Department: EEE **Date: Sept. 20-24, 2021**

ONLINE FACULTY DEVELOPMENT PROGRAMME

on

"FUTURISTIC ELECTRIC TRANSPORTATION SYSTEMS"

(SEPTEMBER 20th -24th, 2021)

Sponsored by

AICTE TRAINING AND LEARNING (ATAL) ACADEMY

AICTE Training and Learning (ATAL) Academy sponsored online Faculty Development Programme (FDP) on "**FUTURISTIC ELECTRIC TRANSPORTATION SYSTEMS**" is organized by Department of Electrical and Electronics Engineering, Sree Vidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh. India during september 20th -24th, 2021. An amount of Rs. 93000.00 (Rupees Ninety Three Thousands only) is sanctioned to **Dr. S.Prabhu** on 22/01/2021 (F. No.01_/AICTE/ATAL-HQ/2020-21 199 (15) for organizing the FDP.

The online FDP is conducted using the Zoom conference. A total of 106 participants from 12 states and one union territory of the country participated in the FDP. The participants are the faculty, research scholars and industrialists of various engineering colleges, government institutions and Industries across the country. Further, the participants are trained by the industry and academic experts. The FDP has received an overwhelming response from the participants. A total of 14 sessions are conducted. Out of 14, 13 are technical sessions and one is on "Stress management through yoga" to promote the FIT INDIA movement across the country.

Electrical machines and semiconductor technology plays a vital role in electric transport systems. This faculty development programme (FDP) is keen to essential theory, contemporary progresses, applications and research consequences addressing the associated theoretical and practical traits on "Futuristic Electric Transportation Systems". The special electrical machines drive systems such as permanent magnet brushless DC motor (PMBLDC), switched reluctance motor (SRM), synchronous reluctance motor (SyRM) and permanent magnet synchronous motor (PMSM)are recently evolved in electric vehicle due to their salient features are to be described.

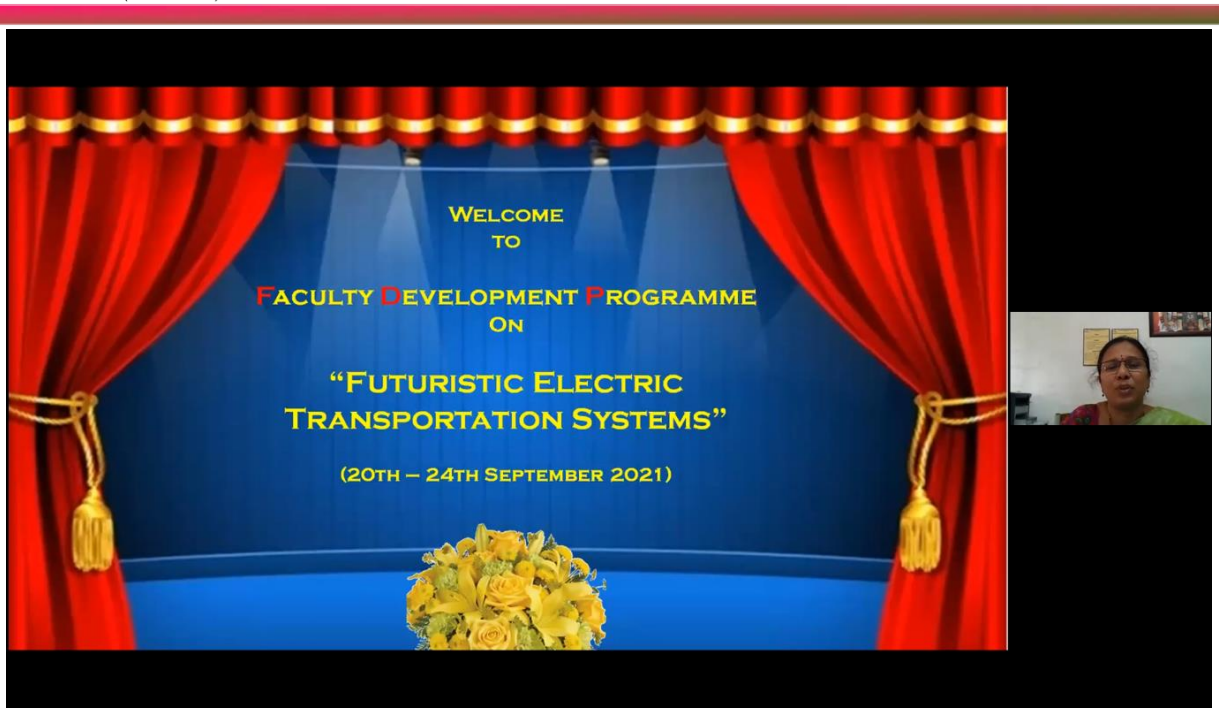
The outcomes of FDP are as follows:

- Gain knowledge on power electronic converters and electrical machines.
- Analyze the problem in the development of Power electronic converters and electrical machines for the electric Vehicles (EVs).
- Train students by conducting hands-on sessions on design and analysis of converters and electrical machines respectively and make students industry ready.

The inaugural function of the online FDP is scheduled on September 20, 2021 at 10:00 AM. In the inaugural function, **Ms. R. Sindhuja,** Assistant Professor, Department of EEE welcomed the chief guest **Dr. V. Chandrasekar**, Component Manager, Kone Elevators Pvt Ltd, Chennai and Guest of Honor **Prof. L. Venugopal Reddy**, Advisor cum Director, SVET, Principal, Directors and Vice – Principal of SVEC and all participants. The event is started with a prayer song.

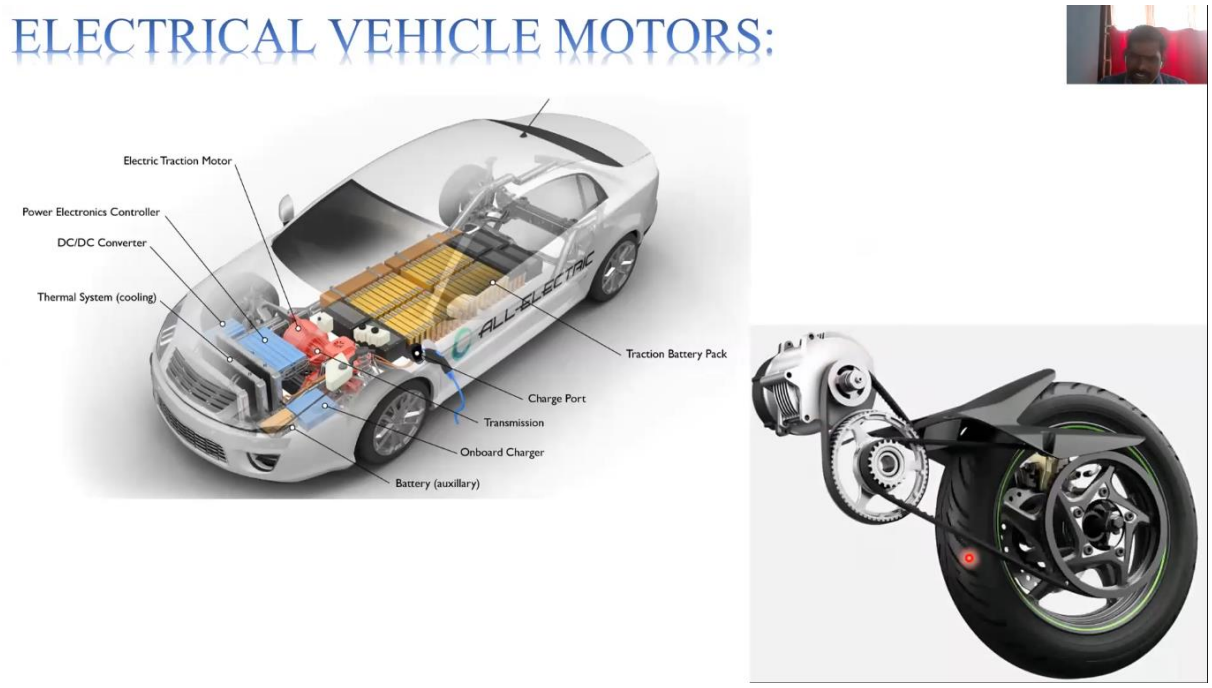
Dr. M.S. Sujatha, Professor and Head, Department of EEE given the welcome speech. In the welcome speech, the Professor and Head, Department of EEE welcomed the chief guest, Guest of Honors, Directors and Principal & vice- principal, of SVEC and all participants and also thanked the ATAL academy for sponsored the FDP. Further, Professor and Head, Department of EEE highlighted the objectives of the FDP, the topics to be discussed, the outcomes of the FDP. Later, the coordinator ATAL FDP **Dr. S.Prabhu**, Assistant Professor, Department of EEE introduced the chief guest **Dr. V. Chandrasekar**, to the participants.

