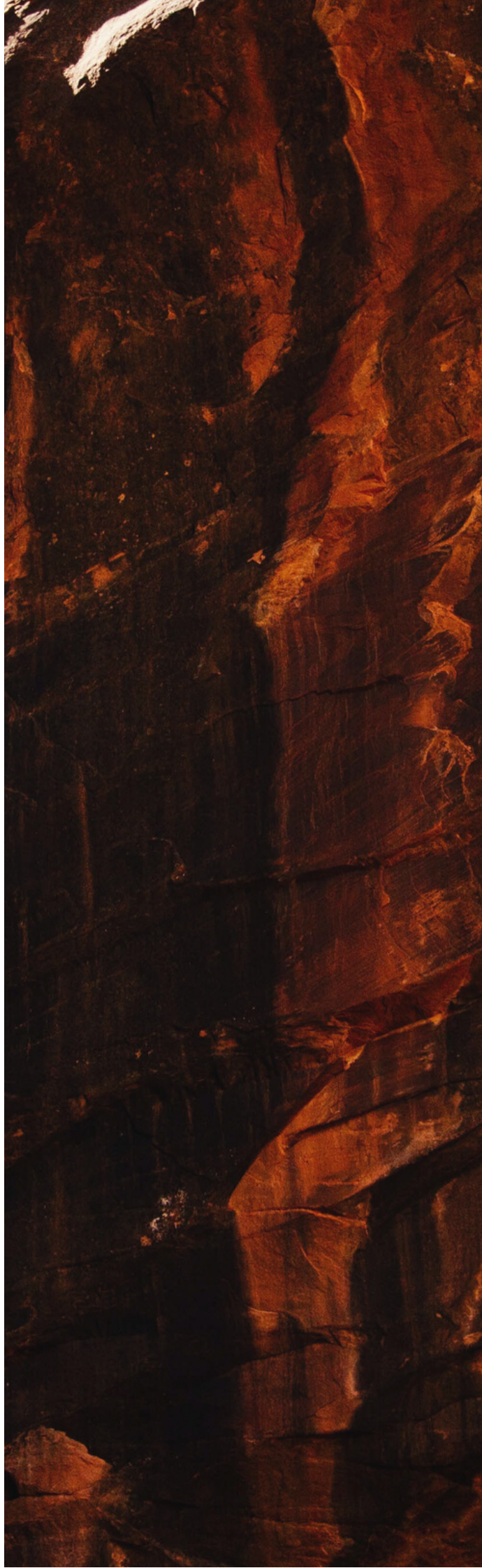
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# **VISION OF THE INSTITUTE**

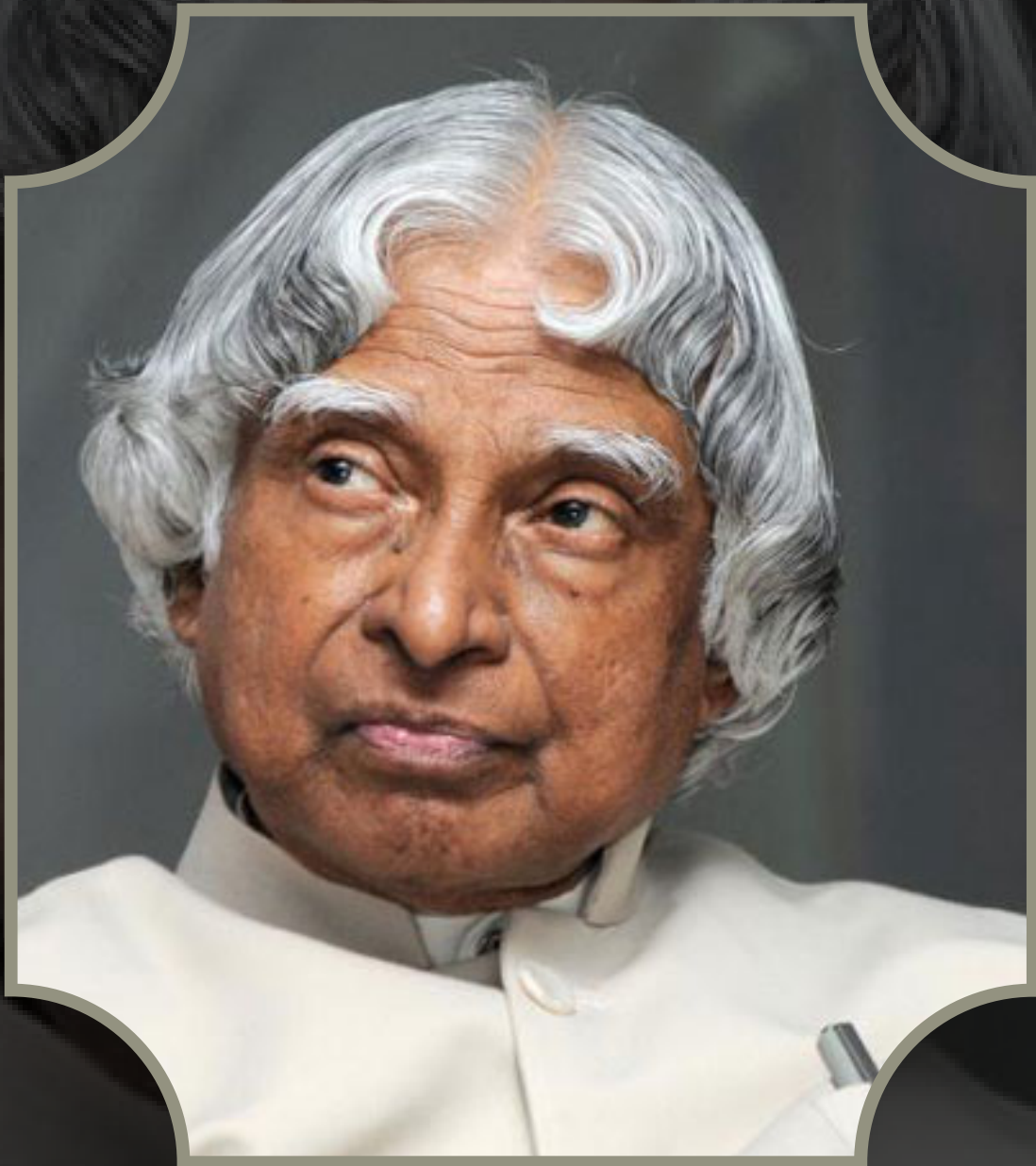
To be a prominent institution passionately developing competent technocrats capable of serving the nation and the world.

## **MISSION OF THE INSTITUTE**

- To promote Inter-departmental collaborative projects & research and improve publications and Initiate Internal Revenue Generation activities through consultancy, continuing education programs etc. (Obtain at least 5 projects every year) involving students wherever possible.
- To provide state-of-the-art teaching-learning ambiance to promote student-centric learning using the latest ICT tools and start new programs at UG & PG levels in cutting edge technology
- Continuous Assistant Professor development initiatives to update their knowledge and skills.
- Set up Incubation and innovation cells and encourage students to innovate and establish start-ups.
- Expand community outreach program through sharing of technical expertise with the aim to encourage experiential learning among students.



# SCIENTIST OF THE MILLENNIUM



“DREAM, DREAM, DREAM.  
DREAMS TRANSFORM INTO THOUGHTS AND THOUGHTS  
RESULT IN ACTION.”

DR. A.P.J. ABDUL KALAM

# VISION OF THE ELECTRICAL ENGINEERING DEPARTMENT

TO IMPART INTERNATIONAL  
STANDARD ELECTRICAL  
EDUCATION AND ENABLING  
STUDENTS TO SOLVE ANY  
SOCIO-ECONOMIC  
PROBLEM THROUGH AN  
INNOVATIVE APPROACH.

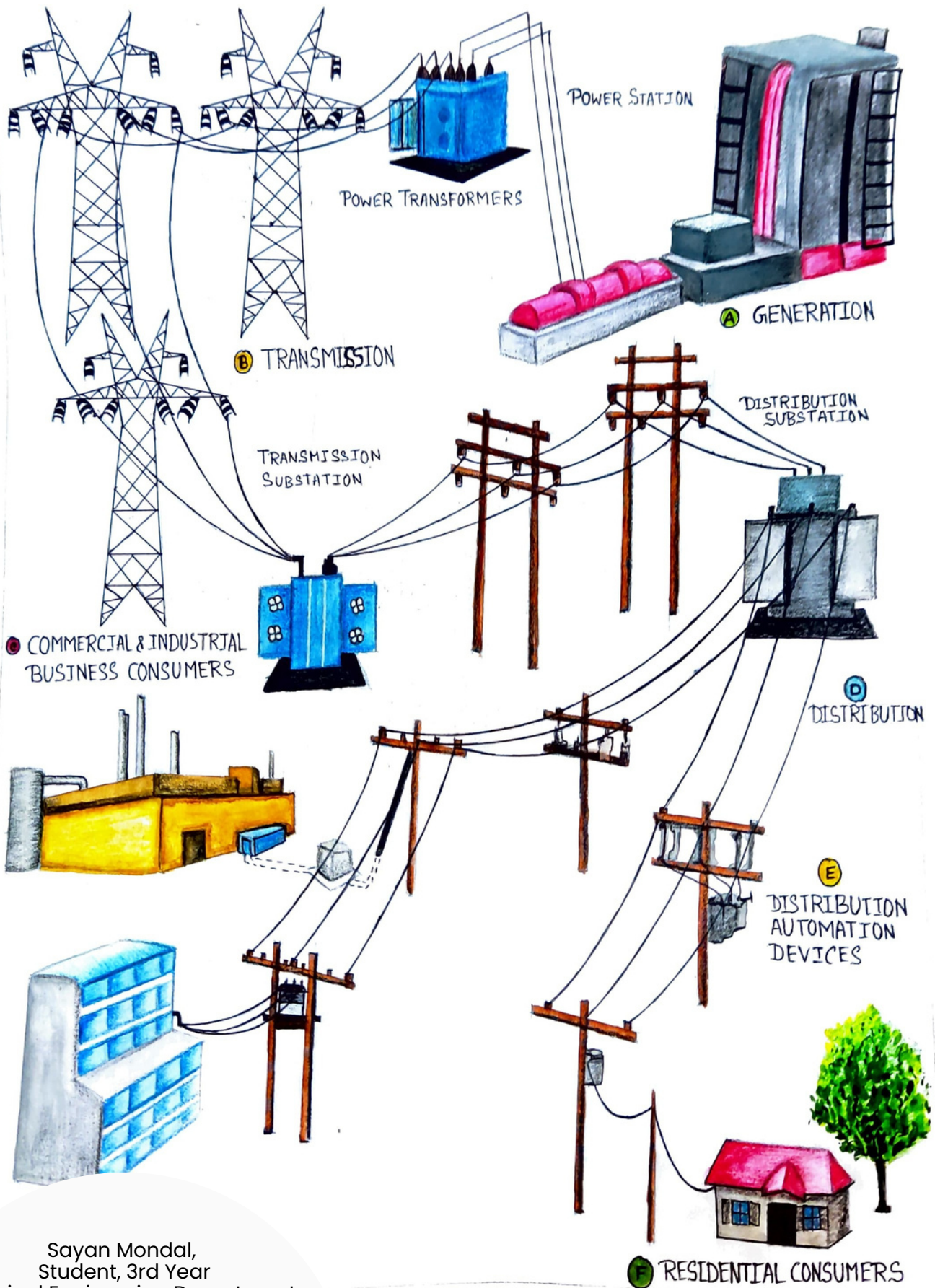




# MISSION OF THE ELECTRICAL ENGINEERING DEPARTMENT

- **PROVIDE CONTINUOUS ASSISTANT PROFESSOR DEVELOPMENT AVENUES TO ASSISTANT PROFESSOR SO AS TO UPGRADE THEIR QUALIFICATION, KNOWLEDGE AND SKILLS TO MEET THE CHALLENGES OF RAPIDLY CHANGING TECHNOLOGY.**
- **ADOPT GLOBALLY RECOGNIZED PEDAGOGY TO ENSURE EFFECTIVE KNOWLEDGE TRANSFER INCLUDING USE OF LATEST ICT TOOLS AND STUDENT CENTRIC LEARNING SOFTWARE SO AS TO PRODUCE JOB READY GRADUATES.**
- **MAINTAIN STATE OF THE ART LABORATORY AND RESEARCH FACILITIES AS PER GLOBAL STANDARD AND CONDUCT DEPARTMENTAL AS WELL AS INTER-DEPARTMENTAL RESEARCH ACTIVITIES, PUBLICATIONS, CONSULTANCIES AND PROJECTS FROM INDUSTRY TO GENERATE REVENUE FOR SELF SUSTENANCE.**
- **INCULCATE THE ENTREPRENEURIAL SPIRIT THROUGH INNOVATION AND INCUBATION CELL TO ENSURE CAPABILITY TO SOLVE THE SOCIETAL PROBLEMS.**

