



**Centre for Career Development,
Indian Institute of Technology, Guwahati**

**Placement Brochure
Class of 2024**


MS(R) IN E-MOBILITY

*Jointly offered by the Departments of Electronics and Electrical Engineering (EEE)
and Mechanical Engineering (ME), IIT Guwahati*



INDIAN INSTITUTE OF TECHONOLGY, GUWAHATI

About the Institute



Established in 1994 as an 'Institute of National Importance,' IITGuwahati has become a preferred destination for people passionate about learning and innovation. IIT Guwahati has been ranked among the Top 100 young universities in the world by the Times Higher Education, one of the two Universities from BRICS nations. IIT Guwahati has several factors contributing to how in a short period, it has established itself as one of the best institutes of its kind in the country. The programs and courses offered at IIT Guwahati are perpetually evolving to adapt to the ever-changing global requirements and the diversity of the fields of study. This has helped the institute become one of the nation's nerve centers for research, development, and technical education. The faculty ensures that the campus students are ready to face the challenges of the professional world by providing them with a sound conceptual understanding of their respective disciplines. The institute also offers a plethora of opportunities to students for their holistic development through its excellent facilities for sports and general extracurricular activities.

ABOUT THE COURSE

This unique program is one of the first in the country and aims to address the growing need for skills in EV technology. The syllabus of the program is developed after extensive discussions with both government and private bodies such as NITI Aayog, Ashok Leyland, Murata Manufacturing Co. Ltd., Kyoto, Japan, and Tata Motors. It is rare to see a curriculum designed as per requirements of both government and private bodies. The unique feature of the program is that it has an extensive laboratory component to ensure that the students get a hands-on feel of the EV technology. Moreover, during the duration of the program, frequent interaction of the students with the industry experts will be arranged. This will enable the students to understand the dynamics and the development of technology happening in the automobile industry.

- It is exclusively for **engineering graduates** who are selected through a valid GATE Score in their engineering domain.
- It is **similar to M.Tech except in terms of credits** of course work and project.
- MS(R) Programme gives more weightage to identifying key problems and application based learning by giving **more credits to project work**.
- MS(R) Programme at IIT Guwahati is a 2 years Programme



MS(R) : 2 Years (4 Semester)

1st semester : Course work

2nd semester : Project and related course work

3 & 4 semester : Project Work

Message From Head of the Department

*“Welcome to **Mechanical Department**, where exceptional talents meet endless opportunities for growth and success in placements.”*

The department of mechanical engineering is one of the largest and oldest departments of the institute. The department is achieving its milestones at various stages of its growth by recruiting and retaining the best faculty members, by upgrading the course-curriculum for catering the need of industry and research, by developing and maintaining state-of-art laboratories, by conducting various QIP, TEQIP and training programs for the students and participants from outside, by conducting cutting-edge research for the country and the society, etc. The department is currently focusing on creating the conducive environment for the students, staff and faculty members to give their best to society and the environment. With best wishes.



K. S. R. Krishna Murthy



COURSE STRUCTURE

Major Courses

- E-mobility, Electric and Hybrid Vehicles
- Modelling, Dynamics and control of EVs
- Energy storage & conversion

Inter Departmental Electives

- Finite Element Methods in Engineering
- Optimization Methods in Engineering
- Robotics and Robots Applications
- Introduction to Artificial Intelligence
- Machine Learning
- Soft Computing
- Robot Sensing and Computer Vision
- Rotor Dynamics
- Electrical Machines and Drives
- Power Electronics Converters for EV application
- Control engineering for Robotics

Application of Courses

- Developing real-life drive cycles for 2-wheelers, 3-wheelers, cars and buses
- Design of EV drivetrain
- Optimization of complex Multivariable Functions
- Simulation of tire forces and modelling of EVs
- Interfacing batteries with power electronics converters and feeding R-L loads
- Open-loop and closed-loop control of PM and Induction motors.
- Measuring charging and discharging characteristics of Li batteries at different C-rates



OUR TESTIMONIALS

Karthick Athmanathan, Head EV & E-Mobility Business Ashok Leyland Limited

Master's level program on Electric Vehicles from premier institutes like IITs is long due. IIT-Guwahati is very well placed to offer this program considering the very hands-on and industry-relevant work the Electric Mobility Lab there has been doing over the years. We have been interacting with this team for the past few years, and their exposure to industry problems and India-specific issues is exceptional. The program, especially the hands-on laboratory part is well-conceived. Our team here in AL has worked closely with the IITG team, and we are happy to have been part of this effort and offering. While the course work will provide the basic introduction to Electric Mobility, given the vast areas to specialize in, the three-semester project is expected to provide a solid grounding in the chosen specialty.

