ELECTRIC VEHICLE

A Long – Term Internship Report Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPURAMU

Submitted By

PANGA VENKATA RAVINDRA REDDY 202U1A0306

Under the Guidance Of

Mr. P. KUMAR BABU, M.Tech., Ph.D.
Professor & Head

Department of Mechanical Engineering

Long-Term Internship report submitted in partial fulfilment of the

Requirements for the award of the degree of

BACHELOR OF TECHNOLOGY
IN
MECHANICAL ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

GEETHANJALI INSTITUTE OF SCIENCE AND TECHNOLOGY

A Unit of USHODAYA EDUCATIONAL SOCIETY
Approved AICTE, New Delhi & Permanently Affiliated to JNTUA,Anantapuramu
NAAC 'A' Grade Accredited Institution, An ISO 9001:2015 certified Institution
Recognized under Sec.2(f)&12(B) of UGC Act, 1956
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3rd Mile, Bombay Highway, Gangavaram (V), KOVUR(M), SPSR Nellore (Dt.), Andhra Pradesh, India – 524137

BONAFIDE CERTIFICATE

This is to certify that the long-term internship entitled "**ELECTRIC VEHICLE**" is a bonafide record done by **PANGA VENKATA RAVINDRA REDDY (202U1A0306).** In the department of MECHANICAL ENGINNERING, Geethanjali Institute of Science and Technology, Nellore and is submitted to Jawaharlal Nehru Technological University, Anantapuramu in the partial fulfillment for the award of BACHELOR OF TECHNOLOGY degree IN MECHANICAL ENGINEERING. The work has been carried out under my supervision.

Faculty Guide
Dr. P. Kumar Babu, M.Tech, Ph.D.
Professor & Head
Dept. of Mechanical Engineering
GIST., NELLORE

Head of the Department
Dr. P. Kumar Babu, M.Tech, Ph.D.
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Submitted for the Viva -Voice Examination held on:

Internal Examiner External Examiner

(2020-2024)

INTERNSHIP REPORT

PROGRAM BOOK FOR

INTERNSHIP

(virtual)

Name of the Student: PANGA VENKATA RAVINDRA REDDY

Name of the College: Geethanjali Institute of Science and Technology

Registration Number: 202U1A0306

Period of Internship: 16 WEEKS From: 08-01-2024 To: 27-04-2024

Name and Address of the Intern Organization: SKILLDZIRE

JNTUA **University**

YEAR: - 2023-2024

An Internship Report on

ELECTRIC VEHICLE

Submitted in accordance with the requirement for the degree of

Bachelor Of Technology

Department of

Mechanical Engineering

Submitted by:

PANGA VENKATA RAVINDRA REDDY

Reg. No: 2O2U1A0306

Department of

MECHANICAL ENGINEERING

COLLEGE NAME

Geethanjali Institute of Science and Technology-Nellore

Student's Declaration

I Panga Venkata Ravindra Reddy a student of B. Tech Program, Reg. No. 202U1A0306 of the Department of Mechanical Engineering in Geethanjali Institute of Science and Technology College do hereby declare that I have completed the mandatory internship from: 08-01-2024 to 27-04-2024 in SKILLDZIRE.

(Signature and Date)

Official Certification

This Is To Certify That Panga Venkata Ravindra Reddy Reg. No. 202U1A0306 Has Completed His/Her Internship In SKILLDZIRE. On ELECTRIC VEHICLE Under My Supervision As A Part Of Partial Fulfillment Of The Requirement For The Degree Of B. Tech In The Department Of Mechanical Engineering In Geethanjali Institute Of Science And Technology -Nellore.

This is accepted for evaluation.

(Signatory with Date and Seal)

Endorsements

Faculty Guide

Head of the Department

Principal

Certificate from Intern Organization

This Is To Certify That Panga Venkata Ravindra Reddy Reg. No. 202U1A0306 Of Geethanjali Institute Of Science And Technology. Underwent Internship In SKILLDZIRE. From 08-01-2024 to 27-04-2024

The Overall Performance of The Intern During His /Her Internship Is Found To Be _____ (Satisfactory/Not Satisfactory).

Authorized Signatory with Date and Seal

CERTIFICATE OF INTERNSHIP

This is to Certify that Mr./Ms

Panga Venkata Ravindra Reddy

Enrolled in the Mechanical Engineering - 202U1A0306

From College Geethanjali Institute of Science and Technology

of university JNTUA, Anantapur

has Successfully Completed long-term Internship programme titled

Electric Vehicle (Mech)

Under SkillDzire for 240 Hours.Organized By **SkillDzire** in collaboration with **Andhra Pradesh State Council of Higher Education**.