# ELECTRICAL DISTRIBUTION SYSTEM



Sayan Mondal,  
Student, 3rd Year  
Electrical Engineering Department





Souvik Chakraborty,  
Student, 2nd Year  
Electrical Engineering Department





# RENEWABLE AND NONRENEWABLE ENERGY

**ALTERNATIVE ENERGY SOURCES, SUCH AS WIND AND SOLAR ENERGY, ARE A POSSIBLE SOLUTION TO THE DEPLETION OF NONRENEWABLE SOURCES.**

Renewable and nonrenewable resources are energy sources that human society uses to function on a daily basis.

● **The Difference :** between these two types of resources is that renewable resources can naturally replenish themselves while nonrenewable resources cannot. This means that nonrenewable resources are limited in supply and cannot be used sustainably.

● **TYPES :** There are four major types of nonrenewable resources: oil, natural gas, coal, and nuclear energy. Oil, natural gas, and coal are collectively called fossil fuels. Fossil fuels were formed within the Earth from dead plants and animals over millions of years—hence the name “fossil” fuels. They are found in underground layers of rock and sediment. Pressure and heat worked together to transform the plant and animal remains into crude oil (also known as petroleum), coal, and natural gas. The plants and animals that became fossil fuels lived in a time called Carboniferous Period, around 300 to 360 million years ago. The energy in the plant and animal remains originally came from the sun; through the process of photosynthesis, solar energy is stored in plant tissues, which animals then consume, adding the energy to their own bodies. When fossil fuels are burned, this trapped energy is released. Crude oil is a liquid fossil fuel that is used mostly to produce gasoline and diesel fuel for vehicles, and for the manufacturing of plastics. Natural gas is widely used for cooking and for heating homes. It consists mostly of methane and is found near oil deposits below Earth’s surface. Natural gas can be pumped out through the same wells used for extracting crude oil.

Coal is a solid fossil fuel that is used for heating homes and generating power plants. It is found in fossilized swamps that have been buried beneath layers of sediment. Since coal is solid, it cannot be extracted in the same manner as crude oil or natural gas; it must be dug up from the ground.

Nuclear energy comes from radioactive elements, mainly uranium, which is extracted from mined ore and then refined into fuel. Unfortunately, human society is—for the time being—dependent on nonrenewable resources. Approximately 80 percent of the total amount of energy used globally each year comes from fossil fuels. We depend on fossil fuels because they are energy-rich and relatively cheap to process. But a major problem with fossil fuels, aside from their being in limited supply, is that burning them releases carbon dioxide into the atmosphere. Rising levels of heat-trapping carbon dioxide in the atmosphere is the main cause of global warming.

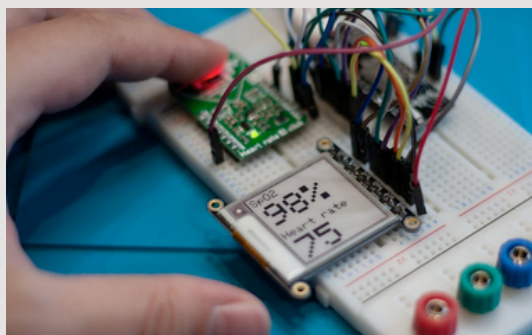


**Jiyarul Karim Sk,  
Student  
Department of  
Electrical Engineering,**

*Photo credit  
Olivia Wilson / Liceria Co.*



## The Role of Open Source Hardware in COVID-19 Digital Response



Open source initiatives have a varied history in international development, with both successful and less positive outcomes. These efforts have emerged due to the unique challenges and low-resource settings where creativity is necessary. However, the majority of open source initiatives have mainly focused on software and digital solutions.

The COVID-19 pandemic has presented an unprecedented challenge, and hardware innovations have played a crucial role in the response. PPE, ventilators, thermometers, and tools for social distancing policies have been crucial. Although digital solutions, such as contact tracing and data-driven tools, have been essential, hardware has also played a significant part in the COVID-19 response and is likely to continue to do so during the recovery phase.

The UNDP partnered with Hackster and various technology companies to launch the global COVID-19 Detect and Protect challenge. The challenge aimed to mobilize makers, inventors, designers, and innovators to develop open source hardware solutions for combating the COVID-19 pandemic. Through this challenge, significant insights have been gained, and there is an ongoing effort to refine the process of transitioning from global crowdsourcing to local implementation of open source hardware solutions.

### Why open source is important for COVID-19

The global open source community has played a critical role in fighting COVID-19, as the disease's speed and widespread impact highlight the usefulness of building on or replicating open source solutions. Open source solutions can be particularly valuable in lower-income settings, where public health systems are most stretched.

However, it is essential to acknowledge that open source has its limitations, and closed-source solutions have much to offer in tackling COVID-19 and international development more broadly. Instead of an open-closed-source dichotomy, we must choose the most appropriate tools to prevent further deaths and suffering.

In the context of COVID-19, open source hardware solutions are particularly valuable as they can accelerate countries' response, especially where essential physical assets are limited, and localise response where international supply chains have been disrupted. They can also lower barriers to developing useful tools and assets to fight against COVID-19. Additionally, open source may play a critical role in COVID-19 recovery.



**UNDP Accelerator Labs: a global network of innovators, focused on exploration and experimentation.**

# ROLE OF 5G FOR DIGITAL PLATFORMS REAL TIME HEALTH CARE SYSTEM



## ROLE OF 5G IN DIGITAL HEALTH CARE SYSTEM

It's been over a year since the first instance of COVID-19 was discovered and the virus has spread over the world. Advanced technology, which has inadvertently contributed to the virus's spread, has also managed to keep some survival and comfort systems afloat. People were still able to communicate with one another via technology, defying the self-isolation that had become the norm by 2020. Better communication networks, such as 5G, are currently being tested in order to keep everyone linked in several ways. The successor to the cutting-edge 4G LTE network, 5G promises to provide better bandwidth, lower latency, and enormous connections. This suggests we're getting closer to simultaneously communicating data from multiple devices. [Source: Health at Homes]

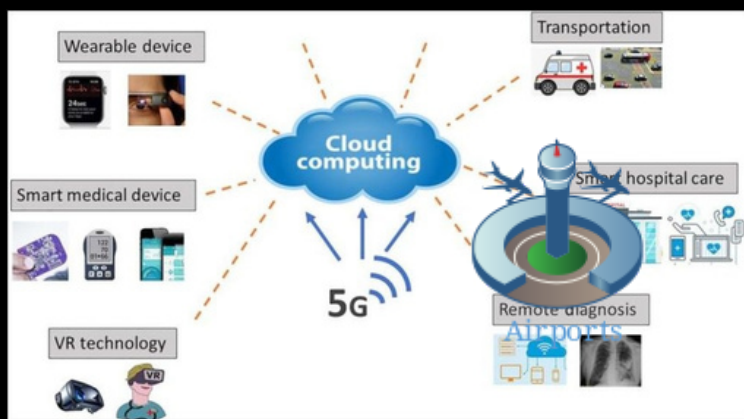
The spread of the corona virus (SARS-COV- 2) has put enormous strain on healthcare systems around the world, and 5G networks have the potential to transform and improve all of the important components of healthcare.

5G promises to bring critical levels of connection to enable a new health ecosystem that can precisely, efficiently, conveniently, cost-effectively and at a large scale address the demands of patients and providers. However, network security and data privacy are critical for 5G networks to reach their full potential in healthcare settings. According to Industry Research Future's pre-COVID-19 analysis, the telehealth market would develop at a compound annual growth rate of 16.5 percent from 2017 to 2023, paralleling the rise and rollout of 5G.

these are almost certainly going to be higher growth rates presently. Doctors will be able to interact remotely with patients at home or in field hospitals without fear of network blackouts, disconnections, or lag time thanks to faster network speeds and improved treatment quality. Following the corona virus pandemic, 5G eMBB technology will allow for remote support of high-quality healthcare while lowering patient exposure to disease by reducing in-person visits to doctors and healthcare institutions. Patients who are unable to travel to their healthcare providers will be able to visit them via natural-feeling telepresence devices thanks to 5G. As a result, crucial healthcare treatments for chronically ill or confined patients can be delivered over a wireless network.







## Better Performance

5G networks offer high-resolution video and reduce latency (1 ms or less) by reducing the delays and increasing data transfer speed — from 100 Mbps to 20Gbps. Enhanced network performance is crucial for real-time data transfers. For instance, if a remote consultation with a patient is riddled with lags, doctors cannot diagnose health conditions properly — a delay in arm movement could be a symptom of an issue with the latency of teleconsultation technology. Better performance is also a prerequisite for applications based on augmented reality.

## Some 5G health care use cases are

- 1) Connected ambulance with lower latency, high bandwidth & network slicing
- 2) High definition (HD) virtual consultations of healthcare professionals
- 3) Remote patient monitoring
- 4) Video-enabled medication adherence
- 5) Augmented reality and virtual reality assistance for the blind & for training and education
- 6) Video analytics for behavioral recognition
- 7) Real time high-throughput computational processing
- 8) Remote expert for collaboration in surgery
- 9) Distraction and rehabilitative therapy



Offices



Malls



City



Suburbs



Stadiums



**Sushovan  
Roy,**

**Assistant Professor,  
Department of  
Electrical Engineering,**

# Blockchain in healthcare



EVEN BEFORE THE COVID-19 PANDEMIC, TECHNOLOGY HAD BEEN CHANGING THE DELIVERY OF HEALTHCARE AROUND THE WORLD. TODAY, AUTOMATION AND AI ARE HAVING A PROFOUND IMPACT ON HEALTHCARE PROCESSES AT ALL STAGES OF THE PATIENT PROCESS: SCHEDULING, CLINICAL ASSESSMENT, DIAGNOSIS, PRESCRIPTIONS, FOLLOW-UP CARE, AND BILLING.

BENEFITS OF HEALTHCARE AUTOMATION IN ADMINISTRATION HEALTHCARE LEADERS ALREADY KNOW THAT AUTOMATION WORKS. ACCORDING TO HEALTHCARE INDUSTRY RESEARCH ORGANIZATION CAQH, THE INDUSTRY HAS REDUCED ADMINISTRATIVE COSTS BY \$122 BILLION AS A RESULT OF AUTOMATION AND COULD SAVE AN ADDITIONAL \$16 BILLION BY FULLY AUTOMATING SOME COMMON TASKS. IMPLEMENTING AUTOMATION IN HEALTHCARE WILL LIKELY BE THE FIRST RESPONSIBILITY OF NEW HEALTHCARE ADMINISTRATORS AS THEY ARE TASKED WITH LOWERING COSTS, IMPROVING CARE QUALITY, AND USING DATA ANALYSIS TO SUPPORT DECISION-MAKING.

