



SRI MANAKULA VINAYAGAR

ENGINEERING COLLEGE

(AN AUTONOMOUS INSTITUTION)

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE



BROCHURE

**ELECTRIC VEHICLE-CENTRE OF EXCELLENCE
IN COLLABORATION WITH TVS TRAINING & SERVICES
(A TVS GROUP COMPANY)**

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE MEMORANDUM OF UNDERSTANDING (MOU)

Sri Manakula Vinayagar Engineering College and TVS Training & Services signed a Memorandum of Understanding (MoU) to establish a Centre of Excellence in Electric Vehicles. The Centre of Excellence laboratory has been established at SMVEC campus and training will be provided by TVS Training & Services.

The MoU between SMVEC and TVS -TS has been signed on 28.3.2024. This MoU was signed by Dr.V.S.K.Venkatachalapathy, Director cum Principal, Sri Manakula Vinayagar Engineering College, and Mr. Mohammed Samiuddin, Deputy General Manager, TVS - Training & Services.

This centre of Excellence has been equipped with state-of-the-art facilities to provide a conducive environment for research. It is expected to make a valuable contribution to developing electrical vehicle technology. It will serve as a hub for research, innovation, and collaboration in electric vehicle cutting-edge technology.

Also, it will provide a platform for exchanging knowledge and ideas to facilitate the development of skills and expertise in this field. TVS - Training & Services will take care of Training, Assessment and placement support.

This centre of excellence provides value-added training and placement support to external candidates from other colleges, Industries and Polytechnic colleges also.

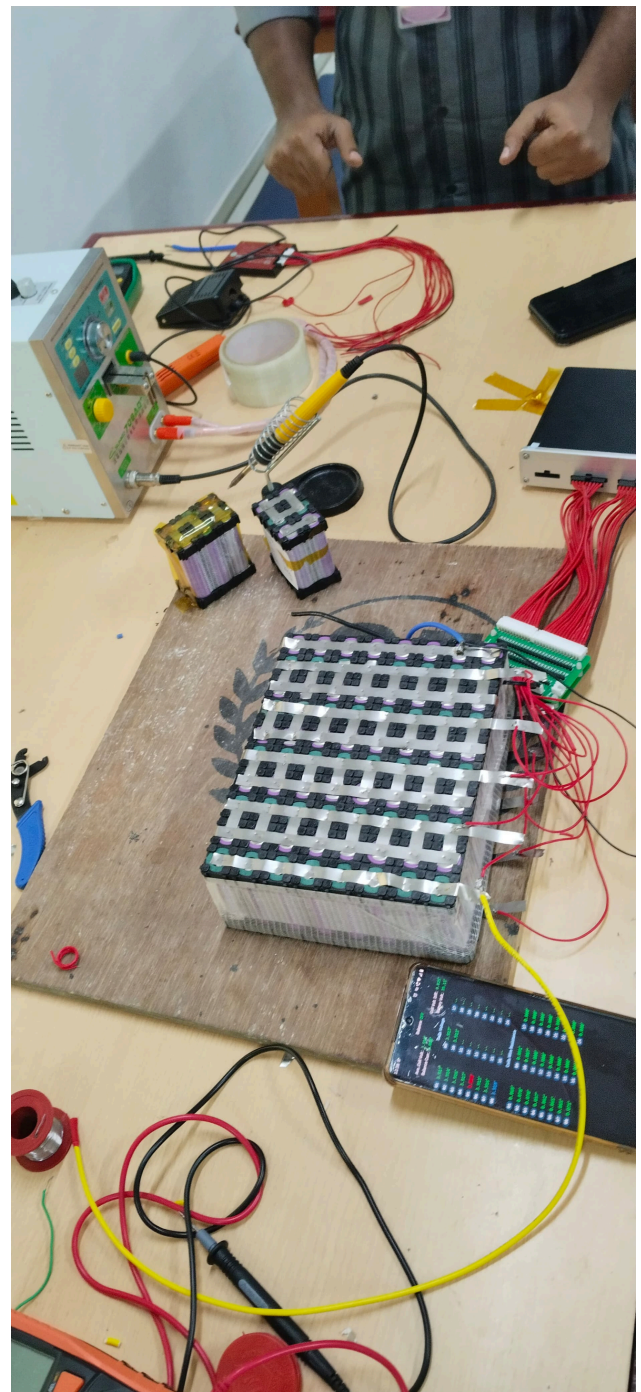
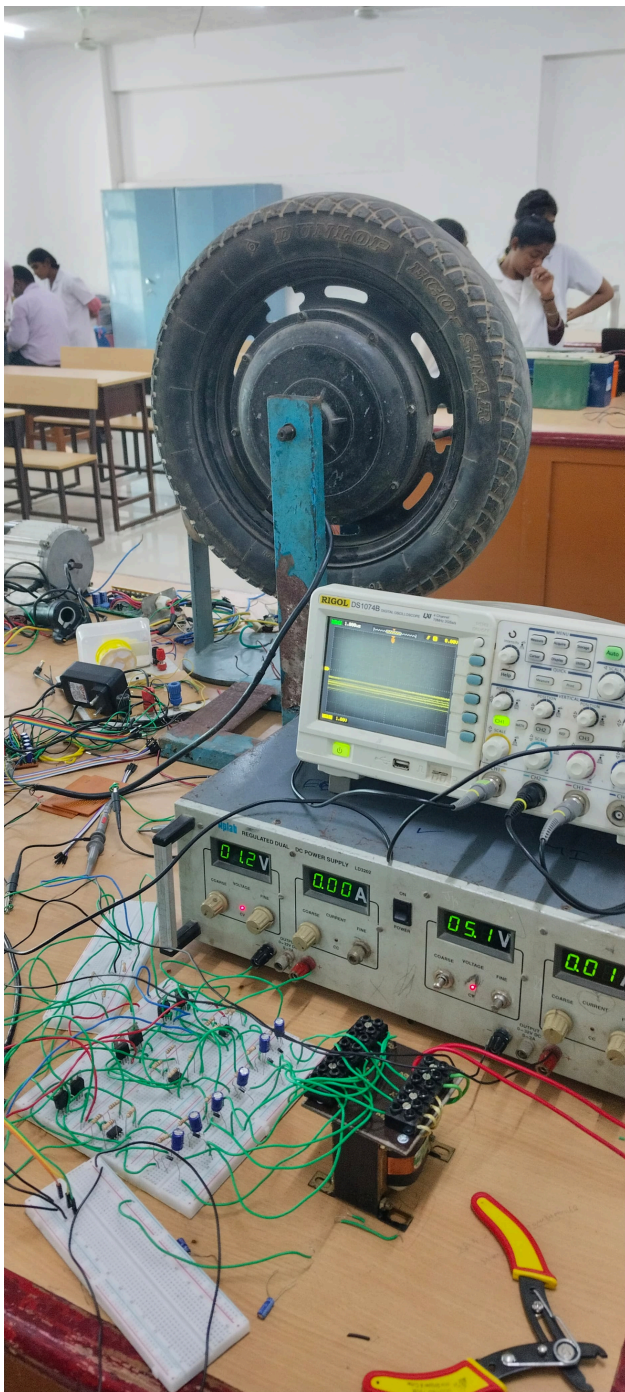


*MoU for Electric Vehicle - Centre of Excellence was signed by
Dr.V.S.K.Venkatachalapathy, Director cum Principal,
Sri Manakula Vinayagar Engineering college,
and
Mr. Mohammed Samiuddin, Deputy General Manager,
TVS - Training & Services, Chennai.*

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

This centre of Excellence has been equipped with state-of-the-art facilities to provide a conducive environment for research. Electric Vehicles Centre of Excellence is focussed on areas like BLDC/PMSM Motor Testing, Battery Management System, Cell Tester, ADAS Simulator and EV car setup.

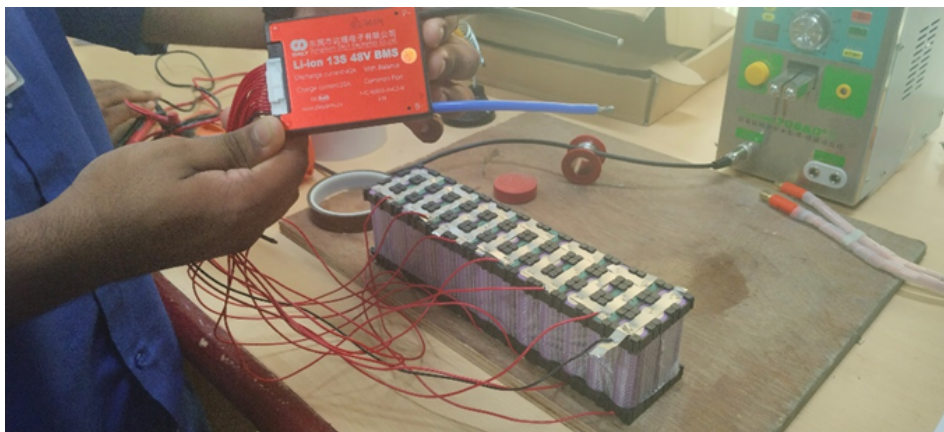
It will serve as a hub for research, innovation, and collaboration in electric vehicle cutting-edge technology. Also, it will provide a platform for exchanging knowledge and ideas to facilitate the development of skills and expertise in this field for Students and Faculties. This centre of excellence provides value-added Industrial training with placement support.



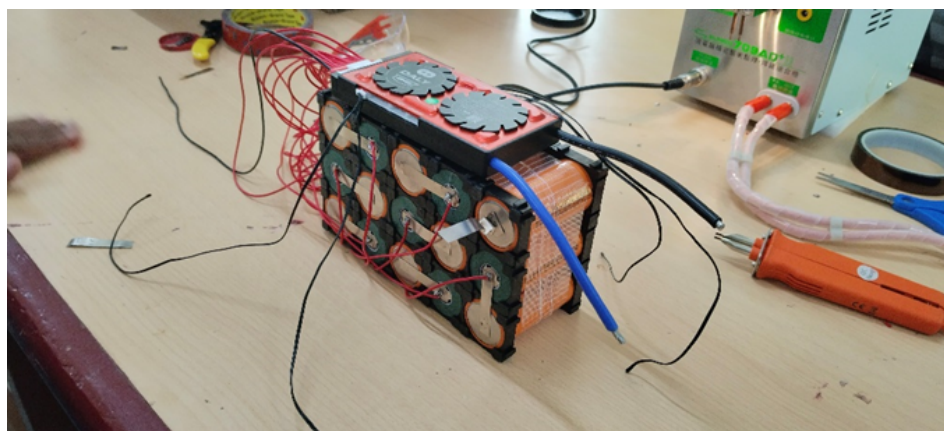
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Spot Welding Machine

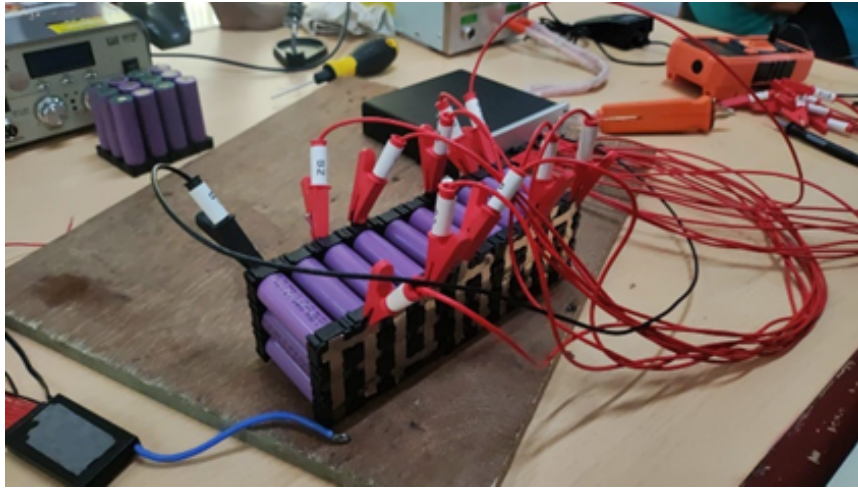


**Connection of 48V Battery Management System (BMS), 40A,13 Series,
with NMC cell pack of 40 pieces**



**Smart Battery Management System (BMS), 48V, 40A,15S
with LPF cell pack of 15 pieces**

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Battery pack equalizer with Active balancer with Bluetooth and Cell Assembler



Electric vehicle station

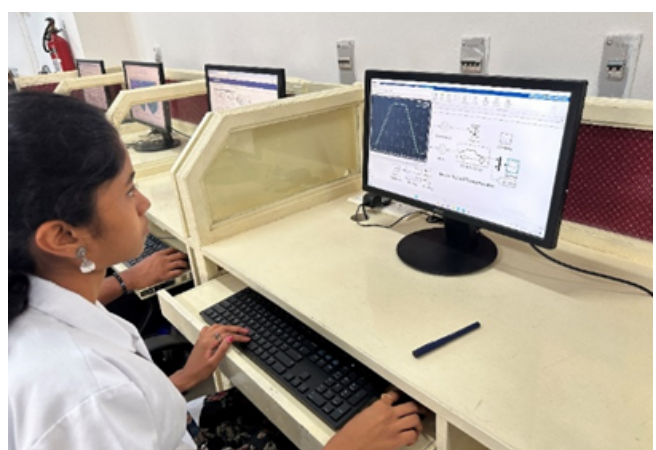
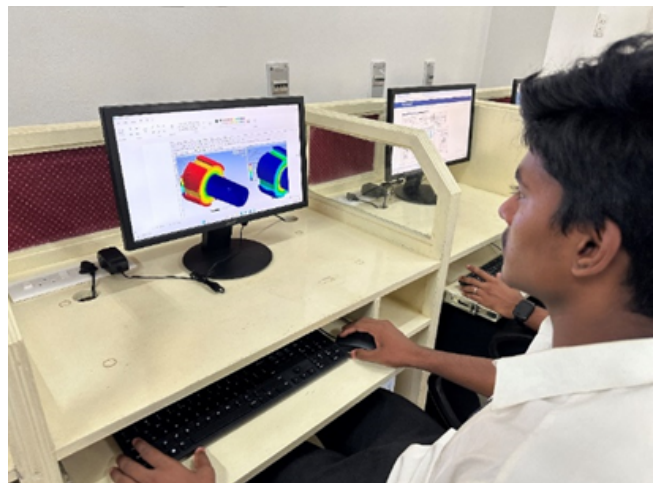


BMS continuously monitors battery voltage, current, and temperature to ensure safe operation

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Advanced Driver Assistance System (ADAS) simulator

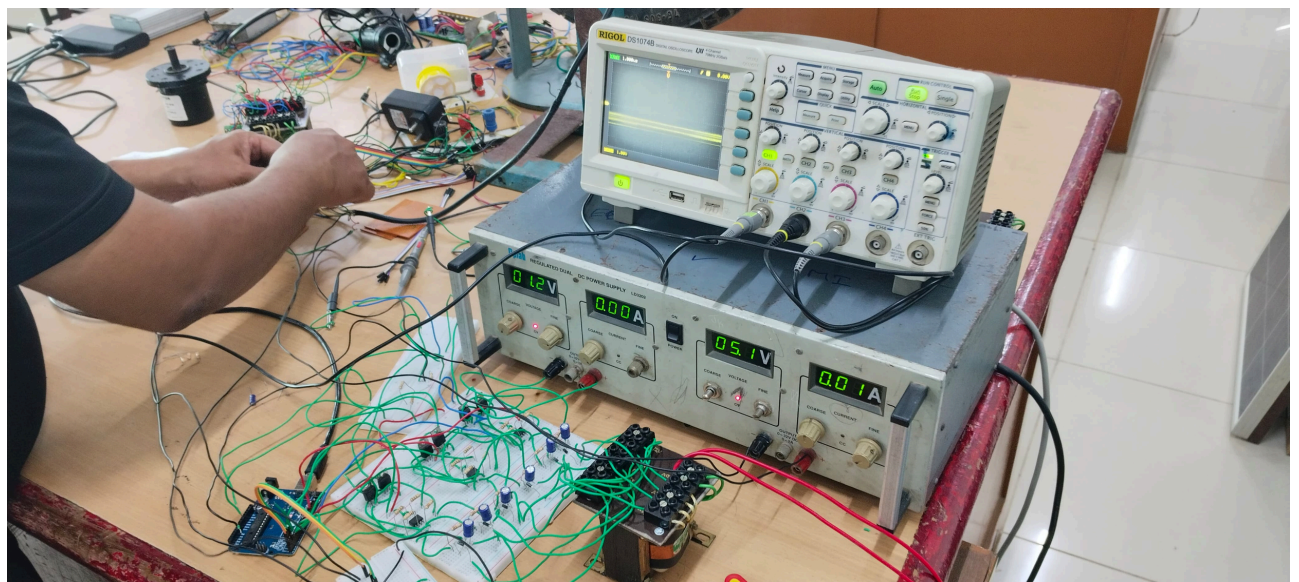


Hands on experience through MATLAB and ANSYS Simulation software

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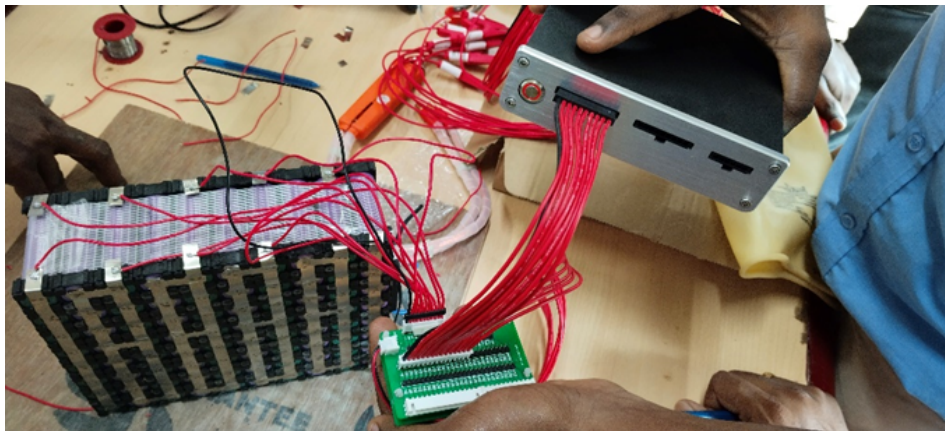


5-days 'Training Program on Electric Vehicles' for students through the Electric Vehicle-Centre of Excellence laboratory in our college premises.