Ms. R. Sindhuja, Assistant Professor, Department of EEE is welcoming the chief guest and the participants.



Dr. M. S. Sujatha, Professor & Head , Department of EEE is giving the welcome speech.

Dr. S. PRABHU, Coordinator, ATAL-FDP is introducing the chief guest **Dr. V. Chandrasekar** to the participants.



Dr. V. CHANDRASEKAR, Component Manager, University Collaboration & Patenting, Kone Elevator India Pvt. Ltd., Chennai is addressing the participants.

Dr. V. Chandrasekar, has emphasized the skills that can gain by the participants after learning the Futuristic Electric Transporation Systems engineering concepts related to Electric motor, Power Electronic Converters used in transporation system.

The schedule of the workshop was as below:

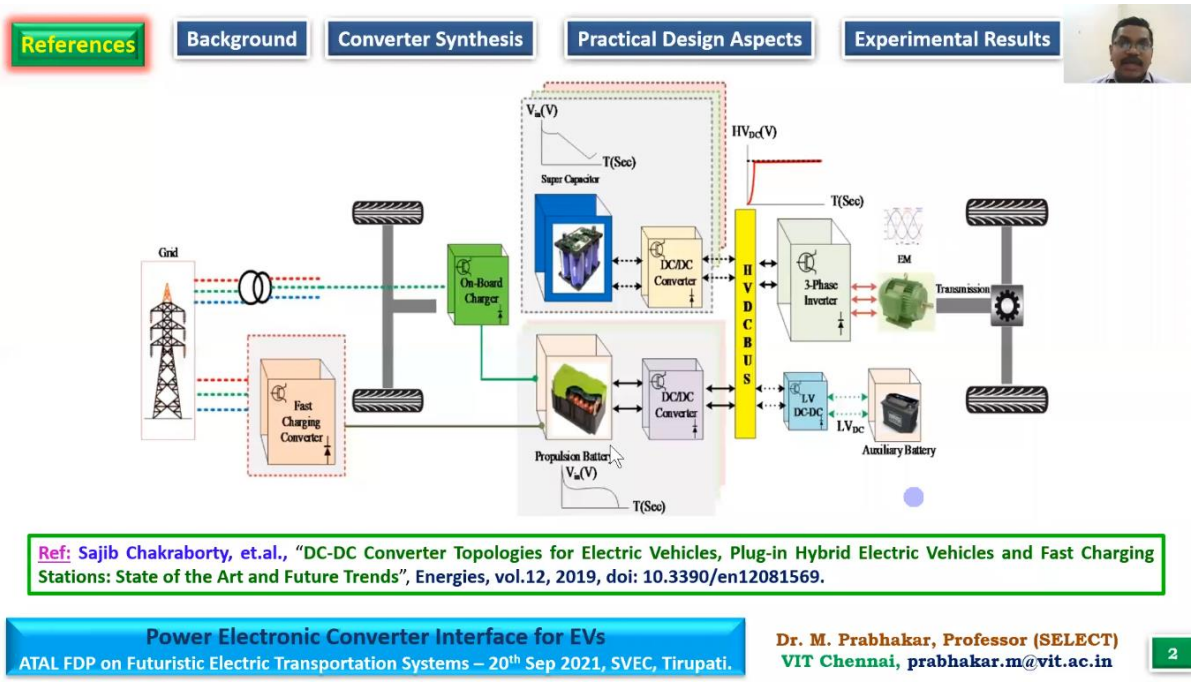
Day & Date	10:00 AM – 11:30 AM	12:00 Noon – *01*:30 PM		02:30 PM – 4:30 PM
Day 1 20.09.2021	**Inaugural function followed by keynote speech** by **Dr. V. Chandrasekar** Component Manager, Kone Elevator Chennai	**Session 1** **"Power Electronic Converters Interface for EVs"** **Dr. M. Prabhakar** Professor, Department of Electrical & Electronics Engineering, VIT University, Chennai Campus.		**Session 2** **"Modelling and Reliability Assessment for EVs"** **Dr. N.M.G. Kumar** Department of EEE, Sree Vidyanikethan Engineering College, Tiruapti,
Day 2 21.09.2021	**Session 3** **"Introduction to EV power Train"** **Dr. Jammy Ramesh Ragul** Adhoc Faculty, Department of Electrical and Electronics Engineering, NIT - Andrapradesh	**Session 4** **"Stress Management Through Yoga"** **Dr. Jeyaprakash** Principal Vethathiri Maharishi College of Yoga, Chennai	**Lunch Break (01.30PM – 2.30 PM)**	**Session 5** **"Multilevel Inverter – Pulse width Modulation Techniques for the Application of EVs"** **Dr. B. Hemanth Kumar** Assistant Professsor, Department of EEE, Sree Vidyanikethan Engineering College, Tiruapti
Day 3 22.09.2021	**Session 6** **" Design Aspects and variations of BLDC motor for reduced cogging torque"** **Dr. C. Carunaiselvane** Assistant Professor Department of Automobile engineering, SRM Institute of Science and Technology, Kattaggulatur, Chennai Campus.	**Session 7** **"Electric Vehicle Technology"** **Mr. A. Pradeep** Specialist, Charging technology, Robort Bosch Pvt ltd, chennai		**Session 8** **"Power Controllers for Electric Vehicles"** **Dr. K. Janardhan** Assistant Professsor, Department of EEE, Sree Vidyanikethan Engineering College, Tiruapti
Day 4 22.09.2021	**Session 9** **" Design Aspects and variations of BLDC motor for reduced cogging torque"** **Dr. C. Carunaiselvane** Assistant Professor Department of Automobile engineering, SRM Institute of Science and Technology, Kattaggulatur, Chennai Campus.	**Session 10** **"Electric Vehicle Technology"** **Mr. A. Pradeep** Specialist, Charging technology, Robort Bosch Pvt ltd, chennai		**Session 11** **"Power Controllers for Electric Vehicles"** **Dr. K. Janardhan** Assistant Professsor, Department of EEE, Sree Vidyanikethan Engineering College, Tiruapti
Day 5 22.09.2021	**Session 12** **"SOC Estimation Techniques Using Machine Learning Techniques"** **Dr. K. Narasimha Raju,** Professor & Dean, Department of EEE, KL Deemed University, Andra pradesh	**Session 13** **"EVs Motors Performance Range"** **Mr. A. Manikandan** Manager, E-Propelled Pvt Ltd, Chennai		**Session 14** **"Technology Road map for Futuristic Transportation Systems & Valedictory Function"** **Dr. A. ManiMuthu** Research Fellow, NTU, Singapore

The details of technical sessions are as follows.

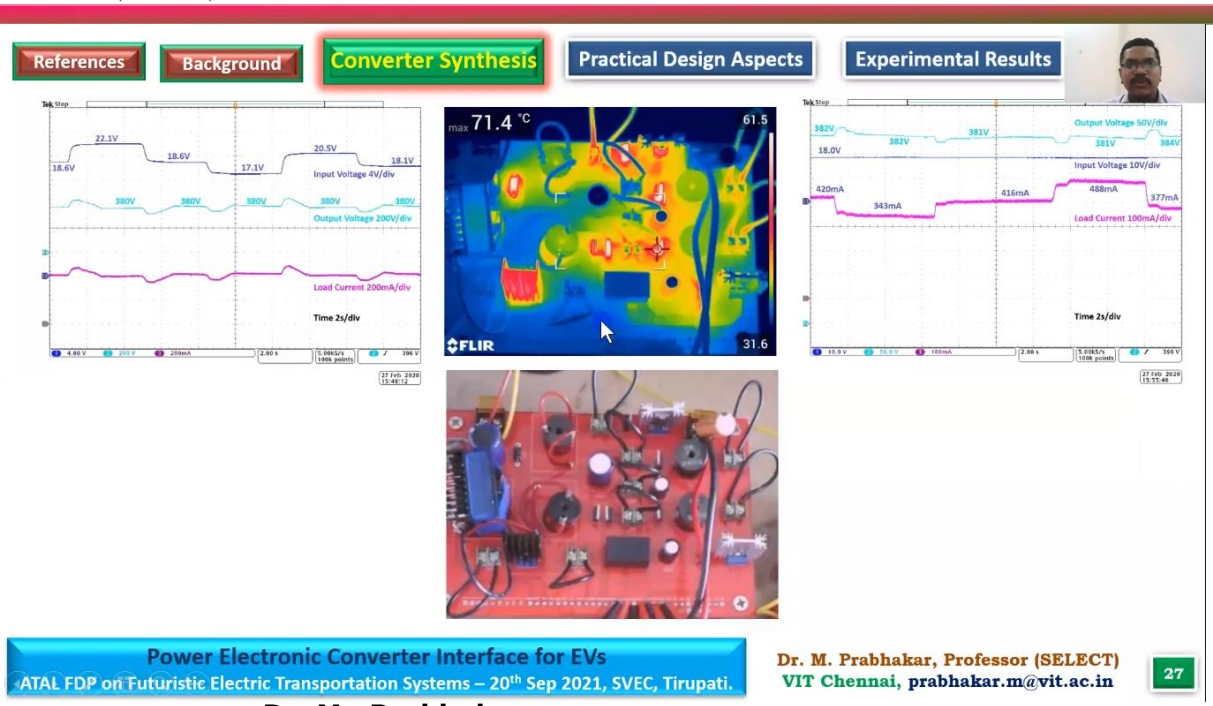
September 20, 2021 (Day – 1, Session – 1)

Dr. M. Prabhakar, Professor, VIT University, Chennai acted as a resource person for second sessions of Day-1 to deliver the Power electronics reliabilty concepts. The 2nd session of Day-1 / Technical session – 2, is started at 12:00 Noon. The participants are trained on the following concepts of Converter to interface with EVs.