THE FOLLOWING ARE SOME OF THE ADMINISTRATIVE BENEFITS OF AUTOMATION IN HEALTHCARE:

## 1. PATIENT BILLING AND SCHEDULING

ROBOTIC PROCESS AUTOMATION (RPA) CAN HANDLE ADMINISTRATIVE TASKS AROUND THE CLOCK, ALLOWING STAFF TO FOCUS ON PRESSING TASKS THAT REQUIRE DECISION-MAKING AND LEADERSHIP SKILLS. CLAIMS, BILLING, AND SCHEDULING TASKS THAT CAN BE AUTOMATED CAN STREAMLINE PROCESSES, IMPROVE BILLING AND REVENUE, AND ENHANCE PATIENT MANAGEMENT. IN ADDITION, AUTOMATION CAN MANAGE PATIENT INTAKE AND SCHEDULING, ALL OF WHICH LEAVES STAFF FREE TO MAKE SURE PATIENTS GET THE CARE THEY NEED.

## 2. STAFF SUPPORT

THE COVID-19 PANDEMIC PUT A STRAIN ON HEALTHCARE FACILITIES AROUND THE GLOBE. PROVIDERS SOON SAW THE NEED TO PROTECT THEIR STAFF. THEY ESTABLISHED HOTLINES — AUTOMATED TRIAGE SCREENING TOOLS THAT LET PATIENTS SELF-TRIAGE AND TOOK THE WORK OFF OF NURSES AND STAFF. SOME HOSPITALS USED TRAINED AI TOOLS TO IDENTIFY PNEUMONIA IN COVID-19 PATIENTS. THESE AND OTHER USES OF AUTOMATION IN HEALTHCARE WERE DESIGNED TO SUPPORT STAFF AND HELP PREVENT BURNOUT.

## 3. EHRs

WHEN FORMER PRESIDENT BARACK OBAMA SIGNED THE AFFORDABLE CARE ACT INTO LAW IN 2010, IT MANDATED THE ADOPTION OF ELECTRONIC HEALTH RECORDS (EHRs). MORE THAN 10 YEARS LATER, EHRs HAVE PROVIDED HEALTHCARE LEADERS WITH A TREASURE TROVE OF ACTIONABLE DATA THAT IS IMPROVING CARE. AUTOMATED PROCESSES EXCEL AT MANAGING THE MASSIVE AMOUNT OF DATA IN EHRs. COLLECTING THE DATA IS JUST PART OF AUTOMATION IN HEALTHCARE, HOWEVER. HEALTHCARE PROFESSIONALS CAN USE PATIENT RECORDS TO TRAIN AI APPLICATIONS, UNDERSTAND PATIENT POPULATION DATA, CONDUCT PATIENT RESEARCH, AND IMPROVE CARE. IT SPECIALISTS MUST CLEAN THE DATA BEFORE IT CAN BE ANALYZED AND MADE USEFUL.

## 4. PATIENT COMMUNICATIONS

CHATBOTS ANSWER PATIENT QUESTIONS AND SCHEDULE APPOINTMENTS. USING NATURAL LANGUAGE PROCESSING (NLP) CAPABILITIES, AI CAN CONDUCT SURVEYS AND ANALYZE RESPONSES. AUTOMATION IN HEALTHCARE HELPS PROVIDERS MEET PATIENTS WHERE THEY ARE AND MAKE IT EASIER TO ACCESS CARE.



## 6. DASHBOARD ANALYTICS

ONE OF THE MAIN RESPONSIBILITIES OF HEALTH ADMINISTRATORS IS MEASURING AND IMPROVING OPERATIONAL EFFICIENCIES. HEALTHCARE DASHBOARDS ARE ONE OF THE MOST POWERFUL TOOLS FOR HEALTHCARE PROVIDERS TO VISUALIZE DATA TO UNDERSTAND THEIR KEY PERFORMANCE INDICATORS (KPIs) AND HELP GUIDE DECISION- MAKING. A HEALTHCARE DASHBOARD CAN ALLOW INSURERS TO UNDERSTAND CLAIMS DATA, PROVIDERS TO BETTER SEE CLINICAL DATA, AND HOSPITALS TO TRACK RESOURCE ALLOCATION. IMPROVING PATIENT OUTCOMES THROUGH AUTOMATION HEALTHCARE PROVIDERS ARE USING AUTOMATION IN HEALTHCARE TO MEET GOALS SUCH AS REDUCING MEDICAL ERRORS AND IMPROVING DIAGNOSTIC CAPABILITIES. THEY CAN ALSO USE IT TO HELP IMPROVE PATIENT COMPLIANCE. FOR EXAMPLE, RESEARCHERS AND TECHNOLOGY PROVIDERS HAVE TRAINED AI TO IDENTIFY COVID-19 SYMPTOMS AND SPOT CANCERS, NOT TO REPLACE CLINICIANS BUT TO HELP THEM DELIVER CARE.

## 7. REDUCED POTENTIAL FOR MEDICAL ERRORS

ACCORDING TO A STUDY PUBLISHED BY THE NATIONAL CENTER FOR BIOTECHNOLOGY INFORMATION, "ABOUT 400,000 HOSPITAL PATIENTS EXPERIENCE SOME TYPE OF PREVENTABLE HARM EACH YEAR," WITH THE COST OF MEDICAL ERRORS RANGING BETWEEN \$4 BILLION AND \$20 BILLION ANNUALLY. HEALTH TECHNOLOGY STARTUPS HAVE CREATED AI APPLICATIONS TO HELP PREVENT DEATHS BY ERROR; FOR INSTANCE, TECHNOLOGY CAN ANALYZE HER DATA TO FLAG UNUSUAL PRESCRIPTIONS.

## 8. AUGMENTED REALITY

AUGMENTED REALITY (AR) USES 3D MODELING AND VISUALIZATION TO SUPPORT DOCTORS IN DIAGNOSES, SURGERY, AND OTHER PROCEDURES. AR APPLICATIONS RUN ON TABLETS AND PHONES, MAKING THEM ACCESSIBLE TO ALL HEALTHCARE PROFESSIONALS.

## 9. ENHANCED CLINICAL DECISION SUPPORT AND DIAGNOSIS

ONE OF THE BIGGEST BENEFITS OF AUTOMATION IN HEALTHCARE IS THAT IT CAN ENHANCE CLINICAL DECISIONS AND SUPPORT EVIDENCE-BASED PRACTICE, WHICH COMBINES THE USE OF RESEARCH WITH CLINICAL PRACTICE TO IDENTIFY BEST PRACTICES IN DIAGNOSIS AND TREATMENT. AI THAT HAS BEEN TRAINED ON MASSIVE DATASETS CAN SPEED UP RESEARCH AND DIAGNOSES. DOCTORS USE AI TO SUPPORT THEIR TREATMENT DECISIONS, AUGMENTING RATHER THAN REPLACING THEIR EXPERTISE.

## 10. IOT

SMARTWATCHES, WEARABLE MEDICAL DEVICES, AND SMART THERMOMETERS ARE JUST SOME OF THE WAYS THAT PROVIDERS ARE DELIVERING HEALTHCARE OUTSIDE OF A CLINIC OR HOSPITAL. THESE DEVICES COLLECT DATA ON PULSE AND BLOOD PRESSURE, HEART ACTIVITY, AND TEMPERATURE TO IDENTIFY ILLNESS AND DISEASE CLUSTERS. USING AUTOMATION TO GATHER THIS DATA FOR ANALYSIS IS THE PROMISE OF THE INTERNET OF THINGS (IOT). AS WITH EHRs, HEALTHCARE LEADERS MUST BE AWARE OF THE DATA SECURITY CONCERNS SURROUNDING IOT.



**Jakaria Islam**  
**Student**

**Department of Electrical**  
**Engineering,**

# TOPIC OF THE YEAR

## Women empowerment and technology

**W**omen empowerment has been the most talked about topic in socio-economic and political environment for the last few decades. Debates, talk shows, seminars... there are innumerable happenings are taking places on daily basis to emphasis these two words: "WOMEN EMPOWERMENT". But it is high time now to understand that "Empowerment", is not a product of a revolution but of evolution. In this context a dialogue from the play "A Doll's House" composed by Henrik Ibsen can be recalled which represents the internal voice of a woman. When Helmer tells Nora—"First and foremost, you are a wife and mother." Nora replied—"That I don't believe any more.

Gender equality is one of the most contentious issues in the twenty-first century. Women deserve the same rights and opportunities as men, yet there are several obstacles that women encounter on a daily basis. Women's contributions in any sector have been as valuable as men's, yet their achievements are often overlooked or lost over time.

As we are all engineers over here, let's cultivate the field of our profession and discover those power ladies who have set examples for many of us. Let's take a look at the list of top 5 Indian women engineers who have conquered great heights in this supposed-to-be male dominated profession.



**Kalpana Chawla**

FIRST WOMAN OF INDIAN ORIGIN TO GO TO SPACE  
INDIAN-BORN AMERICAN ASTRONAUT AND  
MECHANICAL ENGINEER  
1962-2003



**PRIYA  
BALASUBRAMANIAM, VIC  
E PRESIDENT  
OF IPHONE  
OPERATIONS, APPLE**

Priya Balasubramaniam is an engineer with a background in mechanical engineering, supply chain management, marketing and software engineering. She is currently the vice president of Core Technologies Operations and iPhone Operations at Apple Inc. She has started working at Apple in 2001 and since then there has been no looking back for her as she has climbed the ladder in the international supply chain team where she handles manufacturing of Apple's iPhones.



She has proved to be influential on a global scale. For India, she's has played a prominent role in negotiating a new deal to manufacture Apple products.



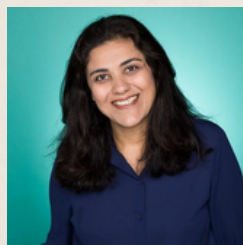
**NANDINI RAMANI, FORMER  
VICE PRESIDENT  
OF ENGINEERING, TWITTER**

Twitter's former vice president of engineering, Nandini Ramani has played a vital role in the organization's engineering processes. She also played a crucial role in Twitter's product strategy for emerging marketing in the world and more importantly in India as well. Nandini Ramani was involved in several other projects, with one of them being Twitter's Early Bird Camp internship program for high school students. Currently she is in the role of vice president in Amazon Web Services (AWS).



**ANJALI JOSHI, FORMER  
GOOGLE VICE  
PRESIDENT OF PRODUCT  
MANAGEMENT**

Former Google vice president of Product Management, Anjali Joshi, Electrical Engineer, has years of experience in Google and she is fiercely known for being an engineer who can handle any kind of problems in the organization. She has worked on Google's cloud and infrastructure and has handled news and finance as well. As a leader for the product and engineering team, she's responsible for several products that also includes search, image search, health search, maps, translation and localization. Currently she is the co-founder & CBO at Take Two Co.



**KOMAL MANGTANI,  
HEAD OF DATA  
INTELLIGENCE, UBER**

Komal Mangtani is the head of data intelligence at Uber. Her tech team provides the technology that helps the business to explore new market opportunities and also analyses the overall business performance. She focuses on developing engineering culture at a large scale by promoting technical innovation.