Certificate ID: SDAP-04910

Issued On 17-Apr-2024

Approved By AICTE

Authorized Signature

ACTIVITY LOG FOR THE FIRST WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
08-01-2024	Introduction to Electric Vehicles	Overview of Electric Vehicles and its Concepts	Virtual
09-01-2024	Introduction to Electric Vehicles	Overview of Electric Vehicles and its Concepts	Virtual
10-01-2024	Introduction to Electric Vehicles	Overview of Electric Vehicles and its Concepts	Virtual
11-01-2024	Introduction to Electric Vehicles	Overview of Electric Vehicles and its Concepts	Virtual
12-01-2024	Introduction to Electric Vehicles	Overview of Electric Vehicles and its Concepts	Virtual
13-01-2024	Introduction to Electric Vehicles	Overview of Electric Vehicles and its Concepts	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 1 (From Dt 08-01-24. to Dt 13-01-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 1 inaugurates our journey into the realm of electric vehicles (EVs), marking the beginningof an exploration into the future of automotive technology and sustainability.
Participants will embark on an immersive voyage into the world of EVs, delving into the originsof electric propulsion, from its nascent beginnings to its present-day resurgence.
Through engaging lectures, interactive discussions, and multimedia presentations, participants will unravelthe underlying principles driving the rise of electric vehicles, including energy efficiency, emissions reduction, and technological innovation.
Moreover, this week offers a panoramic view of the diverse types of electric vehicles, ranging from battery electric vehicles (BEVs) to hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs).
Through real-world examples and case studies, participants will gain insights into the unique advantages and challenges associated with each EV architecture, fostering a nuanced understanding of the EV landscape.
Beyond their technological prowess, electric vehicles also hold the promise of addressing pressing environmental and societal concerns, including air pollution, climate change, and energy sustainability.
Throughout the week, participants will engage in discussions on the environmental benefits of EV adoption, exploring topics such as greenhouse gas emissions reductions, renewable energy integration, and urban air quality improvements.
In essence, Week 1 sets the stage for a captivating exploration of electric vehicles, igniting curiosity, fostering innovation, and empowering participants to embrace the transformative potential of EVs in building a greener, more sustainable future.

ACTIVITY LOG FOR THE SECOND WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
15-01-2024	Major Automotive Systems	Understanding Propulsion, Breaking, Suspension, Steering Systems	Virtual
16-01-2024	Major Automotive Systems	Understanding Propulsion, Breaking, Suspension, Steering Systems	Virtual
17-01-2024	Major Automotive Systems	Understanding Propulsion, Breaking, Suspension, Steering Systems	Virtual
18-01-2024	Major Automotive Systems	Understanding Propulsion, Breaking, Suspension, Steering Systems	Virtual
19-01-2024	Major Automotive Systems	Understanding Propulsion, Breaking, Suspension, Steering Systems	Virtual
20-01-2024	Major Automotive Systems	Understanding Propulsion, Breaking, Suspension, Steering Systems	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 2 (From Dt 15-01-24. to Dt 20-01-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
In Week 2, we delve deeper into the core components that form the foundation of electric vehicles (EVs).
Building upon the foundational knowledge acquired in the previous week, participants embark on a comprehensive exploration of the major automotive systems that are integral to the operation and performance of EVs.
The week kicks off with an in-depth analysis of propulsion systems, where participants gain insights into the various types of electric motors used in EVs, including DC motors, AC induction motors, and permanent magnet motors.
Through interactive demonstrations and technical discussions, participants explore the principles of motor operation, torque generation, and power delivery, gaining a deeper understanding of how electric propulsion drives the performance and efficiency of EVs.
Next, we shift our focus to braking systems, examining the innovative technology behind regenerative braking and its role in recapturing kinetic energy during deceleration.
Moving on, participants explore the intricacies of suspension and steering systems in EVs, uncovering the design considerations, componentry, and control algorithms that contribute to ride comfort, stability, and handling dynamics.
Through interactive workshops and vehicle demonstrations, participants gain insights into the role of adaptive suspension systems, electronic stability control (ESC), and electric power steering (EPS) in enhancing the driving experience and safety of EVs.
Throughout the week, participants engage in hands-on activities, laboratory experiments, and real- world case studies to deepen their understanding of the interplay between various automotive systems and their collective impact on the overall performance, efficiency, and driving dynamics of electric vehicles.
By the end of Week 2, participants emerge with a nuanced understanding of the sophisticated mechanisms that drive the evolution and advancement of electric mobility.

ACTIVITY LOG FOR THE THRID WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
22-01-2024	Type of HV Battery Cells	Working of Lithium-ion, Nickel-metal Hydride, Emerging Battery Technologies	Virtual
23-01-2024	Type of HV Battery Cells	Working of Lithium-ion, Nickel-metal Hydride, Emerging Battery Technologies	Virtual
24-01-2024	Type of HV Battery Cells	Working of Lithium-ion, Nickel-metal Hydride, Emerging Battery Technologies	Virtual
25-01-2024	Type of HV Battery Cells	Working of Lithium-ion, Nickel-metal Hydride, Emerging Battery Technologies	Virtual
26-01-2024	Type of HV Battery Cells	Working of Lithium-ion, Nickel-metal Hydride, Emerging Battery Technologies	Virtual
27-01-2024	Type of HV Battery Cells	Working of Lithium-ion, Nickel-metal Hydride, Emerging Battery Technologies	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 3 (From Dt 22-01-24. to Dt 27-01-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 3 sheds light on the pivotal role of high-voltage (HV) battery cells in propelling the electric vehicle revolution.
Participants delve into the intricate world of energy storage, exploring the diverse chemistries and configurations of HV battery cells that serve as the lifeblood of EVs.
The journey begins with an exploration of lithium-ion battery technology, the predominant energy storage solution powering modern electric vehicles. Participants unravel the underlying principles of lithium-ion chemistry, gaining insights into the advantages of high energy density, lightweight construction, and long cycle life.
Through interactive demonstrations and hands-on laboratory exercises, participants dissect the anatomy of lithium-ion cells, evaluating key performance metrics such as energy density, power output, and thermal stability.
Next, participants venture into the realm of nickel-metal hydride (NiMH) batteries, an alternative energy storage technology utilized in some hybrid electric vehicles (HEVs) and early-generation EVs.
Through comparative analysis and case studies, participants assess the unique characteristics and trade-offs associated with NiMH chemistry, including lower energy density, higher self- discharge rates, and reduced environmental impact. .
Moreover, the module explores emerging battery technologies on the horizon, offering participants a glimpse into the future of EV energy storage solutions.
Throughout the week, participants are immersed in a dynamic learning environment that combines theoretical insights with practical experimentation, enabling them to gain a deeper understanding of HV battery cells' diverse landscape and their pivotal role in shaping the future of electric mobility.
By the end of Week 3, participants emerge equipped with the knowledge and insights to navigate the evolving landscape of EV energy storage solutions with confidence and foresight.