- Voltage stability
- Temperature distribution in converter circuits.
- Testing Needs
- Practical traits.



Dr. M. Prabhakar, is explaining the concept of Power electronic converter interface for EVs.

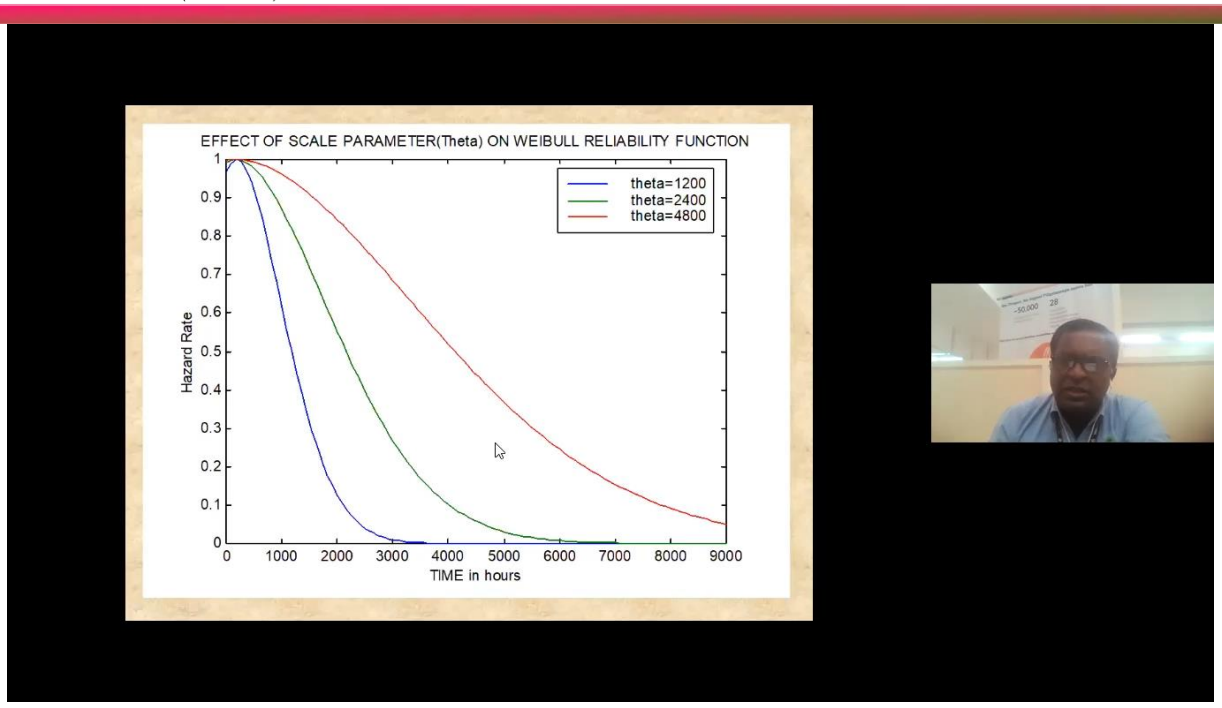


Dr. M. Prabhakar is demonstrating the converter synthesis for EVs.

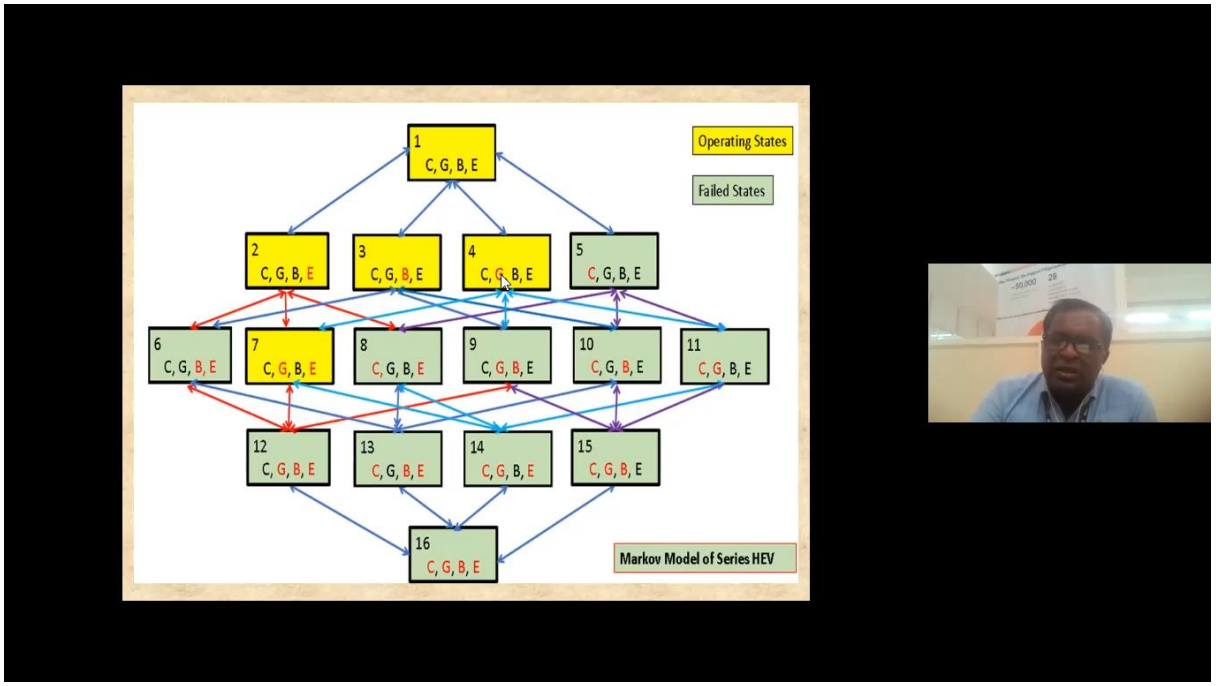
September 20, 2021 (Day – 1, Technical Session – 2)

The final session of Day-1 / Technical session – 2, is started at 2:30 PM. In this session, **Dr. N.M.G Kumar, Sree Vidyanikethan Engineering College, Tirupati** expalined the Importance of Modelling and Assessment of Electric Vehicle : Reliability Perceptive. The participants have gained the knowledge on the following concepts.

- Failure Probability distributions
- MTTF (Mean time to Failure)
- MTTR (Mean time to Repair)
- MTBF (Mean time between Failure)
- CUT set, TIE set
- Marcov decision Process
- F & D techniques (Frequency and duration)



Dr. N.M.G Kumar, Importance of Reliability in EVs

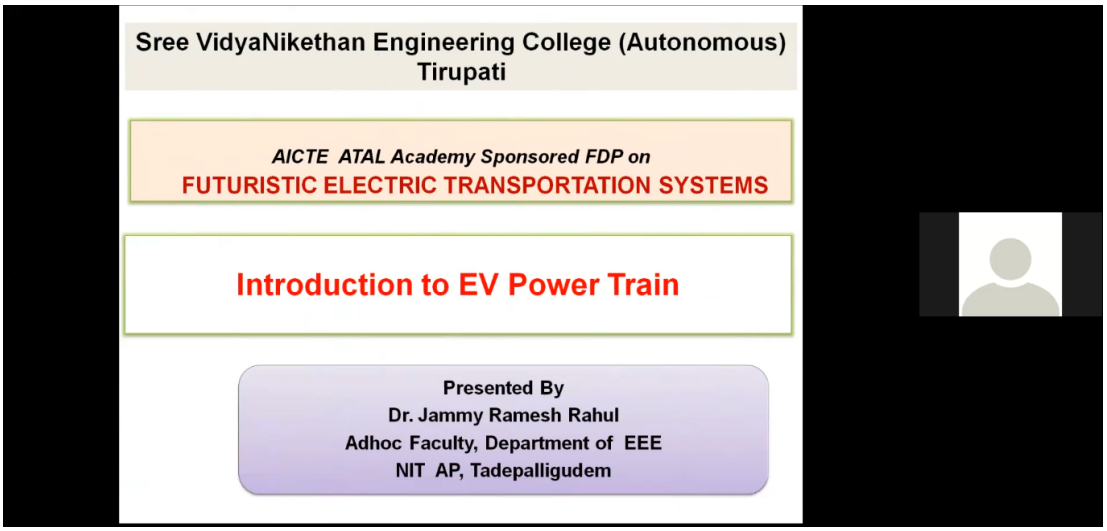


Dr. N.M.G Kumar, need of morkov model for series HEV.

