YASHODA SHIKSHAN PRASARAK MANDAL, SATARA
YASHODA TECHNICAL CAMPUS
DEPARTMENT OF ELECTRICAL ENGINEERING

ELECTRICAL MIRROR

January 2024

....AN TECHNICAL MAGAZINE

Department of Electrical Engineering

YASHODA SHIKSHAN PRASARAK MANDAL, SATARA
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TODAY'S READER CAN BE A TOMORROW'S LEADER !

PRESIDENT'S DESK

I welcome you to YSPM's Yashoda Technical Campus, Satara, an Institution which inculcates true values while disseminating quality education for shaping the career of our students. All our institutes are approved by the concerned statutory bodies and fulfill all the norms and standards laid down by them. Our technical campus is located in a lush, green, pollution free, picturesque environment. Our institutes have well qualified, experienced and student caring faculty, well equipped laboratories, spacious lecture halls and tutorial rooms, well maintained rich library, e-library, Wi-Fi Campus, Computer with Internet Facility, and a play ground with sports facilities. We emphasize on overall personality development of our students. Our faculty pays attention to each students a platform to excel not only in academics but also in co-curricular and a multi disciplinary study culture. Amenities provided by our institutes include transport facility, hostel facility, reprographics facility, canteen, STD PCO, medical centre, sports centre etc.

We are committed to import value based quality education along with development of positive attitude, skills and abilities to apply knowledge in order to meet the challenges of future. I extend my best wishes for your bright and prosperous future.

Prof. Dasharath Sagare
Founder President
YSPM - YSS, Satara

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PRINCIPAL'S MESSAGE

GREETINGS TO ALL!

I am really honored and feel very privileged to function as the Principal of Yashoda Technical Campus (YTC), Satara. Let me take this opportunity to thank the Management, Yashoda Shikshan Prasarak Mandal (YSPM), Satara for giving me an opportunity to serve the community here in YSPM family.

We believe that the existence, growth, survival and future of every Educational Institute will long lasting only if that Institute make and keep the students & parents and all the stakeholders of the Institute feel very happy and satisfied. The students & parents will be happy only if they get their expectations and dreams are fulfilled for which the student has taken an admission in the Institute. This can be achieved only if every entity in an Institute works with Academic Excellence, Research Excellence and Training & Placement Excellence, along with Overall Development of the Student to Serve the Society thereby exceling and ensuring EXCELLENCE IN TECHNICAL EDUCATION with OUTCOME BASED EDUCATION. Our Institute Growth lies in Institute Motto that is "PARENTS AND STUDENTS DREAMS ARE OUR INSTITUTE MISSIONS". Therefore I appeal everyone to join together in achieving the aim "A HAPPY STUDENT, A HAPPY PARENT, AND A HAPPY & MOST PREFERABLE INSTITUTE.

Dr. P. R. Badadapure
Principal, YSPM, Satara
PhD (ECE)
MIEEE LMISTE, IAENG, IFERP, ICSES

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HOD'S MESSAGE

Welcome to the Department of Electrical Engineering. The Department has been immensely active and professionally productive since its inception in 2011. Presently, the department has U.G. Program with more than 100 undergraduate students.

Since the commencement of the program, the department has made sincere efforts in the development of students through effective teaching – learning processes, training and industrial visits. Eight (8) batches of Electrical Engineering have been passed out from the institute. The students graduated from our department have been securing good placements in Private and Public sectors.

The Department is having mixture of well experienced and young, enthusiastic faculty members. The Laboratories are well equipped with Latest Experimental and Computational Facilities. Industry Interaction has been increased with industry-sponsored projects. Industries also offer the vocational training to our students. The department organizes Guest Lectures, Faculty Development Programs, Workshops and Seminars in various specialized field which offers an opportunity to meet eminent speakers and exchange ideas. The faculty frequently publishes and presents their research work in reputed national/ international Journals and Conferences. Apart from the curriculum, students from our department have won prizes by participating in Local, State and National level competitions.

I am pleased to release 2023-24 first edition of technical magazine. The magazine will help you to update recent trends in electrical engineering. We are growing and our mission to improve the quality and utility of Teaching-learning mechanism.