ACTIVITY LOG FOR THE FOURTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
29-01-2024	Battery Management Systems	BMS Algorithms, Sensor Technologies, Thermal Management	Virtual
30-01-2024	Battery Management Systems	BMS Algorithms, Sensor Technologies, Thermal Management	Virtual
31-01-2024	Battery Management Systems	BMS Algorithms, Sensor Technologies, Thermal Management	Virtual
01-02-2024	Battery Management Systems	BMS Algorithms, Sensor Technologies, Thermal Management	Virtual
02-02-2024	Battery Management Systems	BMS Algorithms, Sensor Technologies, Thermal Management	Virtual
03-02-2024	Battery Management Systems	BMS Algorithms, Sensor Technologies, Thermal Management	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 4 (From Dt 29-01-24. to Dt 03-02-24)

Objective of the Activity Done: Electric Vehicle

Detailed Report:

In Week 4, we embark on a deep dive into the intricate world of the battery management system (BMS), a cornerstone technology essential for ensuring the health, performance, and safety of electric vehicle (EV) batteries.

Participants unravel the complexities of BMS operation, gaining insights into the sophisticated algorithms, sensor technologies, and control strategies employed to monitor and manage battery parameters with precision and efficiency.

The module commences with an exploration of BMS fundamentals, where participants gain a foundational understanding of the role and importance of BMS in EVs.

Through interactive lectures and multimedia presentations, participants delve into the key functions performed by BMS, including state-of-charge estimation, cell balancing, thermal management, and fault detection.

Participants also examine the architecture and components of a typical BMS system, from battery sensors and voltage monitors to control algorithms and communication interfaces.

Next, participants delve into the intricacies of BMS algorithms and sensor technologies, uncovering the advanced methodologies employed to monitor battery parameters such as temperature, voltage, and state of charge with high accuracy and reliability.

Moreover, the module explores the critical role of BMS in mitigating thermal runaway risks and ensuring battery safety in diverse operating conditions.

Throughout the week, participants engage in collaborative discussions, problem-solving activities, and group projects aimed at applying BMS principles to real-world scenarios and challenges.

By the end of Week 4, participants emerge with a comprehensive understanding of the pivotal role played by BMS in advancing the reliability, efficiency, and safety of electric vehicle battery systems, poised to tackle the complexities of managing EV battery fleets with confidence and expertise.

ACTIVITY LOG FOR THE FIVETH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
05-02-2024	Battery Charging Systems	Charging Infrastructure, Charging Standards, Charging Methodologies	Virtual
06-02-2024	Battery Charging Systems	Charging Infrastructure, Charging Standards, Charging Methodologies	Virtual
07-02-2024	Battery Charging Systems	Charging Infrastructure, Charging Standards, Charging Methodologies	Virtual
08-02-2024	Battery Charging Systems	Charging Infrastructure, Charging Standards, Charging Methodologies	Virtual
09-02-2024	Battery Charging Systems	Charging Infrastructure, Charging Standards, Charging Methodologies	Virtual
10-02-2024	Battery Charging Systems	Charging Infrastructure, Charging Standards, Charging Methodologies	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 5 (From Dt 05-02-24. to Dt 10-02-24

Objective of the Activity Done: Electric Vehicle

Detailed Report:

In Week 5, our exploration shifts towards the dynamic and intricate ecosystem of battery charging systems that power electric vehicles (EVs).

Participants embark on an enlightening journey through the diverse landscape of charging infrastructure, standards, and methodologies that shape the EV charging experience.

The module commences with an overview of charging infrastructure, where participants gain insights into the various types of charging stations and their deployment across residential, commercial, and public spaces.

Through interactive lectures and multimedia presentations, participants explore the evolution of charging technologies, from Level 1 slow chargers to Level 3 DC fast chargers, and their impact on charging efficiency, convenience, and accessibility for EV drivers.

Next, participants delve into the realm of charging standards, uncovering the role of organizations such as the Society of Automotive Engineers (SAE) and the International Electrotechnical Commission (IEC) in establishing uniform protocols for EV charging.

Through comparative analysis and case studies, participants examine the differences between AC and DC charging standards, including CCS, CHAdeMO, and Tesla Supercharger, and their implications for interoperability, compatibility, and global adoption of EVs.

Moreover, the module explores the diverse methodologies employed in EV charging, ranging from conventional plug-in charging to emerging technologies such as wireless charging and vehicle-to-grid (V2G) integration.

Throughout the week, participants engage in collaborative discussions, problem-solving activities, and group projects aimed at analyzing real-world charging scenarios and proposing innovative solutions to enhance the EV charging experience.