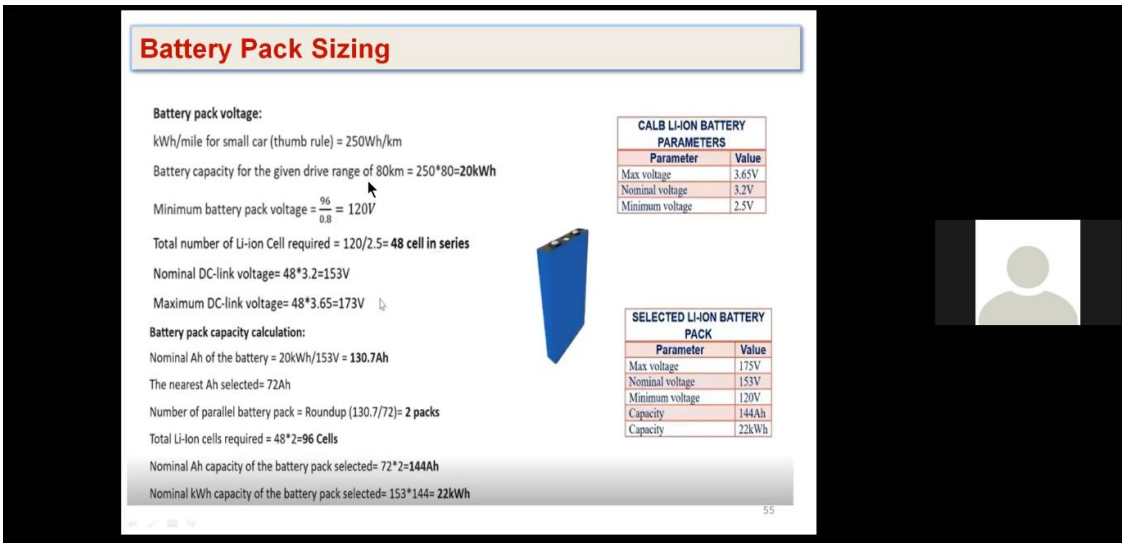
September 21, 2021 (Day – 2, Technical Session – 3)

Dr. Jammy Ramesh Ragul , Adhoc Faculty, NIT tadepalligudem, andra Pradesh acted as a resource person for the third technical session in Day-2. The first session of Day-2 was started at 10:00 AM. In this session **Dr. Jammy Ramesh Ragul**, explained the concepts of Introduction to EV Power Train. The participants have gained the practical knowledge on the following concepts.

- V – G
- G – V
- V – V
- Battery size Packing
- Motor for EVs



Dr. Jammy Ramesh Rahul, delivers the concepts of power train for EVs



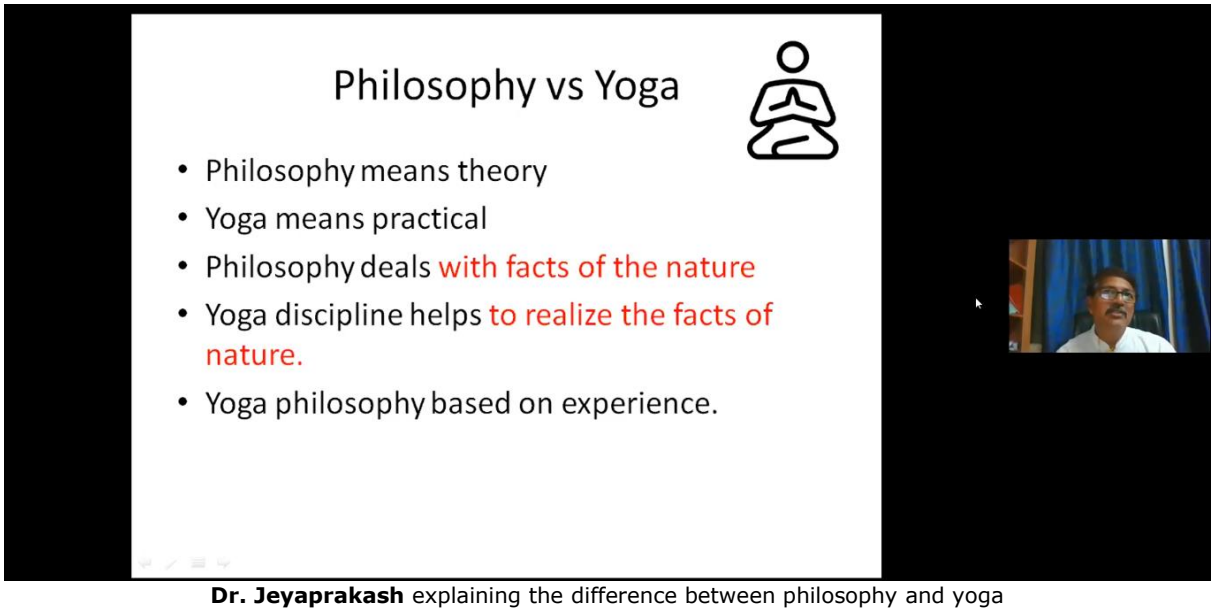
Dr. Jammy Ramesh Rahul, delivers the concepts of battery pack sizing

September 21, 2021 (Day – 2, Technical Session – 4)

The second session of the Day-2 / Technical session 4 was started at 12.00 AM. In this session, **Dr. Jeyaprakash,** Principal, vedathatri maharishi college of yoga, chennai has demonstrated the following concepts of stress management through yoga.

- Importance of meditation,
- Harmony levels
- Layers in human body
- Charging methods