Dr. Seshu Bhagavathula, President New Technologies and Business Initiatives, Ashok Leyland Limited

The course is conceptualized with a lot of practical content which I think is the most important aspect of this initiative, so the industry will find it easier to employ these students coming out of IIT-G. The balance between theory, concepts and hands-on experience is another very important aspect of the program. The content has a broad coverage of all the aspects of e-Mobility (technology, business issues, financial aspects, etc.,) so, once finished, the students are ready to either enter the industry life or can even pursue advanced research! With the content being most contemporary and relevant to today's needs, this document compares very well with similar courses being conducted elsewhere – this is on par with the best!



INDUSTRY LECTURES

A VERY INFORMATIVE AND TECHNICAL LECTURES ON EV'S
BY EXPERTS FROM INDUSTRIES AND TOP UNIVERSITIES.

S.NO	TITLE OF THE TALK	ABOUT THE SPEAKER OF RESPECTIVE LECTURE
1.	Model based System Engineering, Plant Modeling, Controls Development, Verification and Validation, Electric Vehicles	Mr. Sundaresan, Vice-President EV and e-mobility Solutions at Ashok Leyland
2.	Electric Vehicle Design and Development Challenges and Opportunity.	Mr. Huzefa, Deputy General Manager – Electric & Hybrid Vehicle Technology (Product Development), Ashok Leyland
3.	Electric Motors and Controllers for EVs.	Mr. Arun Krishna Gilli, Deputy General Manager, Ashok Leyland
4.	Cell Chemistry of Batteries.	Mr. Balaji, Manager at Ashok Leyland
5.	BMS for EVs.	Dr. Shankar Akella, General Manager at Ashok Leyland
6.	A talk on Suspension systems.	Mr. Vijaykumar, Divisonal Manager at Ashok Leyland Prof. Patrick Glynn
7.	Product development process , Supply chain	Prof. Patrick Glynn,Lead researcher at the Commonwealth Science and Industrial Research Organization.
8.	A lecture on Electronic Vehicle Control Units for EVs.	Dr. Seshu Bhagavathula, Board member of Volta Trucks, Sweden.
9.	Towards Robust Electric City Bus Fleets (Uncertainty Quantification of Electric Bus Energy Consumption)	Dr. Jari Vepsalainen, AALTO UNIVERSITY.
10.	An expert lecture on EV Integration Challenges.	Mr. Mahendra Pardeshi, AVP-Electric Mobility Solutions at Hinduja Tech Limited
11.	E-mobility in overall context of transportation	Dr. Seshu Bhagavathula, Board member of Volta Trucks, Sweden.
13.	Development Trends in Transport - Electric Machines.	Mr. Stuart Bradly, Principal Engineer at Warwick University.
14.	A talk on battery testing.	Prof. Yue Guo from University of Coventry
15.	A talk on Compressed Air Energy Storage (CAES) Systems.	Professor Seamus D Garvey, Professor of Dynamics & Director of the Rolls-Royce UTC in Gas Turbine Transmission Systems, Faculty of Engineering, The University of Nottingham, UK.
16.	A talk on Business Models-Key to EV success.	Dr. Karun Malhotra,Managing Director of Murata Business Engineering (India) Pvt. Ltd (MBEI).



