Online MTech Admission in Electric Vehicle (EV) Technology: 2022

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Background

The Government of India (GoI) announced National Electric Mobility Mission Plan 2020 (NEMMP 2020) to achieve national energy security and minimize transportation pollution by promoting electric and hybrid vehicles. Indian Automotive Industry wants to become one of the top three countries in the world in global exports of electrical vehicles (EV) and components. Technology development and skilled human resources are vital to achieving the above objectives. The Automotive Industry in India has self-reliance in design, manufacturing in Internal Combustion Engine Technology. However, the Industry is looking for experts in EV technology by training existing skilled manpower through Industry-academia interaction programs especially in battery management, motor operation and, and controllers for efficient supply of power under different drives. Academic Institutes are willing to collaborate with Industry to conduct the research and address challenges in promoting EV Technology.

IIT Hyderabad with its upcoming dedicated test track for autonomous and electrical vehicles, state of art research in battery technology, motor drive and control, is at the forefront of research and development of electric vehicle technologies. It has also incubated a company "PURENERGY" out of its incubation cell. With the launching of many electric vehicles from OEM companies in recent years and coming up of more than 12 startups in Hyderabad, in order to meet the challenges of future workforce in EV, IIT Hyderabad has taken the lead in EV technology research and skill development through Interdisciplinary Master's Program (IDP). This program will be coordinated by a group of 22 faculty members from Mechanical Engineering, Electrical Engineering, Design, Chemical Engineering, Civil Engineering, Physics and Chemistry disciplines with strong focus in EV research and training to offer PG programs as part of the institute initiative of IDP. Through this online MTech Program in EV Technology, IITH reaches out to industry professionals with an objective to upskill them.

The proposed online MTech Program in EV Technologies encompasses the multidisciplinary approach (one of the main pillars of New Education Policy, NEP-2020) to train the workforce in the technology domains of Drives, Transmission, Batteries, Power Electronics, Safety, and Product Design.

Eligibility - Online students need not have GATE qualification. They should have BTech first class (60%) in ME, EE, ECE, CE, and other relevant equivalent degrees and 2 years of industry experience after BTech and they should be currently working in an industry.

Duration: Max 4 Years for MTech (EV) and Max 3 Years for Executive MTech (EV)

A) **MTech (EV) with thesis** – Duration 2-4 Years: 48 Credits (Course credits: 24 + Thesis credits: 24)

- **Courses can be done over 1-3 years**
- **Thesis will be done in the final year only after completing 24 course credits**

***Note*:** Online students will do their project in their own industry and not at IITH. The project can be started only after 24 credits of courses are completed with 7.5 CGPA. During the project each candidate will have a guide from IITH and may have another from his/her industry.

B) **Executive MTech (EV) without thesis**: **Duration 1-3 Years**.

Full Course credits: 24

- **Courses can be done over 1-3 years.**

Online MTech: (24 Course Credits and 24 Thesis Credits = 48 Credits)

a) Courses: 24 Credits (Tentative)

S. No.	Course Code	Course Name	Credit
1.	Basket 1	Vehicle Fundamentals	6
2..	Basket 2	Electrical Fundamentals	6
3.	Basket 3	Energy Fundamentals	6
4.	Basket 4	Design and Material Fundamentals	6

Courses in each basket are mentioned below:

S. No.	Course Code	Course Name	Credit
Basket 1: Vehicle Fundamentals - 6 Credits			
1.	EV5019	Design of EV	2
2.	EV5029	Testing and Certification of EV	1
3.	EV5039	Vehicle and Tire Dynamics	2
4.	ME5429	FEM Lab	1
5.	ME5449	CFD Lab	1