Dr. Jeyaprakash explaining the concepts of stress management through yoga

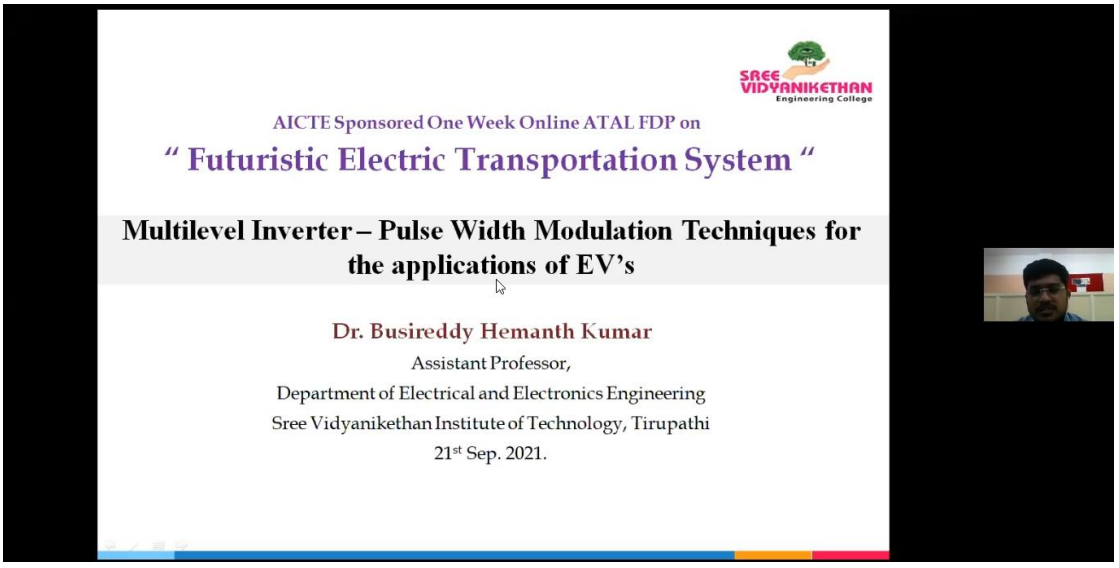


Dr. Jeyaprakash explaining the difference between philosophy and yoga

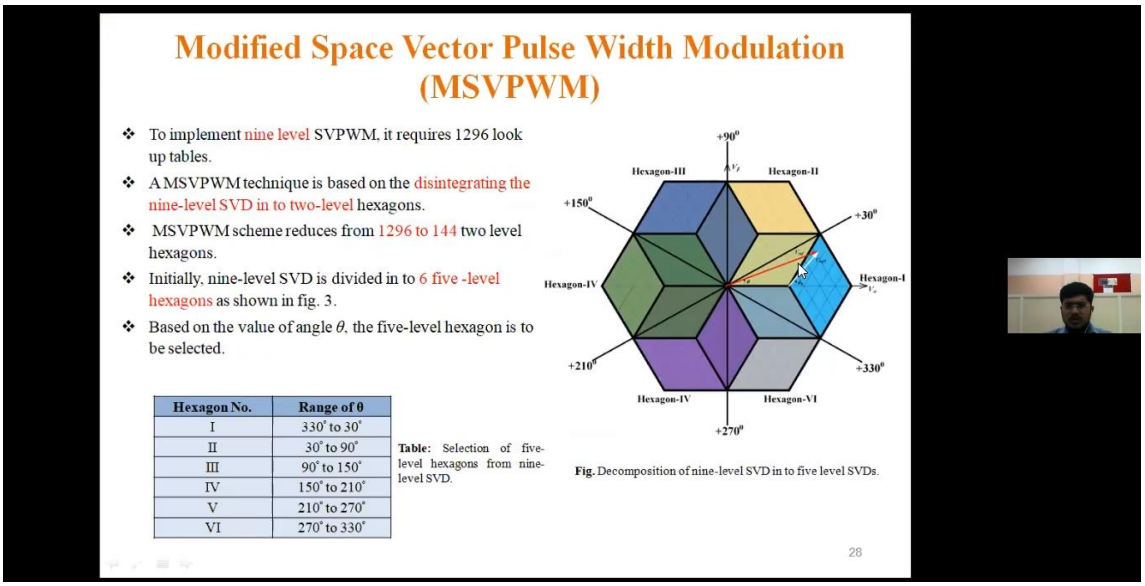
September 21, 2021 (Day – 2, Technical Session – 5)

The session was started at 2.30 PM. In this session, **Dr. B .Hemanth Kumar,** aassistant professor, sree vidyanikethan engineering college, tirupati has delivered a lecture Multilevel Inverter – Pulse width Modulation Techniques for the Application of EVs. He explained the concepts of various modulation techniques as,

- Pulse width modulation
- Space vector modulation
- Modified space vector modulation
- Futhur modified pulse width modulation



Dr. B. Hemanth Kumar is explaining Multilevel Inverter – Pulse width Modulation Techniques for the Application of EVs

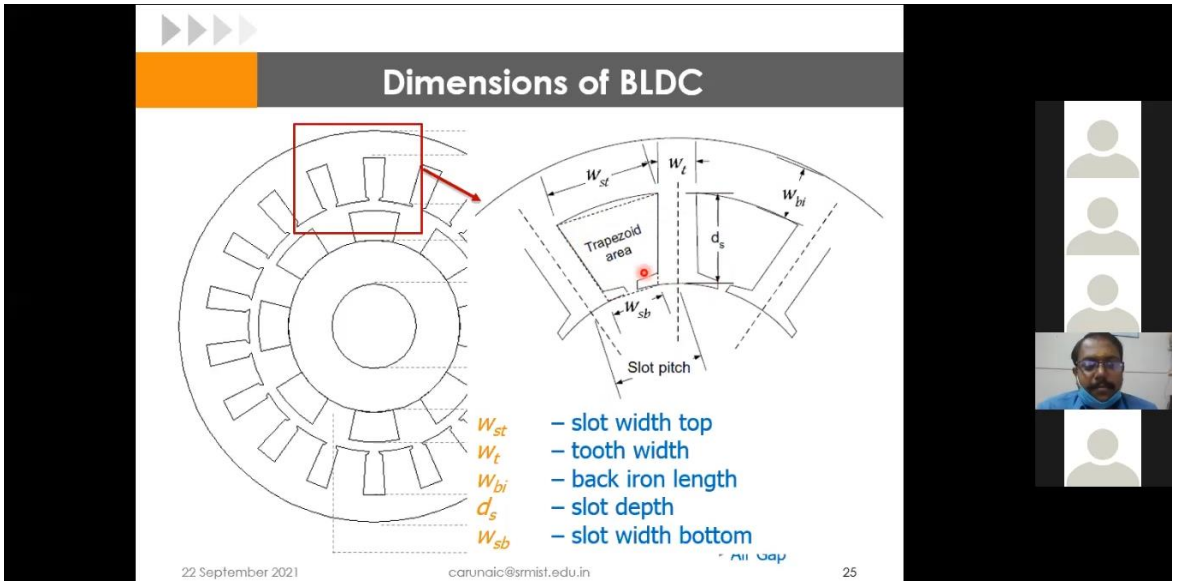


Dr. B. Hemanth Kumar is demonstarating the modified space vector Pulse width Modulation Techniques

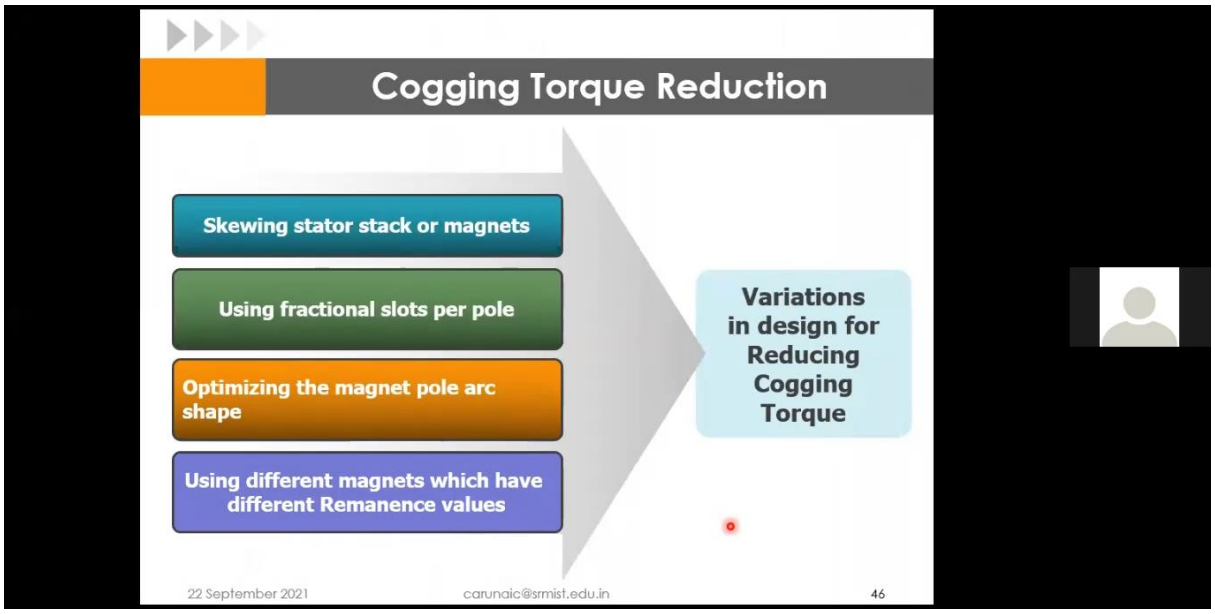
September 22, 2021 (Day – 3, Technical Session – 6)

The first session of the Day-3 / technical session 6 was started at 10:00 AM. **Dr. C. Carunaiselvane**, **assistant professor, SRMIST – Kattankulathur Campus, Chennai** acted as a resource person for first session of Day-3. In this session **Dr. C. Carunaiselvane,** explained Design Aspects and Variations of BLDC motor for Reduced Cogging Torque. The participants have gained the knowledge on the following concepts.

- Design procedure of motor for EVs,
- Impact of permanent magnet motor,
- Dimensions of BLDC,
- Cogging torque reduction technique



Dr. C. Carunaiselvane is explaining the procedure of diminsioning BLDC motor.