Microcontroller-Based Firing Circuit for 100 W BLDC Motor Control with Breadboard Implementation

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Battery pack equalizer 24S 5A with Active balancer with Bluetooth and Cell Assembler



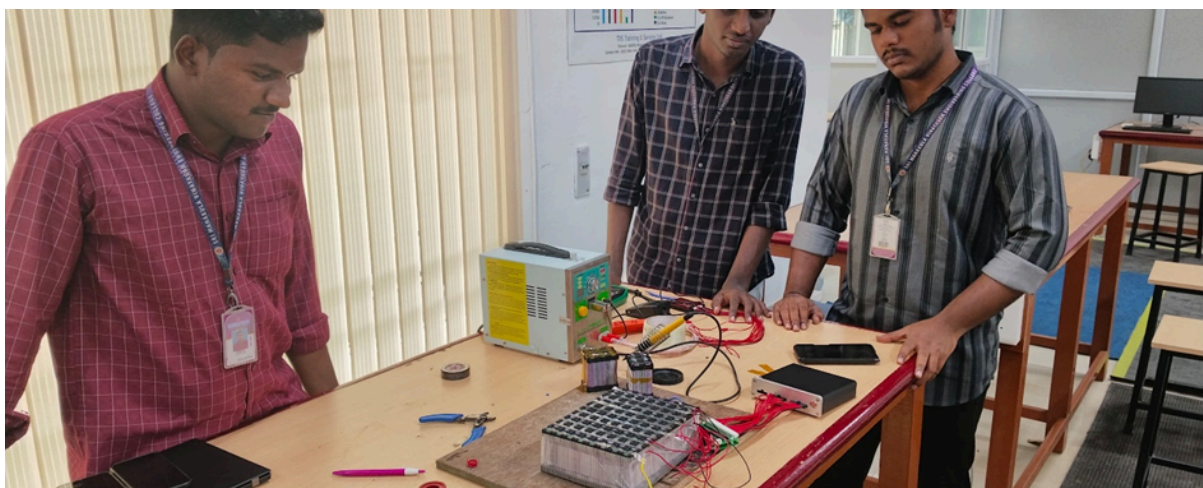
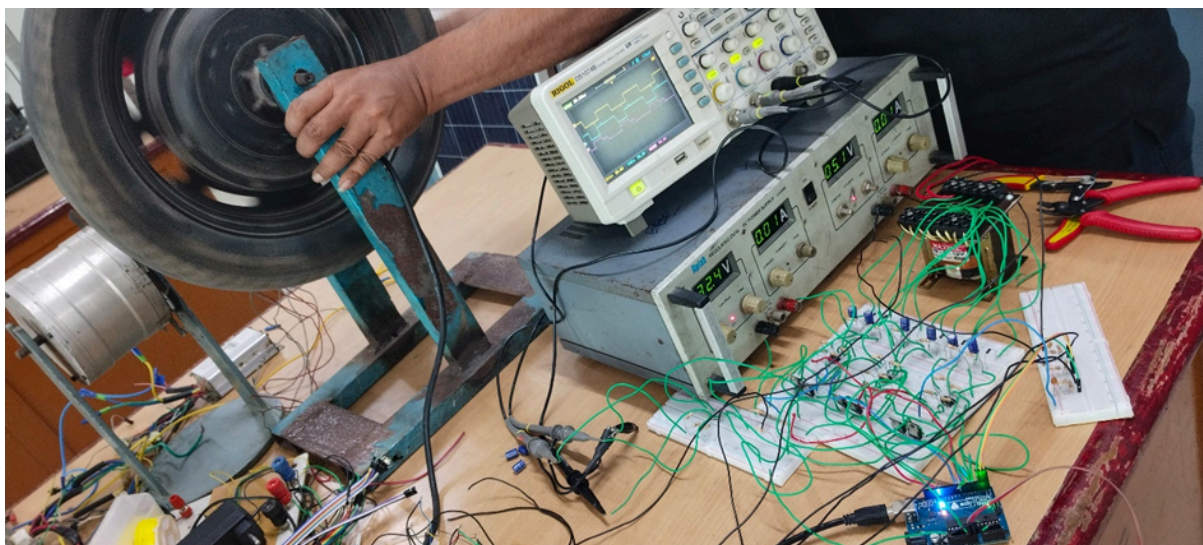
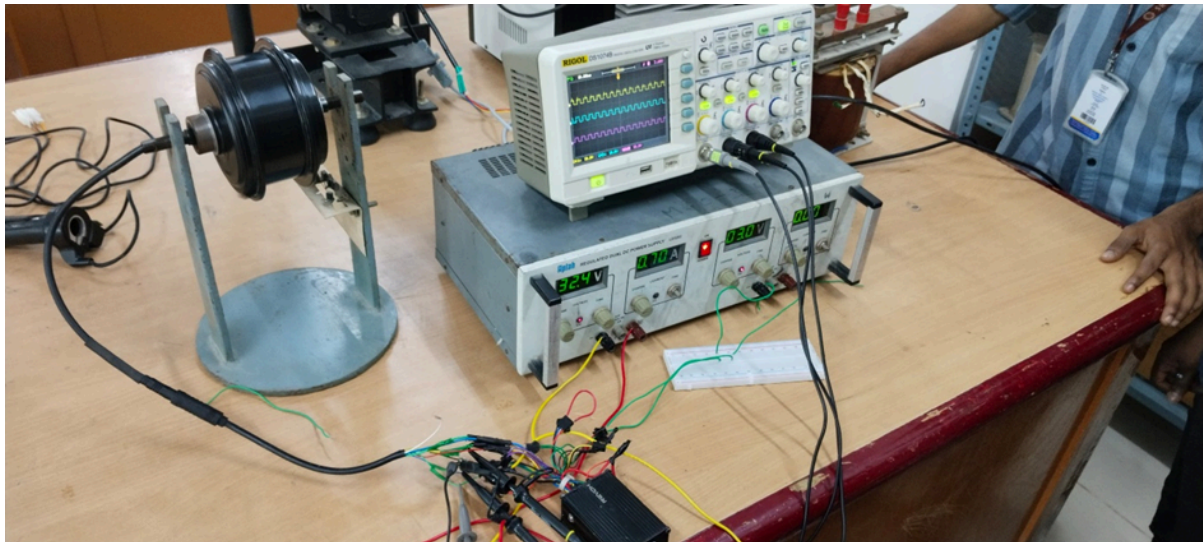
Electric motor testing for PMSM and BLDC



Cell testing upto 8 channels

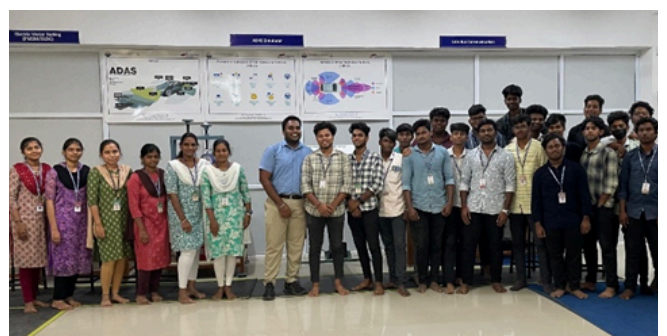
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Gallery-Electric Vehicle Centre of Excellence



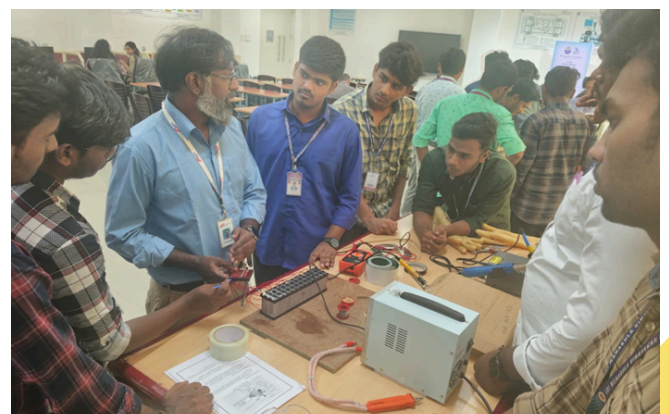
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Glimpses from the 5-Day Industrial Training Program on Electric Vehicle Technology



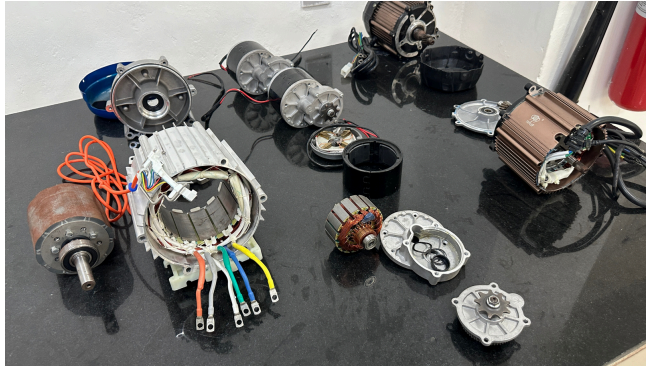
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Glimpses from the 5-Day Industrial Training Program on Electric Vehicle Technology



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Highlights of the 5-Day Training Program on Electric Vehicles



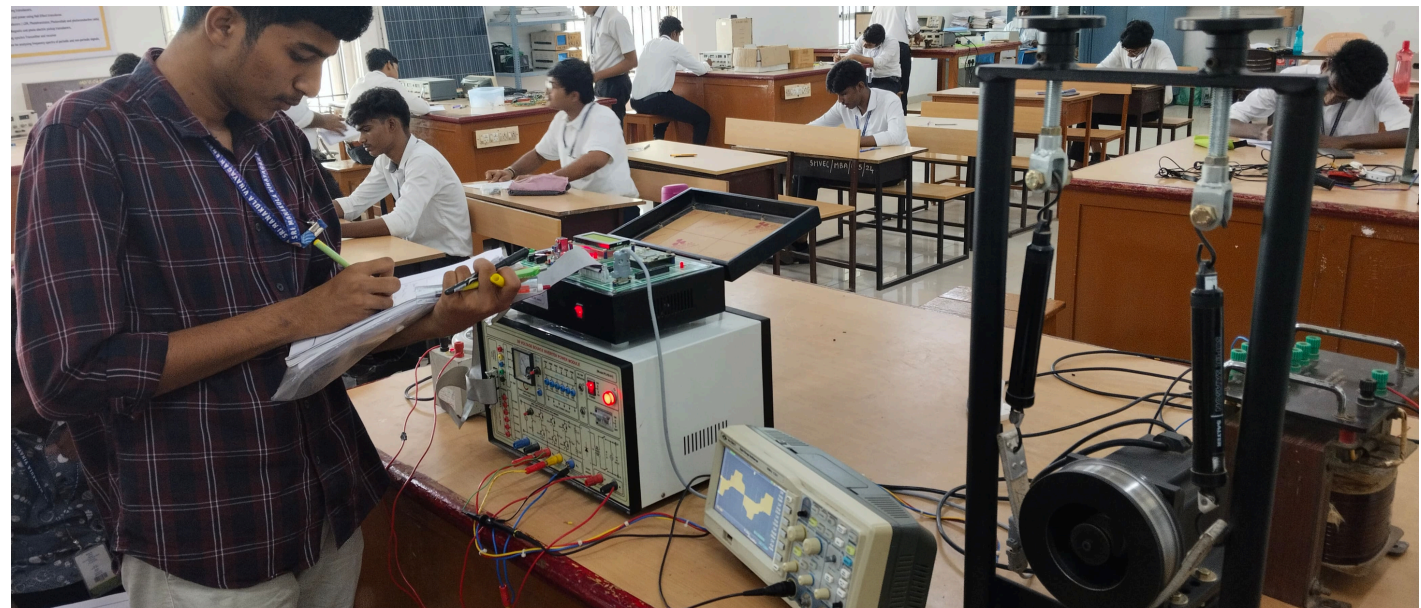
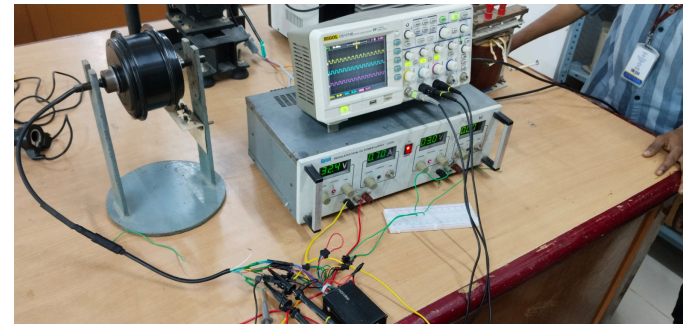
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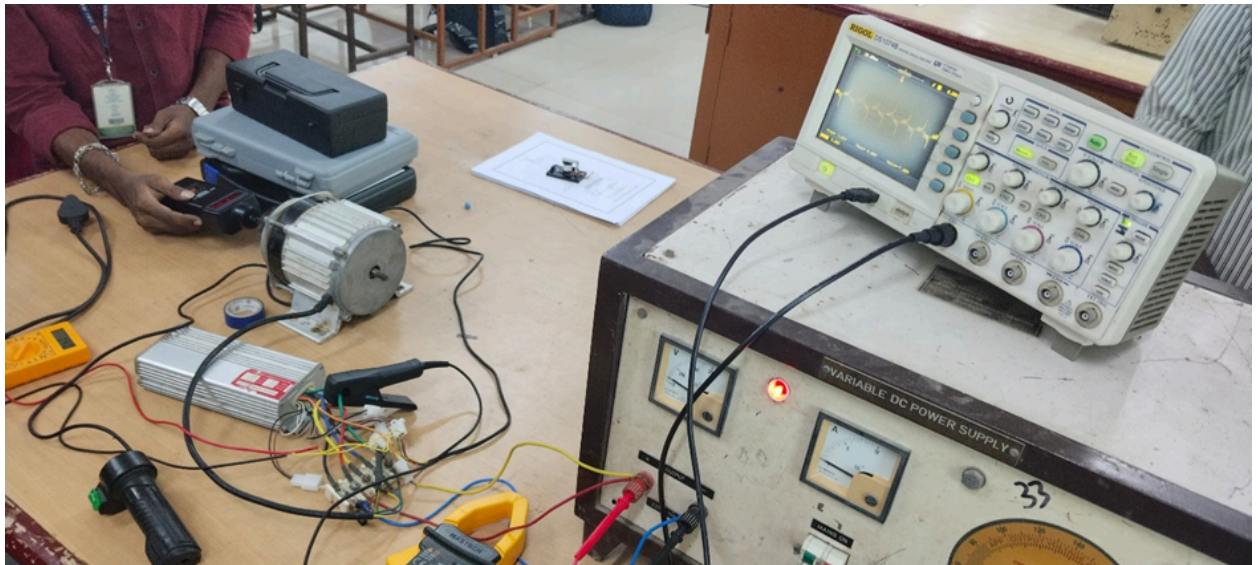
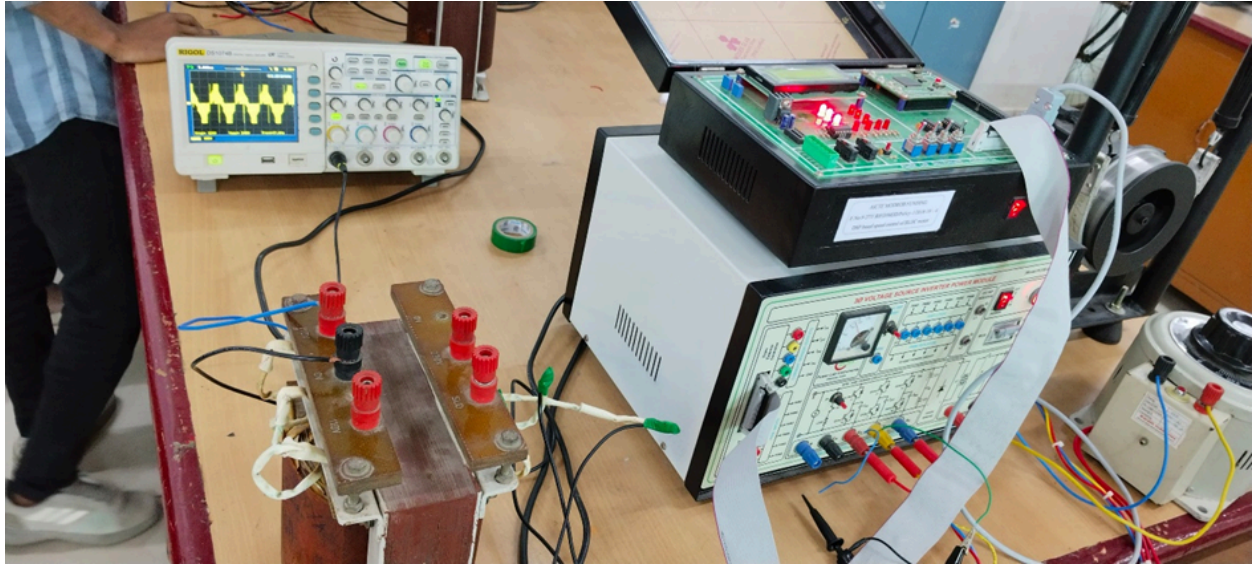
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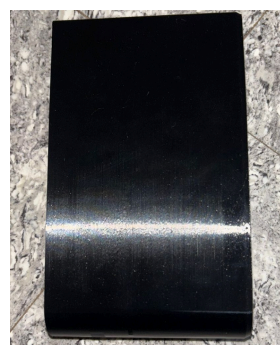
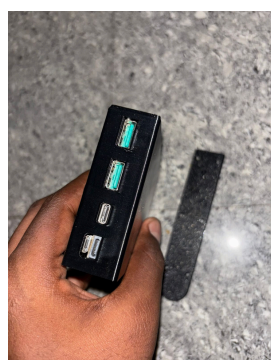
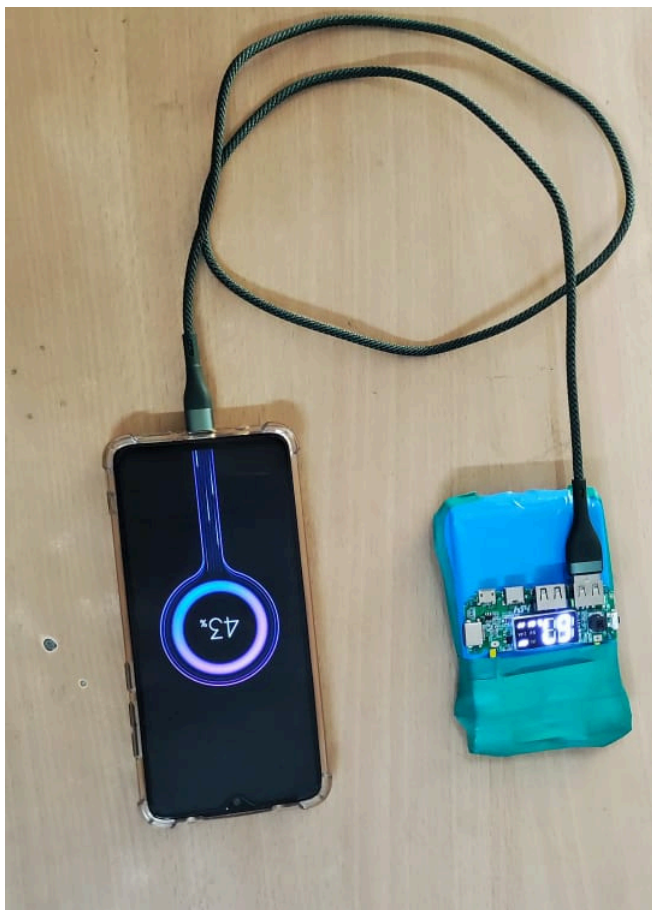
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Outcome from Electric Vehicle Centre of Excellence

"DIY High-Capacity Powerbank Developed by 2nd Year Students"

Balaji.A, Elanchezhiyan.S, Kishore Kumar.S

This 13,500 mAh (~49 Wh) DIY powerbank offers higher backup than standard models while staying compact with a custom 3D-printed PLA enclosure. It supports multiple inputs (USB-C, Micro-USB, Lightning) and provides dual USB-A and one USB-C output with up to 22 W PD/QC 3.0 fast charging. The device recharges fully within 1-2 hours and includes safety protections against over-voltage, overheating, and short circuits. At just ₹1200, it delivers a cost-effective balance of performance, portability, and safety.