Basket 2: Electrical Fundamentals - 6 Credits			
1.	EV5049	Power Convertor Design	3
2.	EV5059	Embedded System Hardware and Design	2
3.	EV5069	Electric Vehicles	1
4.	EV5079	Automotive Communication and Sensing	3
5	EV5089	Embedded Programing	3
Basket 3: Energy Fundamentals - 6 Credits			
1.	EV5099	Electrochemical Energy Storage Systems: Batteries, Fuel Cells, and Super Capacitors.	3
2.	EV5109	Energy Management	1
3	EV5119	Hydrogen Economy	2
4	EV5129	Photovoltaic (PV) Technology	2
5	EV5139	Energy Conversion and Storage Devices Lab	2
Basket 4: Design and Materials Fundamentals - 6 Credits			
1	EV5149	Advanced Materials in Design	3
2	EV5159	Strategies for Sustainable Design	3
3	EV5169	Life Cycle Analysis for EV	2
4	EV5179	Introduction to Lightweight Design	1
5	EV5189	UI & UX (User Interface and User Experience)	3

Thesis Stage 1 and 2

Course code	Name of the course	Credit
EV6115	Thesis - 1	12

Course code	Name of the course	Credit
EV6125	Thesis - 2	12

Note: Course Credits: 24 (1-6 Semesters) + Thesis Credits: 24 (after completion of course credit).

I) Faculty members associated with EV Course: 28

S. No.	Name of Faculty/Department
1	Dr. Ashok Kumar Pandey, MAE
2	Dr. B Venkatesham, MAE
3	Dr. Nishant Dongari, MAE
4	Dr. Surendra Kumar Martha, CY
5	Dr. Shishir Kumar, EE
6	Dr. Jose Titus, EE
7	Prof. Ch.Subrahmanyam, CHY
8	Dr. Pradeep Yemula, EE
9	Dr. Narendra Kurra, CHY
9	Dr. Prabhat Kumar, MAE
10	Dr. Abhinav Kumar, EE
11	Dr. Mahesh Ganesan, CHY
12	Dr. Shiva Ji, DS
13	Dr. Srikar A V R, DS
14	Dr. Sai Santosh Kumar Raavi, PHY
15	Prof. P Rajalakshmi, EE
16	Dr. Rupesh Wandhare, EE
17	Prof. Deepak John Mathew, DS
18	Dr. Prasad Onkar, DS
19	Dr. Digvijay S. Pawar, CE
20.	Prof. Vinod Janardhan, CH
21.	Dr. Ketan P Detroja, EE
22	Dr. Amit Acharyya, EE
23.	Dr. R. Gangadharan, MAE

24.	Prof. Raja Banerjee, MAE
25.	Dr. Pankaj Kohle, MAE
26.	Dr. Sayak Banerjee, MAE
27.	Dr. Sai Sidharth, MAE

List of students admitted for online MTech in 2021 and 2022:

S.No.	Name of Student	Name of Company
1.	Mr SOUMYASHREE SAHOO	Maruti Suzuki
2.	Mr Raj Arjun Pandey	NTPC
3.	Mr GYAN SWAROOP	HEROMOTOCORP
4.	Mr Rahul Vibukumar Nair	Aker Solutions Pvt. Ltd.
5.	Ms PADMAJA TEJASWI SINGAMPALLI	HPCL
6.	Mr Chunduru Raju	TSSPDCL
7.	Mr Deepak Pokhariyal	BHEL ESD Bangalore
8.	Mr. Rajkumar M	Expleo Technologies India Private Ltd
9.	Mr. Prithvi Raj	Mercedes Benz R & D India
10	Mr. SAI KIRAN P.V.S	Skill Lync, (Currently in ARAI Pune)
11.	Mr. Ravi Sankar	CDAC, Kolkata

Course Content

Course Code:EV5019

Course Name: Design of EV
Credits: 2
Semester Schedule: ODD Semester
Course type: theory
Prerequisites: None

Course Syllabus:

Introduction to Electrical Vehicles, EV Subsystems, Design of EV Drivetrain, Battery Performance Parameters, Mechanical and Thermal Design of EV, Noise and Vibration requirements.