Prof. Dr. N. N. Jamadar
HOD, Faculty of Electrical Engineering,Yashoda Technical Campus, Satara

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Overview of Department

Welcome to the Department of Electrical Engineering at YSPM's Yashoda Technical Campus, Satara. The department has been immensely active and professionally productive since its inception in 2011. The department offers 4 years Bachelor of Technology in Electrical Engineering.. The department undergoes several curricular and extra-curricular activities throughout the year. The department is having mixture of well experienced and young, enthusiastic faculty members who are involved in industry institute interaction besides their day to day teaching activities. The Electrical Engineering department has been established at Yashoda Technical Campus, Satara, in the academic year 2011–12 and offers Bachelor of Technology Degree. The Department of Electrical Engineering at Yashoda Technical Campus (YTC) delivers latest knowledge in Electrical Engineering along with the Computational Facilities including MATLAB, Mi- Power, and Turbo C+ programming Software. It prepares students for careers in industry, academia, and also create young entrepreneurs.

Strength of Department

- Well Qualified, Experienced staff.
- Well-Equipped laboratories.
- World class infrastructure.
- Excellent academic performance.
- E-Library, E-Books, Departmental Library facility for students.
- Girls and boys hostel with all facilities.
- College bus facility for students and staff.
- Wi-Fi, Computers, Software Facility.

Vision of the Department

To emerge as a center of excellence in Electrical Engineering education producing knowledgeable, employable, and ethical engineering graduates to serve industry/society.

Mission of the Department

We, at Department of Electrical Engineering, are committed to achieve our vision by-

M1: Preparing technically and professionally competent engineers by imparting quality education through effective teaching learning methodologies.

M2: Developing professional skills and right attitude among students that will help them to succeed and progress in their personal and professional career.

M3: Inculcating moral and ethical values in students with concern to society and environment.

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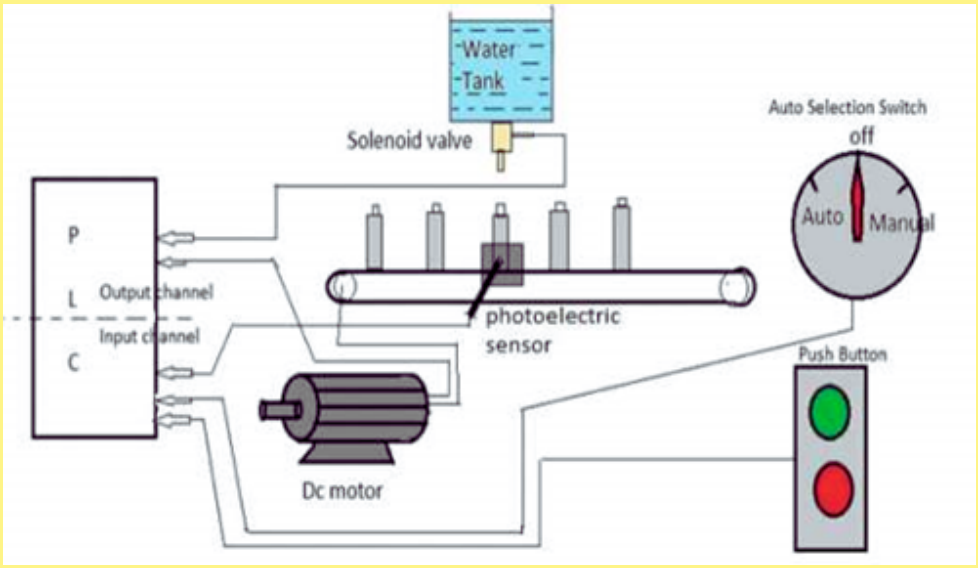
PLC Based Automatic Bottle Filling system



A bottle filling system with PLC allows the user-defined selection volume in percentage which uses the ladder language. Ladder logic is used to control the process. The filling operation is based on the user-defined volume through which the user can choose the volume of liquid to be filled.