By the end of Week 5, participants emerge equipped with a comprehensive understanding of the multifaceted landscape of EV charging systems, poised to navigate the complexities of charging infrastructure, standards, and emerging trends with confidence and foresight.

ACTIVITY LOG FOR THE SIXTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
12-02-2024	Electric Vehicle Side Charging System	Side Charging Design, Functionality, Urban Infrastructure	Virtual
13-02-2024	Electric Vehicle Side Charging System	Side Charging Design, Functionality, Urban Infrastructure	Virtual
14-02-2024	Electric Vehicle Side Charging System	Side Charging Design, Functionality, Urban Infrastructure	Virtual
15-02-2024	Electric Vehicle Side Charging System	Side Charging Design, Functionality, Urban Infrastructure	Virtual
16-02-2024	Electric Vehicle Side Charging System	Side Charging Design, Functionality, Urban Infrastructure	Virtual
17-02-2024	Electric Vehicle Side Charging System	Side Charging Design, Functionality, Urban Infrastructure	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 6 (From Dt 12-02-24. to Dt 17 -02-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
In Week 6, we venture into the innovative realm of side charging systems for electric vehicles (EVs), exploring their design, functionality, and integration into urban infrastructure.
Participants embark on an enlightening journey into the concept of side charging as a novel solution for enhancing EV accessibility and convenience in densely populated areas were traditional charging infrastructure faces space constraints.
The module commences with an exploration of side charging system design, where participants gain insights into the various configurations and form factors of side chargers.
Next, participants delve into the functionality of side charging systems, uncovering the operational principles and user interface design considerations that contribute to a seamless charging experience.
Moreover, the module explores the integration of side charging systems into urban infrastructure, examining the technical considerations and urban planning implications associated with deployment.
Through site visits and urban design workshops, participants analyze the factors influencing side charging station placement, power distribution, and grid integration, with a focus on enhancing accessibility and minimizing visual impact.
Furthermore, discussions on emerging technologies such as dynamic wireless charging offer participants a glimpse into the future of urban EV charging solutions.
Throughout the week, participants engage in collaborative discussions, design charrettes, and hands-on activities aimed at analyzing real-world urban charging scenarios and proposing innovative solutions to enhance EV accessibility and convenience.
By the end of Week 6, participants emerge equipped with a comprehensive understanding of the technical, operational, and urban planning aspects of side charging systems, poised to contribute to the advancement of sustainable urban mobility solutions.

ACTIVITY LOG FOR THE SEVENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
19-02-2024	EV-DC Charging Equipment Manufacturers	DC Charging Equipment, Industry Landscape, Market Trends	Virtual
20-02-2024	EV-DC Charging Equipment Manufacturers	DC Charging Equipment, Industry Landscape, Market Trends	Virtual
21-02-2024	EV-DC Charging Equipment Manufacturers	DC Charging Equipment, Industry Landscape, Market Trends	Virtual
22-02-2024	EV-DC Charging Equipment Manufacturers	DC Charging Equipment, Industry Landscape, Market Trends	Virtual
23-02-2024	EV-DC Charging Equipment Manufacturers	DC Charging Equipment, Industry Landscape, Market Trends	Virtual
24-02-2024	EV-DC Charging Equipment Manufacturers	DC Charging Equipment, Industry Landscape, Market Trends	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 7 (From Dt 19-02-24. to Dt 24-02-24)

Objective of the Activity Done: Electric Vehicle

Detailed Report:

Week 7 shines a spotlight on the vibrant and diverse landscape of DC charging equipment manufacturers that are driving innovation in the electric vehicle (EV) industry.

Participants embark on an immersive virtual tour through the global marketplace of DC charging solutions, exploring the products, technologies, and market presence of leading manufacturers shaping the future of EV charging.

The module commences with an overview of DC charging equipment, where participants gain insights into the various types of DC chargers available in the market, including fast chargers, ultra-fast chargers, and high-power chargers designed for commercial and residential applications.

Next, participants delve into the dynamic landscape of DC charging equipment manufacturers, uncovering the diverse array of players in the market, from established industry giants to innovative startups and niche players.

Through case studies and market analysis, participants gain insights into the market positioning, product portfolios, and technological innovations driving the success of leading manufacturers in the DC charging equipment space.

Moreover, the module offers a forward-looking perspective on market trends, technological advancements, and prospects shaping the DC charging equipment landscape.

Through guest lectures and panel discussions with industry experts, participants gain valuable insights into emerging technologies such as vehicle-to-grid (V2G) integration, smart charging, and bi-directional charging, and their potential to revolutionize the EV charging experience.

Throughout the week, participants engage in interactive discussions, market research exercises, and virtual tours of manufacturing facilities, gaining a comprehensive understanding of the competitive dynamics and technological innovations driving the DC charging equipment market.

By the end of Week 7, participants emerge equipped with valuable insights and perspectives on the evolving landscape of EV charging infrastructure, poised to navigate the complexities of DC charging equipment selection and deployment with confidence and foresight.