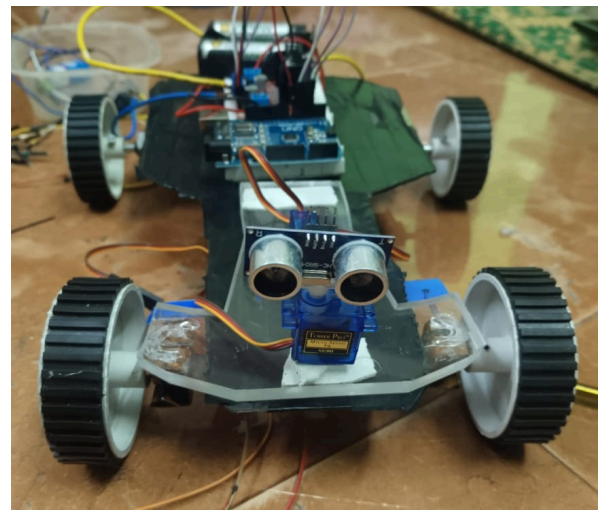
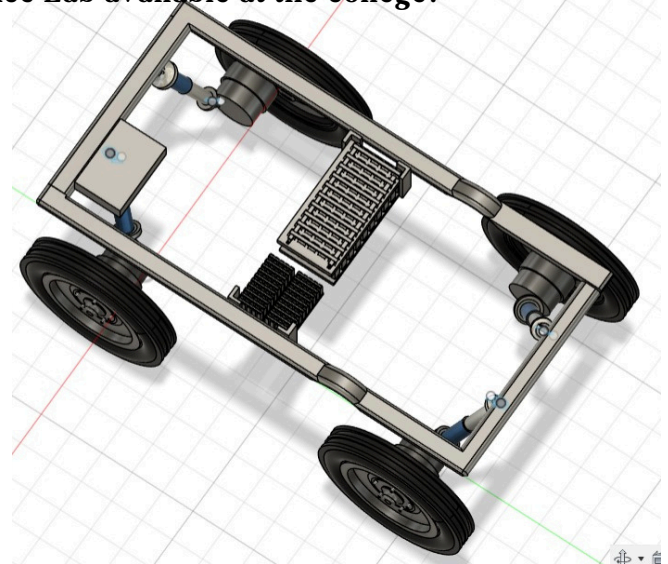
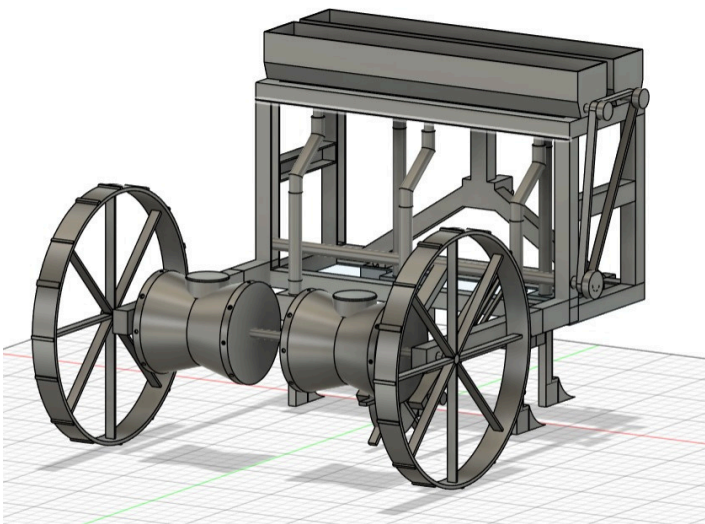
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“EVFarm: A Sustainable Multipurpose Electric Vehicle for Agriculture”

Gokul.V, Malaravan.M, Manimurugan.A, K.Devanadan , Roubam.A

“EVFarm is a sustainable, multipurpose electric vehicle designed to support agricultural operations with eco-friendly mobility and versatile utility. Powered by clean energy, it reduces fuel dependence, minimizes emissions, and integrates attachments for farming, transportation, and fieldwork—offering an affordable and green solution for modern agriculture. The students showcased this innovation at the Electric Vehicle (EV) competition held at SRM College. The project was developed using the facilities of the Electric Vehicle Centre of Excellence Lab available at the college.”



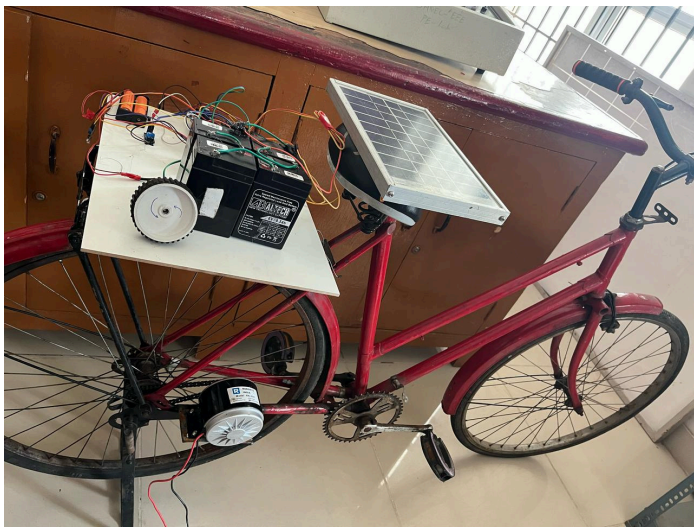
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Outcome from Electric Vehicle Centre of Excellence

“SUSTAINABLE ENERGY HARVESTING TECHNOLOGY FOR E-BICYCLE”

Archana R,Kasthuri C,Lokeshwari D,Soniya V

“The project was developed using the facilities of the Electric Vehicle Centre of Excellence Lab at the college. The rapid growth of electric bicycles (e-bikes) as an eco-friendly and sustainable mode of transportation has created a demand for innovations in energy generation and management. As e-bikes continue to play a vital role in reducing urban congestion and lowering carbon emissions, the integration of sustainable energy harvesting technologies can significantly enhance their efficiency and extend operational range. This paper presents a comprehensive analysis of various energy harvesting methods, including kinetic energy recovery, solar power integration through photovoltaic panels, vibration-based energy conversion, and thermal energy recovery from motor and battery components.”



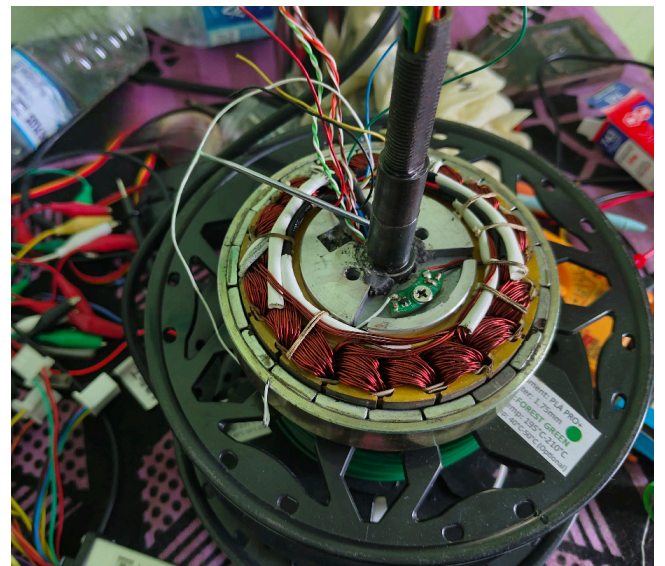
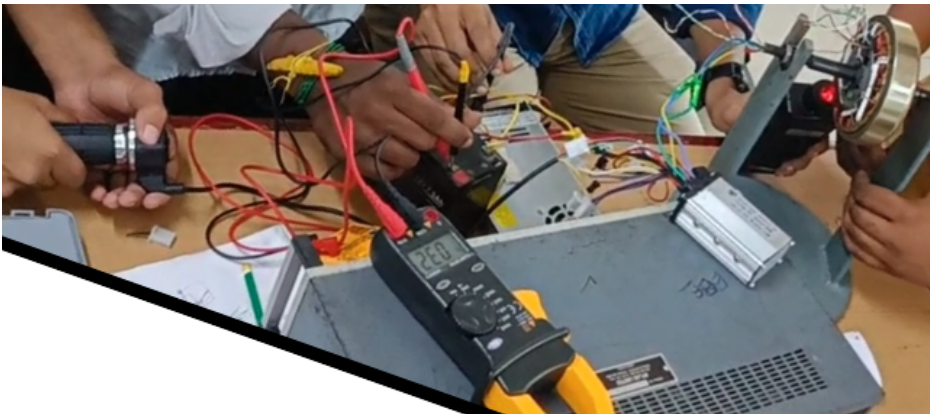
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Outcome from Electric Vehicle Centre of Excellence

“DESIGN AND FABRICATION OF LOW- COST BLDC MOTOR FOR ELECTRIC VEHICLES”

JEEVASUDHAN G, JOTHIKRISHNAN K, SATHISH FRANCIS XAVIER, YOGARAJAN R

“The growing demand for affordable and efficient electric mobility solutions has emphasized the need for developing low-cost motor systems tailored for short-range urban transport. This project presents the comprehensive design, simulation, and fabrication of a 250W, 36V Brushless DC (BLDC) hub motor optimized for electric bicycles and scooters. The motor features an 18-slot, 20-pole outer rotor topology integrated with fractional-slot concentrated windings and a star-connected phase configuration. A minimal air gap of 0.5 mm, along with precise rotor-stator alignment, is employed to enhance magnetic coupling and torque density. Electromagnetic modeling and performance evaluations were conducted using Ansys Motor-CAD V2023.1.1, with a focus on key metrics such as torque production. A team of students developed this project at the college’s Electric vehicle Centre of Excellence Lab.”



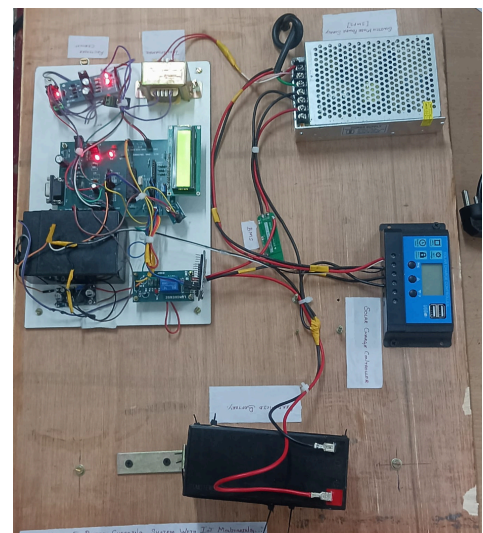
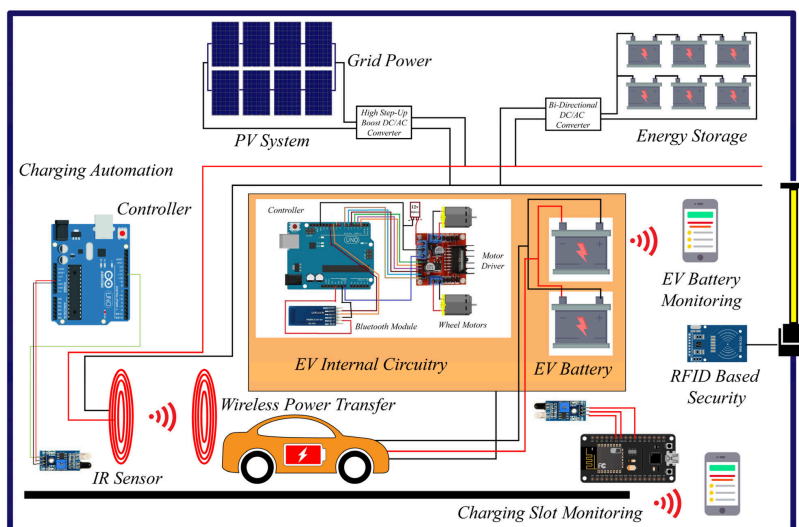
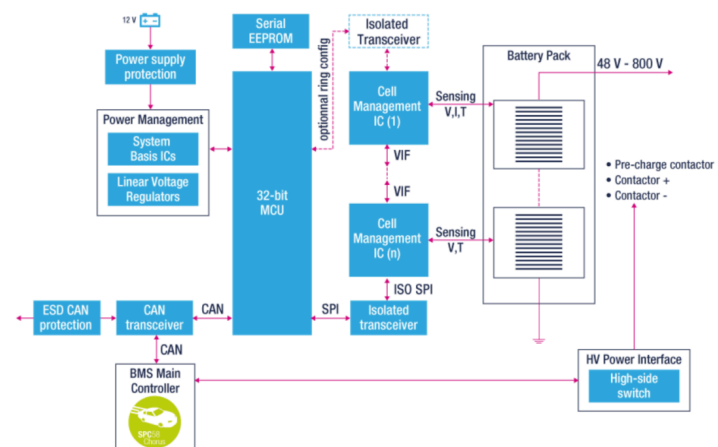
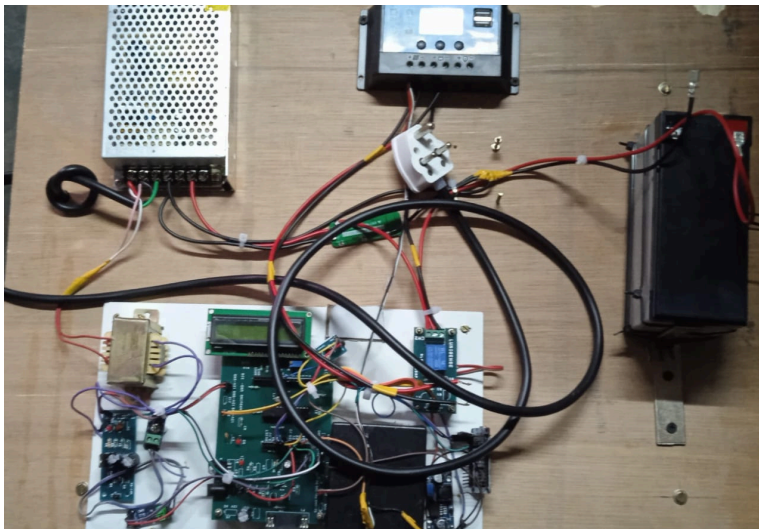
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Outcome from Electric Vehicle Centre of Excellence

“HYBRID EV BATTERY CHARGING SYSTEM WITH IOT MONITORING”

Lokesh.N, Thamizharasan.S, Dinesh.R.S

“The proposed system optimizes energy utilization by employing Maximum Power Point Tracking (MPPT) to dynamically regulate power from renewable sources, thereby ensuring an environmentally friendly and efficient charging process. An IoT-based monitoring feature provides real-time data on battery health, charge status, and overall system performance, enabling improved control of charging cycles and extending battery lifespan. Integrated with a Battery Management System (BMS), the IoT technology delivers detailed analytics and automated adjustments to maintain optimal battery functionality. This project was developed using the facilities of the Electric Vehicle Centre of Excellence Lab at the college.”



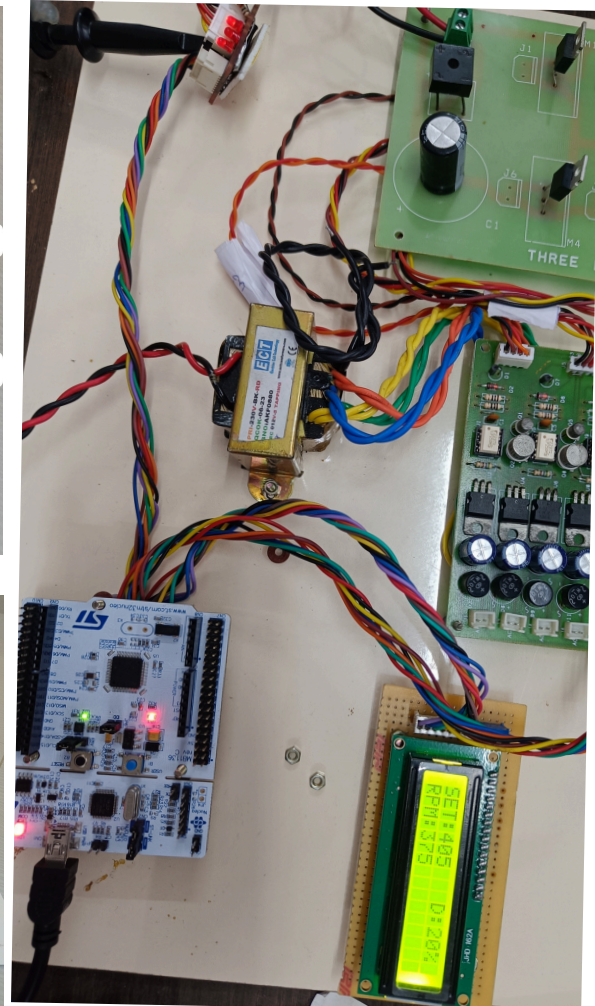
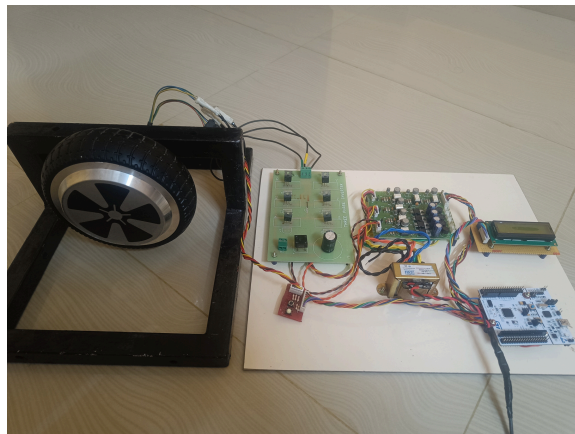
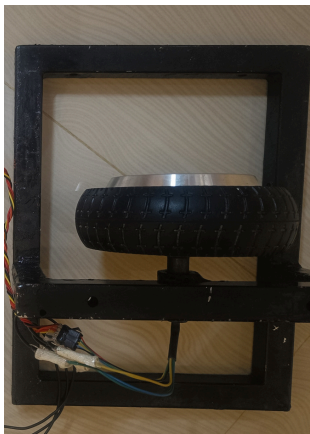
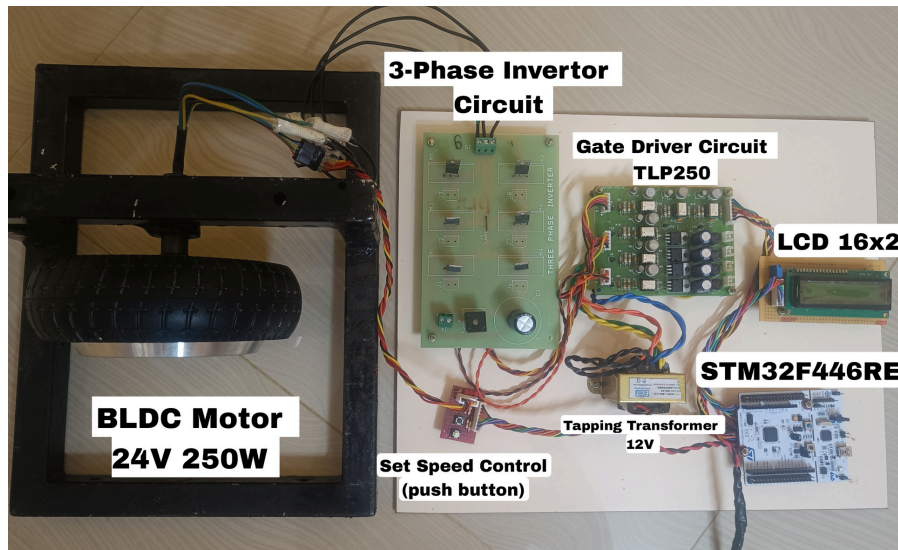
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

“Development of Optimized FOPID Controller for BLDC Motor Drive for Electric Vehicle Application”

Jayakumar D, Karthikeyan P, Tom Tijo Edattukaran

“This paper presents the design and implementation of a Fractional Order Proportional-Integral-Derivative (FOPID) controller for Brushless DC (BLDC) motors, with the objective of enhancing electric vehicle (EV) performance. BLDC motors are widely recognized for their high efficiency, compact structure, and precise controllability. However, their nonlinear dynamics and sensitivity to load variations pose significant challenges for conventional Proportional-Integral-Derivative (PID) controllers, which often underperform under dynamic operating conditions. The proposed FOPID controller introduces fractional-order parameters, providing greater flexibility and improved control precision. A team of students developed this project at the college’s Electric vehicle Centre of Excellence Lab.”