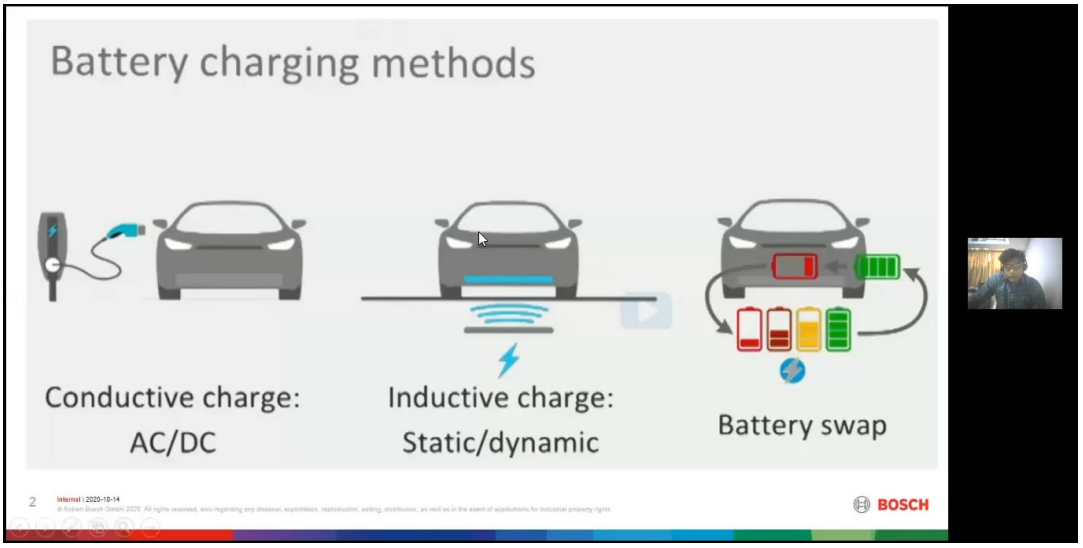


Dr. C. Carunaiselvane is demonstrating the cogging torque reduction in BLDC motor

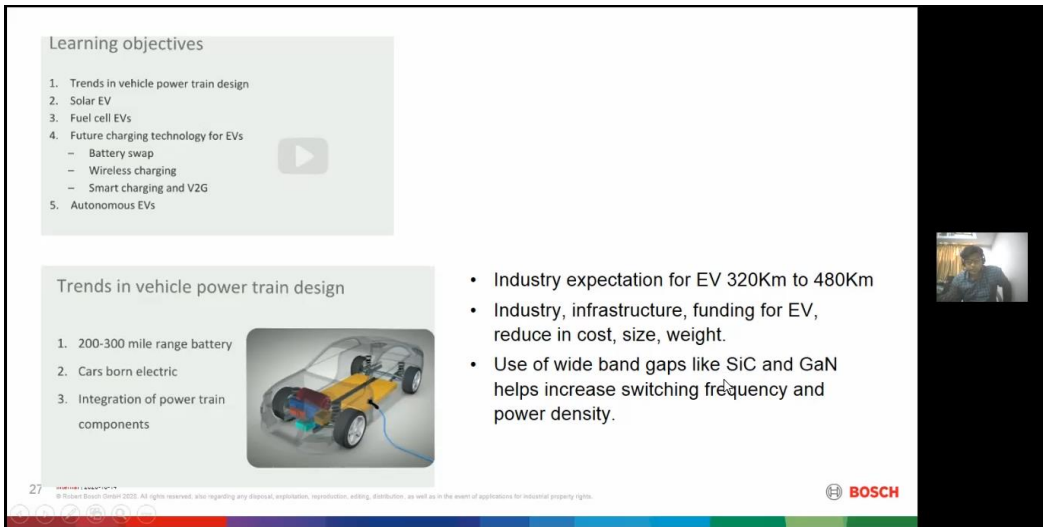
September 22, 2021 (Day – 3, Technical Session – 7)

The seesion 2 of the Day-3 / technical session 7 was started at 12:00 Noon. **Mr. A. Pradeep, Specialist, charging techniques, robort bosch india Pvt Ltd** acted as a resouce person. He delivered a session on "Electric Vehicle Technology". **Mr. A. Pradeep** explaine the concepts of various charging techniques and the participants gain knowledge on,

- Static charging, Dynamic charging, Battery swapping
- Sofe charging region
- Connectors for charging
- Fuel cell for EVs



Mr. A. Pradeep, explaning the types of charging techniques.

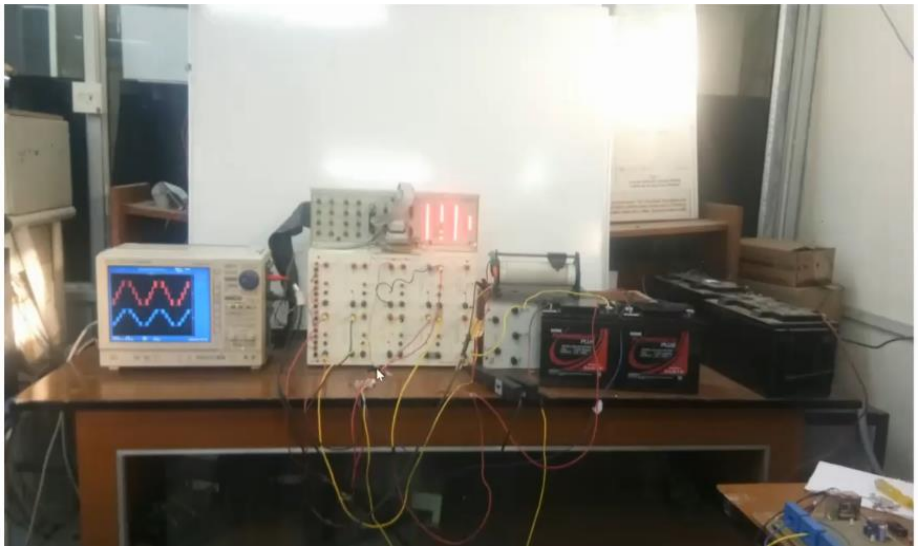


Mr. A. Pradeep, explain the concepts of power train design

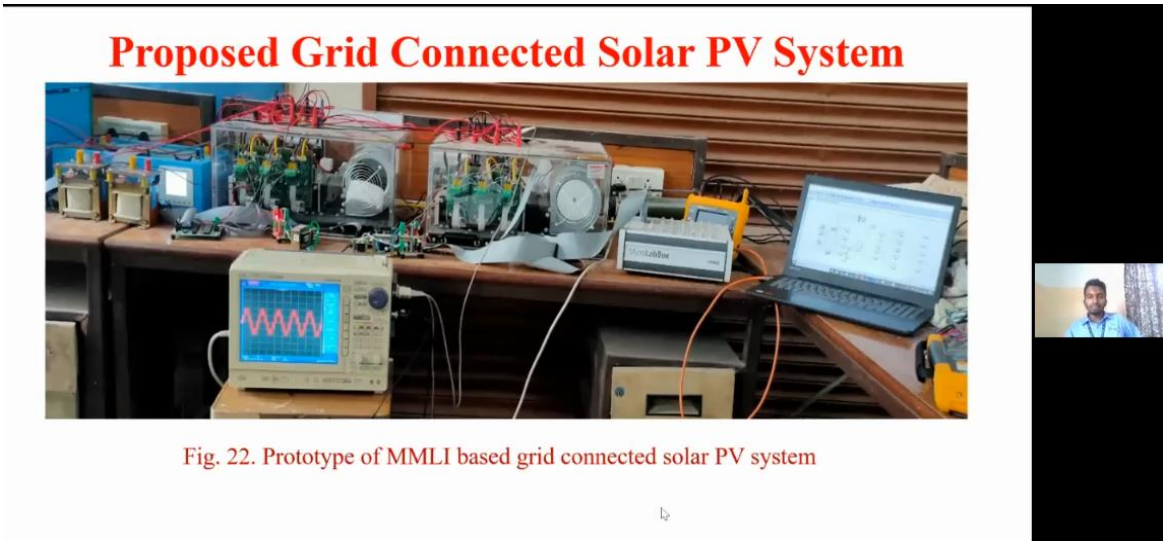
September 22, 2021 (Day – 3, Technical Session – 8)

The third session of the Day-3 was started at 2.30 PM. In this session, **Dr. K. Janardhan,** Assistant Professor, Department of EEE, Sree Vidyanikethan Engineering College, Tiruapti acted as a resource person. **Dr. K. Janardhan**, He delivered a session on Power Controllers for Electric Vehicles. In this session, the participants have gained the knowledge on the following:

- Inverter for EVs, Microlab Box.
- Multilevel converters, Switch Selection
- Circuit Design for EVs



Dr. K. Janardhan, explain the conventional method for grid connected solar PV systems