**APARNA RAMANI,  
DIRECTOR OF  
ENGINEERING,  
FACEBOOK**

Aparna Ramani works at Facebook as the director of Engineering, Realtime Data where her team helps in processing real-time data and analytics as they play a very important role in technology for Facebook's News feed. Internally, Aparna's team is also known to handle unprepared challenges very well. Isn't it amazing to find out these names who are just dominating the technical world at present? These super powered ladies are actually celebrating "Women Empowerment" in true sense! We are proud Indians as we observe our women are having a magnificent career in the field of Engineering and will continue to do so in coming days.



**Asmita Poddar  
ASSISTANT PROFESSOR  
Department of Electrical  
Engineering,**



Women empowerment and technology, as the technology has changed the way people a business functions, peoples thinking, behaving, communicating and working at different work places. Technology has been linked to change

We are living in a technological age; technology is helping women to advance their careers and contributions in their open source's community. Ogburn (1964) as a cultural theorist posits the social change as a product of technological changes. He suggested technology as the fundamental driver of social change, that comes through three staged process, invention, discovery and diffusion. The societal responses to different stages, however, temper its essential projection. The first stage is the addition of new knowledge to the existing base or it is a new way of seeing reality. The material reality remains same but its form changes, that is, people now see it for the first time. Ogburn's second stage is the process of accumulation as new technologies grow at a certain rate and pervade life. The third stage is diffusion, as the ideas transact from one culture to other and gets adopted from one area to another. The interface between cultures becomes the source of diffusion. Ogburn believes diffusion as the dominant force of social change that can have far-reaching effects on human relationships. He substantiated his argument by highlighting missionaries, who introduced steel axes to the aborigines of Australia. Such an outside adoption reformulated their whole social fabric. Before this, the men controlled the production of axes, using a special stone available only in a remote region and passing axe-making skills from one man to another. Women had to request permission to use the stone axe. When steel axes became common, women also possessed them, and the men lost both status and power.

Today, the concept of gender equality is circling the globe, with the basic idea that it is wrong to withhold rights on the basis of someone 's sex. This idea, though now taken for granted in a few parts of the world, is revolutionary. Like citizenship, it is destined to transform basic human relationships and entire societies. Furtherin relation to the three stages of social change, Ogburn coined the term cultural lag to refer to the cultural response to technological diffusion, that is, how non-material elements of culture respond to an invention or discovery. As the new technologies invade the social settings, the culture comes under strain to give response. In other words, we play catch-up with changing technology, adapting our customs and ways of life to meet its needs. The computer or mobile technologies offers a good example to understand social change. The proceeding sub-themes discuss how it (ICT) is changing our way of life.

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PUJA MALO  
STUDENT

DEPARTMENT OF ELECTRICAL  
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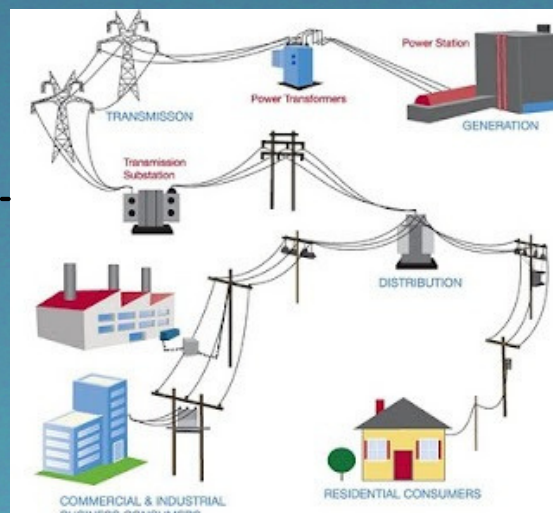




# NEW TECHNOLOGY FOR GRID LEVEL ELECTRICAL ENERGY STORAGE



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.

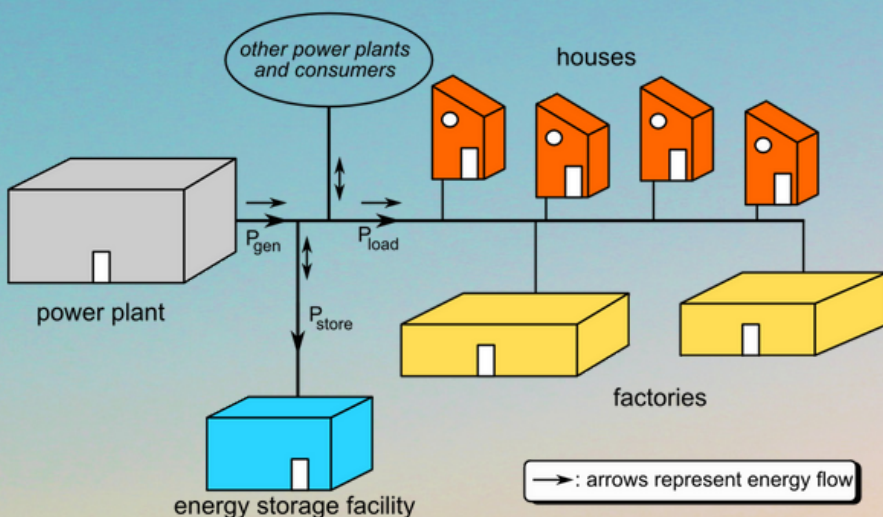


This technology is unique because it uses small carbon particles suspended in the electrolyte liquid to create slurry of particles that can carry an electric charge. Uncharged slurry is pumped from its tanks through a flow cell, where energy stored in the cell is then transferred to the carbon particles.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



DR. BIVAS ROY,  
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Department of Electrical  
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# DID TESLA REALLY INVENT ELECTRIC CAR?



'TESLA' is at the top of the news for making a modern electric car. Perhaps in the modern days, it is known to everybody. But it is not so popular that the car was named after Nikola Tesla, an electrical engineer and a genius inventor. While Tesla's star began to fade long ago, Tesla, Inc. (the car company) has contributed to something of a Nikola Tesla revival. Marc Seifer, the author of "Wizard: The Life and Times of Nikola Tesla" mentioned that it's a sociological fact that Elon Musk took the Tesla name and launched Nikola Tesla into the stratosphere. "Tesla's risen to the surface again, and now he's getting his due" - the author further added.

Now, who is Nikola Tesla? He was a giant of innovation because of his contributions in the fields of electricity, radio and robotics. In the age of Westinghouse, Edison, J. P. Morgan and Marconi, he invented, predicted or contributed to the development of hundreds of technologies that play big parts in our daily lives -- like remote control, wireless transmission, neon and fluorescent lights, laser beams, x-rays, robotics and, of course, the alternating current (A.C.) systems, the basis of our present-day electrical system. In 1931, Tesla was on the cover of Time magazine. But the cruelty of time, he died as a



Poor man in 1943 after years devoted to projects many of which did not receive adequate financing. Yet his most significant inventions resonate today. The man has certainly left so many marks on the world of modern technology — which is no doubt the reason that Elon Musk and others took inspiration from him when they were coming up with a name for the electric-vehicle startup Tesla Motors (which has now blown up to become a notable player in the car market).

But how much, exactly, did Nikola Tesla have to do with the development of the technology of electric cars? For sure, the AC induction motor was developed by him (at the same time as, and autonomously from, Galileo Ferraris, who also “invented” the same). But was there a lot more to it? Given some of the more fantastic stories out there (mostly originating in biographies of the man written long after his death). One of the most persistent of those stories is the one that puts onward the idea that Nikola Tesla created an electric vehicle (a Pierce-Arrow modified version) that could be powered wirelessly, and eliminated the need for a battery. Now, what is the truth? Nikola Tesla made an electric car? And he did it all without batteries?? Way back in 1931???

A version such stories about Tesla’s car is found in the book - Secrets of Cold War Technology - Project HAARP and Beyond, by Gerry Vassilatos. According to the story, Tesla had used a brushless AC electric motor and replaced the stock gasoline engine. The motor was described to have been rotating by a “cosmic energy power receiver” consisting of a box that was measuring about 25 inches long by 10 inches wide by 6 inches high. It was containing 12 radio vacuum tubes and connected to a 6-foot-long (1.8 m) antenna. The car was said to have been driven for about 50 miles at speeds of up to 90 mph during eight days. This same basic story comes up on many websites, some more



reputable and dependable than others, but all format of the stories remains the same. In such stories it was claimed that one person is said to be taken for the ride in the modified car was Peter Salvo (who claimed to be a nephew of Tesla), and the area of the ride was around Buffalo, New York.

Now let's do a fact check. Nikola Tesla’s actual grandnephew, William Terbo, has in the past commented that Nikola “did not have a nephew by the name of Peter Savo.” So, who is Peter Salvo? What is the “cosmic energy power receiver” that was used in the modified car?? We certainly have no answer.

Unfortunately, the story is sometimes referred to as the “Nikola Tesla electric car hoax”. There is no evidence (absolutely none at all) that such a car or technology ever existed in the past. So from where did this electric car story come from? And why is it so persistent? It is suspected that the story is so resilient for several reasons, first and foremost being that Tesla has an almost God-like status among many people, especially people inclined to be at best, more open-minded and imaginative, and at worst free-energy crazy.

Now let us discuss the fact of electric vehicles. If we look around the history of electric cars, the invention of the electric car is attributed to various inventors in the mid 19th century. An early type of electric motor created a small car model powered by the then-new type of engine was invented by In 1828, Ányos Jedlik, a Hungarian. In 1834 in Vermont, the first American DC electric motor was invented by Thomas Davenport. However, the most viable way to store electricity in the car through rechargeable batteries did not exist until 1840. The maximum speed of these earliest electric cars was, however, low due to technical limitations, - approximately 32 km/hour. At the turn of the century, 40% of American cars were powered by steam, 38% by electricity and 22% by petrol.

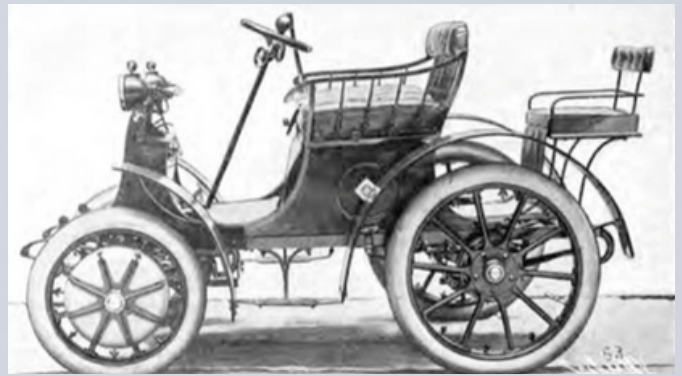


Most of the early electric cars were massive and with lavishly designed wagons with a luxurious interior full of expensive materials. The upper class of very rich customers stood out for owning such cars. The sale of electric cars had its peak in 1912. However, after success at the beginning of the century, electric cars began to lose their position in the car market. By the time the automobile industry entered the 1920s, cars that used IC engines overtook the electric car, the downfall of which was attributed to lack of horsepower battery charging time and distance covered on one charge. And hence, electric cars lost in the market demand and failed to be a viable commercial product. Although several years passed without public attention, in the seventies and eighties the energy crisis became the most discussed matter of concern which then led to renewed interest in electric cars.

Now, come to the present day, who is the founder of Tesla Car? Is it Elon Musk? The answer is a big NO. Contrary to popular belief, the company was founded in 2003 by two Silicon Valley engineers Martin Eberhard and Marc Tarpenny, who "wanted to prove that electric cars could be better than gasoline-powered cars." Elon Musk is the present CEO of that organization.