The Auto-Fill can be set up to release one or more bottles into the filling area, depending on how many nozzles your filling machine has. As the bottles are released into the filling area, a sensor sees the bottles and will automatically begin the filling process by actuating the filling machine. The count sensor will then send signal to the machine that the bottles are already in place and the filling cycle should now begin. The float sensor is a detecting device that ensures product availability. They are responsible in sending signal to the pump whenever the liquid level in the tank becomes low.

Kedar Jagannath Detake
Second Year

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Advanced Robotics and Automation: Transforming Industries and Daily Life

Advanced robotics and automation have become pivotal forces in reshaping industries and enhancing various aspects of daily life. Here are key developments in this dynamic field:

1. Industrial Robotics:
   - Robotic systems in manufacturing have evolved beyond repetitive tasks. Advanced industrial robots now incorporate machine learning and computer vision for adaptive and intelligent automation, improving efficiency and precision in production processes.
2. Collaborative Robots (Cobots):
   - The rise of collaborative robots marks a shift towards human-robot collaboration. These robots work alongside humans, enhancing productivity and safety in shared workspaces. Cobots are designed to be easily programmable and adaptable to diverse tasks.
3. Autonomous Vehicles and Drones:
   - Automation extends to transportation with autonomous vehicles and drones. Self-driving cars, trucks, and drones equipped with AI and sensors are transforming logistics, delivery services, and even urban mobility, promising safer and more efficient transportation.
4. AI-Powered Automation:
   - Integration of artificial intelligence (AI) with robotics enables machines to learn and adapt. AI algorithms enhance decision-making processes, allowing robots to navigate complex environments, recognize objects, and optimize tasks based on real-time data.
5. Robotic Process Automation (RPA):
   - In the business sector, RPA is streamlining routine tasks. Software robots mimic human actions in handling data, processing transactions, and interacting with digital systems. This leads to increased operational efficiency and reduced human error.
6. Medical Robotics:
   - Surgical robots and robotic-assisted procedures are revolutionizing healthcare. Surgeons can perform minimally invasive surgeries with enhanced precision using robotic systems, reducing patient recovery times and improving overall surgical outcomes.
7. Robotic Exoskeletons:
   - Exoskeleton technology is advancing rehabilitation and augmenting human capabilities. Robotic exoskeletons assist individuals with mobility impairments and find applications in industries where heavy lifting is required, reducing the physical strain on workers.
8. Swarm Robotics:
   - Inspired by collective behavior in nature, swarm robotics involves coordinating large groups of robots to work collaboratively. This approach is being explored for tasks such as search and rescue missions, environmental monitoring, and agriculture.

Sutar Aditi Anil
Second Year

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MATLAB Applications in Electrical Engineering

Machine Making is a very important aspect of electrical engineering, and MATLAB can help with the automation of the entire process. It can detect the humidity levels in the surrounding air and soil. With the use of different sensors and wireless modules, MATLAB can be used to automate various functions. MATLAB is used in several industries, including the automotive industry, which is the essence of electrical engineering. It also finds its utility in aerospace and defence companies. MATLAB is also used to develop control and fuel consumption systems, which are essential in the electrical engineering space.

Robotics is another domain where MATLAB is widely used. The tool can make robots do complicated tasks as it is known for providing the required automation. All you need is some hardware support, and you can make a world-class robot using MATLAB.
MATLAB is a popular tool in the field of electrical engineering. Some operations, like magnetic field measurements, can be enhanced and accelerated. Many of its toolboxes are now widely acknowledged as capable of replacing traditional instruments in advanced electrical engineering applications (SPICE).
MATLAB is a high-performance technical computing language. It combines computation, visualisation, and programming in a user-friendly interface with problems and solutions written in standard mathematical notation. Data exploration, analysis, and visualisation of Graphics for science and engineering can all be achieved efficiently using MATLAB. Therefore, understanding electrical engineering and bringing it to use becomes relatively easy with the help of MATLAB.