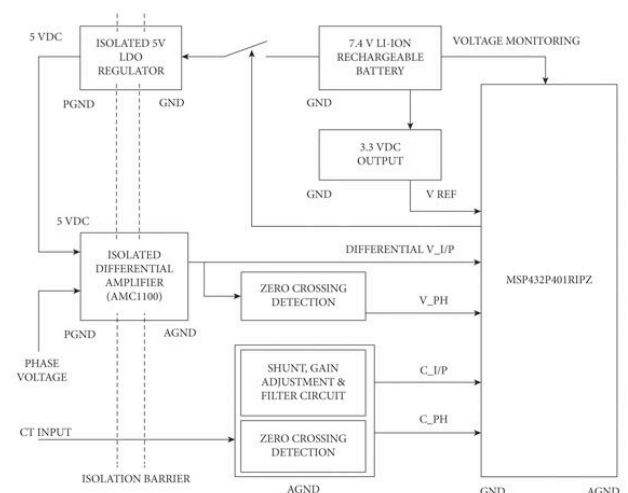
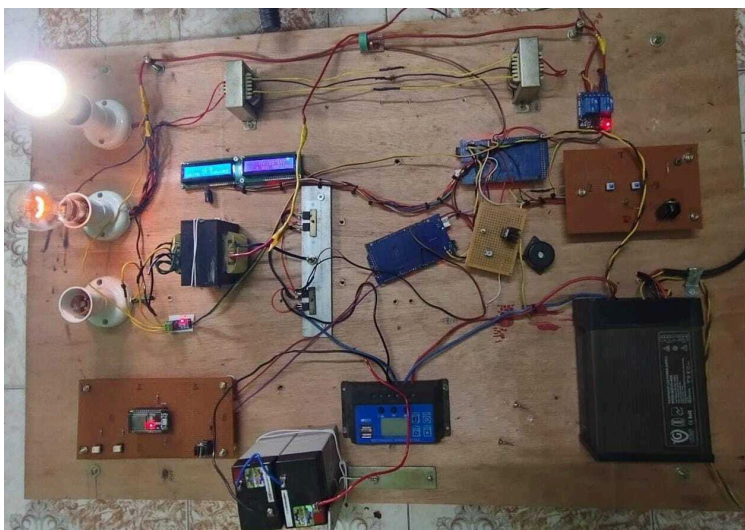
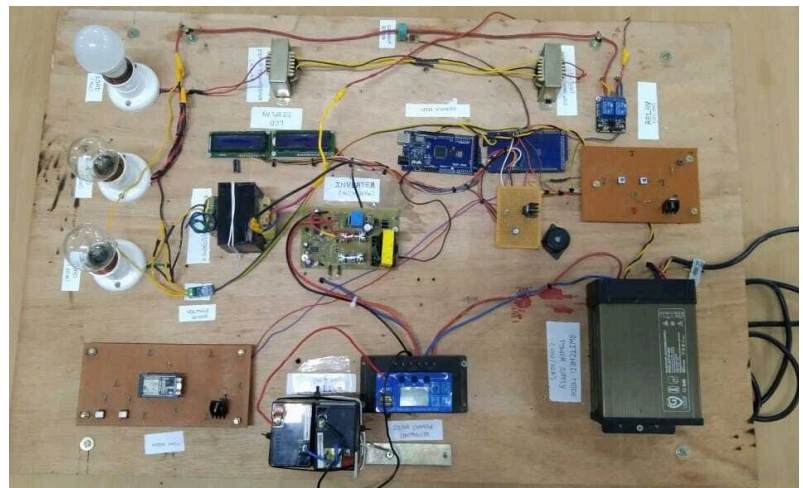
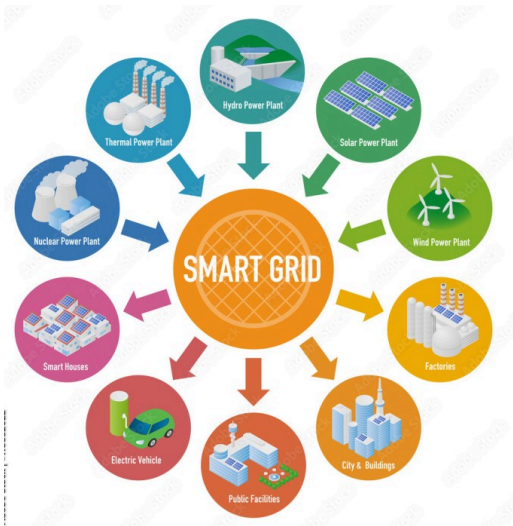
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"SQP BASED PREDICTIVE CONTROLLER FOR GRID PARAMETERS OPTIMIZATION IN DISTRIBUTED GENERATION SYSTEM"

Gunapriya.S, Kalaiyarassi.M, Nivedha.G, Vinisha Laxmi.G

With the increasing integration of solar-based Distributed Generation (DG) systems into electrical grids, maintaining voltage stability and power quality has become a major challenge due to the intermittent and nonlinear characteristics of solar energy. Weather-related fluctuations, along with unpredictable load variations, can cause voltage and frequency instability. Conventional control methods often prove inadequate in addressing these rapid and dynamic changes. To address this issue, the students developed their project utilizing the facilities available at the college.



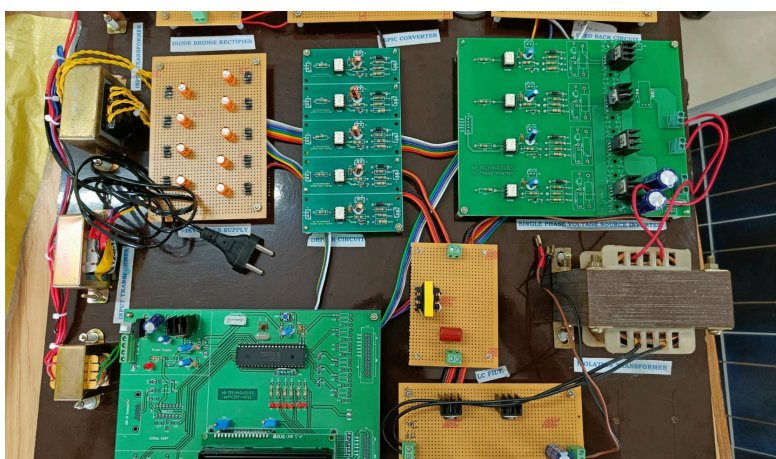
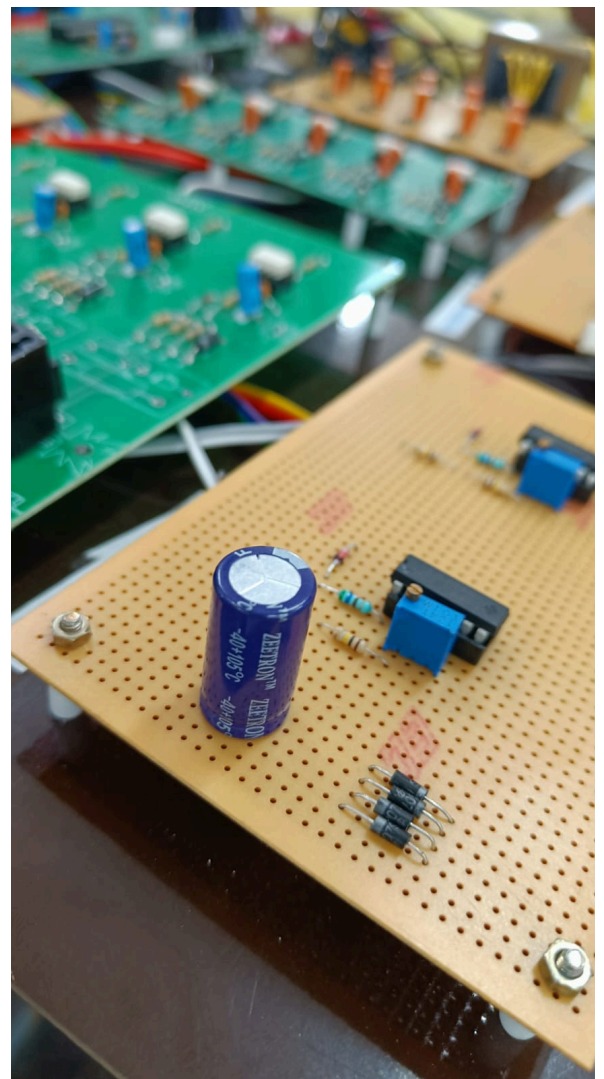
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Outcome from Electric Vehicle Centre of Excellence

“IMPLEMENTATION OF CLOSED LOOP CONTROL FOR TWO STAGE DC-DC ISOLATED CONVERTER USING GLOBAL MONOTONIC TRACKING SYSTEM”

Sai Siddarth T S, Pranav B, Yuvaraj N, Ramana Krishnan S

“The students assembled the PCB at the Electric Vehicle Centre of Excellence Lab facilities. To enhance efficiency, reliability, and speed in electric vehicle (EV) charging systems, this project proposes a two-stage isolated DC-DC converter utilizing global monotonic tracking. The system features an advanced charging architecture powered by a photovoltaic (PV)-based supply, integrated with a SEPIC converter and optimized control strategies. A single-phase high-frequency inverter, combined with an LC tank network and an isolation transformer, ensures efficient energy transfer and operational safety.”



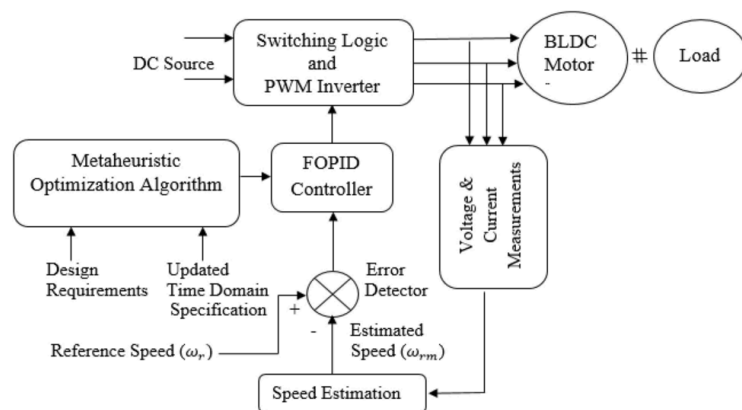
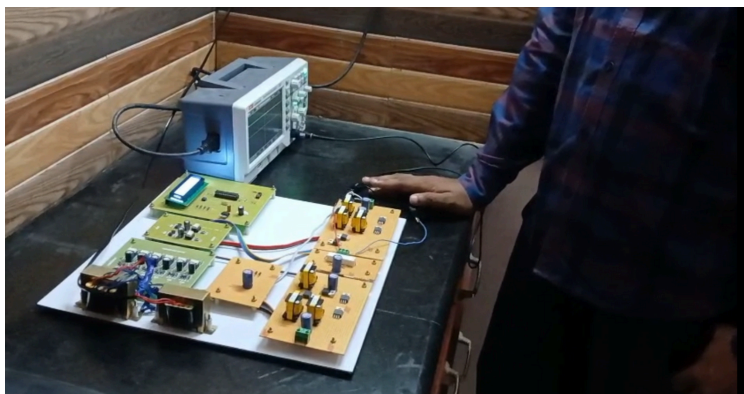
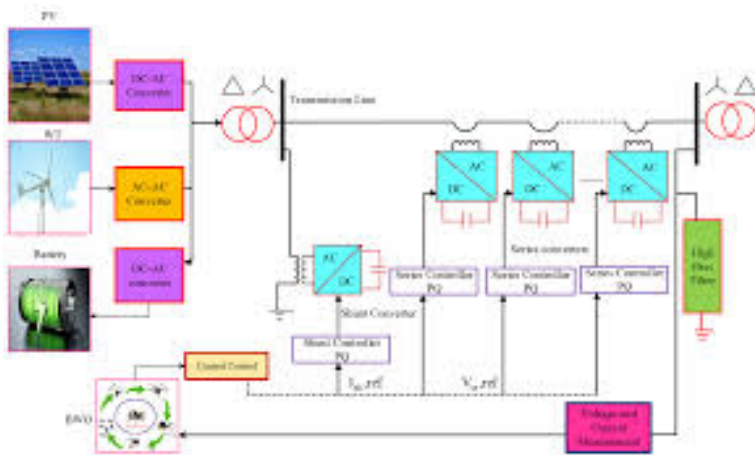
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Outcome from Electric Vehicle Centre of Excellence

“Design and implementation of FOPI controller for multiphase inherited dc-dc converter using GA optimaization”

Roshan Aravind, Sridhasanambi, Elamparithi, Gurudevan

“In modern power electronics, high efficiency and fast dynamic response are essential for DC-DC converters, particularly in high-current, low-voltage applications such as data centers, electric vehicles, and renewable energy systems. This Project presents the design and implementation of a Fractional Order Proportional-Integral (FOPI) controller for a multiphase interleaved DC-DC converter. The proposed control strategy is designed to enhance system stability, minimize output voltage ripple, and improve transient performance.”



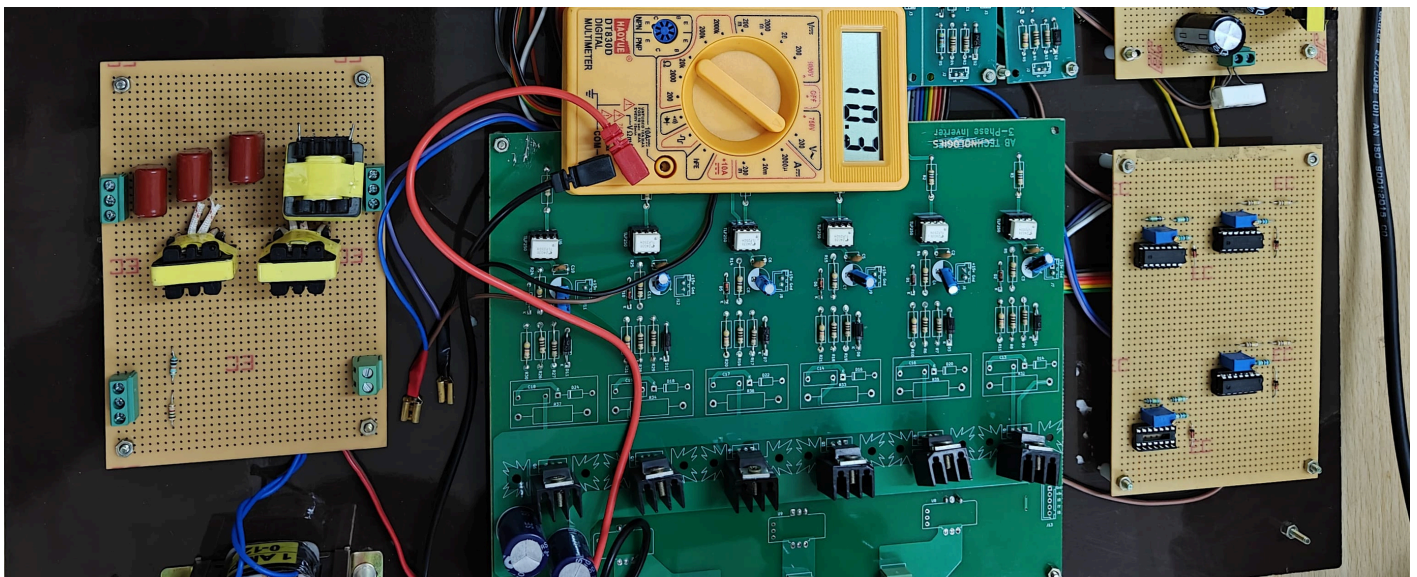
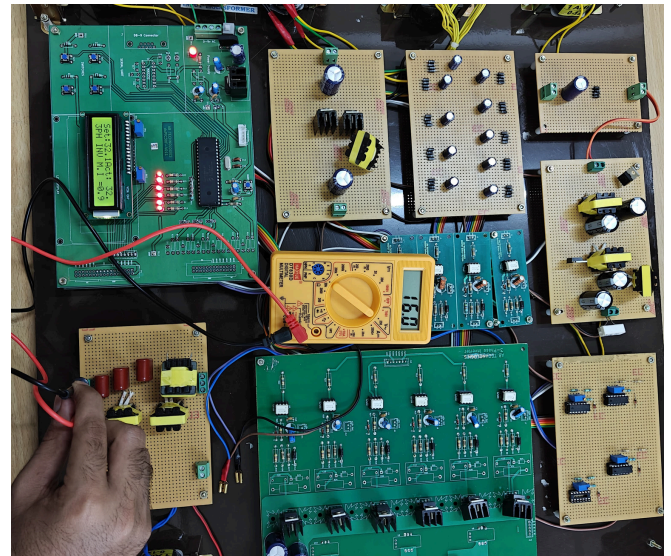
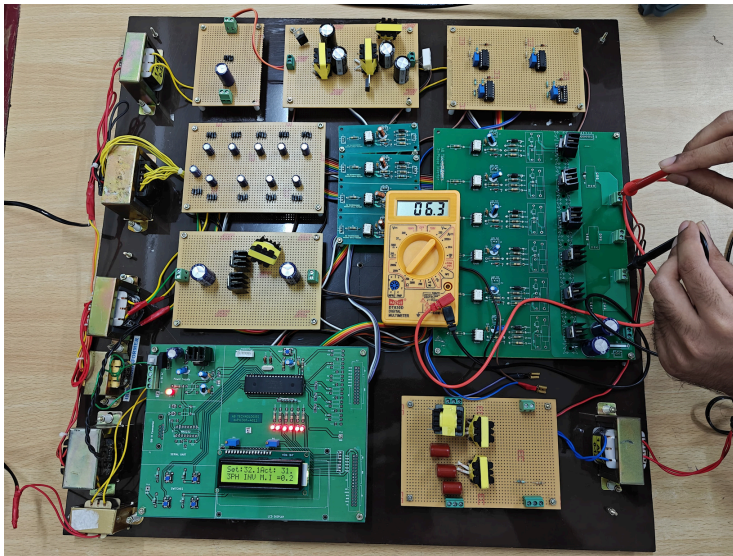
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“PV FED EV CHARGING STATION USING RELIFT LUO CONVERTER WITH ANFIS CONTROLLER”

ABDUL HAFREEDH, RAHUL T, SRINIVASAN S, NIJANTHAN S

“The project was developed and tested at the Electric Vehicle Centre of Excellence Laboratory. It proposes a hybrid power management system designed for efficient energy integration and utilization in electric vehicle (EV) applications. The system integrates a photovoltaic (PV) array, an AC grid source, and a battery storage unit, all coordinated through advanced power electronics and control strategies. PV solar energy is regulated using a Landsman converter and optimized via a Radial Basis Function Neural Network (RBFNN) for Maximum Power Point Tracking (MPPT), ensuring maximum energy extraction and overall system efficiency.”