So in a conclusion, neither Nikola Tesla nor Elon Musk's Tesla (Tesla Motor Inc.) invented the electric car. So definitely a question arises why the globe is so mad about Tesla Motors?

Firstly, a technological breakthrough. Tesla's battery innovations have given it the efficiency in terms of range and cost that has allowed it to defy many of the issues that have plagued many other electric vehicles (EV). Other technological advancements like autopilot or advanced driver-assistance systems incorporating full self-drive systems, solar Roof or solar shingles have also made the vehicle unique.



Lohner-Porsche Electric Coupe, (Year 1899)



WOODS' VICTORIA HANSOM CAB (YEAR 1899)



GERMAN ELECTRIC CAR (YEAR 1904)



Second, business model, controlling the complete customer experience including purchase and servicing which is controlled through an app and its charging network, which is dominant in the US and Europe. Third, design breakthroughs that can be found in their minimalist but functional interiors, with a touch screen to control much of the car's features, and not much else; appealing to those who were attracted to the shift to minimalism, sophisticated and aesthetics products. Finally, process breakthroughs were created not just in terms of manufacturing (e.g. the world's largest casting machine ever made) but also in Tesla's relationship, or lack of relationship with car dealerships, instead favouring a direct distribution model which has reduced costs and complexity (e.g. the cars are built to order and immediately dispatched to buyers, reducing inventory costs).

So in a nutshell, Tesla Motors has innovated many things in their electric vehicles in terms of user experience, technological advancement and market strategy. After a rocky first few years, Tesla has secured a significant share of the EV market, reaching around 12% of global EV sales in 2020 to 14% in 2021 overtaking the Volkswagen Group which was second with a 12% market share in 2021. The company is also expanding its manufacturing facilities worldwide, as well as growing its supercharging station network. With the company finally in profit and expanding, will the company be successful in its grand ambitions? Only the future will tell.



TESLA ROADSTER



TESLA CYBER TRUCK



TESLA MODEL X

## REFERENCE:

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[medium.com](http://medium.com),  
[economictimes.indiatimes.com](http://economictimes.indiatimes.com)



**PRATIK SARKAR**  
**ASSISTANT PROFESSOR**  
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# NANO TECHNOLOGY





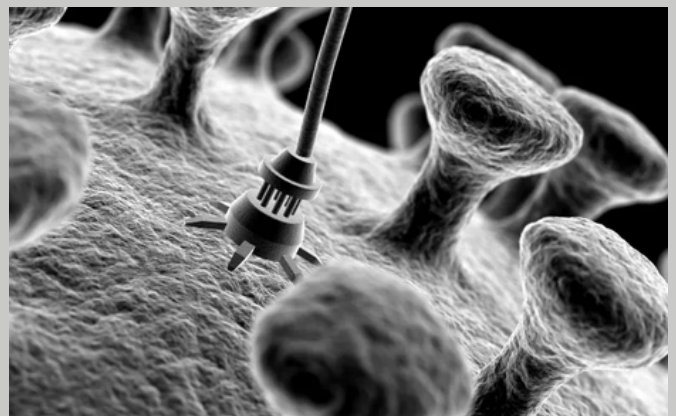
The word Nano means smallest partial which ranges to  $10^{-9}$ . Now in today world we are using nano products all these producers all basically prepared from nano materials such as nano carbons, nano composite structures etc.

This technology is alive due to the fact that many research and developments in laboratories all over the world is occurring. We are saying that we are all giving to use nonorthodox but some scientist say that it will happen in few years while some says that in many years the fact that nano technology is very much, useful in our life is its increasing demand.

We can define nanotechnology as a nonexistence which ranges between 1 to 100 nm. The size of human hair is about 80,000 nm in width. This concept can be collaborated with nanoparticles. But today the biggest problem is its definition more than the fact how to achieve and implement this technology. The scientists which all present their work worldwide has proposed a question that how to define this technology. 13 nations has replied on this and after that we come to the conclusion that a nanotechnology is nothing but the combinations of smallest individual particles ranges between 1-100 nm.

We use this technology i.e. Nano products which are prepared from nanoparticles. Today, the concept of gender equality is circling the globe, with the basic idea that it is wrong to withhold rights on the basis of someone's sex. This idea, though now taken for granted in a few parts of the world, is revolutionary. Like citizenship, it is destined to transform basic human relationships and entire societies.

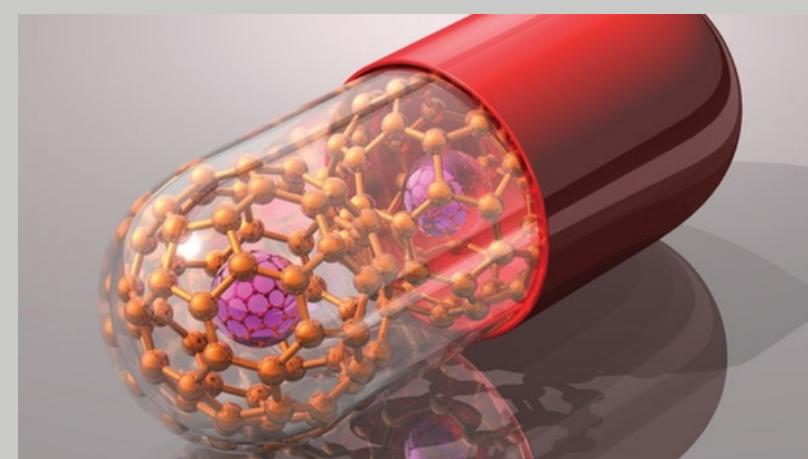
Further in relation to the three stages of social change, Ogburn coined the term cultural lag to refer to the cultural response to technological diffusion, that is, how non-material elements of culture respond to an invention or discovery. As the new technologies invade the social settings, the culture comes under strain to give response. In other words, we play catch-up with changing technology, adapting our customs and ways of life to meet its needs. The computer or mobile technologies offers a good example to understand social change. The proceeding sub-themes discuss how it (ICT) is changing our way of life.




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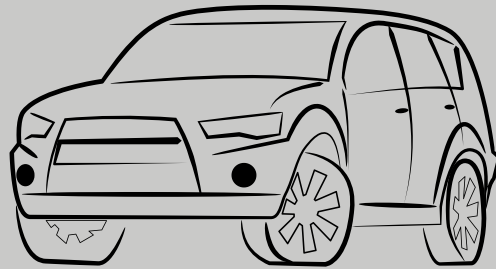
**Manikant Shukla**  
Student

**Department of Electrical  
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# BATTERY MANAGEMENT SYSTEM FOR

## ELECTRIC VEHICLE



**Battery management systems (BMS) are electronic control circuits that monitor and regulate the charging and discharge of batteries. The battery characteristics to be monitored include the detection of battery type, voltages, temperature, capacity, state of charge, power consumption, remaining operating time, charging cycles, and some more characteristics.**

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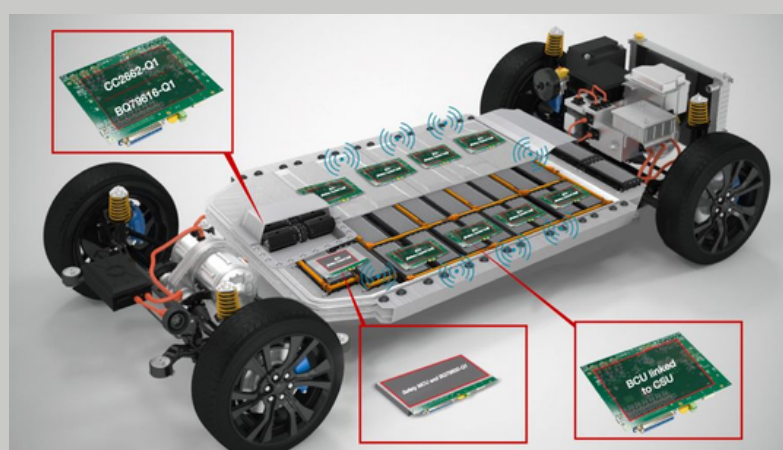
Nowadays, electric vehicles (EVs) are already the accepted solution to reduce pollution and consumption of fossil fuel. The development of electric vehicles was possibly based on battery management systems. The most important part of an electric vehicle is battery management systems and the main component of this system is battery.

For an electric vehicle, battery is the main component, it has the highest cost, biggest weight and volume in the vehicle. Lithium-ion batteries proved to be the best solution for energy storage element in EV applications, because they have high energy density and high specific power. But, the disadvantage of Li-ion batteries is that they need a battery management system to assure the monitoring and protection of the battery, to assure operation in the safe area. Beside protection, for battery packs with many cells, the battery management systems must provide cell balancing, to prolong the life of the battery pack.

EV battery systems are composed of a number of individual cells with a terminal voltage ranging from 1.2V to 4V depending on the specific battery technology. For an EV application, these cells are required to be connected in a series configuration in order to obtain a higher terminal voltage. For optimum performance, each cell should ideally operate at full capacity. In practice, this is does not always occur due to mismatch in the series string. The battery system performance is degraded relative to the weakest cell. Further more, the weakest cell is then subjected to operation abuse by the rest of the batteries. As such, series connected battery packs in EVs require battery monitoring and management systems capable of measuring the voltages of individual battery modules in order to prevent damage and also to identify defective cells.

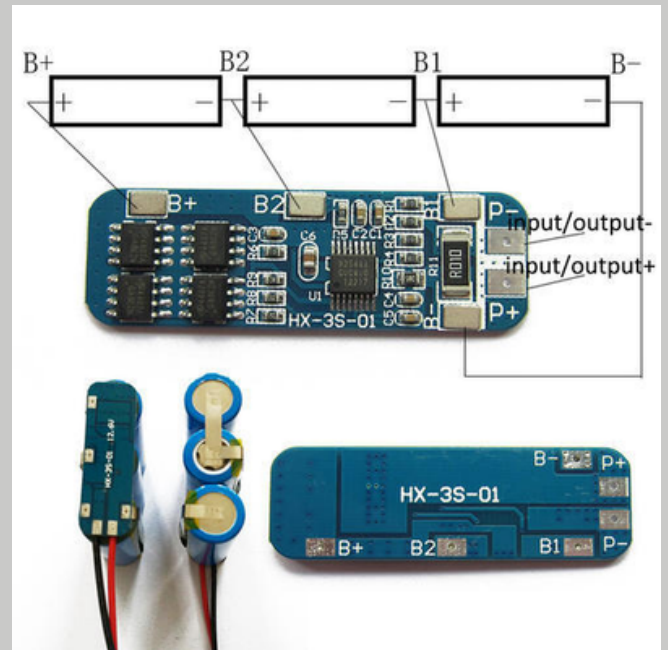
Excessively high or low voltages can damage virtually all types of batteries, and in some cases the results can be catastrophic. Lithium-ion cells, for example, will ignite if they are over charged, which occurs due to a high voltage across the cell. For all battery systems, the weakest cell in the series configuration causes an over-discharge imbalance problem while the strongest cell could cause an over-charge problem. Once high or low voltage cells have been identified, some equalization process also must be used to re-balance the voltages. Imbalances are especially prevalent in EVs since the batteries are frequently subjected to charge and discharge cycles.

The terminal voltages and charging currents of 8 Li-Ion battery modules during an experimental charging process are shown in Fig1. Each battery module consists of 4 Li-Ion cells, creating 16 cells in each series string and 32 cells in total. Each cell requires constant monitoring via a battery management system (BMS). From the experimental value we can get an idea about which battery exhibits a rapid voltage rise compared to the battery modules. The higher voltage of battery results in a decrease in charging current to its parallel branch. The BMS detects this and shuts down the charging process to allow the cells to enter a charge equalization process. Once the BMS detects that the voltage variations between the cells are within the pre-programmed range, the charging process is then continued. he process of allowing the cells to equalize for a given time and then re-establishing the charging current occurs towards the end of the charging process when the batteries are almost at their maximum SoC (State of Charge). It is for this reason that the time required to fully charge(100%) the batteries is longer than the time taken to charge the batteries to nearly maximum SoC (~90%).