References:

1. Husain, I. (2021). Electric and Hybrid Vehicles: Design Fundamentals. United Kingdom: Taylor & Francis Group.

2. M. Ehsani, Y. Gao, S. Gay and A. Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles, CRC Press, 2005.

3. C. C., Chau, K. T. (2001). Modern Electric Vehicle Technology. United Kingdom: Oxford University Press.

Course Code:EV5029

Course Name: Testing and Certification of EV
Credits: 1
Semester Schedule: ODD Semester
Course type: theory
Prerequisites: None

Course Syllabus:

Electric vehicles are the future of transportation. Electric mobility has become an essential part of the energy transition strategy and will result in significant changes for vehicle manufacturers, governments, companies and individuals.

In this course, you will gain comprehensive knowledge on various tests that are conducted on an electric vehicle, in order for it to qualify for final certification and approval for mass production and introduction into the market. It will help engineers and managers to make appropriate improvements and strategic decisions on their electric vehicle products and their implications.

Battery performance safety test- Evaluation testing of Battery as per AIS 048, ECE R100, USABC, etc., performance testing, life-cycle testing and safety/abusive testing, Material Characterization of battery electrodes and electrolytes.

Electric Motor Characterization – Net Power, Power & Efficiency as per AIS 041, ECE R85. Reliability, durability and overload capacity. Evaluation of torque, speed, motor characteristics Regenerative braking test. Thermal Characteristics.

Durability Tests of Electric Vehicle – Lab simulation of tracks. Simulations for environmental conditions like temperature and humidity.

Vehicle Performance on Chassis Dynamometer and Test Tracks – Electric energy consumption as per AIS 039 and ECE R101. Electric range as per AIS 040 and ECE R101. Power at wheels as per AIS 041. Brakes, gradeability, noise.

Charger Testing and Certification – Testing as per AIS 138, Testing as per Bharat EV Charger specification AC001 and DC001.

Reference:

1.Standards as per ARAI, Pune. https://www.araiindia.com/

2. Standards as per the production of the e-motor company, https://pureev.in/

Course Code: EV5039

Course Name: Vehicle and Tire Dynamics
Credits: 2
Semester Schedule: EVEN Semester
Course type: theory
Prerequisites: None

Course Syllabus: Fundamentals of Vehicle Dynamics, Free body diagram of vehicle under static and dynamic condition. Representation by quarter car model, half car model and full car model. Tire forces and moments, Different models tire forces and moments. Review of steering condition and its functioning. Kinematics of vehicle motion with and without steering. General stability concept and its application in longitudinal motion. Concept of Vehicle Control using PID control system. Conditions of vehicle stability: Understeering, Neutral steering, Over steering. Vehicle Handling: Simplified equation for lateral motion under different steering conditions. Dynamic analysis and performance characteristics of a comfort vehicle ride

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References:

1. Giancarlo Genta and Lorenzo Morello, "The Automotive Chasis- Volume 1 and 2", Springer, 2009.
2. John C. Dixon, "Tires, Suspension and Handling", SAE, 1996.
3. Reza N.Jazar, "Vehicle Dynamics: Theory and Applications", Springer, 2008

Course Code: ME5429

Course Name: FEM LAB
Credits: 1
Semester Schedule: Even Semester
Course type: theory/computational Lab
Prerequisites: None

Course Syllabus: Finite element methods for solving boundary value problems in solid mechanics. Introduction, Spatial Modelling, Geometric discretization, Element Library, Material Modelling, Loading and Boundary Conditions, Constraints, Surface/Interfaces modelling, Step and job handling and Post-processing. FEA Implementation and Visualization of 1D Problems, Truss Problem, Beam bending, Plane and axisymmetric Problems and 3D problems. Various analysis such as, Static, Transient, Harmonic, Modal, Dynamics and Multi Physics (Thermomechanical, etc).

References

1. R. D. Cook, D. S. Malkus, M. E. Plesha, R. J. Witt, "Concepts and Applications of Finite Element Analysis", Wiley, 2001.
2. O. C. Zienkiewicz and R. L. Taylor, J. Z. Zhu, "The Finite Element Method: Its Basis and Fundamentals", Butterworth-Heinemann, 2013.