Deshmukh Aditya
Third Year

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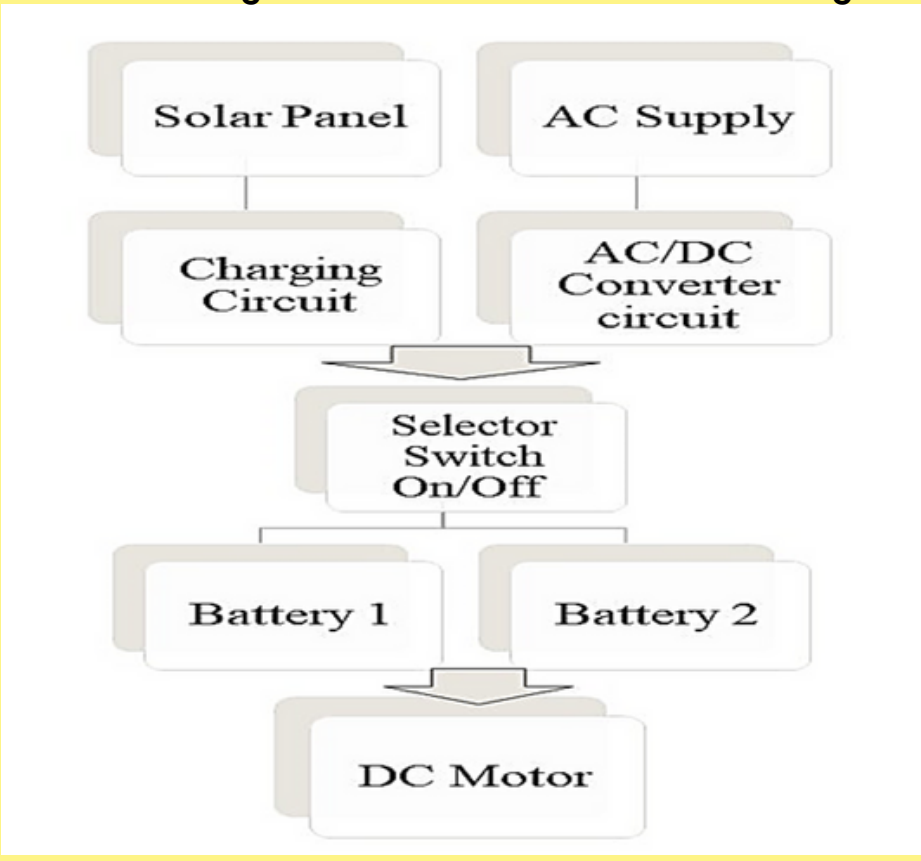
Two Way Charging Systems In EVs

As the name describes, 2-Way charging in EV charging that goes two ways: pulling power from the grid to charge the EV's battery and supplying electricity for other loads from the battery as needed. An EV can help power a home, business, the utility grid, another vehicle, or specific loads with bidirectional charging. Bidirectional charging is a hot topic right now, and it is likely to grow in popularity as the capabilities of EVs expand over time. As a result, several automakers have announced they are releasing vehicles with bidirectional abilities, including Ford, Hyundai, Lucid, and Tesla. In our project we are using two charging way system for charging dual batteries.

The electrical Power will be generated by using ac supply and solar plate. This generated energy stored in a battery and then fed to the DC motor. Meanwhile, petroleum consumption rate in the emerging economics are rapidly expanding. Petroleum sources are limited. Today's nearly 60% of petroleum consumption is dedicated to transportation by means of IC engine vehicles which emits CO & CO2 gas and polluted the environment.



Aman Munir Mulani

Faiz Kasam Mulani

Shubham Hari Shinde

Rohidas Laxman Kharat

Final Year

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A new device could turn your sweat into electricity

Researchers from UC San Diego Jacobs School of Engineering have developed an extremely thin and flexible wearable strip that can stick to your fingertip and generate small amounts of electricity. It can then be used as a source of power for small electronics. The electricity is generated when your finger sweats and can be worn even when sleeping. The device can also generate extra power when you press on it. So, you can continue typing on your computer, texting, or even play the piano.

"Unlike other sweat-powered wearables, this one requires no exercise, no physical input from the wearer in order to be useful. This work is a step forward to making wearables more practical, convenient and accessible for the everyday person," explained co-first author Lu Yin, a nanoengineering PhD student in a release. The findings were published on July 13 in the journal Joule.