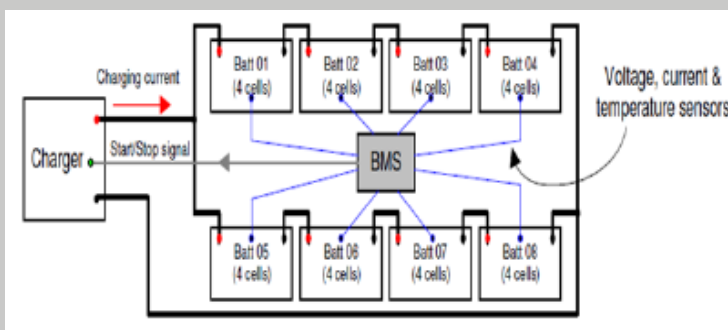
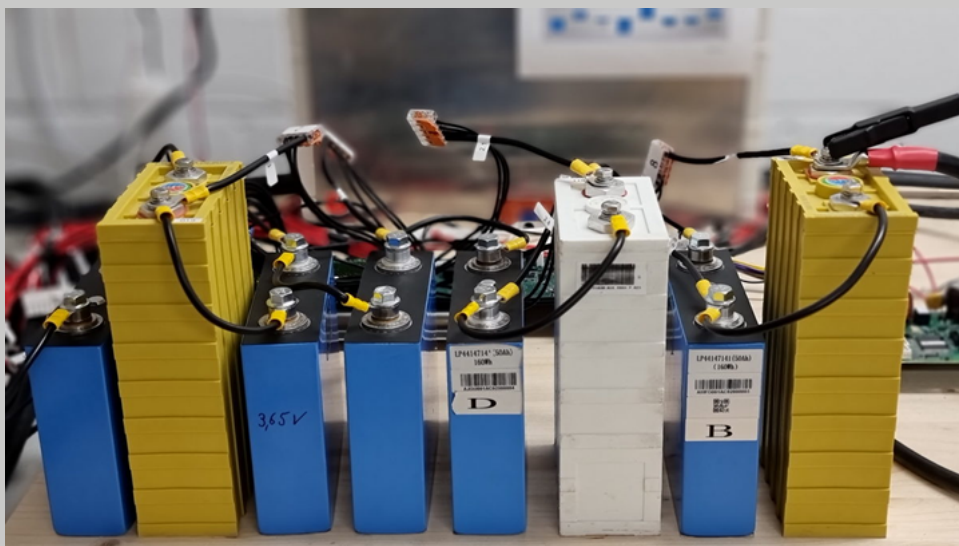


Source: TI Unveils Wireless Battery Management System

Following this, a valid point to consider when designing a power and energy management scheme, is that at high SoC, the battery system will be less receptive to high current bursts that occur during regenerative braking events. Although in sensitive battery systems such as Li-Ion, an independent BMS would be a safeguard of the batteries from such an event by means of disconnecting the battery system from the load, factoring this situation as one of the battery operating constraints in a power and energy management system is advantageous. To the power and energy management system, the operating conditions of the battery is not only limited by the battery itself but also by the operating conditions specified by the BMS.



BMS 3S 10A 12V 18650 Lithium Battery Charger Board Protection Module (Li-po)



LI-ION BATTERY MODULES CONNECTED TO A BMS AND CHARGING SYSTEM

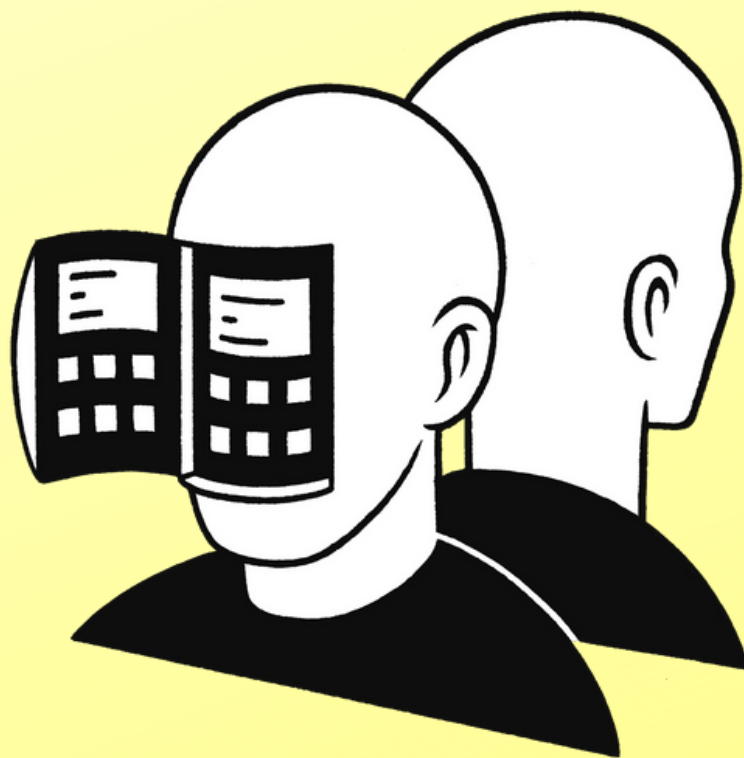


SUROJIT SARKAR,  
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Dream Institute of Technology



# HUMANS AND TECHNOLOGY

A look at how technologies from AR/VR, brain-computer interfaces, and chip implants to health trackers, biometrics and social media are changing the most basic aspects of human life—work, friendship, love, aging, sickness, parenting, learning, and building community.



WHAT MATTERS IN HUMANS  
AND TECHNOLOGY RIGHT  
NOW?

## AR

Augmented reality headsets from companies like Magic Leap and Google Glass have promised to change how we interact with the world. But when will AR really take off?

## BIOHACKING

Biohacking or body hacking is the practice of putting RFID chip implants, sensors, magnets, and other tech implants under the skin. Meet the people who want to become cyborgs.



## **EVERY TIME YOU ATTEND A VIRTUAL MEETING OR EMAIL A COLLEAGUE, YOU'RE USING TECHNOLOGY THAT RUNS ON COMPUTER CHIPS.**

**But semiconductor technology does a lot more than keeping the world connected: It plays a vital role in enabling solutions to many of society's challenges, including climate change, health care, and transportation.**

**Given the importance of semiconductors to our digital society, innovation in the field is essential, said Stanford electrical engineer H.S. Philip Wong at a recent media briefing on the future of semiconductor technology held by the U.S. Department of State's Foreign Press Centers. The key, he said, will be investing in both semiconductor research and development (R&D) and manufacturing so that it's possible to shorten the distance between innovations discovered in university labs and the creation of new semiconductor products. Congress, he noted, should pass the federal CHIPS Act, a bill that would establish funding and incentives to support both semiconductor R&D and manufacturing, because manufacturing and R&D go hand in hand.**

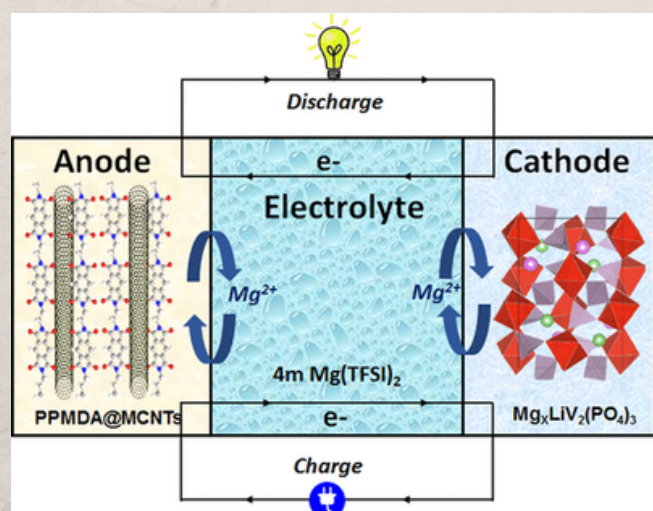
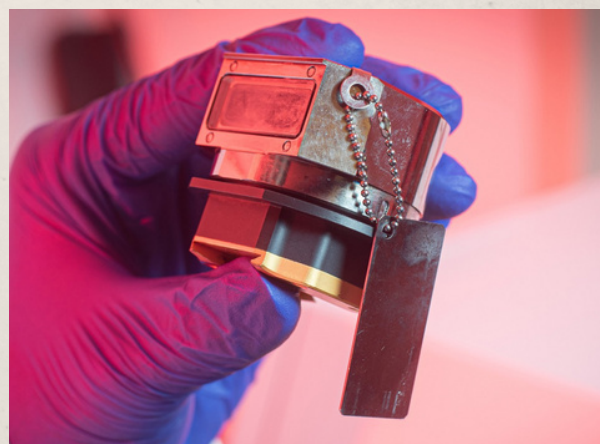
**"R&D without manufacturing is akin to building a bridge to nowhere," said Wong, the Willard R. and Inez Kerr Bell Professor in the School of Engineering.**

SOURCE - STANFORD



# DISCOVERIES HIGHLIGHT NEW POSSIBILITIES FOR MAGNESIUM BATTERIES

Magnesium batteries have long been considered a potentially safer and less expensive alternative to lithium-ion batteries, but previous versions have been severely limited in the power they delivered. Researchers from the University of Houston and the Toyota Research Institute of North America (TRINA)



Schematic of the proposed AMIB components

reported in Nature Energy that they have developed a new cathode and electrolyte - previously the limiting factors for a high-energy magnesium battery - to demonstrate a magnesium battery capable of operating at room temperature and delivering a power density comparable to that offered by lithium-ion batteries.

Dr. Yan Yao, Cullen Professor of Electrical and Computer Engineering at the University of Houston and co-corresponding author for the paper, said the groundbreaking results came from combining both an organic quinone cathode and a new tailored boron cluster-based electrolyte solution.

## Towards New Cathode Materials for Magnesium Secondary Batteries

Magnesium (Mg) rechargeable batteries are promising candidates to replace lithium-ion batteries, but require a better cathode material

**X-ray diffraction and STEM measurements**

- Confirmation of spinel structure and uniform chemical composition

STEM: scanning transmission electron microscopy

**Comprehensive analysis of spinel type cathode-materials with formula  $Mg_{1.33}V_{1.67-x}Mn_xO_4$**

**Charge/discharge cycle tests**

- $Mg_{1.33}V_{1.57}Mn_{0.1}O_4$  exhibited highest capacity at the 13<sup>th</sup> cycle (90 °C)

**Local structural and spectral analysis using quantum beam**

- $Mg_{1.33}V_{1.57}Mn_{0.1}O_4$  has the lowest lattice distortion
- V undergoes changes in oxidation state during charge/discharge

**The superior charge/discharge properties of  $Mg_{1.33}V_{1.57}Mn_{0.1}O_4$  may be explained by:**

- The stable crystal structure
- Charge compensation by V

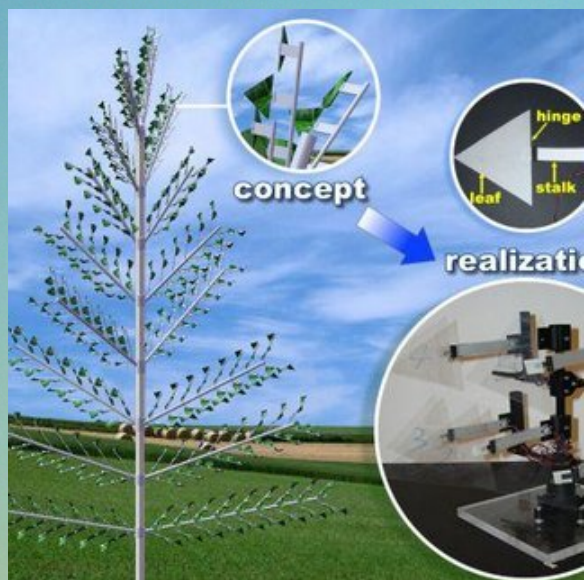
**These findings could open doors to high-performance cathode materials based on the MgV system for next-generation Mg rechargeable batteries**

東京理科大学  
TOKYO UNIVERSITY OF SCIENCE

Electrochemical properties and crystal and electronic structure changes during charge/discharge of spinel type cathode-materials  $Mg_{1.33}V_{1.67-x}Mn_xO_4$  for magnesium secondary batteries  
Idemoto et al. (2023) | Journal of Electroanalytical Chemistry | DOI: 10.1016/j.jelechem.2022.117064



# PRODUCTION OF ELECTRICITY FROM THE ARTIFICIAL NANO TREES



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 thermophotovoltaic 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.