3. A. F. Bower, “Applied Mechanics of Solids”, Online Resource: http://solidmechanics.org/, CRC Press, Taylor & Francis, 2010.
4. R. J. Boulbes, “Troubleshooting Finite-Element Modeling with Abaqus”, Springer, 2020.

Course code: ME5449

Course Name: CFD LAB
Credits: 1
Semester Schedule: Even Semester
Course type: theory/computational Lab
Prerequisites: None

Introduction and concepts of finite volume methods, Integral form of Navier-Stokes equations. Concepts of pressure and density-based solvers. Introduction to Ansys Workbench, basics of Design Modeler, Structured and unstructured meshing, Ansys fluent setup, solution and post processing. Laminar and turbulent viscous incompressible flow problems (2D and 3D Analysis). Compressible flow problems, Combustion modelling. Introduction to OpenFOAM solver.

References

1. Ansys Fluent documentation: Tutorial and Theory guide
2. H. K. Versteeg, W. Malalasekera, “An Introduction to computational fluid dynamics”, Pearson Education, 2008.
3. OpenFOAM Tutorial and User Guides, https://cfd.direct/openfoam/documentation/

Course code: EV5049

Course Name: Power Converter Design
Credits: 3
Semester schedule: Odd semester
Course type: Theory, Core or Elective
Prerequisite: Basic Power Electronics (from Btech curriculum or hands-on experience in Industry)
Course syllabus: Characteristics of power electronic switches, Drive circuits, Voltage and current sensing mechanism, Introduction to Human Machine Interface, Basics of DC-DC converters, DC/AC inverters (single phase and three phases) and PWM Control techniques, Modelling procedures of the power converters, State space averaging, Linearization, Designing of the close loop control of a power converter, AC to DC rectifiers (single phase/three-phase), analysis and performance with passive loads:
References:
1. DC-DC Switching Regulator Analysis by Daniel M. Mitchell ;
2. Voltage Sourced Converters in Power Systems: Modeling, Control, and Applications by Amirnaser Yazdani, Reza Iravani

Course Code: EV5059

Course Name: Embedded System Hardware and Design
Credits: 2
Semester Schedule: Odd Semester
Course type: Theory
Prerequisites: None
Course Syllabus: Overview of microcontrollers and a closer look at ARM Cortex M series and MSP430. Major components: clocks, timers and PLLs, sleeping modes and power saving, display interfaces. Sensors and transducers: electromagnetic, pneumatic, motors and servos. Example usage. PID control examples. Sensor specification and calibration with examples. BUS protocols: I2C, SPI, USB, CAN, Ethernet, Flexray, JTAG, Time-triggered systems. Wireless communications protocols for IoT and sensor networks. Web technologies for communications: websockets, MQTT/zeroMQ, Resource allocation and process management in RTOS and OS, multithreaded designs Software environments and tool chains: make, gcc tool chain, low level C, Finite state machines and their use AutoSAR and its internals, Electronic Interfacing of common components for use with sensors

References:

Due to diverse topics, the topical references will be provided during lectures or put on the course website.

Course Code: EV5069
Course Name: Electric vehicles
Credits: 1
Semester Schedule: Even Semester
Course type: theory
Prerequisites: EV5099

Course Syllabus: Introduction, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Vehicle Dynamics, drive train design methodology and control principles, Battery-fuel cell-super capacitor requirements, BMS, Advantages and disadvantages of EVs.

Course Code: EV5079
Course Name: Automotive Communication and Sensing
Credits: 1
Semester Schedule: Even Semester
Course type: theory
Prerequisites:

Course Syllabus: Inter and Intra Vehicle Communications. Communication Basics-Bandwidth, Data rate, Frequency, Power, SINR, Spectrum, Throughput etc. Vehicle-to-vehicle, vehicle-to-infrastructure, vehicle-to-everything (V2V, V2I, V2X) communications, Communication Protocols: Dedicated short-range communications (DSRC), wireless access in vehicular environments (WAVE), Cellular V2X, Controller Area Network (CAN), Local Interconnect Network (LIN), FLEXRAY, Automotive Ethernet, Physical Layer, Master-Slave relationship, Datalink Layer, AM Radio, Bluetooth, FM Radio, GPS, LIDAR, Short range RADAR, Wireless LAN.