Bhairav Jaywant Gore
Second Year

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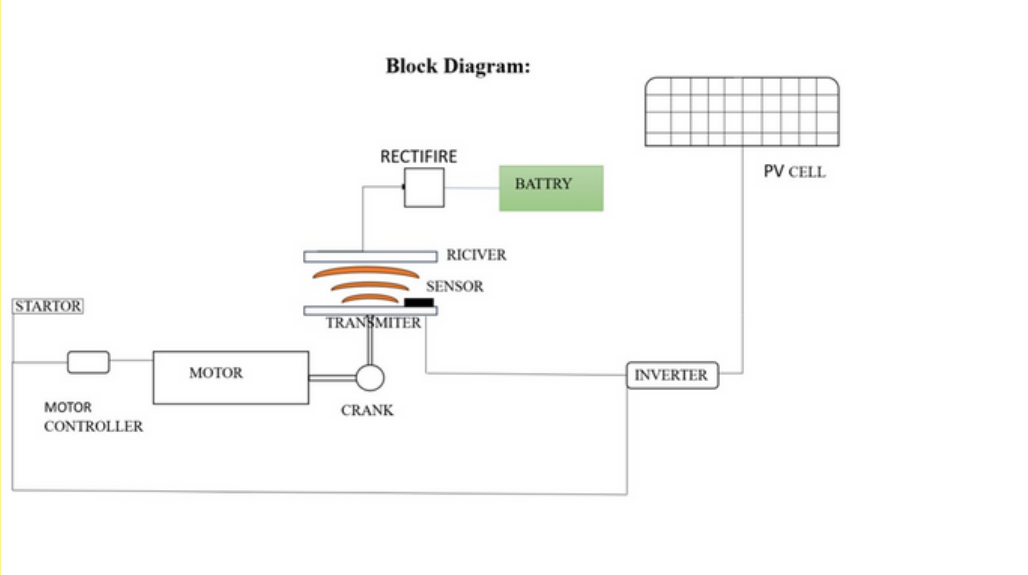
Static wireless charging facility with height adjustment for electrical vehicle



Transforming a static wireless charging facility with adjustable height (airgap) for electric vehicles (EVs) involves implementing advanced technology that allows for efficient and convenient charging. Such a system typically incorporates electromagnetic induction principles to transfer energy between the charging station and the EV without the need for physical connectors. Here's a basic outline of how such a system could work:

Height adjustment:

To accommodate different vehicle heights, the charging station is equipped with sensors and motors. These sensors detect the distance between the EV's receiving coils and the charging station coils. If the gap is too large or too small, the motors adjust the height of the charging coils accordingly, ensuring optimal alignment for efficient energy transfer.

Smart Control System:

A control system manages the height adjustment process. It uses realtime data from sensors to calculate the appropriate height for the charging coils. Machine learning algorithms can be employed to optimize the adjustment process over time based on usage patterns and vehicle types.

Ashitosh vasant kharshikar
Chaitali pandharinath ghadage
Yash rajendra pawar
Vaibhav Ananda sankapal
Final Year

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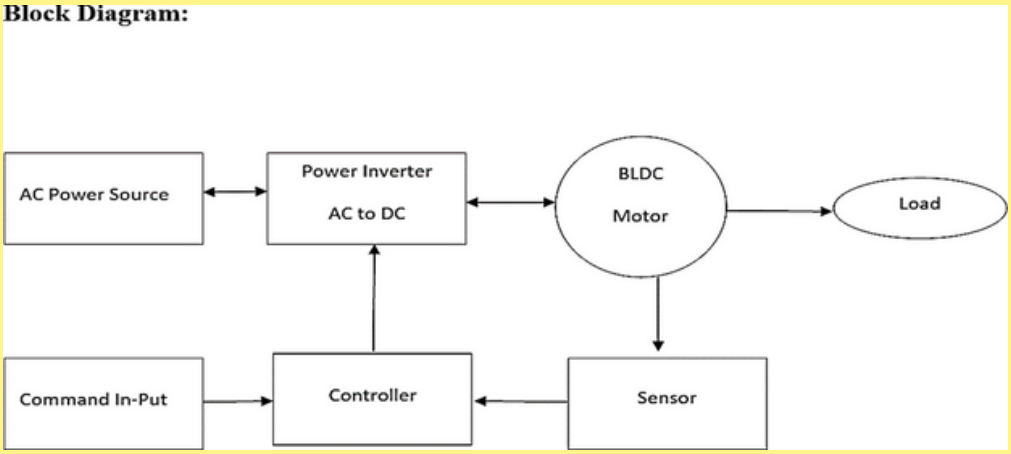
A Brushless Direct Current Motor