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 non material'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.



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Department of Electrical  
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# VEGA WATT

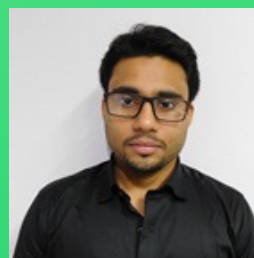
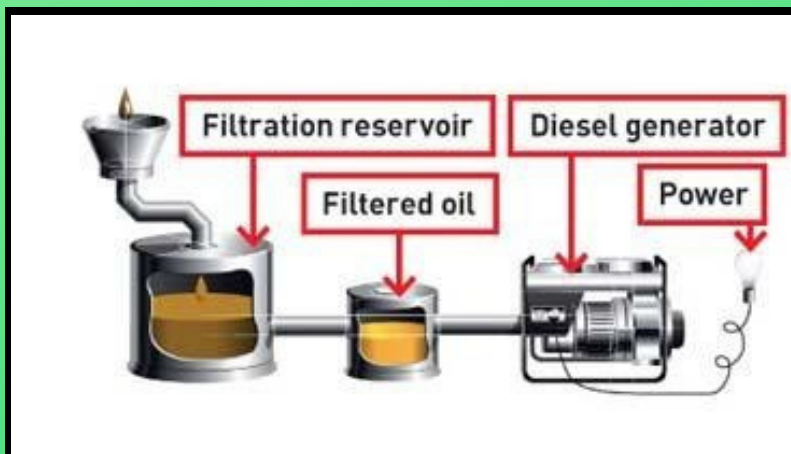
Transforming waste vegetable oils into electricity and heat. Restaurant owners often grapple with what to do with waste oil generated from deep fat fryers. Each year more than 11 billion liters (2.9 billion U.S. gallons) of waste vegetable oil is produced by restaurants, food processing plants and fast 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 food service 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.

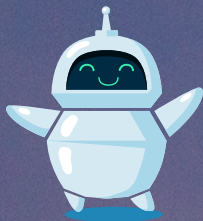


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ENGINEERING,



# METAMORPHIC ROBOT



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.



Metamorphic quadruped robot

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.



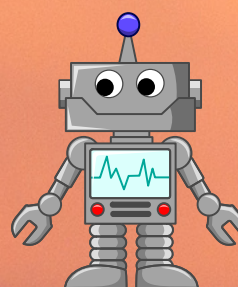
What separates metamorphic systems from other reconfigurable robots is that they possess all of the following properties:

- (1) self-reconfigurability without outside help;
- (2) a large number of homogeneous modules;
- (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



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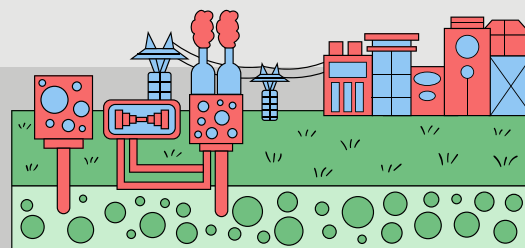


DEPARTMENT OF  
ELECTRICAL  
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# FLY-ASH UTILIZATION

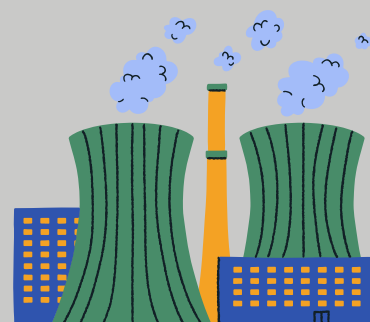
Fly ash, also known as flue-ash, is one of the residues generated in combustion, and comprises the fine particles that rise with the flue gases. Ash which does not rise is termed bottom ash. In an industrial context, fly ash usually refers to ash produced during combustion of coal. Fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys of coal-fired power plants, and together with bottom ash removed from the bottom of the furnace is in this case jointly known as coal ash. Depending upon the source and makeup of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicon dioxide ( $\text{SiO}_2$ ) (both amorphous and crystalline) and calcium oxide ( $\text{CaO}$ ), both being endemic ingredients in many coal-bearing rock strata. Toxic constituents depend upon the specific coal bed makeup, but may include one or more of the following elements or substances in quantities from trace amounts to several percent: arsenic, beryllium, boron, cadmium, chromium, hexavalent chromium, cobalt, lead, manganese, mercury, molybdenum, selenium, strontium, thallium, and vanadium, along with dioxins and PAH compounds.



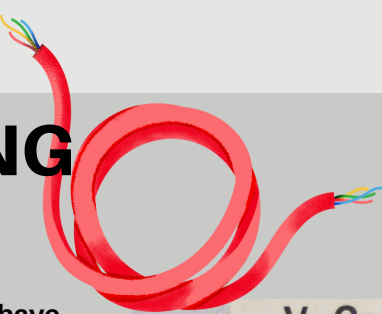
the fly ash may contain higher levels of contaminants than the bottom ash and mixing the fly and bottom ash together brings the proportional levels of contaminants within the range to qualify as non hazardous waste in a given state, whereas, unmixed, the fly ash would be within the range to qualify as hazardous waste. Heavy Water Board had initiated efforts to achieve full utilization of its fly ash being generated in the captive thermal power plant for its Heavy Water Plant at Manuguru. In this plant, there are 3 steam generators and 3 turbo generators each of 30 MW capacity. These units generate 600-900 tonnes of coal ash every day depending upon the ash content, which varies from 30-45%. As per the current practice, fly ash generated from coal-based power plants is disposed off in ash ponds in the form of wet slurries.



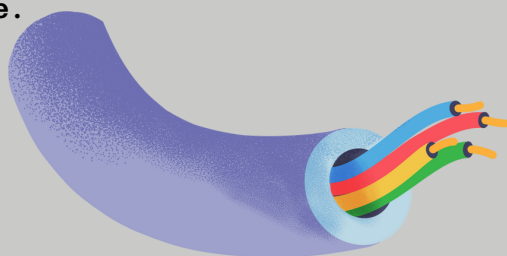
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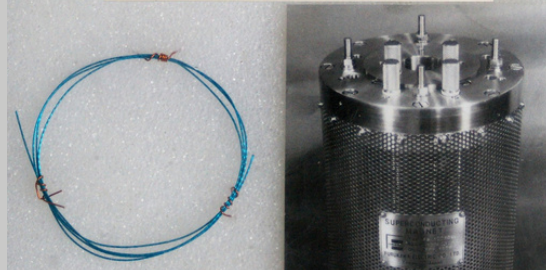
# SUPERCONDUCTING POWER CABLES



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 .



V<sub>3</sub> Ga compound superconducting wire



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.

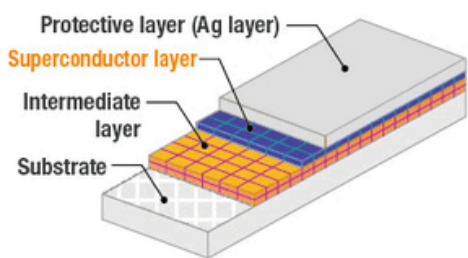
275kV HTS power cable

66kV HTS power cable

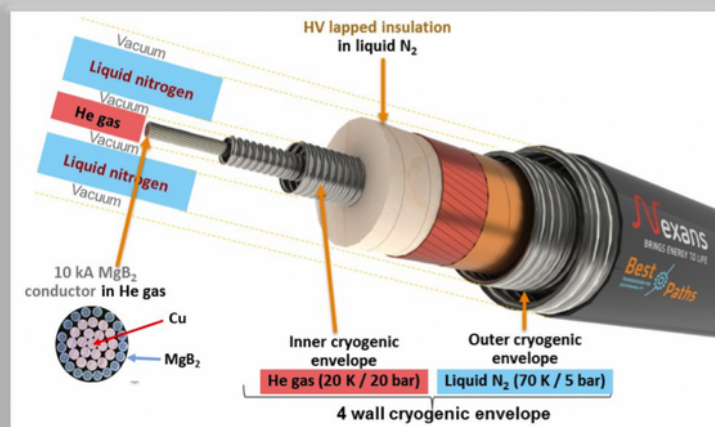


### YBCO tape

YBCO is a crystalline chemical compound with the formula YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7</sub>. This material, a renowned "high-temperature superconductor," achieved prominence because it was the first material to achieve superconductivity above the boiling point of nitrogen.