Reference:

1. Gilbert Held, Inter and Intra Vehicle Communications, Auerbach Publications, 2008.
2. Sommer, C., & Dressler, F. (2014). Vehicular Networking. Cambridge: Cambridge University Press. doi:10.1017/CBO9781107110649

Course Code: **EV5089**

Course Name: Embedded Programming
Credits: 3
Semester Schedule: Even Semester
Course type: theory
Prerequisites: None

Course Syllabus: Introduction to Embedded Systems, Architectures of embedded processors, Memory hierarchy and its management Basics of Microcontrollers –timers, interrupts, analogy to digital conversion, bootloaders Interaction with devices -buses, memory management, device drivers and wireless comm., Interfacing sensors, actuators and peripherals. Real-time principles -multi-tasking, scheduling, synchronization Building low-power high-performance systems –code profiling and optimization Architecture, Case Studies of Real time. Microcontrollers/Microprocessor: Arduino, Raspberry-pi, ARM, FPGA, ESP32, RL78etc)

Course Code: EV5099
Course Name: Electrochemical Energy Storage Systems: Batteries, Fuel Cells and Supercapacitors
Credits: 3
Semester Schedule: Odd Semester
Course type: theory
Prerequisites: None

Course Syllabus:Principles of Operation of Cells and Batteries; Electrochemical Principles and Reactions; Factors Affecting Battery Performance; Battery Design; Primary Batteries; Secondary Batteries: Advanced Lead-acid, Ni-based and lithium ion batteries (Fundamentals, Materials, Electrode preparation, Battery Assembly, Testing, Failure Analysis, Safety issues); Flow Batteries; Next Generation Batteries; Fuel cells, Supercapacitors, Selection and Application of energy storage systems for UPS, Solar, Telecom, Aerospace, Grid and Electric Vehicle Systems.

References

1. Kirby W. Beard. Linden's Handbook of Batteries, Fifth Edition (McGraw-Hill Education: New York, Chicago, San Francisco, Athens, London, Madrid, Mexico City, Milan, New Delhi, Singapore, Sydney, Toronto, 2019).
2. Vladimir S. Bagotsky, Alexander M. Skundin and Yury M. Volfkovich (A.N. Frumkin Institute of Physical Chemistry and Electrochemistry of the Russian Academy of Science, Russia) Electrochemical Power Sources: Batteries, Fuel Cells, and Supercapacitors" By, John Wiley & Sons Inc, New Jersey, USA, 2015, 372 pages, ISBN: 978-1-118-46023-6.

3. Ying-Pin Chen, Sajid Bashir, Jingbo Louise Liu, Nanostructured Materials for Next-Generation Energy Storage and Conversion: Advanced Battery and Supercapacitors, Springer Nature, 10-Oct-2019 - Technology & Engineering - 472 pages.
4. D. Pavlov, Lead-Acid Batteries: Science and Technology, Elsevier 31-May-2011 - Technology & Engineering - 656 pages.
5. C. Vincent, Bruno Scrosati, Modern batteries, Elsevier, 26-Sep-1997 - Technology & Engineering - 368 pages.

Course Code: EV5109
Course Name: Energy Management
Credits: 1
Semester Schedule: Odd Semester
Course type: theory
Prerequisites: None

Course Syllabus: Energy generation, Energy storage, Generation-side management, Network operation, Demand-side management, Design example of the autonomous power supply using solar PV and battery to study energy management, Energy management smart parking lot with EVs.

Course Code: EV5119

Course Name: Hydrogen Economy
Credits: 2
Semester Schedule: Even Semester
Course type: Lab
Prerequisites: EV5029

Course Syllabus: Hydrogen-based energy carrier and storage, Sustainable application, high-efficiency hydrogen conversion devices, Production and storage of hydrogen, Hydrogen Storage in Advanced Solid State and Liquid Materials.