ONGOING PROJECTS

- Application of fuel cell in bus and trucks
- Hybrid cooling system design for Li ion battery pack system
- Development of a resilient Energy Management System (EMS) for HESS-EVs utilizing Model Predictive Control (MPC) techniques
- Modeling analysis and control of flywheel energy storage system for ev: simulation and experimentation on flywheel dynamics
- A Passivity-based fault-tolerant cooperative control scheme for Autonomous Vehicle Platoons with obstacle avoidance
- Design of a loop-shaping H -infinity control scheme to implement energy sharing and optimization for HESS-EVs
- Design of a Sliding-mode Control (SMC) scheme for bidirectional DC-DC converters with applications to EVs having hybrid energy sources



ONGOING PROJECTS

Motors :

- AI ML based motor design platform
- Design of Hub Motors for two wheeler EVS
- Design of Synchronous Reluctance Motor
- Design of Thermal networks for electric motors

Suspension System :

- Electromagnetic Suspension System for HCVs

Autonomous Driving :

- Vision Based Obstacle Detection and autonomous Navigation of UGVs

Power Electronics :

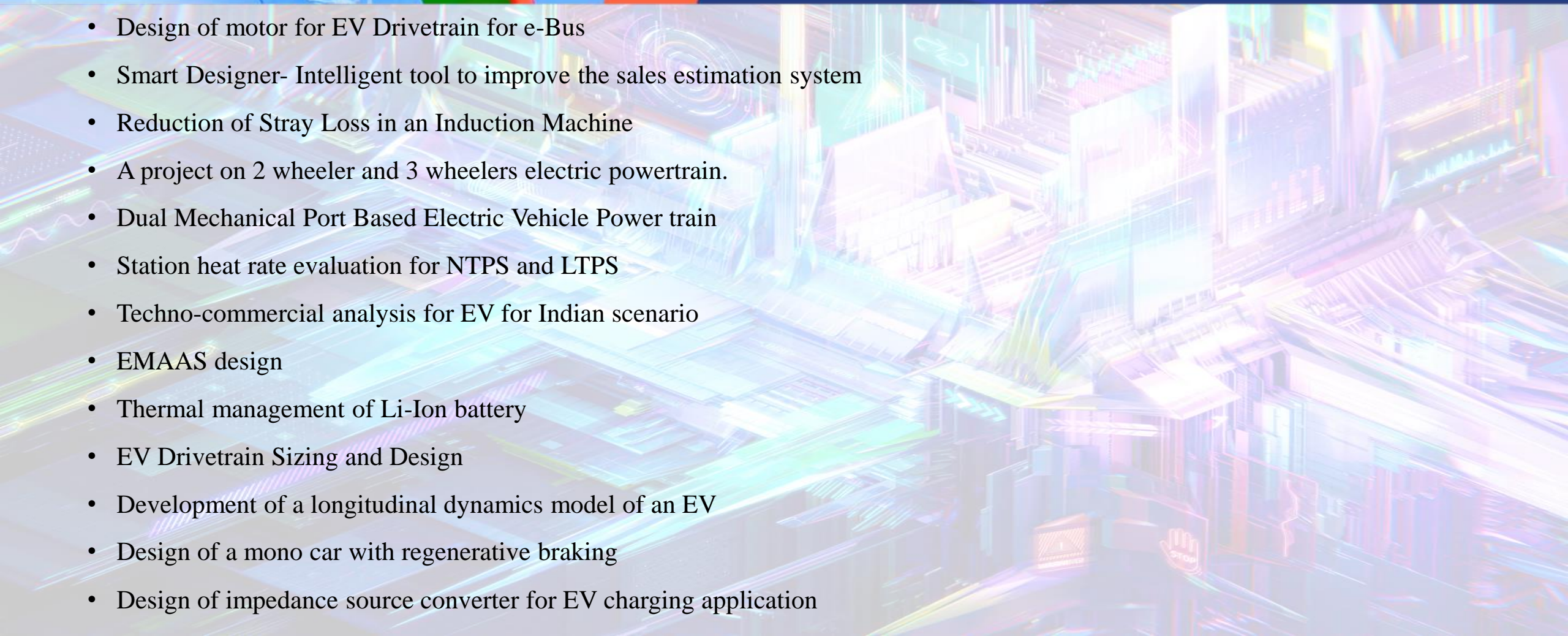
- FPGA based control of modular multilevel converter for EV applications
- investigation of ancillary services of modular multilevel converter for EV applications

Energy Storage :