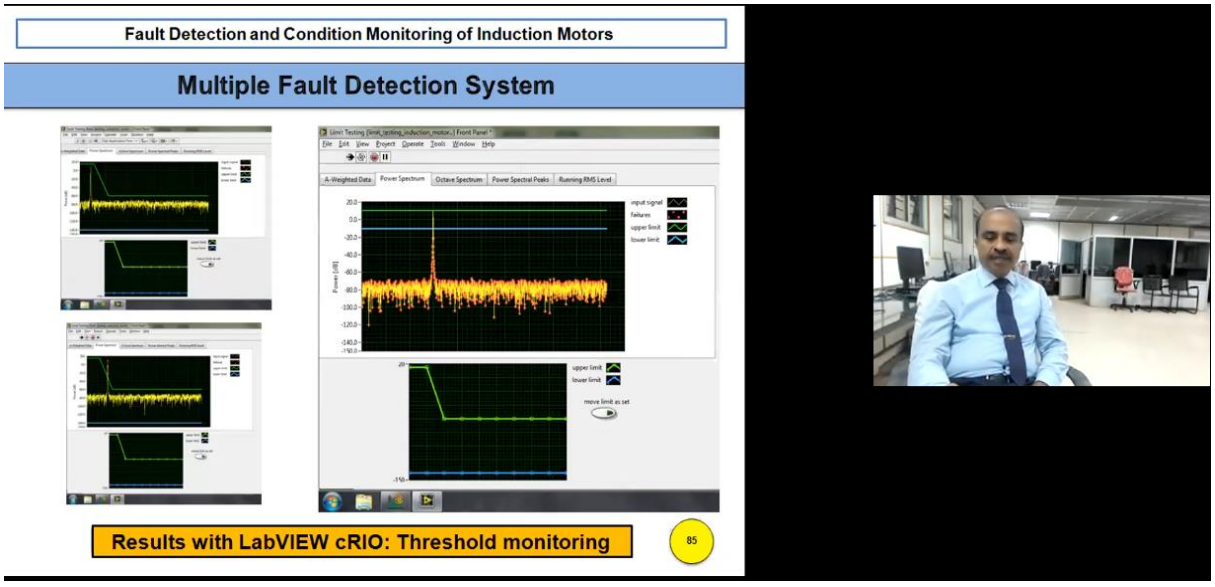


Dr. K. Janardhan, explain the proposed method for grid connected solar PV systems

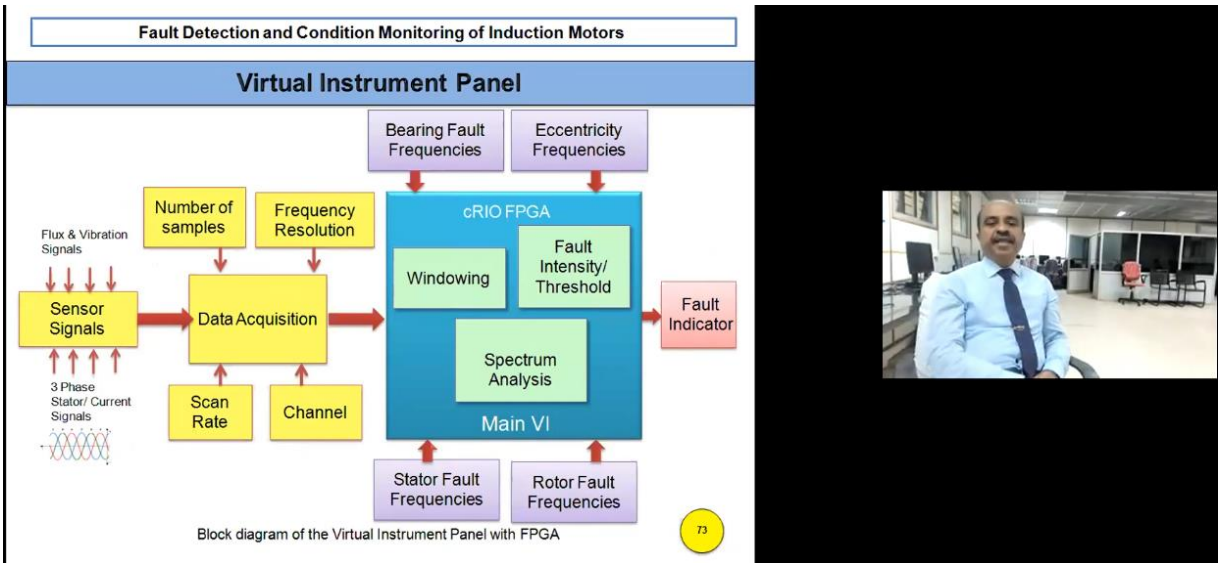
September 23, 2021 (Day – 4, Technical Session – 9)

Dr. S.M. shashidhar, Principal & Professor,Proudhadevaraya Institute of Technology, Karnataka, acted as a resource person for Day-4, technical session 9 to deliver Fault Detection and Condition Monitoring for Induction Motors. The first session of Day-4 was started at 10:00 AM. In this session, the participants have gained the partical knowledge on the following:

- Fault detection in motor
- Multiple fault detection in prototype model
- Research area in noise caused by inverter fed induction motor
- FPGA interface with induction motor.



Dr. S.M. shashidhar, is explaining the multiple fault detection systems.



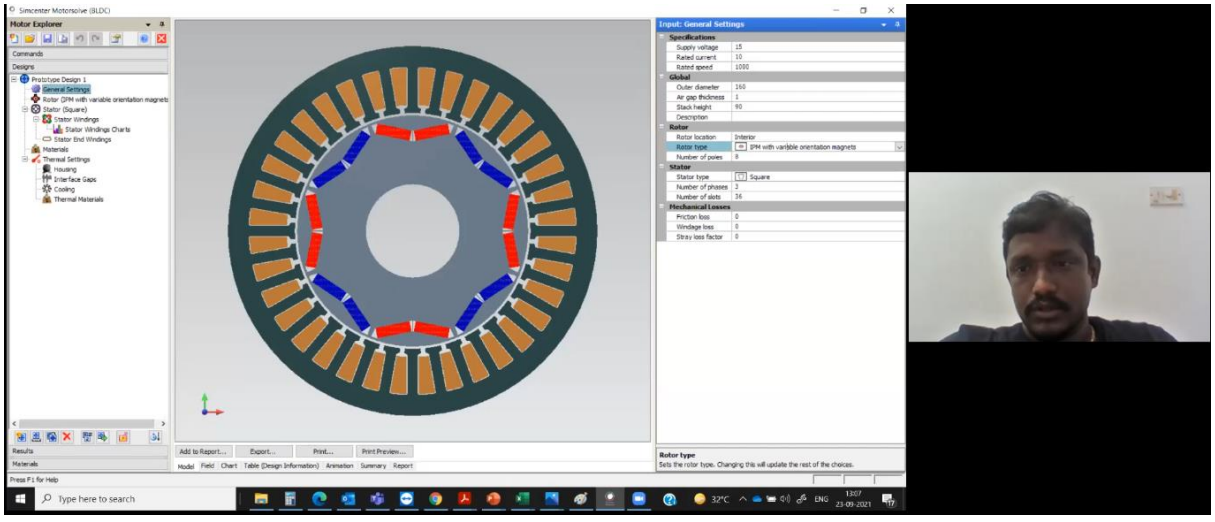
Dr. S.M. shashidhar, is explaining the virtual instrument panel.

September 23, 2021 (Day – 4, Technical Session – 10)

Mr. A. Manikandan, Manager, E-Propelled Pvt Ltd, Chennai acted as a resource person for the technical seesion 9 of the Day-4 was started at 12:00 AM and he delivered a session on electric motor for EV and HEV. The topics that are discussed in this session are:

- Motor design process for EVs using MotorSolve software package
- Cost assessment of machine design
- Involvement of various types of special electrical machines for EV applications.
- Drive train system of EV

Mr. A. Manikandan, is explaining the concepts of electric motor for EV and HEV

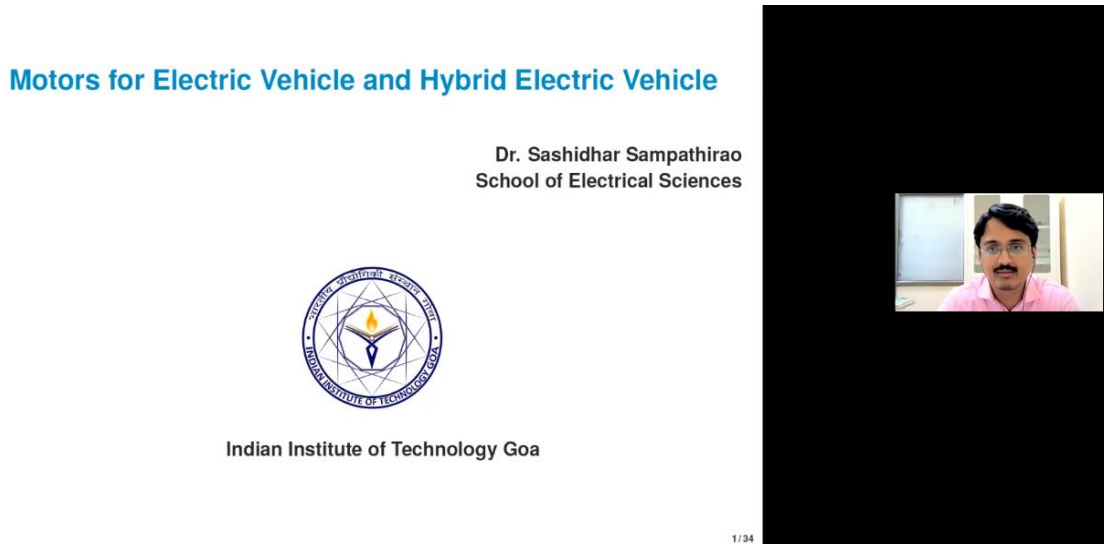


Mr. A. Manikandan, is explaining the design process of reluctance motor for EV application by MotorSolve