Course Code: EV5129

Course Name: Photovoltaic (PV) Technology
Credits: 2
Semester Schedule: Even Semester
Course type: theory
Prerequisites: None

Course Syllabus: Characteristics of the photovoltaic cell; Semiconductor Basics; Silicon solar cells; Thermodynamic limit to efficiency, Light management, electrical losses, thin-film silicon solar cells; Advanced strategies for high-efficiency solar cells; Chalcogenides & III-V Technologies; Organic Photovoltaics; Hybrid Technologies; PV modules.

Course Code: EV5139

Course Name: Energy conversion and storage devices Lab
Credits: 2
Semester Schedule: Even Semester
Course type: Lab
Prerequisites: ET5099

Course Syllabus: Material Synthesis, Electrode Preparation, Lead-acid and Li-ion cell assembly, Battery charge-discharge, life-cycle studies, CV, EIS, Chronoamperommetry and potentiommetry, LSV, Solar cell testing.

Course Code: EV5149

Course Name: Advanced Materials in Design
Credits: 2
Semester Schedule: Even Semester
Course type: theory
Prerequisites: None

Course Syllabus:
This course aims to teach students knowledge of advanced materials and processes from a design perspective. With a theoretical and hands-on experimental approach, students comprehend all the different possibilities that the industry provides to transform matter.

Materials Overview, Classification, Properties and usage of thermoplastics, thermosetting plastics. Process of selection and applications of plastics for engineering and consumer products.

Design Limitations and specific advantages of plastic modelling processes. Concepts of structure and costing. Significance of form in structural strength of products. Influence of materials and processes on product aesthetics. Industrial finishes for plastic, wood and metals.

Properties and use of rubber, ceramics and glass. Overview of natural materials- wood, bamboo, cane, leather, cloth, jute and paper and their use at craft and industrial levels

References:

1. Beadle, John D : Product treatment and finishes, Macmillan, London 1971
2. Beck R. D.: Plastic Product Design, Van Nostrand Reinhold Co., New York, 1980
3. Cleminshaw D., Design in Plastics, Rockport Publishers Inc. (22 February 1994)
4. Garratt J.: Design and Technology, Cambridge University Press, UK, 2004
5. Thompson R.: Manufacturing processes for design professionals, Thames & Hudson, London 2007
6. Ashby, Michael; Johnson, Kara; Materials and Design: The Art and Science of Material Selection in Product Design, Publisher: Butterworth-Heinemann; 2002

Course Code:EV5159

Course Name: Strategies for Sustainable Design
Credits: 3
Semester Schedule: Even Semester
Course type: theory
Prerequisites: None

Course Syllabus and Objective: The course introduces the principle of sustainability in design, the prevalent issues (world / India), approaches towards addressing sustainability, models, methods and tools to analyze and intervene. It uses lifecycle analysis methods and tools to understand simple and complex issues involved in designing of products, components, packaging, and their disposal, etc.

Each decision made for any products has certain impact on the environment and alters ecological balance in some degrees. The course intends to deliver a sensitivity of responsibility, accountability and ownership while being a designer and architect.

Course is developed to how ecological design and planning strategies can be developed in a responsive manner for human needs and biosphere. The design for sustainability offers learning opportunities to enrich design process with ecological sensitivities, working along with nature, stimulate natural systems for design and development of resilient, responsive, and regenerative designs."

Course Code:EV5169

Course Name: Life-Cycle analysis for EV
Credits: 2
Semester Schedule: ODD Semester
Course type: theory
Prerequisites: None

Course Syllabus: The environmental impacts of electric vehicles (EVs) need to be addressed before it becomes the next generation of vehicles commonly owned by the people. Certain battery types are already on the radar of environmental concerns owing to their hazardous nature of elements used and their disposal. The same needs to be checked and understood for minimizing the impacts. A component wise analysis is imperative to understand the factors influencing the environmental impact of EVs from LCA perspective. A quantitative ecological assessment of various stages such as EV charging, battery footprint, real world emissions, realistic lifetime mileages, comparative emissions of EVs,.