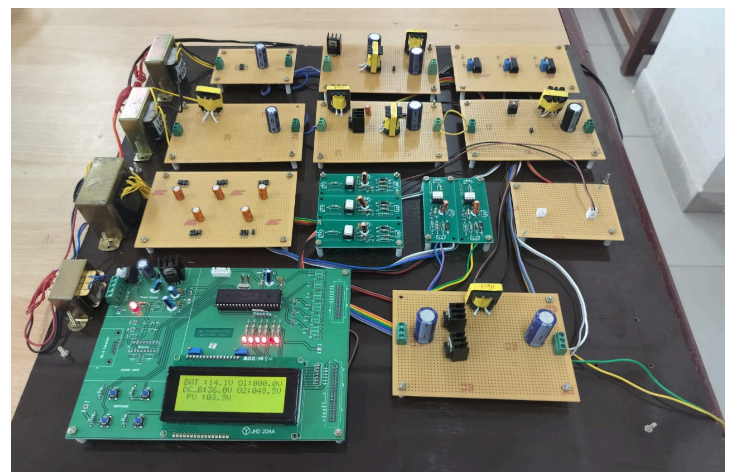
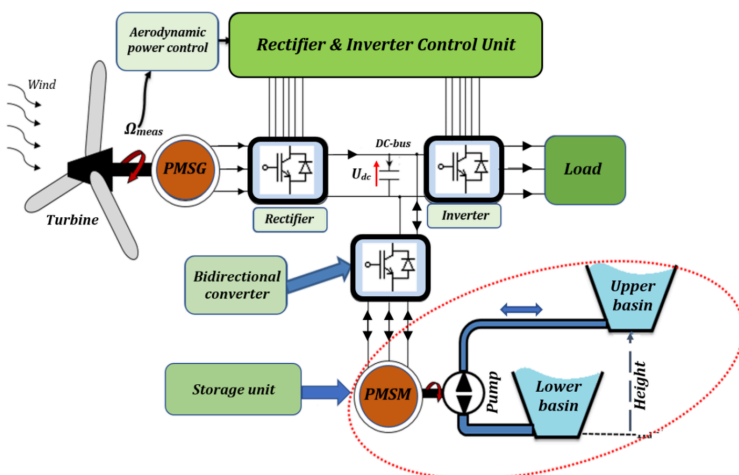
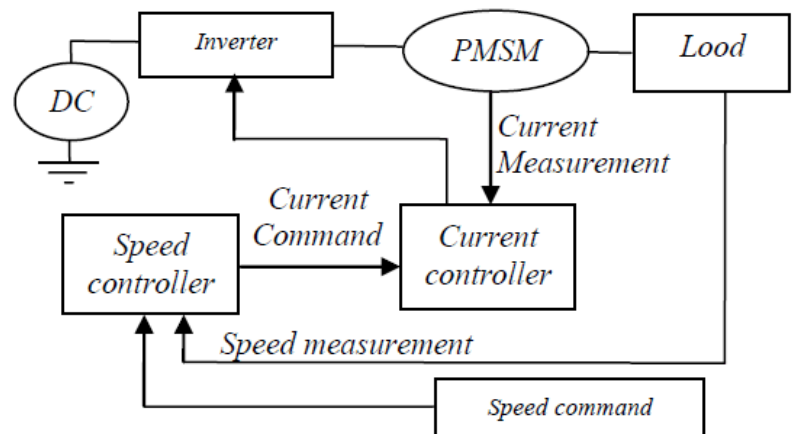
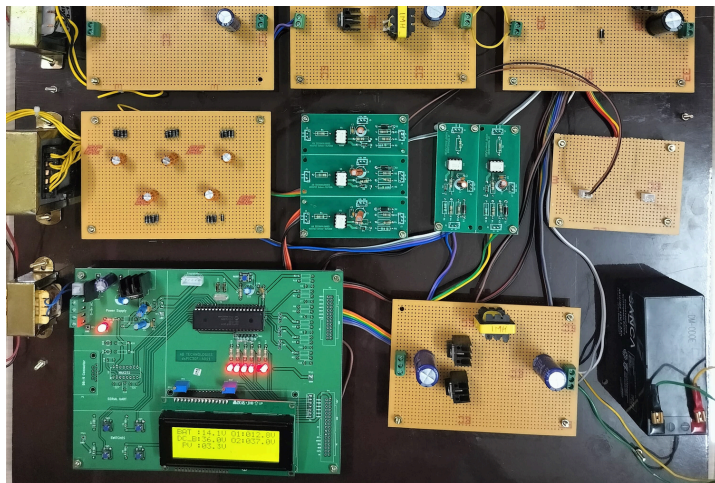
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Outcome from Electric Vehicle Centre of Excellence

“Analysis of Various Power Converters For Permanent Magnet Synchronous Motor Control”

Logesh S, Venkateshwaran R, Yogesh R, Sesahthri N

This project proposes a hybrid power management system designed for efficient energy integration and utilization in electric vehicle (EV) applications. The system incorporates a photovoltaic (PV) array, an AC grid source, and a battery storage unit, all interconnected and controlled by advanced power electronics and controllers. The PV solar energy, which is regulated using a Landsman converter and optimized through a Radial Basis Function Neural Network (RBFNN) for Maximum Power Point Tracking (MPPT).



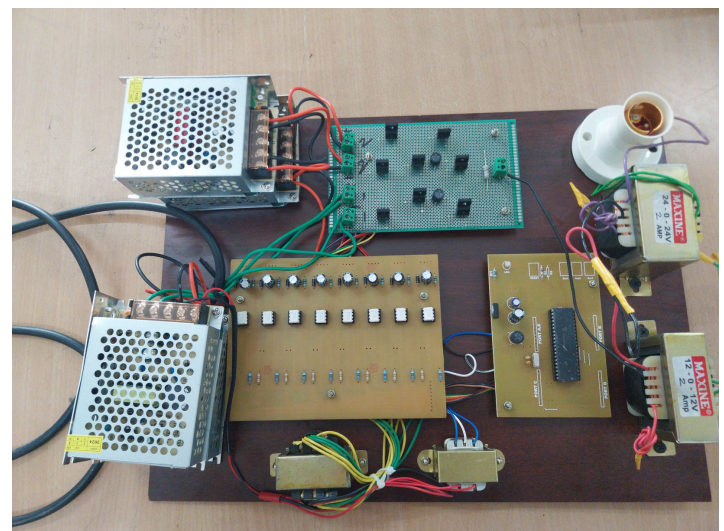
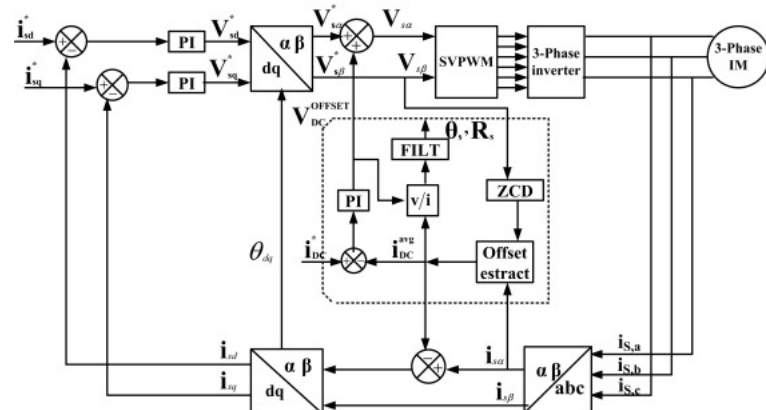
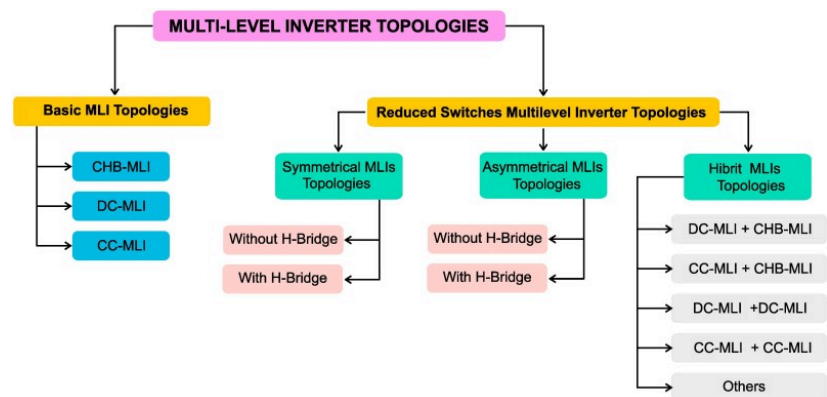
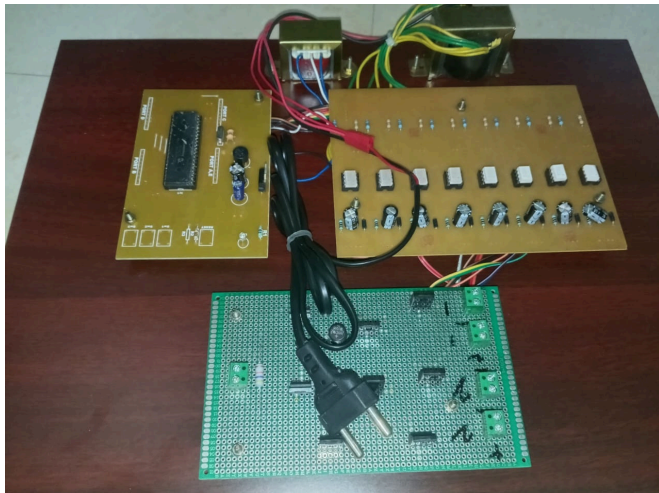
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Outcome from Electric Vehicle Centre of Excellence

“COMPARATIVE ANALYSIS OF VARIOUS CONTROL STRATEGIES FOR REDUCED SWITCH ASYMMETRICAL MULTILEVEL INVERTER”

Kaveeya. K, Priyadharshini. A, Sree Vardni. P, Swetha. S

“This project focuses on an E-Type Reduced Switch Multilevel Inverter (RSMLI) for efficient integration with renewable energy sources, particularly solar applications. The primary objective is to develop a multilevel inverter with a reduced number of switches to enhance system reliability, minimize power losses, and ensure low Total Harmonic Distortion (THD). Advanced switching strategies, including Particle Swarm Optimization (PSO), Taguchi Method, Artificial Neural Network (ANN), Moth Flame Optimization (MFO), and Carrier-based PWM, are explored. The project was assembled and tested at the college laboratory.”



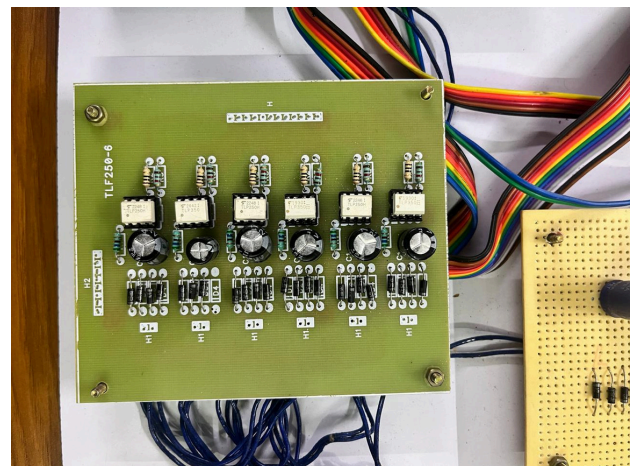
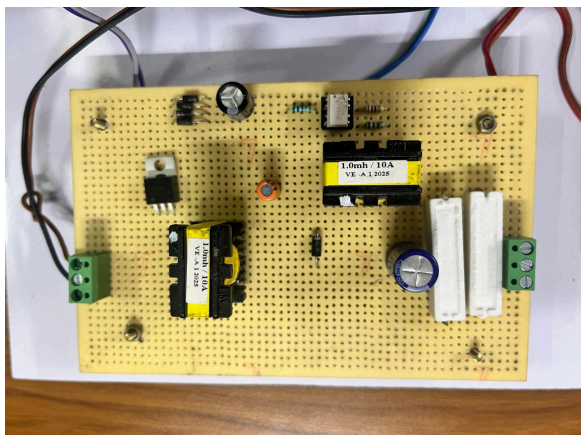
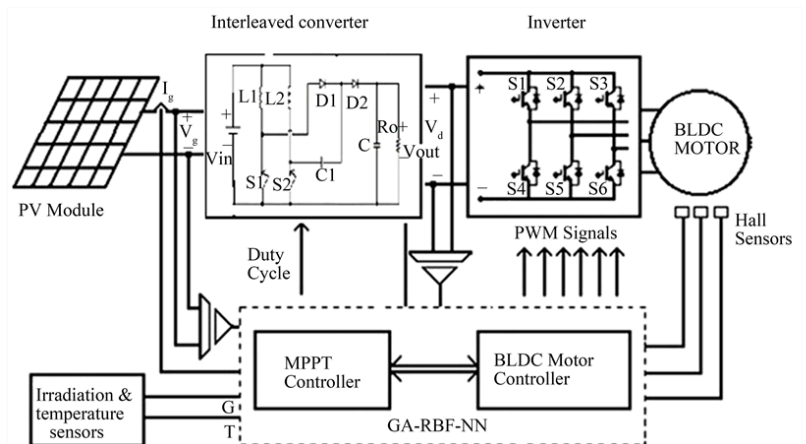
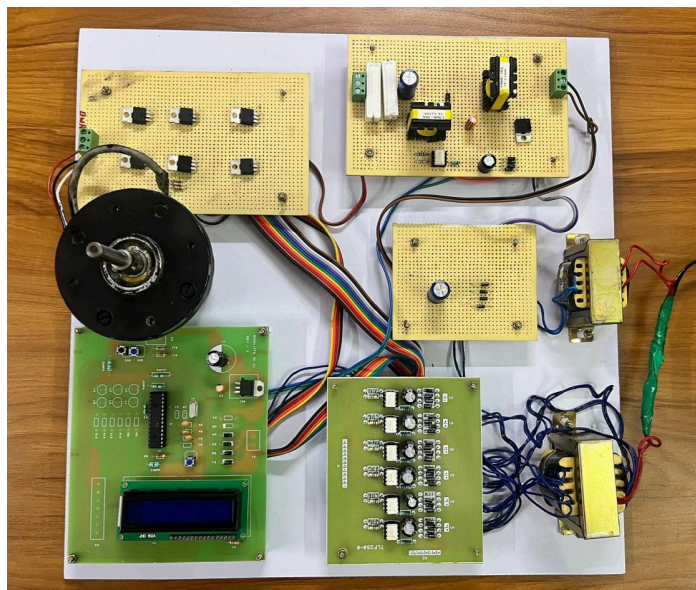
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

“DESIGN OF DC-DC BOOSTCONVERTER FOR BLDC MOTOR DRIVE USING PID AND FIREFLY ALGORITHM”

Gladson JoshuaPaulraj I,Sivaganesh M,Sabarish R,Gandham Nagendra Karthik

“This project focuses on the hardware implementation of a DC-DC boost converter to power a Brushless DC (BLDC) motordrive system using solar energyas the primary source. The primary objective is to step up the input voltage of 100V, which is generated by the solar panel, to the necessary voltage required to operate the BLDC motor efficiently. The system is designed to ensure that the motor receives a stable and reliable power supply despite variations in solar energy output, which is inherently fluctuating due to environmental conditions such as sunlight intensity and weather”



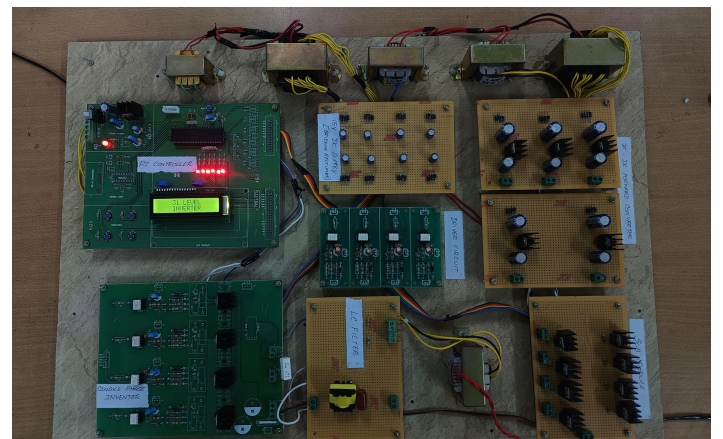
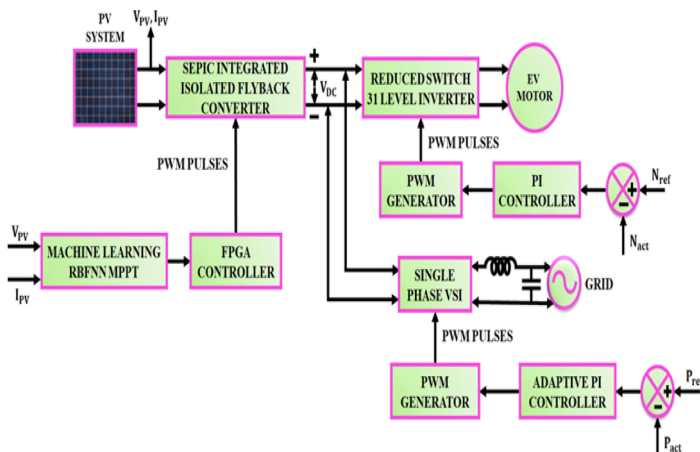
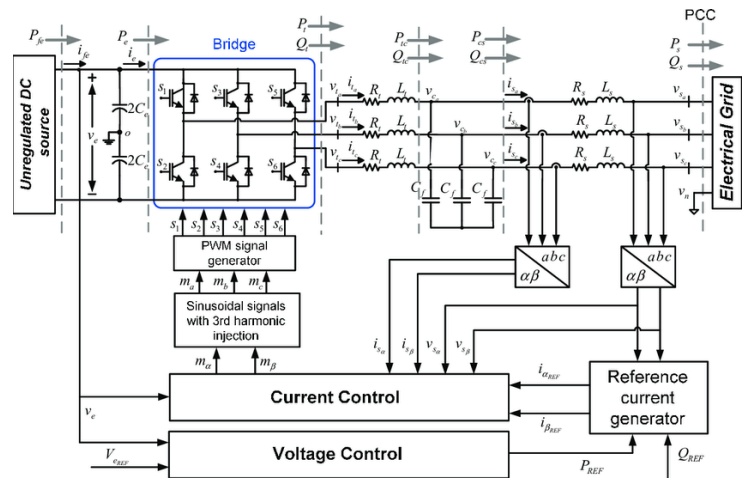
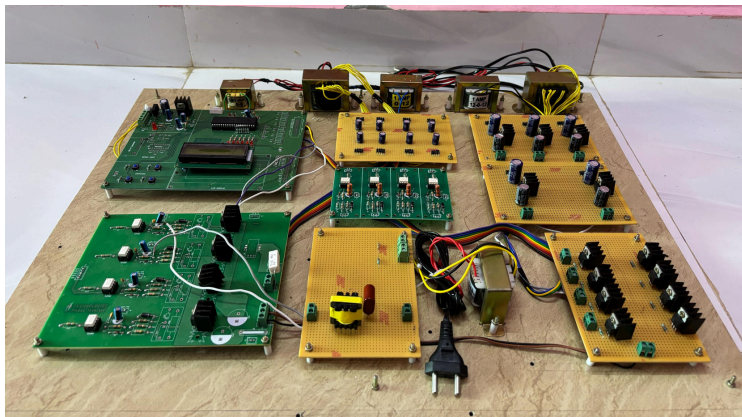
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