ACTIVITY LOG FOR THE EIGHTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
26-02-2024	Regenerative Braking System	Kinetic Energy Recovery, Regeneration Modes, Benefits	Virtual
27-02-2024	Regenerative Braking System	Kinetic Energy Recovery, Regeneration Modes, Benefits	Virtual
28-02-2024	Regenerative Braking System	Kinetic Energy Recovery, Regeneration Modes, Benefits	Virtual
29-02-2024	Regenerative Braking System	Kinetic Energy Recovery, Regeneration Modes, Benefits	Virtual
01-03-2024	Regenerative Braking System	Kinetic Energy Recovery, Regeneration Modes, Benefits	Virtual
02-03-2024	Regenerative Braking System	Kinetic Energy Recovery, Regeneration Modes, Benefits	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 8 (From Dt 26-02-24. To Dt 02-03-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 8 delves into the innovative realm of regenerative braking systems, a fundamental technology in electric vehicles (EVs) aimed at maximizing energy efficiency and enhancing driving dynamics.
Participants embark on an illuminating journey through the intricate mechanisms behind regenerative braking, gaining insights into how this transformative technology harnesses kinetic energy during deceleration and braking events.
The module commences with an exploration of kinetic energy recovery, where participants uncover the physics principles underlying regenerative braking and its role in converting vehicle momentum into electrical energy for storage in the battery.
Through interactive lectures and multimedia presentations, participants delve into the technical aspects of regenerative braking systems, including motor-generator operation, power electronics control, and energy storage strategies.
Next, participants explore the various regeneration modes employed in EVs, from coasting and light braking to aggressive braking and downhill descents.
Through hands-on demonstrations and vehicle simulations, participants experience firsthand the real-world benefits of regenerative braking, including extended driving range, improved fuel economy, and reduced brake wear and maintenance costs.
Moreover, the module offers insights into regenerative braking strategies and their integration with other vehicle systems, such as traction control, stability control, and battery management.
Through case studies and engineering analyses, participants gain a holistic understanding of how regenerative braking enhances EV performance and sustainability by optimizing energy usage, enhancing vehicle stability, and reducing greenhouse gas emissions.
Throughout the week, participants engage in interactive discussions, vehicle demonstrations, and laboratory experiments aimed at exploring the practical applications and implications of regenerative braking technology.
By the end of Week 8, participants emerge equipped with a comprehensive understanding of the principles, benefits, and challenges associated with regenerative braking systems, poised to contribute to the advancement of sustainable transportation solutions.

ACTIVITY LOG FOR THE NINTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
04-03-2024	Electric Vehicle AC Systems	Design Considerations, Energy Efficiency, Thermal Management	Virtual
05-03-2024	Electric Vehicle AC Systems	Design Considerations, Energy Efficiency, Thermal Management	Virtual
06-03-2024	Electric Vehicle AC Systems	Design Considerations, Energy Efficiency, Thermal Management	Virtual
07-03-2024	Electric Vehicle AC Systems	Design Considerations, Energy Efficiency, Thermal Management	Virtual
08-03-2024	Electric Vehicle AC Systems	Design Considerations, Energy Efficiency, Thermal Management	Virtual
09-03-2024	Electric Vehicle AC Systems	Design Considerations, Energy Efficiency, Thermal Management	Virtual

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INTERNSHIP WEEKLY REPORT

WEEK – 9 (From Dt 04-03-24. To Dt 09-03-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 9 shifts our focus to the often-overlooked yet essential component of electric vehicles: the air conditioning (AC) system.
Participants delve into the intricacies of AC systems tailored specifically for electric vehicles, exploring their design considerations, energy-efficient operation, and impact on vehicle range and comfort.
The module commences with an exploration of the design considerations that go into creating AC systems optimized for electric vehicles.
Through interactive lectures and multimedia presentations, participants gain insights into the unique challenges faced by AC systems in EVs, such as space constraints, weight limitations, and thermal management requirements.
Participants also explore the integration of AC components with other vehicle systems, such as battery cooling, power electronics cooling, and cabin air filtration.
Next, participants delve into the principles of energy-efficient operation in EV AC systems, uncovering the innovative approaches employed to minimize energy consumption while maximizing cooling performance.
Through case studies and engineering analyses, participants explore the impact of factors such as compressor efficiency, refrigerant choice, and system design on overall energy efficiency and vehicle range.
Moreover, the module offers insights into thermal management strategies aimed at optimizing AC system performance and preserving battery health in diverse operating conditions.
Participants examine the role of thermal insulation, heat exchangers, and variable-speed compressors in maintaining optimal cabin comfort while minimizing energy consumption and range impact.
Furthermore, discussions on cabin comfort enhancement techniques provide participants with a comprehensive understanding of the role played by AC systems in enhancing the overall driving experience of electric vehicles.
By the end of Week 9, participants emerge equipped with a deep understanding of the design principles, energy efficiency strategies, and thermal management techniques that underpin the operation of AC systems in electric vehicles, poised to contribute to the advancement of sustainable transportation solutions.