Permanent magnet (PM) brushless DC motors (BLDCM) are generated by virtually inverting the stator and rotor of PM DC motors. These motorsare actually fed by rectangular AC waveform.The advantage is the removal of brushes, leading to eliminate many problems associated with brushes. Another advantage is the ability to produce a larger torque because of the rectangular interaction between current and flux.

Due to their superior efficiency, excellent controllability, and higher speed capabilities, brushless DC motors (BLDC) are one of the most widely used DC motors. These characteristics make BLDC suitable for many kinds of applications in a large variety of industries. Nowadays, BLDC motors are nearly everywhere and have a solid role in manufacturing and industrial applications as actuators and in CNC machine tools. Similarly, its efficiency has made it a popular choice for white goods, computer hard drives, electric and hybrid vehicles, and even medical equipment.

Classical DC motors are no doubt good and simple but inefficient in some ways. Although dc motors possess good control characteristics and ruggedness, their performance and applications are inhibited due to sparking and commutation problems. The Permanent Magnet Brushless DC (PMBLDC) motor is able to overcome the limitations mentioned above and satisfy the requirements of a variable speed drive.

Block Diagram:



Shubham Sanjay Jawale
Omkar Gorakhnath Jadhav
Sanika Kishor Rudruke
Pratik Kumbhar
Final Year

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Designing The Insulated-Gate Bipolar Transistor

Although most people aren't aware of insulated gate bipolar transistors (IGBTs), they do enjoy their benefits. From air conditioners to electric cars to stereo amplifiers, the modern world relies on the power semiconductor device and its efficient fast-switching capabilities. In fact, it's hard to imagine today's mobile, energy-conscious, and gadget-driven society without the IGBT. While there are other power-switching approaches, the IGBT earns high marks for its inherent efficiency, which allows amplifiers, motors, and other devices to run on less power and at lower cost. IGBT modules also deliver high power density in a compact form—an important attribute in a world where space is almost always a critical design factor.

Jayant Baliga played a major role in bringing the IGBT into reality. While working at General Electric in the late 1970s, Baliga conceived the idea of a functional integration of metal-oxide-semiconductor (MOS) technology and bipolar physics—research that directly led to the IGBT's development. The first step toward producing an operational IGBT was taken by a Japanese researcher named Yamagami, who in a 1968 Japanese patent application proposed a MOS controlling a positive-negative-positive-negative (PNPN) semiconductor device without regenerative action.

Other researchers made additional progress over the next decade. In advanced electronics research, though, multiple individuals and/or teams often make similar discoveries virtually simultaneously. This is exactly what happened during the latter stages of the IGBT's development. As Baliga was closing in on creating a functional IGBT, RCA engineers Hans W. Becke and Carl F. Wheatley were designing a similar device. The unintentional competition between Baliga and Wheatley/Becke led to both sides being credited with the IGBT's invention by various experts and authorities, creating a debate that continues to this day.

Borate Kartik Rajendra
Second year

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The World May Have Crossed a Solar "Tipping Point"

The world may have crossed a "tipping point" that will inevitably make solar power our main source of energy, new research suggests.

The study, based on a data-driven model of technology and economics, finds that solar PV (photovoltaics) is likely to become the dominant power source before 2050 – even without support from more ambitious climate policies.

However, it warns four "barriers" could hamper this: the creation of stable power grids, financing solar in developing economies, capacity of supply chains, and political resistance from regions that lose jobs.

The researchers say policies resolving these barriers may be more effective than price instruments such as carbon taxes in accelerating the clean energy transition.