OUTCOME FROM ELECTRIC VEHICLE CENTRE OF EXCELLENCE

"SINGLE SOURCE ISOLATED DC-DC FORWARD CONVERTER BASED REDUCED SWITCH 31 LEVEL INVERTER FOR GRID TIED SYSTEM"

Vigneshwaran V, Santhanakrishnan E, Thilak Baskaran C M, Maheyndiran S

"The increasing demand for renewable energy sources, particularly solar and wind power, has driven significant research and development in grid-tied inverters. These inverters play a crucial role in seamlessly integrating distributed generation systems into the existing power grid. However, conventional multilevel inverters often suffer from high switching losses, complex control circuitry, and increased component count, limiting their efficiency and reliability"



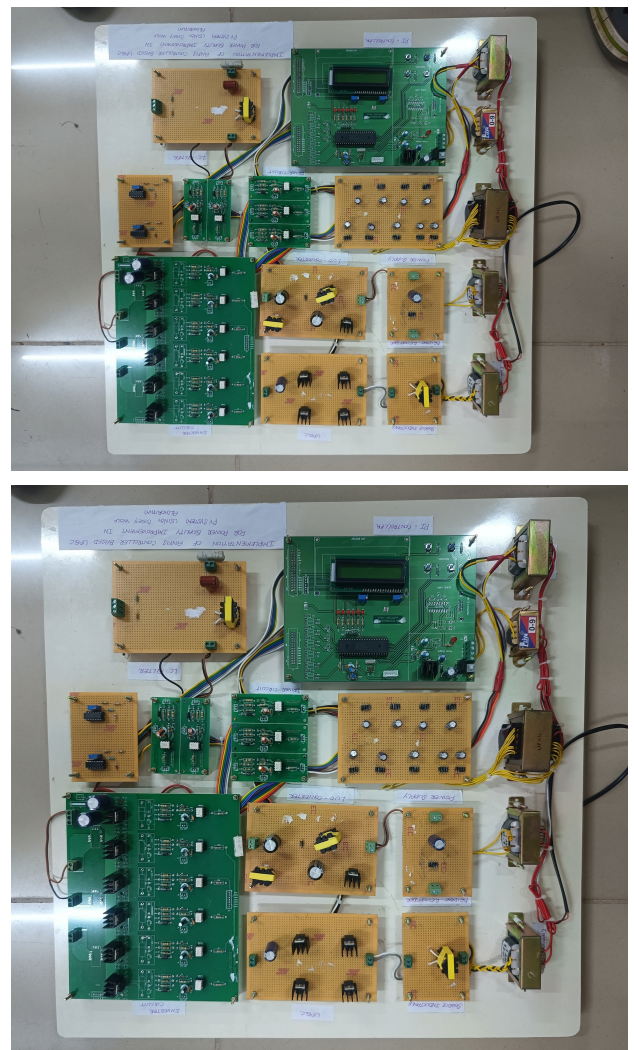
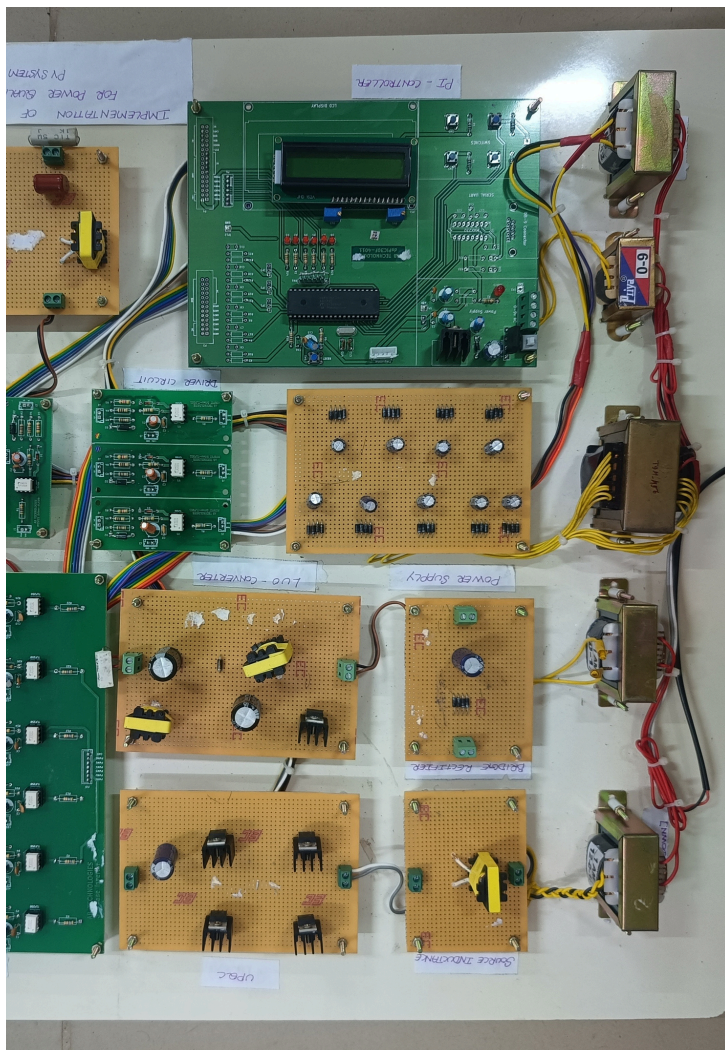
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

“ IMPLEMENTATION OF ANFIS CONTROLLER BASED UPQC FOR POWER QUALITY IMPROVEMENT IN PV SYSTEM USING GREY WOLF OPTIMIZATION ALGORITHM”

KARTHIKRAJA SD, HEMANATHAN D, PERIASAMY R, VISVAMOURTHY G

“The integration of renewable energy sources, particularly photovoltaic (PV) systems, into the power grid has grown significantly in recent years due to their environmental and economic benefits. However, the intermittent nature of solar energy and the increasing complexity of modern electrical loads can lead to power quality issues, negatively impacting the performance of electrical systems. To address these challenges, this project proposes the implementation of a PI controller-based Unified Power Quality Conditioner (UPQC) for power quality improvement in PV systems, optimized using Grey Wolf Optimization. A team of students developed this project at the college’s Electric vehicle Centre of Excellence Lab.”



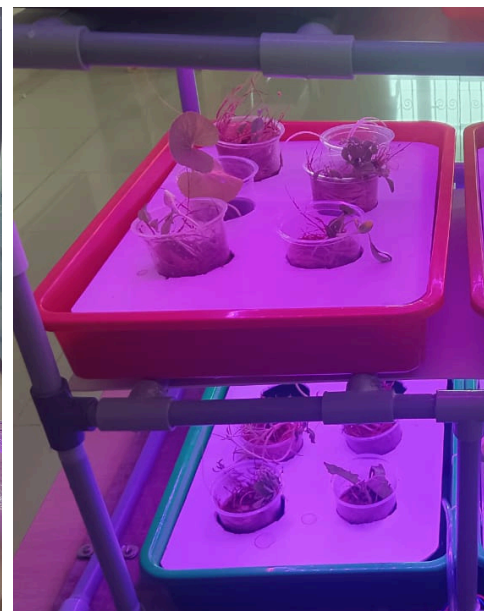
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

“ENERGY-EFFICIENT LED LIGHTING AND SMART CLIMATE CONTROL IN THE HYDROPONIC SYSTEM OF VERTICAL FARMING USING AI AND IOT”

Gayathry G,Kaviya S,Vijayalakshmi S

As the demand for food production in urban areas grows, vertical farming has become a sustainable alternative, allowing crops to be cultivated in stacked layers to maximize space efficiency, conserve water, and minimize environmental impact. This project enhances vertical farming through the integration of Artificial Intelligence (AI) and the Internet of Things (IoT), utilizing Convolutional Neural Networks (CNNs) with the ResNet50 architecture to enable predictive analysis and real-time automation. The system is powered by an ESP32 microcontroller, which collects data from pH, humidity, water level, and air quality sensors to continuously monitor essential environmental factors.



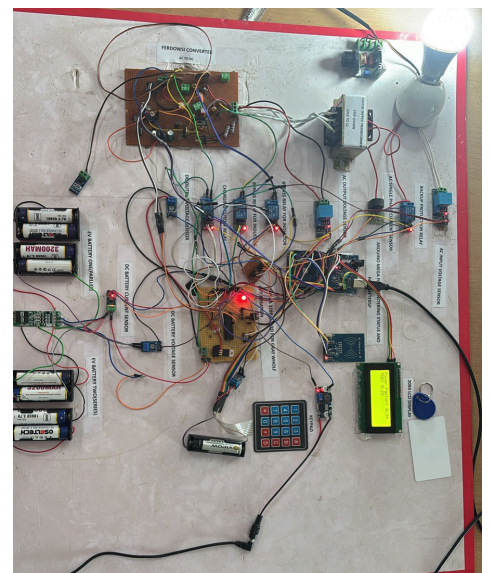
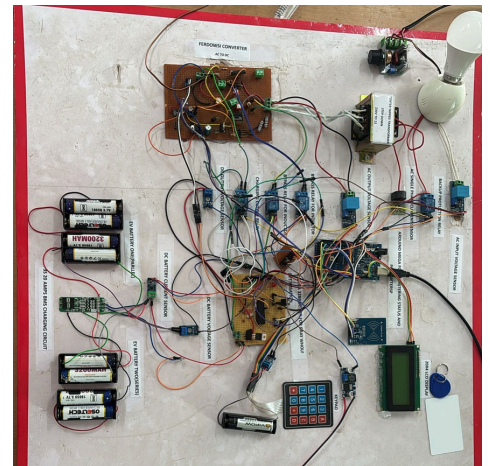
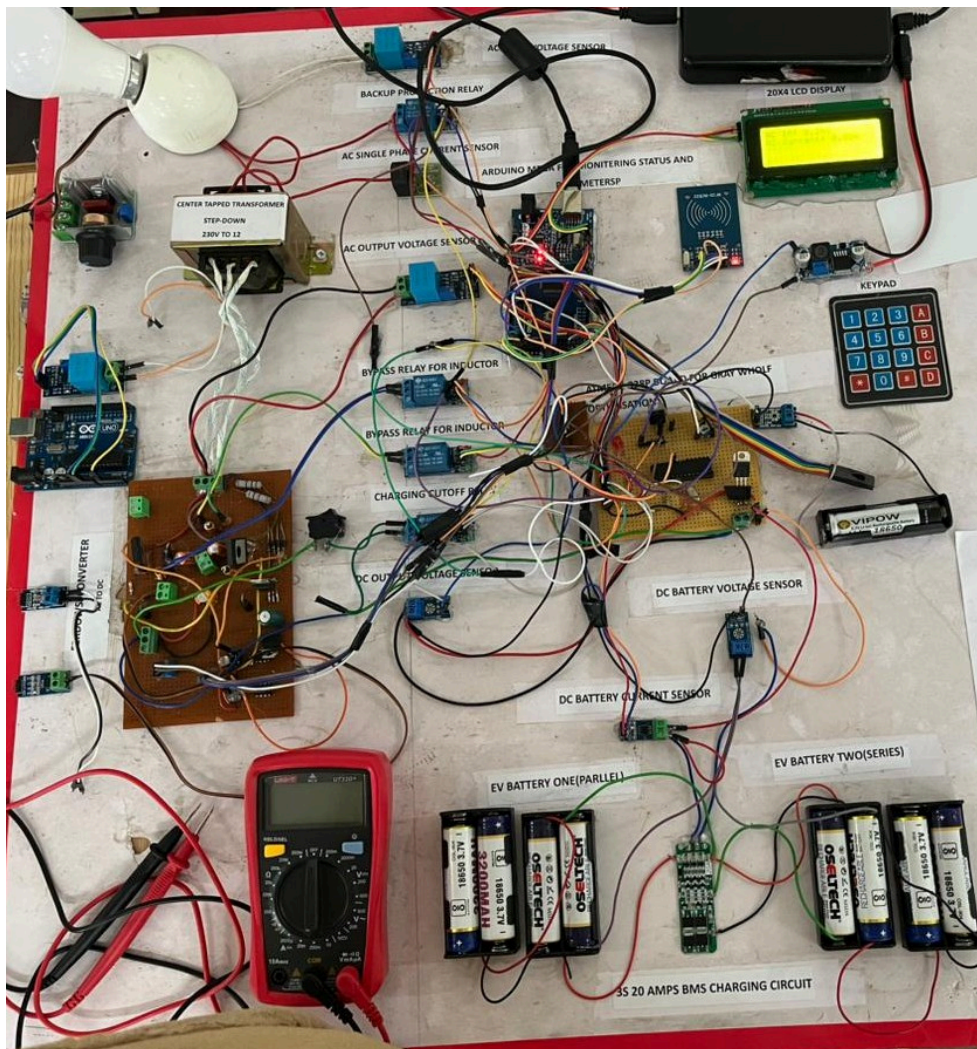
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

"POWER QUALITY ENHANCEMENT OF EV CHARGING SYSTEM WITH FERDOWSI CONVERTER USING GREY WOLF OPTIMIZATION ALGORITHM"

Dhivyashree M, Sowmya S, Susangati Samantaray, Sowmiya J

The rapid adoption of electric vehicles (EVs) has introduced significant challenges to power grid stability, particularly due to the nonlinear and dynamic nature of EV charging loads. These challenges include harmonic distortions, voltage fluctuations, and low power factor, which can degrade address these issues, this study proposes a power quality enhancement solution that combines the FERDOWSI converter with the Grey Wolf Optimization (GWO) algorithm. The FERDOWSI converter improves power flow management by mitigating harmonic distortion and maintaining voltage stability, while the GWO algorithm optimizes the converter's parameters for maximum efficiency and performance



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Outcome from Electric Vehicle Centre of Excellence

Details of Students' Participation in Events



Project Title: one stop solution for monitoring dairy plant energy consumption, hygiene and packaging waste collection from consumers



At the Smart India Hackathon 2023, held at Forge Innovation & Ventures, KCT Tech Park, Coimbatore (19-23 December 2023), students Karthikeyan P (EEE), Jeevasudan G (EEE), Soniya V (EEE), Gunapriya S (EEE), Janane (AI&DS), and Chandru G (ECE) developed the Smart Energy Box and Reverse Vending Machine aimed at improving energy management, hygiene, and waste reusability in dairy plants. Guided by industry mentors and faculty, the team successfully built a functional prototype that enables efficient monitoring and better operational practices in dairy management.

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Details of Students' Participation in Events



Team SPARK MIND from Sri Manakula Vinayagar College of Engineering, participated in Smart India Hackathon 2024 under the theme Smart Automation (Hardware Edition) with the project "Personalized Testing Kits for Testing Residual Chlorine at Delivery Points" (Problem Statement ID: 1569). The team members—Dharani E, Vignesh M (MECH, II year), Arokia Anandu Prasanthu A, Lalith Kumar S (EEE, III year), Kritha L M, and Sabtha Sree G P (ECE, III year)—developed a working prototype capable of detecting residual chlorine, silver ions, and E. coli in water samples. The solution was low-cost, portable, and user-friendly, addressing the need for safe drinking water, especially in rural areas. The hackathon experience enabled the team to turn theoretical concepts into a practical innovation with significant social impact.

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Details of Students' Participation in Events



A team from Sri Manakula Vinayagar College of Engineering–Ruthuresh A (IV Mechatronics), Karthikeyan R (IV Mech), Mukeshkumar R (III EEE), Sanjaiganesh S (III CSE BS), Kamini S (III ECE), and Aisva Malar A (II AI&DS)–participated in the Smart India Hackathon 2023 held at MIT College, Pune. Working on Problem Statement ID: SIH 1584 under the Transportation & Logistics theme (Hardware Category), Team ID 8869 developed an AI-driven, non-contact rail defect detection system using Electromagnetic Acoustic Transducers (EMATs) integrated with AI-based analytics to detect cracks, fractures, rail wear, and other defects in real time, thereby enhancing railway safety and predictive maintenance.

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Outcome from Electric Vehicle Centre of Excellence

Details of Students' Participation in Events



karthikeyan P, jeevasudan G, Soniya V, Gunapriya S, Janani from Sri Manakula Vinayagar College of Engineering participated in the Innovation, Design, and Entrepreneurship (IDE) Bootcamp Phase-II held from 29th January to 2nd February 2024 at Vardhaman College of Engineering, Hyderabad, organized by MIC and AICTE. and won the Best Idea Award for their innovative project.