Reference:
1. Hauschild, Michael Z., et al. 2018. Life Cycle Assessment. Springer
2. Giudice, Fabio. 2006. Product Design for the Environment. Taylor & Francis.

Course Code:EV5179

Course Name: Introduction to Lightweight Design
Credits: 1
Semester Schedule: Even Semester
Course type: theory
Prerequisites: None

Course Syllabus: Introduction to materials Mechanical behavior of materials. Introduction to Polymers and composites in lightweight structures. Introduction to manufacturing of metal structures for lightweight design. Case studies of how industry has implemented lightweighting..

Reference:
1. Material selection for mechanical design, Ashby, 5th edition, 2016·
2. Mechanical behaviour of materials, Chawla and Meyers, 2nd edition 2009.·
3. Engineering mechanics of composite materials, Daniel and Ishai, 2nd edition, 2005

Course Code:EV5189

Course Name: UI & UX
Credits: 3
Semester Schedule: EVEN Semester
Course type: theory
Prerequisites: None

Course Syllabus:

The course introduces to various types of user interfaces and its user experiences. The course allows the students to ideate and create newer models of user interfaces for usability, accessibility and sensory experience.

Recent Activities in EV@IITH

State of Art Test Bed

TiHAN-IIT Hyderabad

DST NM-ICPS TiHAN at IIT Hyderabad is taking up a magnanimous effort in building a unified and state of the art testbed for the development of autonomous navigation systems used in ground and aerial vehicles

Innovation in Battery Research

Energy News / Latest Energy News / Power

INNOVATION: IIT Hyderabad develops dual carbon alternative to lithium-ion batteries

The Electrochemical Energy Storage Lab at the Indian Institute of Technology Hyderabad (IITH), has developed a 5V Dual Carbon Battery utilising self-standing carbon fibre mats as both electrodes - cathode and anode.