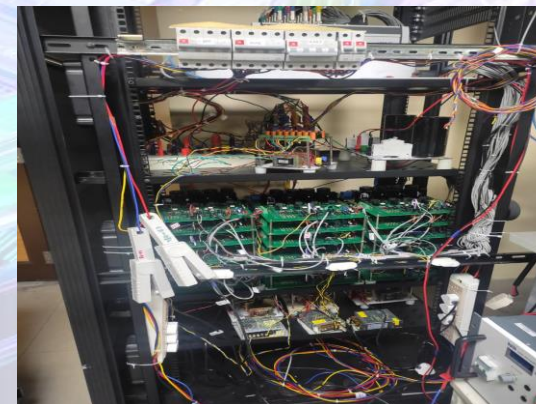
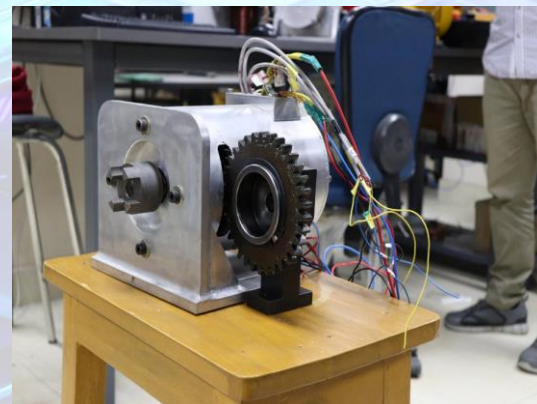
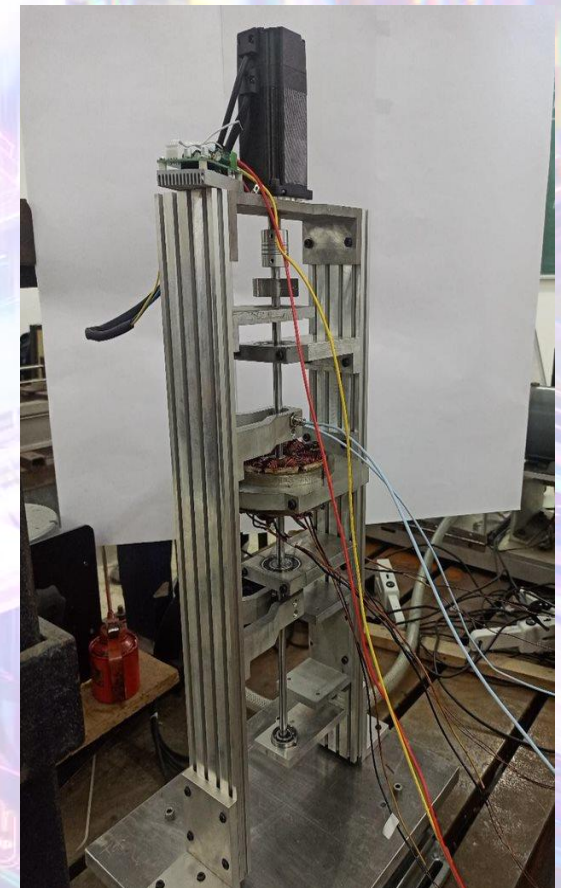
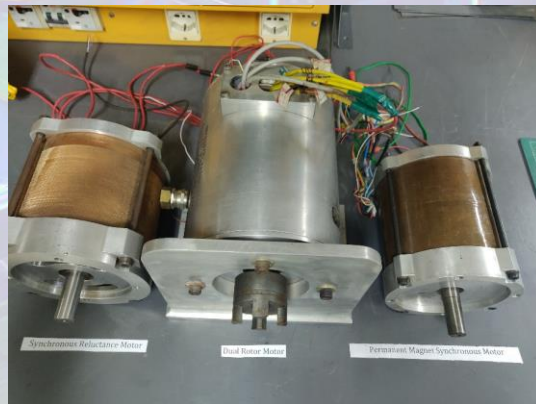
- Reconfigurable Battery Pack
- Cloud Battery Management System
- Design Analysis and Development of flywheel energy storage system integrated with Active Magnetic bearing