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Details of Students' Participation in Events

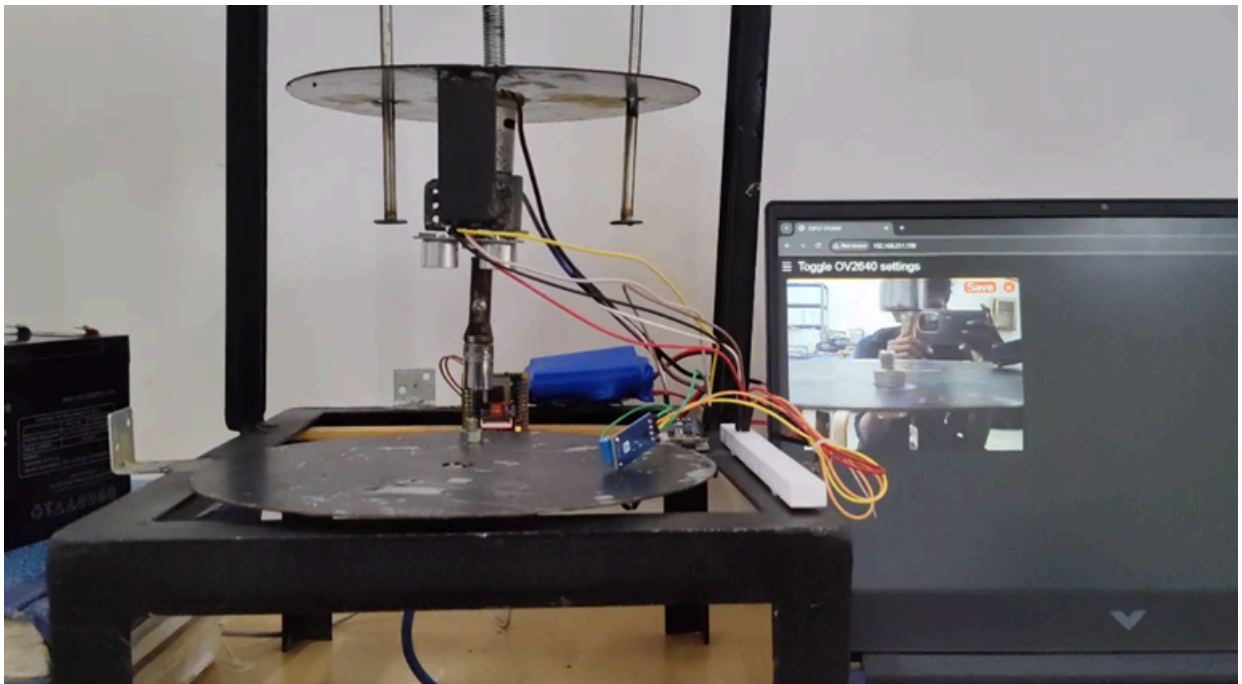
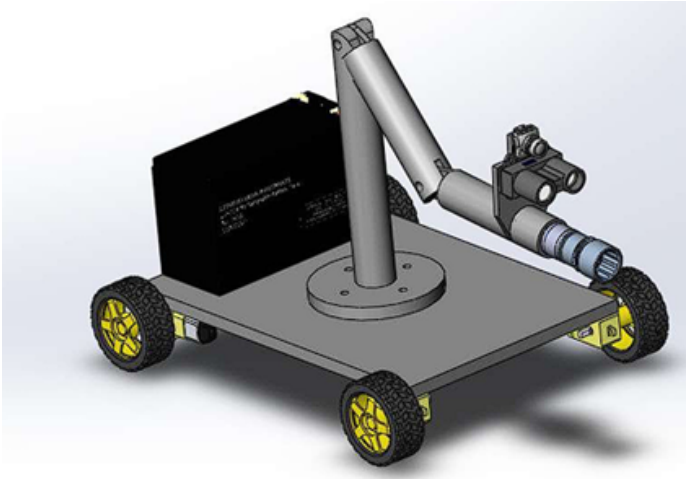
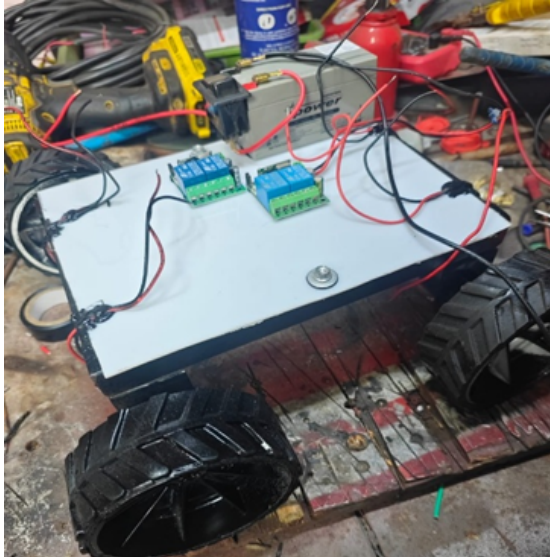


At the Innovation Design and Entrepreneurship (IDE) Bootcamp held at SRM Trichy (23-27 August 2024), organized by AICTE, Ministry of Education, Innovation Cell, and Wadhvani Foundation, students Arokia Anandu Prasanthu A, Mukesh Kumar R, Ashwin Kumar S, and Lalith Kumar S showcased their chlorine detection kit and emerged as the Top Performer Team, winning First Prize out of 76 teams. Their innovation also received incubation support from AICTE, marking a significant step toward scaling the solution for improving water safety.

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

Details of Students' Participation in Events

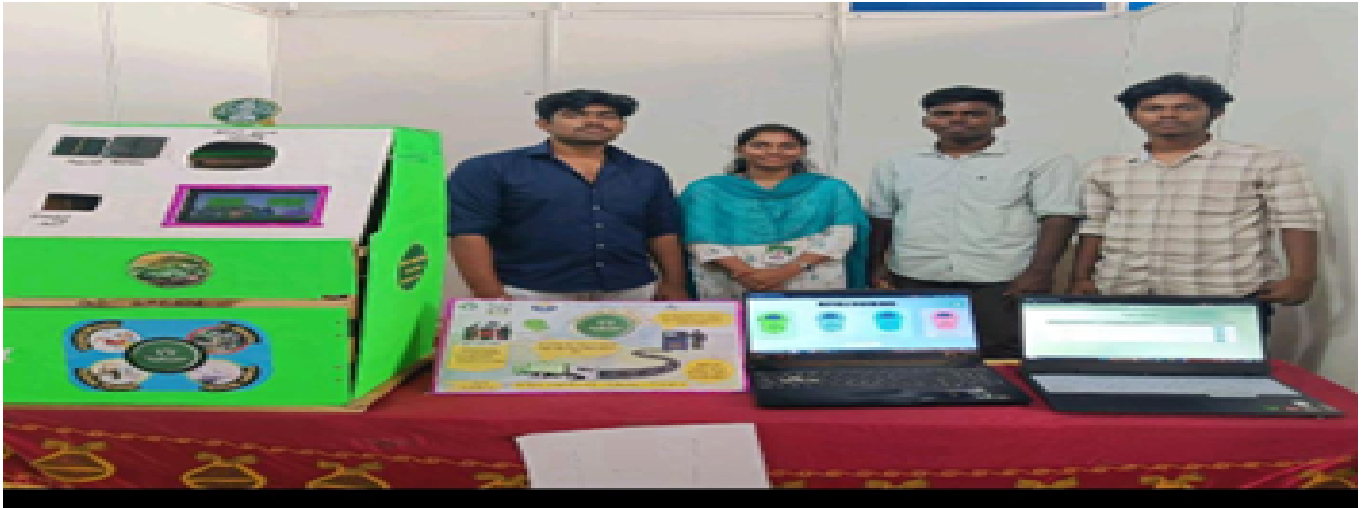


L&T Techfeast is a technology-focused event organized by Larsen & Toubro. Team Innovation Plus—comprising Raghu R(EEE), Rahul T (EEE), Sabarigireesane J (EEE), and Varsinee (EEE)—developed an Autonomous Robotic System for Wind Turbine Bolt Inspection and Maintenance. Their solution uses a LiDAR-based autonomous mini-vehicle with a robotic arm powered by ANN and torque sensors, enabling real-time detection, navigation, and tensioning of wind turbine bolts. Integrated with ESP32-CAM, Raspberry Pi, high-torque motors, and a web-based monitoring system, the prototype improves safety and reduces operational costs. The team progressed through abstract submission (Dec 2024), presentation (Jan 2025), and Virtual POC round (Mar 2025), where 134 teams were shortlisted, advancing to the Grand Finale in May 2025 among 36 finalist teams.

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Outcome from Electric Vehicle Centre of Excellence

Details of Students' Participation in Events







Soniya V, Karthikeyan P and Jayakumar D, third Year Students of EEE department participated and Won Second Place with a Cash of Rs.15,000 in Pragyan - Ingenium the inter-collegiate technical exhibition event organized by NIT Trichy which was held on 24.02.2024.



Praveen Kumar. S, Anbarasan, Srisanthosh. B, final year students of EEE department participated in Inventors Challenge 2023, organized by AICTE, Arm Education and STMicroelectronics which was held on 20.11.2023 and received Rs. 7,290 for product development.





ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|-------------------------------------|--|---|
| 1 | Fluke 1507 | <ul style="list-style-type: none"> •Insulation test range: (0.01 MΩ to 10 GΩ) •Insulation test voltages: (50 V, 100 V, 250 V, 500 V, 1000 V) |  |
| 2 | EV Car open model | To enhance the learning of students and researchers by providing hands-on experience with real-world EV components and systems. |  |
| 3 | Testing tools | Different testing can be performed using various tools to ensure the smooth and efficient operation of each vehicle component, and also, safety of users, equipment, and infrastructure. |  |
| 4 | Dismantled section of the EV motors | Understanding the internal components and their functions of different EV motors. |  |



ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|--------------------------|---|---|
| 5 | CAN Communication | Controller Area Network (CAN) bus plays a crucial role in enabling seamless communication and coordination between the different systems and components. It acts as a central nervous system, facilitating the flow of information and commands, allowing for efficient and coordinated operation of the vehicle. |  |
| 6 | LFP cells (3.7V 6000mAh) | Lithium Ferro phosphate Battery is a rechargeable battery which has large capacity of 6000mAh. Life cycle of this battery is nearly 2500-3000 where in lithium ion 1200 is maximum. This battery is extensively used in EV bike, scooter, cars, etc. |  |
| 7 | NMC cells (3.7V 1200mah) | Nickel Manganese Cobalt (NMC) cells can be connected in series and parallel configurations to make a battery packs for higher capacity used in Electric Vehicles. |  |
| 8 | Spot Welding Machine | spot welding machine plays a pivotal role in assembling the battery cells into the battery pack. This ensures the secure connections that are essential for reliable power distribution and performance. |  |



ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|--|---|--|
| 9 | EV Car model with the ADAS system simulator | It serves as a virtual environment for testing and validating ADAS functionalities in electric vehicles. This simulator replicates real-world driving scenarios, incorporating sensors and radar to emulate the perception capabilities of ADAS technologies. It allows engineers and developers to assess the control features such as adaptive cruise control, lane departure warning, automatic emergency braking, and parking assistance. |  A photograph of an 'EV CAR EXPERIMENTAL SETUP'. It features a white control panel with a steering wheel, a small screen, and various buttons. The panel is mounted on a green metal frame with purple tabletops on either side. Red and blue lights are visible at the base of the frame. |
| 10 | Cell Tester 5V 20A 8Ch with Temperature sensor | The Cell Tester 5V, 20A, 8Ch with Temperature Sensor is a specialized device designed for testing and monitoring of lithium-ion battery cells in various conditions. This device is essential in battery research providing accurate measurements of voltage, current, and temperature to evaluate cell capacity, health, and overall operational characteristics. |  A photograph of a 'CELL TESTER' unit, which is orange and black. It has multiple channels with red LEDs and is connected to several black cables. In the background, a computer monitor displays a graph, and various tools like a screwdriver and a multimeter are visible on the desk. |

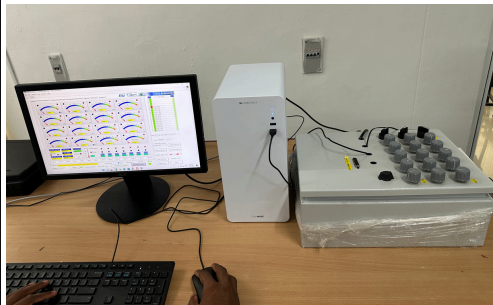
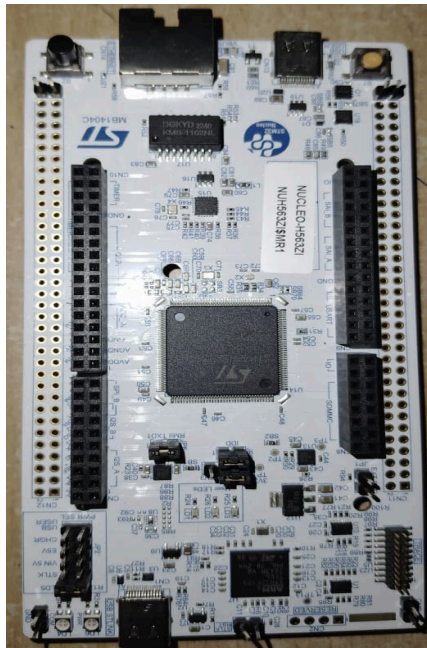
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S. No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|-------|---|--|--|
| 11 | Battery pack equalizer 24S 5A with Active balancer with Bluetooth | Battery pack equalizer actively monitors and balances each cell's voltage and state of charge to ensure uniformity among the cells and maximize the lifespan. Bluetooth connectivity enhances the remote monitoring and control via a mobile app or computer interface, providing real-time data of individual cell voltages, temperatures and current |  |
| 12 | PMSM Motor Test Bench with loading 2000 Watts | It is specially designed to evaluate and validate the performance characteristics of PMSM motors under various operating conditions. By precisely controlling torque and speed, the test bench assesses the motor's efficiency, torque-speed characteristics, thermal management capabilities, and overall operational reliability. This setup is crucial for research, development, and quality assurance in industries like automotive (electric vehicles) and industrial automation |  |

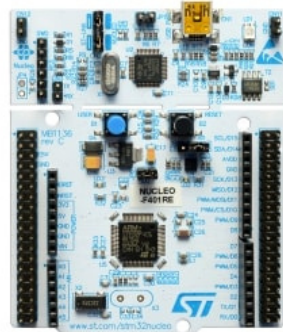



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Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|---------------------------------|---|---|
| 13 | Programmable BMS | <p>A Programmable Battery Management System (BMS) is an advanced type of BMS that allows for customization and control over various battery management functions through programmable settings and parameters. These systems are designed to manage and protect rechargeable batteries by monitoring their state and balancing the cells.</p> |  |
| 14 | Nucleo H563ZI development board | <p>It facilitates the rapid prototyping, evaluation, and development of high-performance embedded applications using STM32H7 series microcontroller. It provides a comprehensive platform equipped with extensive connectivity options, including Arduino Uno Rev3</p> |  |





ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|-----------------------|--|---|
| 15 | NUCLEO-F401RE | This board is used to design, implement, and evaluate innovative solutions in the fields of IoT, automation, and electronics. |  |
| 16 | STM32F407 | To develop, prototype, and test high performance embedded systems. |  |
| 17 | X-NUCLEO-IHM07M1 | The X-NUCLEO-IHM07M1 is a motor control expansion board designed for STM32 Nucleo development boards. It enables the closed loop control of brushed DC motors and supports various applications requiring precise motor control. |  |
| 18 | Battery charger 12 V | 50-60Hz; Rated output: 12V DC, 5-6A Max; Minimum start voltage: 8.0V; Battery range: 4-100Ah. |  |





ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|--|--|---|
| 19 | Magnifier Soldering Stand kit | Magnifier Soldering Stand with 2 LED lights for PCB Soldering Work (35 X / 12 X 65mm / 17mm Lens, Dual-Mode |  |
| 20 | Cycle Hub Motor Kit | <ul style="list-style-type: none"> • 36V, 250W • Battery voltage with speedometer • 12 magnets PAS sensor • 3 level PAS switch • Rear light • Hub motor with waterproof connector <p>A pedal assist system (PAS) is the system used by electric bikes to provide additional power to the rider when pedaling</p> |  |
| 21 | SMD Rework Station (Round Tip) 50 W Temperature Controlled | Surface Mount Device (SMD) rework station .They are used for soldering and de-soldering of integrated circuit (IC) parts or chips and Ball Grid Array (BGA). |  |
| 22 | IR Tester with holder | To estimate Internal resistance upto 0.001 mΩ |  |




ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.N o | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|----------|--------------------------------|--|---|
| 23 | Prismatic cells | capacity : 3.2V , 100Ah |  |
| 24 | Pouch cells (3.7V, 2500mAh) | A pouch cell is a soft battery design where most of the cell components are enclosed in an aluminum-coated plastic film. |  |
| 25 | LFP cells (3.7V, 6000mAh) | Type of lithium-ion battery that uses iron phosphate as the cathode material |  |
| 26 | NMC cells (3.7V, 1200mAh) | Battery chemistry is composed of a combination of nickel, cobalt, and manganese, giving them a high energy density and long life |  |

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments Photo |
|------|---|--|---|
| 27 | Internal Resistance Tester | <ul style="list-style-type: none"> It is used to measure the internal resistance and voltage of the battery at the same time. It adopts kelvin four-wire test clip, which can avoid the influence of contact resistance and wire resistance, and can make more accurate measurement. Resistance measurement range (1 microΩ~200Ω) |  |
| 28 | Vehicle Dismantling Tools •Spaner set •Cutting plier •Hand tool kit •Measurement Tape •Wire Cutter | This facility is utilized by UG/ PG students and Faculty members for their mini projects, final year project and research projects. |  |
| 29 | Safety kits | Safety kits in electric vehicles protect technicians and rescuers from high-voltage electric shocks during maintenance or emergencies by providing insulated tools and protective gear. They enable safe handling of the EV's electrical components, ensuring quick and secure rescue or repair operations. |  |

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle



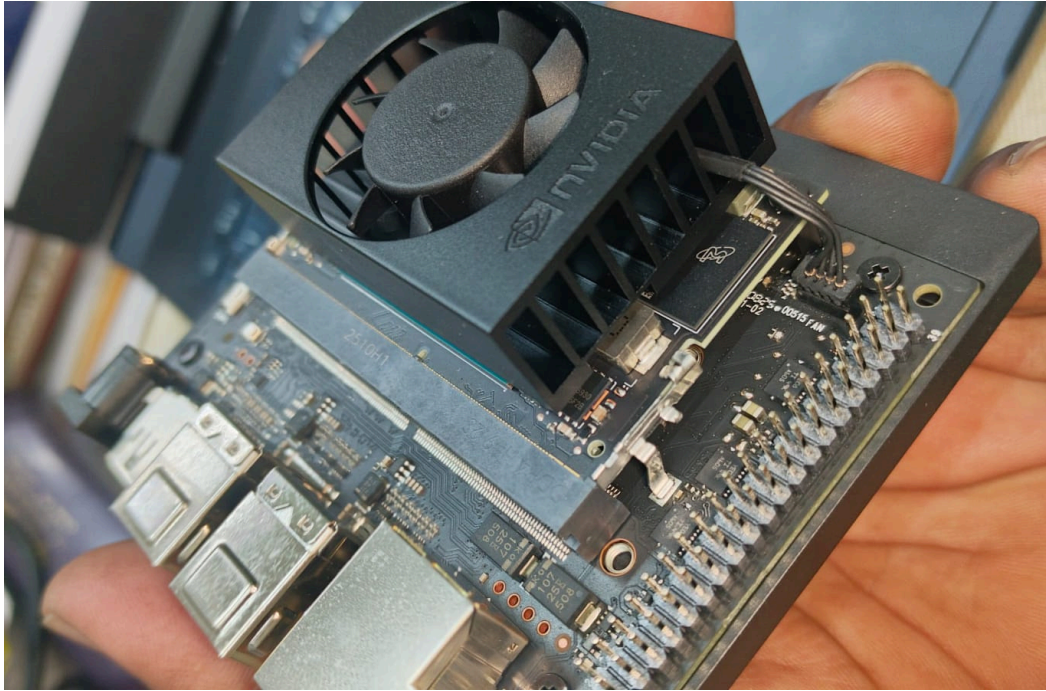
The computer setup used in the EV Centre of Excellence includes an Intel i7 11th Generation processor, 16GB RAM, 2GB NVIDIA graphics card, and a 19" ACER monitor, supporting high-end software like MATLAB for EV system simulation and modeling, ANSYS for structural and thermal analysis, and Cadence Allegro for electronic circuit and PCB design; these tools collectively enable efficient development, testing, and optimization of electric vehicle components and systems.



ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment Details of Centre of Excellence in Electric Vehicle

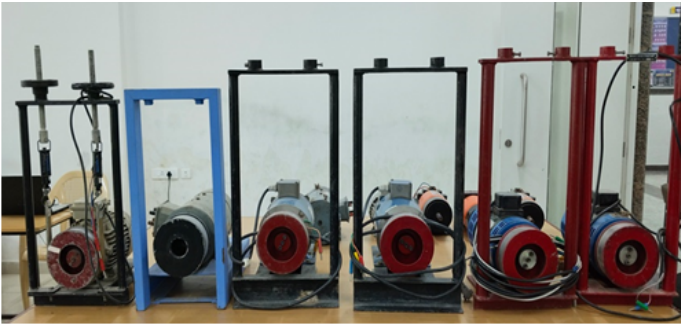
Facilities for developing an AI-Powered Autonomous Vehicle System using Jetson Nano Orin- edge technology with sensor fusion and navigation



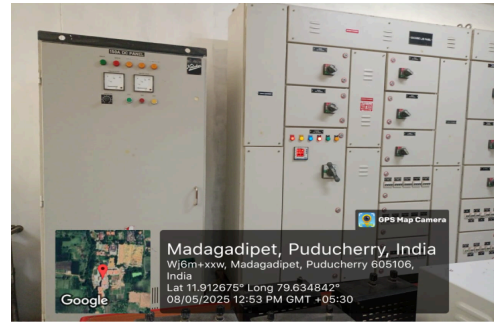
A group of students is developing a model for autonomous vehicles by integrating sensors and AI algorithms to enable self-driving capabilities. They work on environment perception, obstacle detection, and decision-making for safe navigation. The project involves programming vehicle control systems to automate steering, braking, and acceleration. This hands-on experience advances understanding of autonomous technology and its real-world applications.

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Details of Electric motors/ DC source/ Instruments in Laboratories



Prony brake arrangement motor for load test in Power Electronics and Drives Lab



150A DC Rectifier Panel in Electrical Machines Lab



AC & DC Machine Trainer Control Unit



Variable DC Power supply in Power Electronics Lab





DC Shunt Motor coupled to Induction Generator



DC Motor/DC Generator coupled to Three Phase Alternator/Synchronous motor


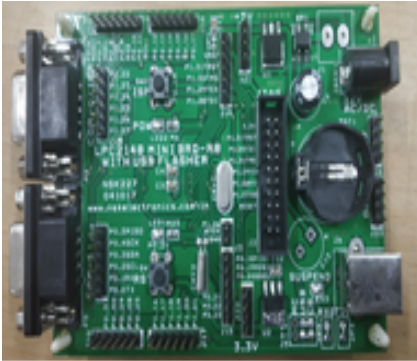
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment details of Project Laboratory/Research Laboratory

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments/ controller Photo |
|------|---|--|---|
| 1 | IMCSIG Oscilloscope ProbeCP2100A AC/ DC current probe-800KHz, 10A/100A | <ul style="list-style-type: none"> •Used for measuring current in AC/DC circuits via an oscilloscope (800kHz,10 A/100 A (peak)) •Clamp-type probe allows non-intrusive measurement - Powered via USB, compatible with various oscilloscope brands •Useful for motor drive analysis, power electronics, inverter testing and waveform visualization. |  |
| 2 | EVAL - L9963 MCU | <ul style="list-style-type: none"> •Battery management monitoring and testing board •Measures and manages 4 to 14 lithium-ion cells in series •Communicates via SPI for external MCU integration •Used in EV battery systems, energy storage, and research applications |  |

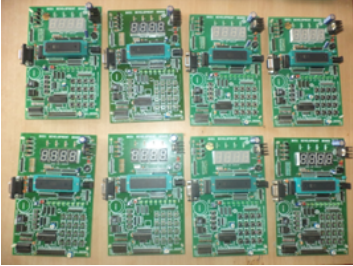


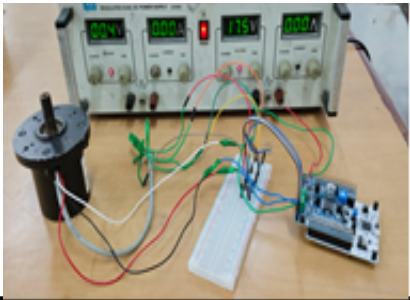
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment details of Project Laboratory/Research Laboratory

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments/ controller Photo |
|------|---|--|---|
| 3 | Low Voltage BLDC Motor Driver Board (X-NUCLEO-IHM08M1). | <p>To monitor and control closed-loop operation of BLDC/PMSM motors.</p> <ul style="list-style-type: none"> •Allows PWM-based control for speed and torque management •Includes safety features: overcurrent, short-circuit, and thermal protection •Ideal for developing and testing EV drives, drones, and robotic applications |  |
| 4 | ARM 7 Development Board | <p>ARM 7 Development Board is used for both learning and practical implementation in the field of embedded system.</p> |  |

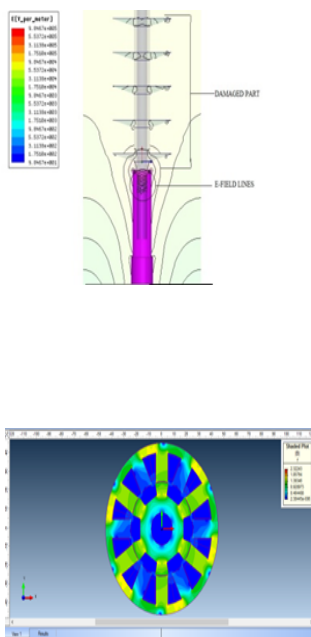

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment details of Project Laboratory/Research Laboratory

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ instruments/ controller Photo |
|------|--|--|---|
| 5 | Microcontroller 8051 development board | It is designed for prototyping and developing projects using the 8051 microcontroller |  |
| 6 | dSP 2812 kit / DSP 5x /6x Digital signal Processor | ARM 7 Development Board is used for both learning and practical implementation in the field of embedded system. |  |
| 7 | Universal programmer burner Top 2008 | Universal programmer burner is a device designed for programming various types of programmable devices, such as microcontrollers, EPROMs, EEPROMs, Flash memory, and IC's. |  |
| 8 | BLDC motor control from STM32G431 series | Controller board is used in electric vehicle BLDC controller. |  |

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Equipment details of Project Laboratory/Research Laboratory

| S.No | Name of the Equipment | Purpose of the Equipment | Equipment/ software used |
|------|--|--|---|
| 9 | <p>a. Magnet 32-bit software package</p> <p>b. ANSYS Multiphysics software package</p> <p>c. AutoCAD drafting tools</p> <p>d. MATLAB software</p> <p>e. Lab VIEW software</p> <p>f. Proteus</p> <p>g. Multisim software</p> <p>h. Qualitek-4</p> <p>i. STM-32 IDE, STM-32 cube MX, STM Programmer, Keil Micro version 4</p> <p>j. Kicat PCB 9.0</p> <p>h. orcad PCB Editor</p> | <p>Learning various software tools used to design and analysis of Electrical machines. This facility is utilized by UG/PG students and Faculty members for their mini projects, final year project and research projects</p> |  |
| 10 | <p>a. Switched Reluctance Motor (680W)</p> <p>b. Permanent DC motor (4pole/250W)</p> <p>c. Double cage induction motor (2 pole/250W)</p> | <p>This facility is utilized by UG/PG students and Faculty members for their mini projects, final year project and research projects.</p> |  |



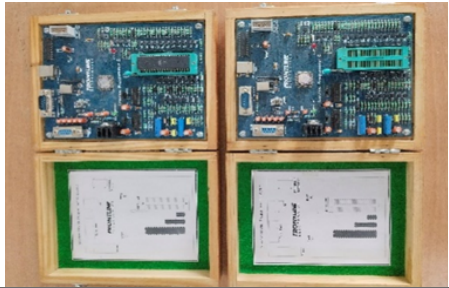
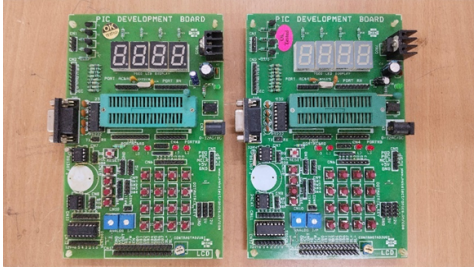
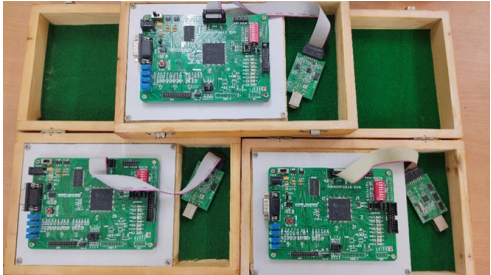
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipments Photo

| Name of the Equipment | Equipment/ instruments/ controller Photo |
|--|---|
| Performance validation of electrical machine setup (AICTE MODROB FUNDING) |  A photograph showing a laboratory setup for performance validation of an electrical machine. It includes a large black control cabinet, a computer monitor, and various cables connected to the equipment. |
| PLC Training equipment with motor Setup for industrial purpose learning (AICTE MODROB FUNDING) |  A photograph of a PLC training setup. It features a large control panel with a digital display and numerous buttons, connected to a motor and other components on a desk. |
| DSP/FPGA based speed control of BLDC motor (AICTE MODROB FUNDING) |  A photograph showing a DSP/FPGA based speed control setup for a BLDC motor. It includes a control board with many components, a motor, and various connecting cables. |
| Internet of Things Development kit (AICTE MODROB FUNDING) |  A photograph of an Internet of Things (IoT) development kit. It shows a laptop, a circuit board, and various electronic components and cables laid out on a desk. |
| Power & harmonics analyzer Model PHA-5850 |  A photograph of a power and harmonics analyzer, model PHA-5850. It is a handheld device with a screen and many buttons, surrounded by various cables and connectors. |

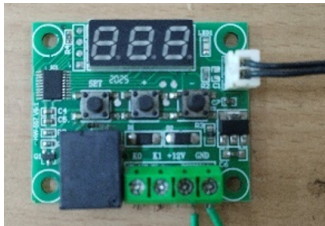
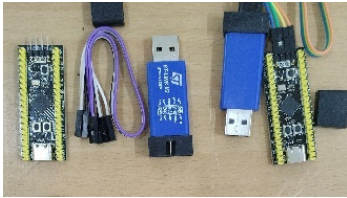
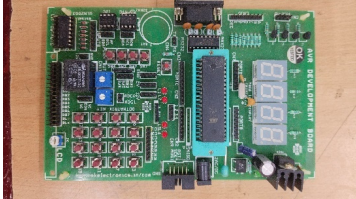

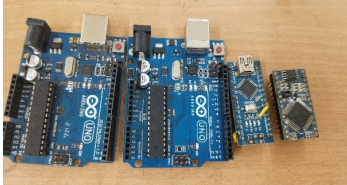

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipments Photo

| Name of the Equipment | Equipment/ instruments/ controller Photo |
|---|--|
| Solar Charge Controller |  |
| Solar Power Meter |  |
| Topview Programmer A for Philips 8051 Microcontrollers. |  |
| PIC development board |  |
| TMS320F2812 DSP Development Board |  |




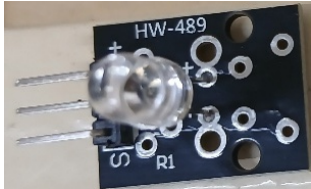
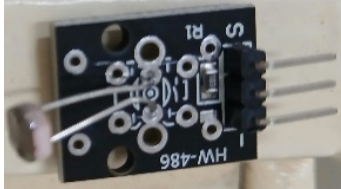

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|--|--|
| Temerature module |  |
| BlackPill board with STM32F411CEU6 with ST LINK |  |
| Devlopment board AVR |  |
| Proximentry sensor |  |
| ARDUINO UNO and Nano |  |
| Capacitor- 100 μ F, 25V and 1000 μ F, 63V, |  |

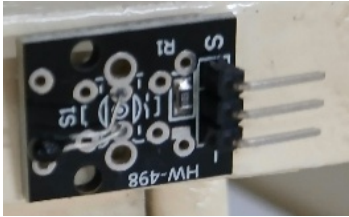
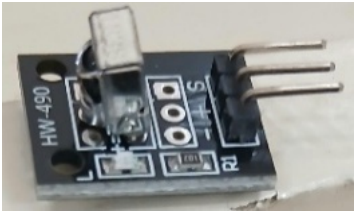



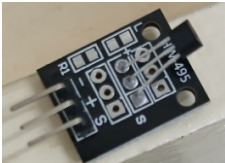
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|-----------------------------------|---|
| Temperature module |  |
| IR Obstacle Avoidance Sensor |  |
| Joystick module |  |
| TR Emission Sensor (B24) |  |
| Photo Resistor Sensor |  |
| Light Blocking Sensor/ Tap module |  |

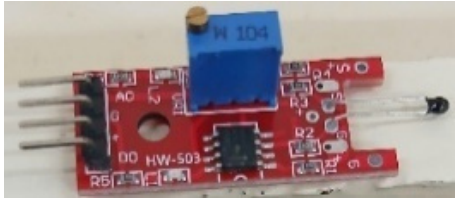
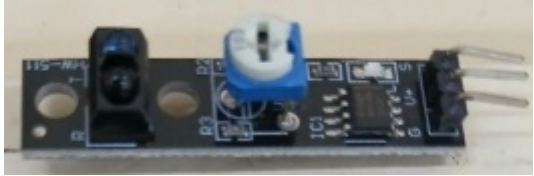
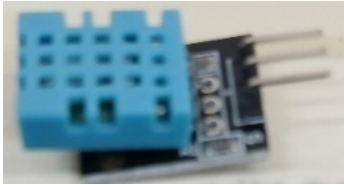


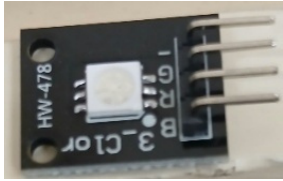
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|--------------------------|---|
| Analog Temp Sensor |  |
| IR Receiver |  |
| Touch Sensor module |  |
| Laser Emit Sensor module |  |
| Passive Buzzer module |  |
| Analog Hall Sensor B31 |  |

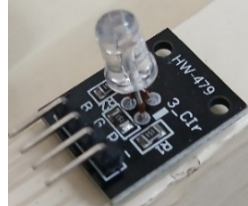

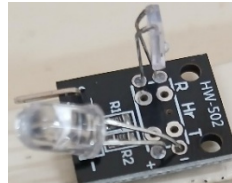
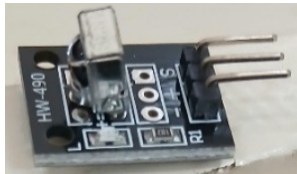
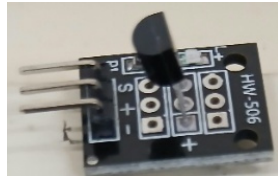

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|-------------------------------|---|
| Digital Temp. Sensor module |  A red printed circuit board (PCB) with a blue integrated circuit (IC) labeled 'DS18B20' and a blue potentiometer. It has several pins extending from the bottom. |
| Tracking Sensor module |  A black PCB with a blue potentiometer and a small black IC. It has several pins extending from the bottom. |
| Temperature & Humidity Sensor |  A small black PCB with a blue potentiometer and a small black IC. It has several pins extending from the bottom. |
| 2-Color LED module |  A black PCB with two white LEDs and a small black IC. It has several pins extending from the bottom. |
| Ball switch module |  A black PCB with a blue potentiometer and a small black IC. It has several pins extending from the bottom. |
| SMD RGB LED module B17 |  A black PCB with a small white SMD LED and a small black IC. It has several pins extending from the bottom. |

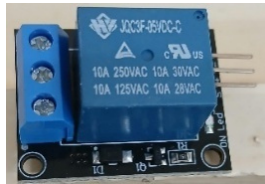
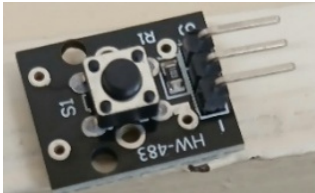
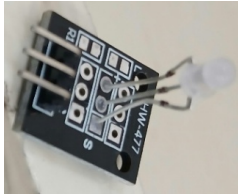
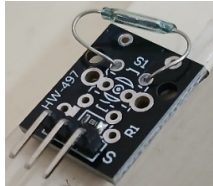

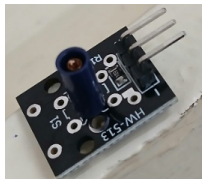
ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|----------------------------|---|
| PTH RGB LED module B18 |  A small black PCB module with a clear, dome-shaped LED lens in the center. It has several pins extending from the bottom. The text 'HW-479' is visible on the right side of the board. |
| Rotary Encoder module B30 |  A black PCB module featuring a silver-colored rotary encoder with a black knob. It has several pins extending from the bottom. The text 'HW-040' is visible on the bottom of the board. |
| Heart Beat Sensor (B32) |  A black PCB module with a clear, dome-shaped LED lens. It has several pins extending from the bottom. The text 'HW-502' is visible on the right side of the board. |
| IR Receiver module (B33) |  A black PCB module with a clear, dome-shaped LED lens. It has several pins extending from the bottom. The text 'HW-480' is visible on the left side of the board. |
| Magnetic Hall sensor (B23) |  A black PCB module with a silver-colored component in the center. It has several pins extending from the bottom. The text 'HW-506' is visible on the right side of the board. |
| Active Buzzer module B19 |  A black PCB module with a circular white label in the center. The label has the text 'REMOVE SEAL AFTER WASHING' and a plus sign. It has several pins extending from the bottom. The text 'HW-512' is visible on the bottom of the board. |

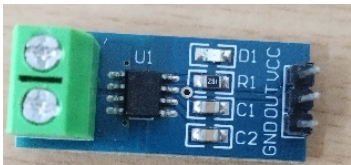
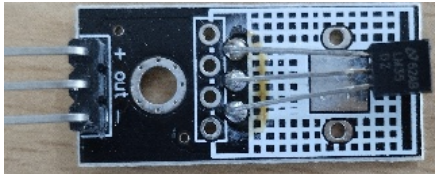

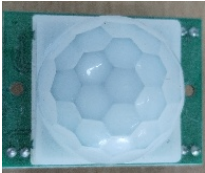

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|------------------------------|---|
| Relay Module B20 |  |
| Button sensor module B22 |  |
| 2-Color LED module B23 |  |
| Small Reed Switch module B26 |  |
| Gas Sensor B29 |  |
| Shock sensor module |  |

ELECTRIC VEHICLE -CENTRE OF EXCELLENCE

Additional Facilities of Equipment's Photos

| Name of the Equipment | Equipment/ instruments/Device Photo |
|--------------------------------|--|
| ACS712 Current sensor module |  A blue printed circuit board (PCB) for the ACS712 current sensor. It features a green terminal block on the left for wire connections. Various electronic components are visible, including a central integrated circuit (U1), several resistors (R1, R2, R3), capacitors (C1, C2), and a diode (D1). Labels on the board include 'GND', 'OUT', 'VCC', and 'GND OUT VCC'. |
| LM35 Temperature sensor module |  A black PCB for the LM35 precision centigrade centimeter temperature sensor. It has a circular cutout in the center. On the left, there are three pins labeled '+', '0', and '-'. On the right, there are four pins labeled 'VCC', 'GND', 'OUT', and 'GND'. The board is populated with the LM35CZD sensor chip and several resistors. |
| MQ2 Smoke & Gas sensor |  A blue PCB for the MQ2 smoke and gas sensor. It features a large, circular, metallic mesh sensor element in the center. The board is labeled 'MQ2' and 'F1'. |
| PIR Sensor |  A green PCB for a passive infrared (PIR) motion sensor. It has a white, dome-shaped sensor lens in the center. The board is labeled 'PIR'. |
| RFID RC522 module |  A blue PCB for the MFRC522 (labeled as RC522) RFID module. It features a white antenna coil on the right side. The board is labeled 'MFRC522' and 'RC522'. |



THANK YOU