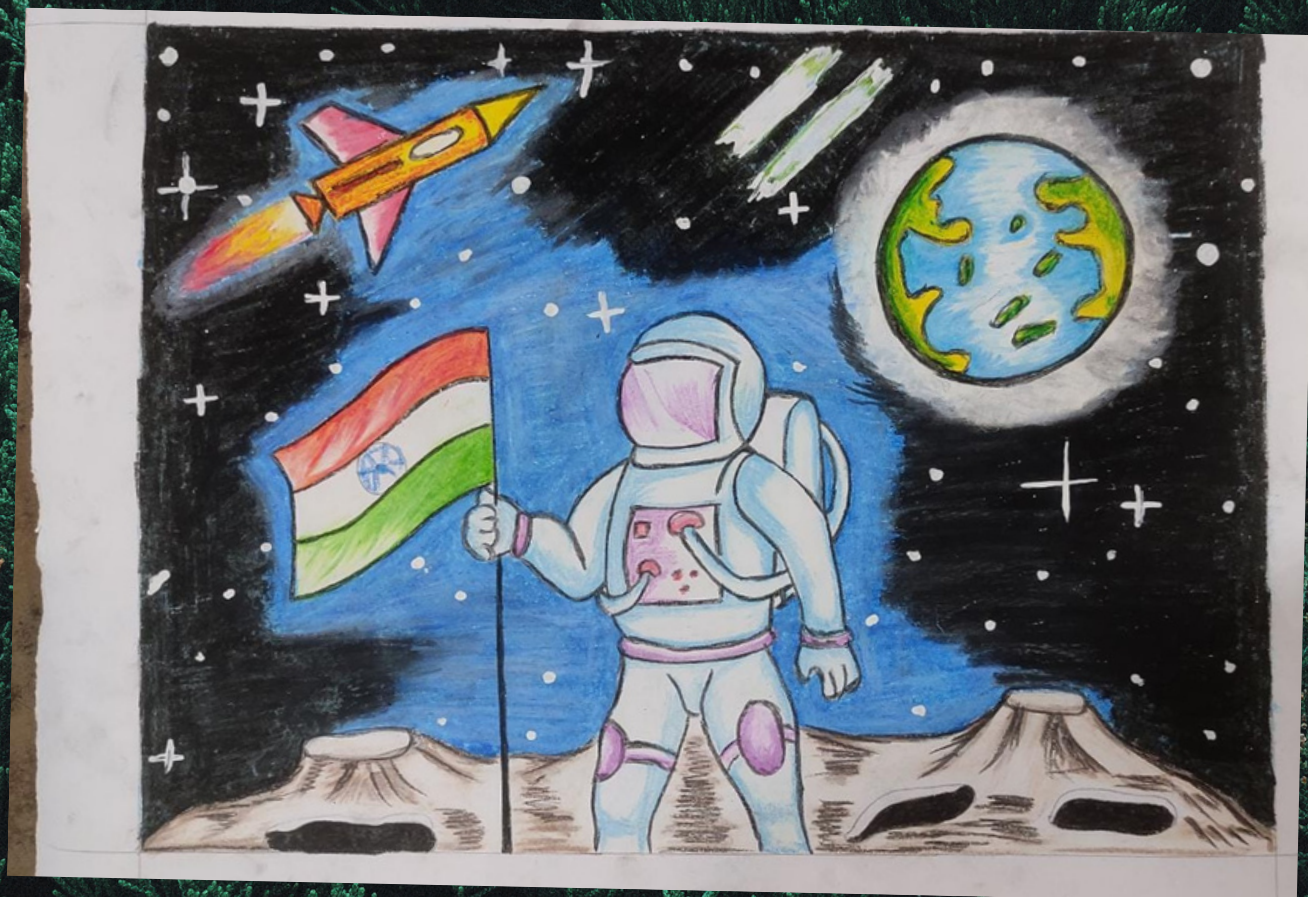


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# SAPCE 4 WOMEN



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# PROJECT BOARD



## AUTOMATIC GARDENING SYSTEM

In the modern era, socio economic challenges in many respects multiplying day by day are creating adverse effect in our livelihood. Anxiety, loneliness, less dedication, less concentration has become a questionable issue for the urban employees. Healthy hobbies like gardening might be a good solution for mental peace which can mitigate some of the mentioned issues to some extent. But, long working hours, nuclear families, frequent travelling are always scheduled in the busy routine of most urban employees which does not allow having plantation or gardening as a hobby. Addressing the need, we have proposed a low cost, compact smart gardening system. All the basic essential requirements like watering, Sunlight, fertilization of a plant will be fulfilled by our smart and compact gardening system. The users no need to worry about the watering or fertilization of the plants and no need to keep the plant outside for sunlight mandatorily. A sensor based microcontroller system will monitor the level of lights, moisture level of the soils round the clock and will act accordingly as required. By using this kind of product a user should remain tension free about their plants and plantation or gardening can be converted as a tension free hobby.



## AUTOMATIC POT STIRRER



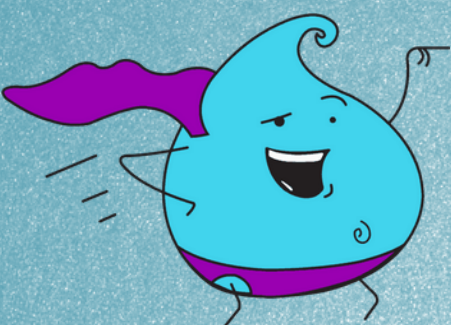
This is an innovative prototype addressing a specific need. During the making of sweets like kheer and jaggery, soups and stocks, etc. a majority of the time is spent by the worker in continuous stirring of the mixture to prevent it from burning. In order to ease the workers we are presenting our idea of an automatic pot stirrer which will continuously stir the pot, based on the temperature of the mixture inside.





# PROJECT BOARD

## HYDRATOR



Everyone need warm water for much reason. During journey in the trains buses, camping, parents with kids, person with medical patients travelling to different cities for treatment. Some loved to drink tea or coffee in long journey. Presently to carry warm water or tea/coffee, most used product is thermo flask. But after some time, temperature of the warm water or tea will decrease. Here comes the concept of Hydrator which is standalone liquid warmer without external power plug during the operation but with rechargeable battery.

Drinking enough water is very important for everyone. But everyday I end up drinking less water than how much I should. I know there are people like me who need to be reminded to drink water. If you're one of us, then this project will change your life (probably).

Meet the Hydrator! This device will motivate you to drink water. How? It works like a game. You'll have to keep your water bottle on top of it. Every hour, the ring around the base lights up. The light remains on until you pick up the bottle, drink water and place it back. After which, the light turns off until the next hour.

But what's so motivating in that? Well it is in the light ring. The light is blue in the beginning. Every time you miss drinking water, the color of the light slightly shifts towards red. The more number of times you miss your reminder, the more red it becomes. Basically it goes from blue to violet and eventually to complete red. Your goal is to keep the color of the light as close to blue as possible by the end of the day.







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# INDUSTRY 5.0

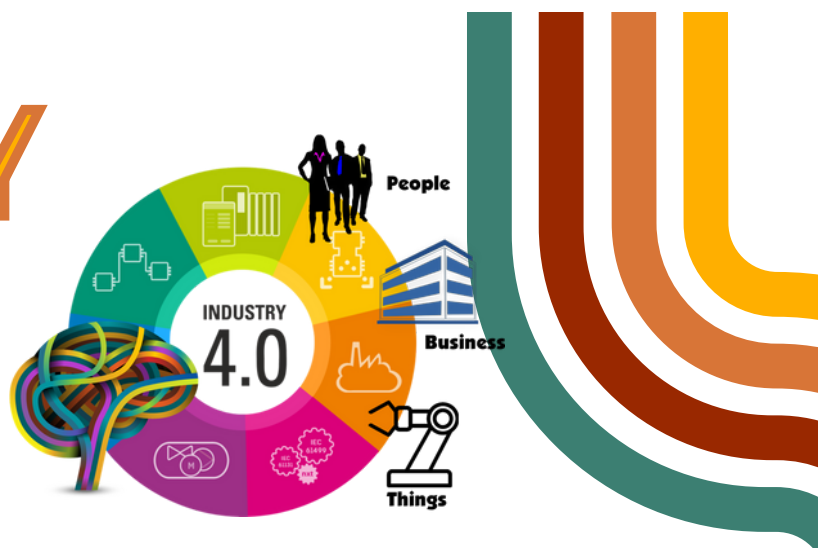
Industry 4.0 and Industry 5.0 represent two different stages of the industrial revolution, each with its own unique characteristics and focus. While both seek to improve manufacturing efficiency, there are several key differences between Industry 4.0 and Industry 5.0.

Industry 4.0 is focused on the integration of advanced technologies such as artificial intelligence, the Internet of Things (IoT), and robotics into the manufacturing process. This has led to the development of "smart factories" that can optimize production, reduce waste, and improve quality through the use of data and automation.

Industry 4.0 is characterized by the digitization of manufacturing processes, with a focus on optimizing and automating workflows. This has enabled manufacturers to produce goods more efficiently and with greater precision, while also reducing costs and improving customer satisfaction.

Industry 5.0, on the other hand, is focused on the integration of advanced technologies with the unique capabilities of humans. It seeks to create a more human-centered approach to manufacturing, where workers are empowered to collaborate with machines to achieve optimal results.

Industry 5.0 seeks to integrate the latest advancements in technology with the unique abilities of humans to improve productivity, efficiency, and innovation. It places a greater emphasis on the human element of manufacturing and seeks to take these advancements to the next level by placing a greater emphasis on the human element of manufacturing.



Industry 5.0 seeks to create a more sustainable and environmentally friendly approach to manufacturing by promoting circular economy principles, creating products that are tailored to the specific needs and preferences of individual customers, and developing a skilled workforce that is capable of working alongside advanced technologies.

In conclusion, while Industry 4.0 and Industry 5.0 both seek to improve manufacturing efficiency, Industry 4.0 is focused on the integration of advanced technologies into the manufacturing process, while Industry 5.0 seeks to create a more human-centered approach to manufacturing by integrating advanced technologies with the unique capabilities of humans.



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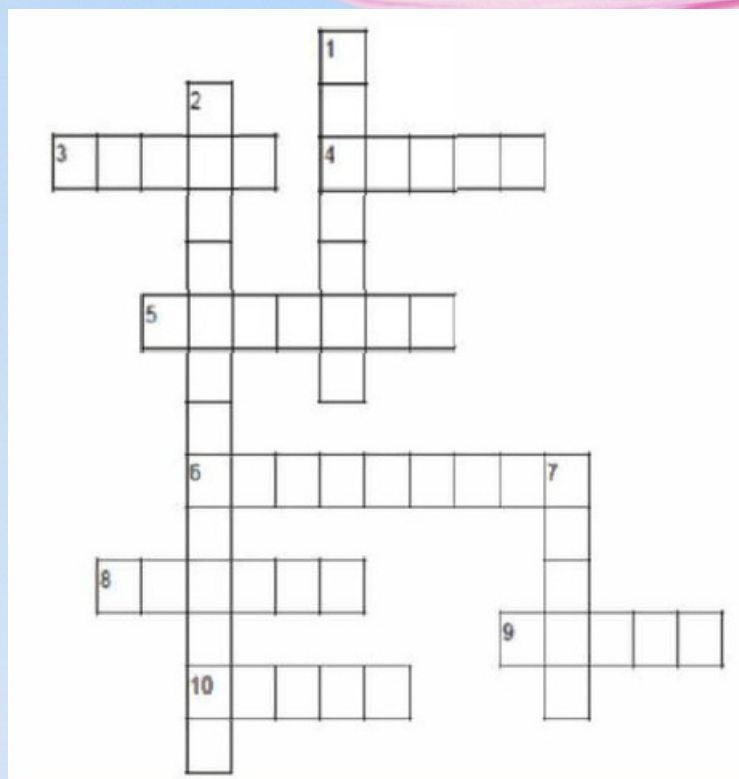


# CROSSWORD PUZZLES

## 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
7. When an object becomes magnetized and exerts magnetic force it's called a ----
8. The earth has a North and \_\_\_ pole
9. The \_\_\_ is a giant magnet
1. He invented the first electric motor (Last Name)
2. \_\_\_ Is a magnet that work with electricity and can be switched on or off





# 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?

- 
- 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) Carpet



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## **ABOUT THE DEPARTMENT**

Electrical Engineering Department of the Dream Institute of Technology was established in the year 2006 for imparting state-of-the-art engineering education to prepare aspiring electrical engineers. It took a pioneering role in establishing the undergraduate program in Electrical Engineering. This Department has been actively engaged in teaching and research in the field of Electrical Engineering.

The Department of Electrical Engineering College in Kolkata at Dream Institute of Technology has a team of experienced Assistant Professor members to equip new age engineers with latest best practices. The academic team works like a team to inculcate the right mix of competencies among students.

From the inception, Department of Electrical Engineering has grown steadily through research, innovation and dedication. The present intake for the B.Tech in Electrical Engineering programme is 120 students. The Department also offers a PG programme in Power Electronics with an intake of 18.

Students who graduated from the Department of Electrical Engineering are well doing well both in the industry and academic fields in India and abroad. Students of Electrical Engineering Department have bagged many prestigious award on several occasions. The state-of-the-art laboratories help students to acquire experiential insights about the subject in the areas of Real-time Electrical Machine, Power System, Circuit Theory, and Power Electronics among many others to ensure students are able to excel in this field.

**Editors:**

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