COMPLETED PROJECTS

- Design of motor for EV Drivetrain for e-Bus
 - Smart Designer- Intelligent tool to improve the sales estimation system
 - Reduction of Stray Loss in an Induction Machine
 - A project on 2 wheeler and 3 wheelers electric powertrain.
 - Dual Mechanical Port Based Electric Vehicle Power train
 - Station heat rate evaluation for NTPS and LTPS
 - Techno-commercial analysis for EV for Indian scenario
 - EMAAS design
 - Thermal management of Li-Ion battery
 - EV Drivetrain Sizing and Design
 - Development of a longitudinal dynamics model of an EV
 - Design of a mono car with regenerative braking
 - Design of impedance source converter for EV charging application
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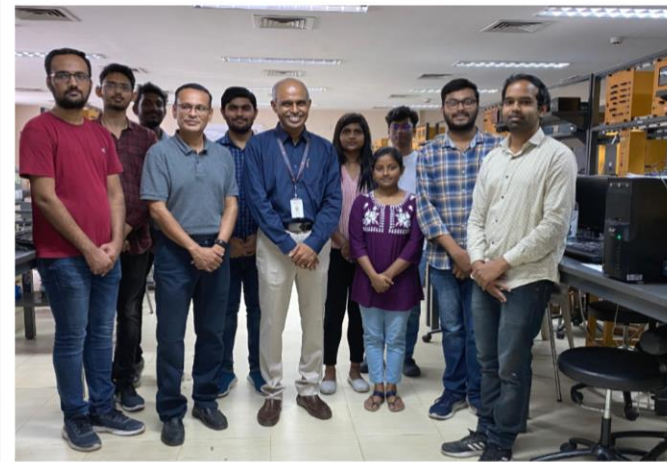
Research labs



Industrial Lab Visits



Mr. [Manoj Raghavan](#) (MD&CEO) and Mr. Atul Kulkarni from [Tata Elxsi](#) visited the EML.



Mr. [Thiru Srinivasan](#),
Managing Director
ePROPELLED™

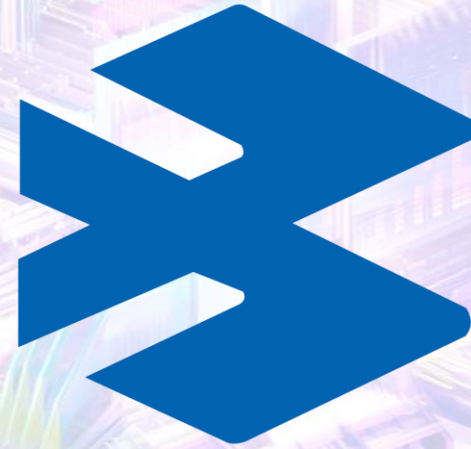


[Shresth Mishra](#)
[Sheetal Shetty](#)
Simple Energy



Internship Recruiters

TVS



BAJAJ

A close-up photograph of an electric vehicle charging station. A blue and white charging cable is plugged into a black charging port. The port has a digital display showing '240V~' and '110V~'. The background is a blurred blue and green surface.

Publications



Accessibility of Electric Vehicle in Indian Market (ISBN-978-93-5578-243-4)

“The E-Mobility team from the Department of Electrical and Electronics Engineering prepared this report on behalf of the Indian Institute of Technology Guwahati to bring forward the gap in electric vehicles’ customer expectations and demands. Further, the report is expected to gauge the country's pulse and the population's readiness for the adoption of EVs in the near future”.

Publications



Electric 2-Wheeler Drive Cycle-Based Drivetrain Sizing (ISBN-978-93-5578-973-0)

“A comprehensive analysis With the evolution of transportation systems towards electrification, there is a rapid growth in demand for electric vehicles, especially in the two-wheelers segment in India. But there is no standard procedure or formal strategy to develop the power train of an EV. This report provides a comprehensive procedure for estimating battery size, design and optimization of motor specifications, fuel consumption and emission analysis from the raw drive cycle data. Since this raw drive cycle data is collected from different parts of India and comprises of both urban and rural drive data, this report is anticipated to represent the Indian driving scenario”.



Past Recruiters



Mercedes

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 **EXIDE**





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