ACTIVITY LOG FOR THE TENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
11-03-2024	HVAC-Cooling & Heating System	Thermal Management, Energy Efficiency, Component Integration	Virtual
12-03-2024	HVAC-Cooling & Heating System	Thermal Management, Energy Efficiency, Component Integration	Virtual
13-03-2024	HVAC-Cooling & Heating System	Thermal Management, Energy Efficiency, Component Integration	Virtual
14-03-2024	HVAC-Cooling & Heating System	Thermal Management, Energy Efficiency, Component Integration	Virtual
15-03-2024	HVAC-Cooling & Heating System	Thermal Management, Energy Efficiency, Component Integration	Virtual
16-03-2024	HVAC-Cooling & Heating System	Thermal Management, Energy Efficiency, Component Integration	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 10 (From Dt 11-03-24. To Dt 16-03-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 10 delves into the multifaceted realm of heating, ventilation, and air conditioning (HVAC) systems in electric vehicles (EVs).
Participants explore beyond basic climate control functionalities, uncovering the sophisticated technologies and thermal management strategies employed to regulate cabin temperature and ensure passenger comfort while maximizing energy efficiency.
The module commences with an exploration of the design considerations that shape HVAC systems in EVs, from cabin layout and insulation to component integration and control algorithms.
Through interactive lectures and multimedia presentations, participants gain insights into the unique challenges faced by HVAC systems in electric vehicles, such as limited space, variable power sources, and thermal management requirements.
Next, participants delve into the principles of energy-efficient operation in EV HVAC systems, uncovering the innovative approaches employed to minimize energy consumption while maximizing heating and cooling performance.
Through case studies and engineering analyses, participants explore the impact of factors such as heat pump technology, thermal energy recovery, and cabin pre-conditioning on overall energy efficiency and vehicle range.
Moreover, the module offers insights into component integration and control strategies aimed at optimizing HVAC system performance and passenger comfort.
Participants examine the role of sensors, actuators, and control algorithms in regulating airflow, temperature, and humidity within the cabin, ensuring a comfortable and pleasant driving experience.
Furthermore, discussions on emerging trends such as heat pump technology and thermal energy recovery offer participants a glimpse into the future of HVAC solutions aimed at enhancing the sustainability and performance of electric vehicles.
Throughout the week, participants engage in hands-on demonstrations, laboratory experiments, and vehicle simulations aimed at exploring the practical applications and implications of HVAC systems in electric vehicles.

ACTIVITY LOG FOR THE ELEVENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
18-03-2024	Body Control Module in EV	Architecture, Functionality, Integration, Cybersecurity, OTA Updates	Virtual
19-03-2024	Body Control Module in EV	Architecture, Functionality, Integration, Cybersecurity, OTA Updates	Virtual
20-03-2024	Body Control Module in EV	Architecture, Functionality, Integration, Cybersecurity, OTA Updates	Virtual
21-03-2024	Body Control Module in EV	Architecture, Functionality, Integration, Cybersecurity, OTA Updates	Virtual
22-03-2024	Body Control Module in EV	Architecture, Functionality, Integration, Cybersecurity, OTA Updates	Virtual
23-03-2024	Body Control Module in EV	Architecture, Functionality, Integration, Cybersecurity, OTA Updates	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 11 (From Dt 18-03-24. To Dt 23-03-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 11 sheds light on the pivotal role played by body control modules (BCMs) in orchestrating the myriad electronic systems and functionalities within electric vehicles (EVs).
Participants delve into the architecture, functionality, and integration of BCMs, exploring their crucial role in managing everything from lighting and infotainment to advanced driver assistance systems (ADAS) and vehicle security features.
The module commences with an exploration of BCM architecture, where participants gain insights into the hardware components, communication protocols, and software interfaces that comprise modern BCMs.
Through interactive lectures and multimedia presentations, participants explore the evolution of BCM technology, from standalone control units to integrated systems capable of interfacing with multiple vehicle subsystems.
Next, participants delve into the functionality of BCMs, uncovering their role in managing various vehicle systems and functionalities, including lighting controls, door locks, power windows, and climate control.
Through case studies and real-world examples, participants gain practical insights into the configuration and programming of BCMs to meet vehicle-specific requirements and user preferences.
Furthermore, discussions on cybersecurity considerations and over-the-air (OTA) update capabilities provide participants with insights into the evolving landscape of vehicle connectivity and software-defined functionality.
Through interactive workshops and scenario-based exercises, participants explore best practices for securing BCMs against cyber threats and leveraging OTA update capabilities to enhance vehicle performance and functionality over time.
Throughout the week, participants engage in hands-on demonstrations, diagnostic exercises, and simulation-based training sessions aimed at developing proficiency in configuring, troubleshooting, and optimizing BCMs in electric vehicles.
By the end of Week 11, participants emerge equipped with a comprehensive understanding of the critical role played by BCMs in enabling advanced vehicle functionalities, poised to contribute to the advancement of electric mobility solutions with confidence and expertise.

ACTIVITY LOG FOR THE TWELVETH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
25-03-2024	Grid-Connected EV	Vehicle-to-Grid(V2G) Technology, Grid Stabilization, Demand Response	Virtual
26-03-2024	Grid-Connected EV	Vehicle-to-Grid(V2G) Technology, Grid Stabilization, Demand Response	Virtual
27-03-2024	Grid-Connected EV	Vehicle-to-Grid(V2G) Technology, Grid Stabilization, Demand Response	Virtual
28-03-2024	Grid-Connected EV	Vehicle-to-Grid(V2G) Technology, Grid Stabilization, Demand Response	Virtual
29-03-2024	Grid-Connected EV	Vehicle-to-Grid(V2G) Technology, Grid Stabilization, Demand Response	Virtual
30-03-2024	Grid-Connected EV	Vehicle-to-Grid(V2G) Technology, Grid Stabilization, Demand Response	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 12 (From Dt 25-03-24. To Dt 30-03-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
Week 12 delves into the transformative potential of grid-connected electric vehicles (EVs) in shaping the future of mobility and energy systems integration.
. Participants explore the concept of vehicle-to-grid (V2G) technology, which enables bidirectional energy flow between EVs and the electrical grid, unlocking opportunities for grid stabilization, demand response, and renewable energy integration.
The module commences with an exploration of V2G technology, where participants gain insights into the principles of bidirectional energy exchange between EVs and the grid.
Through interactive lectures and multimedia presentations, participants uncover the technical components and communication protocols that enable V2G functionality, including vehicle chargers, smart meters, and grid management systems.
Next, participants delve into the potential benefits of grid-connected EV deployment, including grid stabilization through frequency regulation, peak shaving, and load balancing.
Through case studies and simulation exercises, participants examine real-world examples of V2G applications, from vehicle fleet management to residential energy storage, and their impact on grid reliability and resilience.
Moreover, the module offers insights into the regulatory and economic considerations associated with grid-connected EV deployment.
Participants explore the regulatory frameworks governing V2G operations, including market participation rules, tariff structures, and grid interconnection standards.
Additionally, discussions on emerging business models, such as vehicle-to-home (V2H) and vehicle-to-building (V2B) integration, offer participants a glimpse into the evolving landscape of distributed energy resources and demand-side management.
By the end of Week 12, participants emerge equipped with a deep understanding of the technical, regulatory, and economic factors driving the integration of electric vehicles into the grid, poised to contribute to the advancement of sustainable transportation and energy systems integration with confidence and foresight.