IANS • April 05, 2021, 14:45 IST

EDUCATION LATEST EXAMS SCHOOL CAMPUS

Home / Education / IIT Hyderabad-Incubated Startup To Launch Electric Motorcycle

IIT Hyderabad-Incubated Startup To Launch Electric Motorcycle

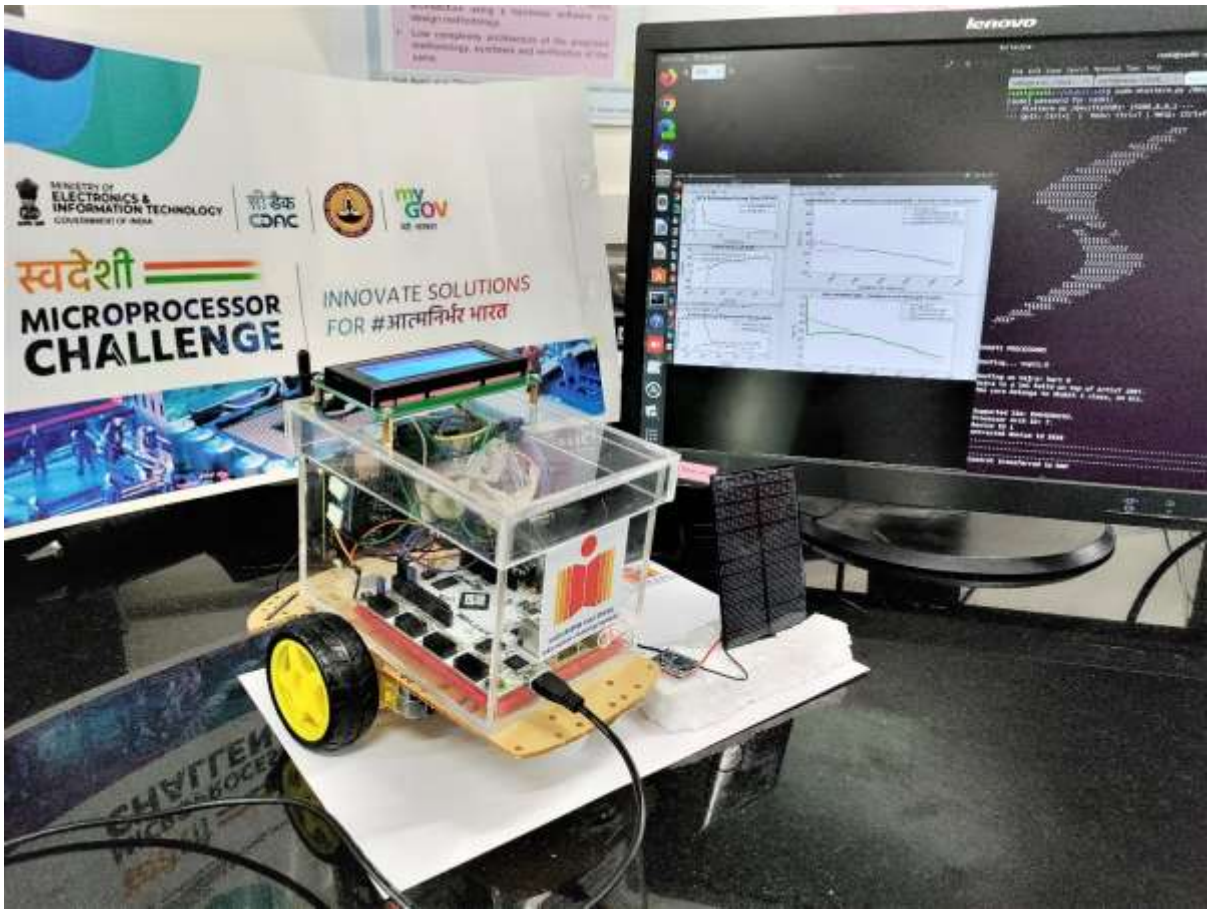
An Indian Institute of Technology Hyderabad's incubated startup named PURE EV will be launching the first-ever electric motorcycle labelled as ETRYST 350.

Education | Written By Bhoomika Aggarwal | Updated: Feb 11, 2021 3:57 pm IST

TiHAN Testbed on Autonomous Navigations

CARGO DELIVERY DRONE TESTING

SMART BATTERY MANAGEMENT SYSTEM USING IOT




3.7 V Li-Ion Cell
5 V Dual Carbon Cell
2V/ 2Ah Lead-acid cell
2V Lead-carbon ultracapacitor


Indian Institute of Technology Hyderabad
IIT Hyderabad & Suzuki Motor Corporation
collaborates for India-specific Autonomous Car - ADAS
Technology Development

Testimonial from registered students:

Mr. Gyan Swaroop (HEROMOTOCORP) || EV21MTECH15004

"It is my privileged, to join such a professional course, it will instrumental my knowledge and analytical skill to a new height, and will able to fulfill the India future requirements of Atmanirbhar Bharat."

"Additional Courses can be proposed: PMSM machine and control , BMS design and development, AI and machine learning for BMS design and control."

Deepak Pokhariyal (BHEL, Bangalore) || EV21MTECH15009

"In today's fast changing era, all industries now focus on high productivity with optimized head counts. The M. Tech. (EV Tech) program has an excellent curriculum, assessments and exam patterns. This program has definitely helped me to enhance my skills as an engineer. I feel honored to be an alumni of IITH."

Sai Kiran Parimi Venkata Shiva (ARAI, Pune) || EV22MTECH15003

"The course is intended for Working professionals and the stakeholders of the EV revolution. It serves its purpose in providing basic to advanced technical knowledge transfer about the Mechanical, Electrical and Computational elements in Electric Vehicle Engineering. Students can choose electives in the field, which they wish to gain expertise in and can learn about the evolving technologies as well. The Dynamic method of having electives, online teaching and recordings is what Working professionals can benefit from, with good support from the faculty and the institution."