The study, led by the University of Exeter and University College London, is part of the Economics of Energy Innovation and System Transition (EEIST) project, funded by the UK Government's Department for Energy Security and Net Zero and the Children's Investment Fund Foundation (CIFF).

Tejaswi Arun Bhandwalkar
Second year

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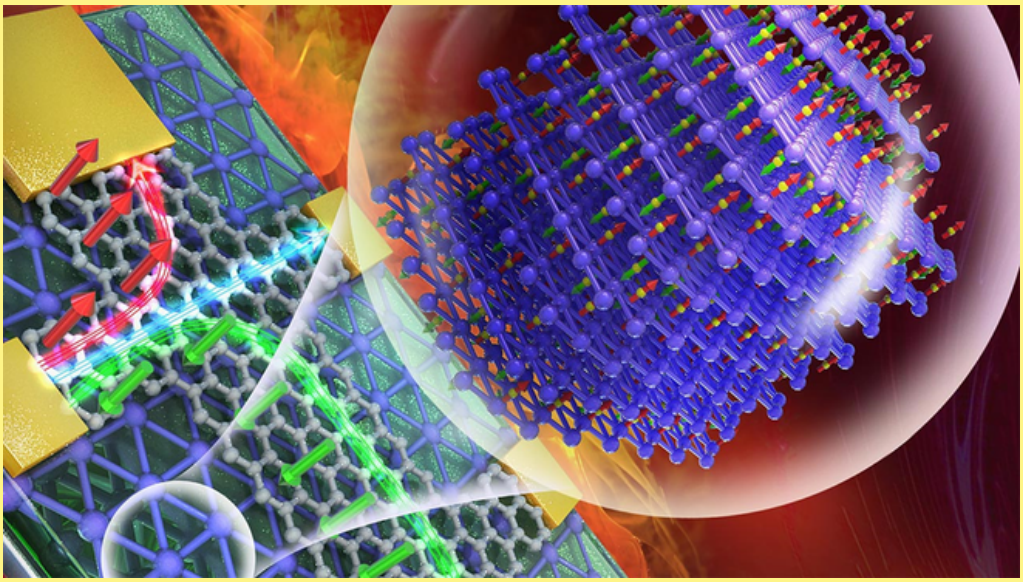
Innovative New Magneto-Electric Transistor Could Cut 5% From World's Digital Energy Budget?



A new spin on one of the 20th century's smallest but grandest inventions, the transistor, could help feed the world's ever-growing appetite for digital memory while slicing up to 5% of the energy from its power-hungry diet. Following years of innovations from the University of Nebraska–Lincoln's Christian Binek and University at Buffalo's Jonathan Bird and Keke He, the physicists recently teamed up to craft the first magneto-electric transistor. Along with curbing the energy consumption of any microelectronics that incorporate it, the team's design could reduce the number of transistors needed to store certain data by as much as 75%, said Nebraska physicist Peter Dowben, leading to smaller devices. It could also lend those microelectronics steel-trap memory that remembers exactly where its users leave off, even after being shut down or abruptly losing power.

KAUSTUBH RAJENDRA RAKSHE
Second Year

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Do India has already begun shifting to EVs?.

India is taking the lead in the global shift to electrification by introducing several electric vehicles or hybrid vehicles. According to market research firm Jato Dynamics, Electric vehicle (EV) sales grew 112% YoY to 50,284 units during April-September 2023. Thus, India has already begun shifting to EVs. But the question is whether the infrastructure is ready for such a major shift in the automobile industry? Here is a close look at the current situation in the country.

India's electric vehicle (EV) market has hit a turning point, with EVs accounting for approximately 5 per cent of total vehicle sales between October 2022 and September 2023. By 2030, EVs could constitute more than 40 per cent of India's automotive market, generating over $100 billion in revenue. The surge in adoption is particularly pronounced in the two-wheeler and three-wheeler segments, where EVs have already captured 50+ per cent of new sales. Additionally, electric four-wheelers segments, where EVs have already captured 50+ per cent of new sales. Additionally, electric four-wheelers (E4Ws) are expected to comprise 30 per cent of all four-wheeler sales by 2030.