ACTIVITY LOG FOR THE THIRTEENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
01-04-2024	Lightweight Bodies in EVs	Lightweight Materials, Design Strategies, Structural Optimization	Virtual
02-04-2024	Lightweight Bodies in EVs	Lightweight Materials, Design Strategies, Structural Optimization	Virtual
03-04-2024	Lightweight Bodies in EVs	Lightweight Materials, Design Strategies, Structural Optimization	Virtual
04-04-2024	Lightweight Bodies in EVs	Lightweight Materials, Design Strategies, Structural Optimization	Virtual
05-04-2024	Lightweight Bodies in EVs	Lightweight Materials, Design Strategies, Structural Optimization	Virtual
06-04-2024	Lightweight Bodies in EVs	Lightweight Materials, Design Strategies, Structural Optimization	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 13 (From Dt 01-04-24. To Dt 06-04-24)

Objective of the Activity Done: Electric Vehicle

Detailed Report:

Week 13 delves into the realm of lightweight materials and design strategies employed to optimize the weight and efficiency of electric vehicle (EV) bodies.

Participants explore innovative approaches to vehicle body design, including the use of advanced composites, aluminum alloys, and carbon fiber-reinforced plastics.

The module commences with an exploration of lightweight materials used in EV body construction, where participants gain insights into the properties and characteristics of materials such as carbon fiber, aluminum, and high-strength steel.

Through interactive lectures and multimedia presentations, participants uncover the manufacturing processes and cost considerations associated with lightweight materials, as well as their impact on vehicle performance and energy efficiency.

Next, participants delve into design strategies aimed at minimizing vehicle weight while maintaining structural integrity and safety.

Through case studies and real-world examples, participants explore concepts such as topology optimization, multi-material design, and integrated body structures, gaining practical insights into how lightweight bodies enhance vehicle dynamics, range, and energy efficiency.

Moreover, the module offers discussions on crashworthiness, durability, and sustainability considerations associated with lightweight body design in electric vehicles.

Participants examine the trade-offs between weight reduction and safety performance, as well as the environmental implications of materials selection, manufacturing processes, and end-of-life disposal.

Furthermore, discussions on emerging technologies such as additive manufacturing and biomimicry offer participants a glimpse into the future of lightweight body design and fabrication.

By the end of Week 13, participants emerge equipped with a comprehensive understanding of the principles, challenges, and opportunities associated with lightweight body design, poised to contribute to the advancement of sustainable transportation solutions with confidence and foresight.

ACTIVITY LOG FOR THE FOURTEENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
08-04-2024	Motor Control Unit	PWM, FOC, SiC Power Electronics, Advanced Motor Control Strategies	Virtual
09-04-2024	Motor Control Unit	PWM, FOC, SiC Power Electronics, Advanced Motor Control Strategies	Virtual
10-04-2024	Motor Control Unit	PWM, FOC, SiC Power Electronics, Advanced Motor Control Strategies	Virtual
11-04-2024	Motor Control Unit	PWM, FOC, SiC Power Electronics, Advanced Motor Control Strategies	Virtual
12-04-2024	Motor Control Unit	PWM, FOC, SiC Power Electronics, Advanced Motor Control Strategies	Virtual
13-04-2024	Motor Control Unit	PWM, FOC, SiC Power Electronics, Advanced Motor Control Strategies	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 14 (From Dt 08-04-24. To Dt 13-04-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
As we approach the penultimate week, participants dive into the intricacies of motor control units (MCUs), the brains behind the operation of electric motors in electric vehicles (EVs).
Through a combination of theoretical lectures and hands-on exercises, participants explore the principles of motor control, unlocking the mechanisms that drive electric propulsion systems forward.
The module commences with an in-depth exploration of motor control principles, where participants gain insights into fundamental concepts such as pulse-width modulation (PWM), which regulates the power delivered to electric motors by adjusting the width of voltage pulses.
Through interactive lectures and multimedia presentations, participants delve into the theory and applications of PWM, understanding its role in controlling motor speed and torque with precision.
Next, participants explore field-oriented control (FOC), a sophisticated motor control technique that aligns the magnetic fields within electric motors to optimize efficiency and performance.
Through case studies and real-world examples, participants examine how FOC algorithms implemented within MCUs enhance motor efficiency and responsiveness, enabling smooth and dynamic vehicle operation.
Moreover, the module offers insights into sensor less control techniques, which eliminate the need for physical sensors by leveraging motor feedback signals to estimate rotor position and speed.
Furthermore, discussions on emerging trends such as silicon carbide (SiC) power electronics and advanced motor control strategies offer participants a glimpse into the future of electric propulsion systems.
Through interactive workshops and design exercises, participants explore innovative approaches to motor control that leverage advanced materials and algorithms to unlock new levels of efficiency, power density, and reliability in EV drivetrains.
Throughout the week, participants engage in hands-on demonstrations, simulation exercises, and laboratory experiments aimed at exploring the practical applications and implications of motor control units in electric vehicles.
By the end of Week 14, participants emerge equipped with a deep understanding of the principles, challenges, and opportunities associated with motor control, poised to contribute to the advancement of electric propulsion technology with confidence and foresight.

ACTIVITY LOG FOR THE FIFTEENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
15-04-2024	Safety Features in Electric Vehicles	Structural Design, Active Safety Systems, AEB, LKA, Safety Ratings	Virtual
16-04-2024	Safety Features in Electric Vehicles	Structural Design, Active Safety Systems, AEB, LKA, Safety Ratings	Virtual
17-04-2024	Safety Features in Electric Vehicles	Structural Design, Active Safety Systems, AEB, LKA, Safety Ratings	Virtual
18-04-2024	Safety Features in Electric Vehicles	Structural Design, Active Safety Systems, AEB, LKA, Safety Ratings	Virtual
19-04-2024	Safety Features in Electric Vehicles	Structural Design, Active Safety Systems, AEB, LKA, Safety Ratings	Virtual
20-04-2024	Safety Features in Electric Vehicles	Structural Design, Active Safety Systems, AEB, LKA, Safety Ratings	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 15 (From Dt 15-04-24. To Dt 20-04-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
In the week 15 of our journey, participants embark on a critical exploration of safety features and technologies in electric vehicles (EVs).
Through a comprehensive examination of structural design, active safety systems, and passive restraint mechanisms, participants gain insights into how EV manufacturers prioritize occupant protection and crashworthiness.
The module commences with an in-depth analysis of structural design considerations in EVs, where participants explore the principles of crumple zones, reinforced safety cages, and impact- absorbing materials.
Through interactive lectures and multimedia presentations, participants uncover the engineering principles behind vehicle safety design, understanding how structural integrity contributes to mitigating injury risks in the event of a collision.
Next, participants delve into the realm of active safety systems, including collision avoidance technologies such as autonomous emergency braking (AEB), lane-keeping assist (LKA), and blind-spot monitoring.
Through case studies and real-world examples, participants examine the effectiveness of these systems in preventing accidents and reducing the severity of collisions, enhancing overall vehicle safety.
Moreover, the module offers insights into passive restraint mechanisms, such as airbags, seat belts, and child restraint systems, which provide additional layers of protection for vehicle occupants in the event of a crash.
Participants explore the evolution of passive safety technologies and their integration into modern EVs, as well as the regulatory standards and crash test protocols used to evaluate their effectiveness.
Furthermore, discussions on emerging technologies such as pedestrian detection systems and advanced driver assistance systems (ADAS) offer participants a glimpse into the future of automotive safety and accident prevention in electric vehicles.
By the end of Week 15, participants emerge equipped with a comprehensive understanding of the principles, technologies, and regulatory frameworks governing EV safety, poised to contribute to the advancement of automotive safety standards with confidence and foresight.

ACTIVITY LOG FOR THE SIXTEENTH WEEK

Day & Date	Brief Description of The Daily Activity	Learning Outcome	Person InCharge Signature
22-04-2024	Final Review and Assessment	Reviewing course material and assessing learning outcomes.	Virtual
23-04-2024	Final Review and Assessment	Reviewing course material and assessing learning outcomes.	Virtual
24-04-2024	Final Review and Assessment	Reviewing course material and assessing learning outcomes.	Virtual
25-04-2024	Final Review and Assessment	Reviewing course material and assessing learning outcomes.	Virtual
26-04-2024	Final Review and Assessment	Reviewing course material and assessing learning outcomes.	Virtual
27-04-2024	Final Review and Assessment	Reviewing course material and assessing learning outcomes.	Virtual

INTERNSHIP WEEKLY REPORT

WEEK – 16 (From Dt 22-04-24. To Dt 27-04-24)

Objective of the Activity Done: Electric Vehicle
Detailed Report:
In the final week of our journey, participants engage in a comprehensive review of the course material covered over the duration of the program.
This week serves as an opportunity to consolidate knowledge and reinforce understanding before the final assessment.
Throughout the week, participants revisit key concepts, tools, and techniques learned during the course. Instructors guide discussions on important topics.
Address any lingering questions or uncertainties, and provide clarification on complex subjects.
Additionally, participants undertake a final assessment designed to evaluate their proficiency in Electric Vehicle.
The assessment may include practical exercises, theoretical questions, and problem-solving scenarios to gauge participants.
Comprehension and application of Electric Vehicle principles.
The final assessment serves as a culmination of the participants learning journey, allowing them to demonstrate their skills and knowledge acquired throughout the course.
It provides valuable feedback to both participants and instructors, highlighting areas of strength and areas for further improvement.
By the end of final week, participants will have completed their final assessment and concluded the Electric Vehicle course.