Yash Shamrao More
Second Year

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Bio metric Authentication for SCADA security

Securing the critical infrastructure in the United States requires authentication of people authorized to access the critical systems. These controls can regulate personal access to the physical sites housing the power stations, water facilities, or gas lines encompassing the critical infrastructure, or they may regulate access to either the remote or centralized systems comprising the SCADA networks. Limiting access to authorized personal has been a cornerstone of infrastructure security since its inception.

Technology now exists to tie the authentication of authorized individuals (and the exclusion of unauthorized people) directly to the physical being of the people seeking access. This is managed through a process called biometric security, which measures some physical aspect of any person seeking access to a sensitive element and reconfirms that physical aspect at the time access is requested. The biometric system may measure a person's fingerprints, finger length and shape, head shape or facial features – any one or more of an infinite number of human body features – to confirm whether that person is the same one who has previously received authorization to enter the sensitive computer system or restricted area.

Pramodini Rajendra Sonavane
Second Year

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Flexible Electronics and Wearables

Flexible and Wearable Electronics involve the amalgamation of advanced materials and gadgets with different processes to produce lightweight electronic products. The current challenge in this area is to tap the different markets for these products that can benefit from these innovations. The challenges in Advanced Functional Materials need to be addressed in order to improve the manufacturing processes and technologies to create sustainable and innovative products for the end-consumer. The IAM consortium on Flexible and Wearable Electronics is focused on generating ideas to improve the processes and innovations the progress in device technology.

Wearable and Flexible Electronic Devices is a rapidly developing area. The area is a unique field that functions on the combination of Materials Science &Technology, Artificial Intelligence, and Nanotechnology. Different Advanced Materials are directly used in the manufacturing of these devices. From wearable watches to other smart products, the area is booming and IAM uses its consortium to bring together diverse expertise and generate new ideas for the progress of this area.

Akhade Pratiksha
Second Year

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South Africa to Unveil First Electric Vehicle by 2026 as Part of Green Transport Transition.

In a significant stride towards embracing sustainable practices, South Africa's burgeoning automotive industry is poised to roll out its inaugural electric vehicle (EV) in 2026, as announced by the country's Trade Minister. This development aligns with South Africa's overarching commitment to a green transport transition, a pivotal element of the Just Energy Transition (JET) plan aimed at fostering a low-carbon and climate-resilient economy. The JET initiative underscores the necessity for a substantial investment of 128.1 billion rand ($6.84 billion) from 2023 to 2027 to enable the transport sector to play a meaningful role in South Africa's ambitious decarbonization agenda.

Distinguished as the foremost automotive manufacturing hub on the African continent, South Africa hosts renowned global brands such as Toyota, Isuzu, Volkswagen, and Mercedes.

The country's automotive sector operates within a globally integrated supply chain, importing components from various corners of the world and exporting the final products to over 150 countries worldwide.

Priyanka Kashinath Thakare
Third year

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Talent beyond IITs: Small-town college supplied motors for Chandrayaan-3

Lesser-known engineering colleges in India also produce students the country can be proud of. While it's well-known that big private manufacturers such as Godrej Aerospace and L&T have contributed to the making of Chandrayaan-3, few would know that an engineering college in Tamil Nadu's Salem district devised motors for the Moon mission.

Students and researchers of Sona College of Technology developed a stepper motor for use in the LVM-3 rocket that lifted off the Chandrayaan-3 spacecraft and placed it into the Earth's orbit. The research team of the college developed the simplex permanent magnet stepper motor for the actuator assembly of LVM-3 that controlled the rocket engine's liquid fuel and oxidizer mixture ratio. While the college designed the motor, it was produced by a private company, Vee Technologies. In April this year, in a significant milestone in developing India's own reusable launch vehicle that is similar to a space shuttle, ISRO successfully conducted the Reusable Launch Vehicle (RLV) autonomous landing mission at Chitradurga in Karnataka. This ISRO project too had a critical component designed by Sona SPEED (Sona Special Power Electronics and Electric Drives), the R&D unit of Dept. of Electrical and Electronics Engineering at Sona College of Technology.

Swaraj Vinod Vende
Second Year