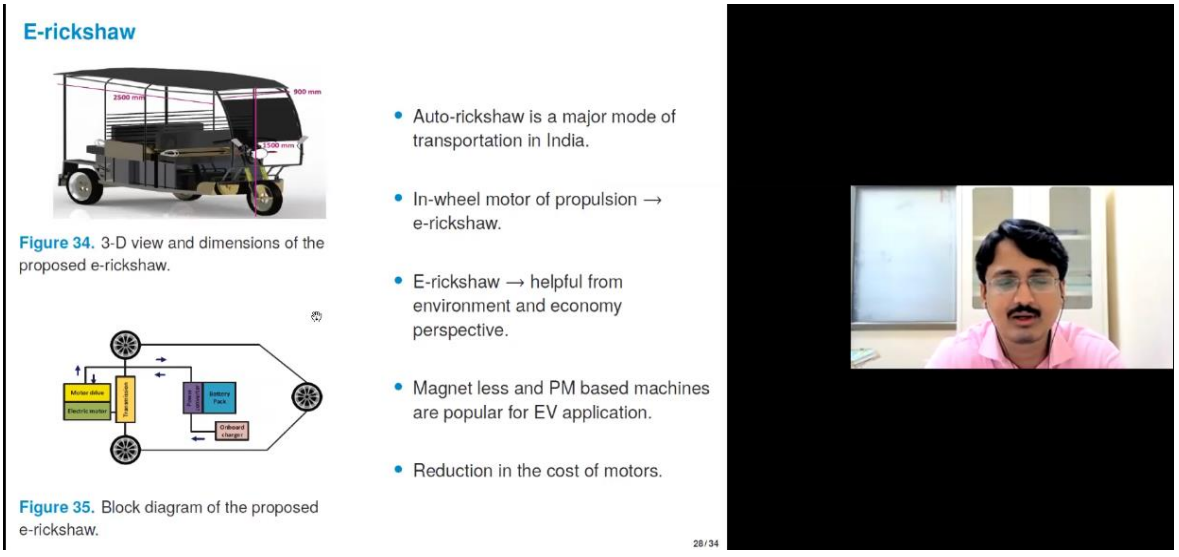
September 23, 2021 (Day – 4, Technical Session – 11)

Dr. Sashidhar Sampathirao, Assistant Professor, School of electrical sciences, IIT Goa, acted as a resource person for the technical session 11 of Day-4 to deliver "motors for electric vehicle and hybrid electric vehicle" and was started at 02:30 PM. In this session, the participants have gained the partical knowledge on the following:

- EV motor sizing
- Motor for micro HEV
- Motor for medium HEV
- Motor for plug-in type
- Motor for E-Bus, E-Rickshaw
- Charging of EVs



Dr.Sashidhar Sampathirao, is explaining concepts on motors for electric vehicle and hybrid electric vehicle

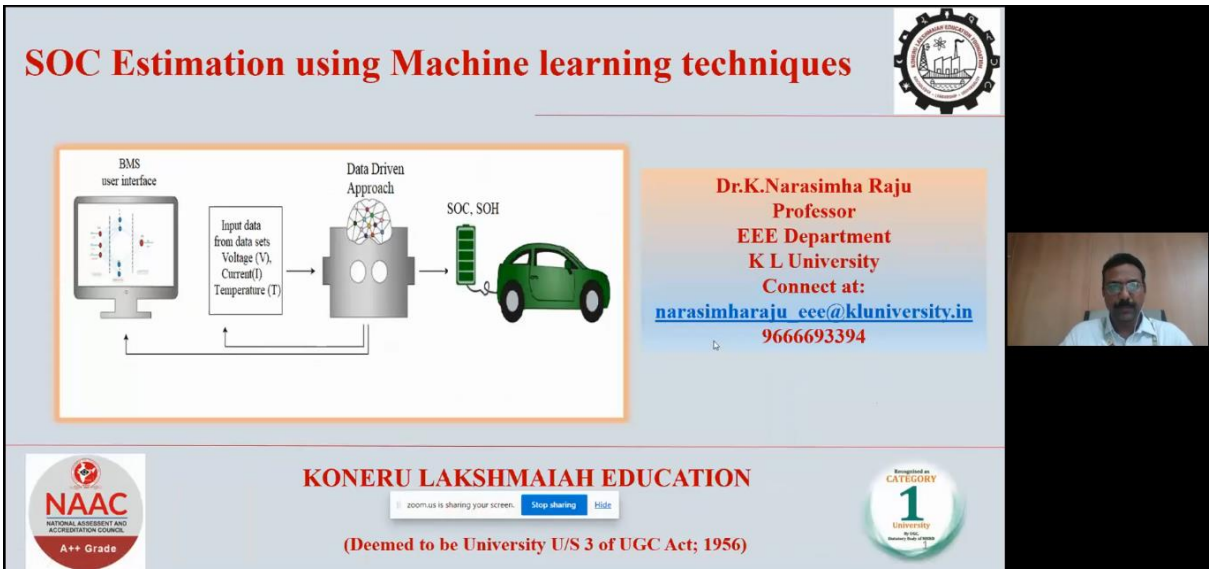


Dr.Sashidhar Sampathirao, is explaining concepts on motors in E-rickshaw

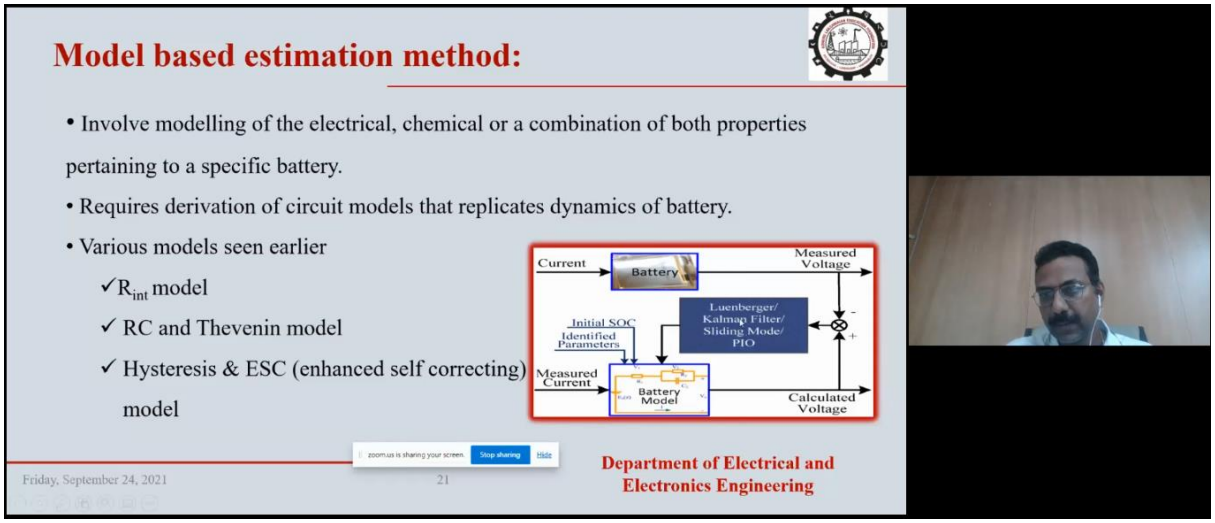
September 24, 2021 (Day – 5, Technical Session – 12)

Dr. K. Narasimha Raju, Dean, KL Deemed University, Andra Pradesh, acted as a resource person for technical sessions - 12 during Day-5 to demonstrate the SOC Estimation Techniques Using Machine Learning Techniques and This session of Day-5 was started at 10:00 AM. In this session, **Dr. K. Narasimha Raju**, explained the following concepts

- Importance of state of charge (SOC) estimation
- SOC estimation issues and challenges
- SOC estimation techniques
- Introduction to data driven and machine learning techniques
- Multivariate Regression and KNN Technique for SOC estimation



Dr. K. Narasimha Raju, explaining the SOC estimation using machine learning techniques .

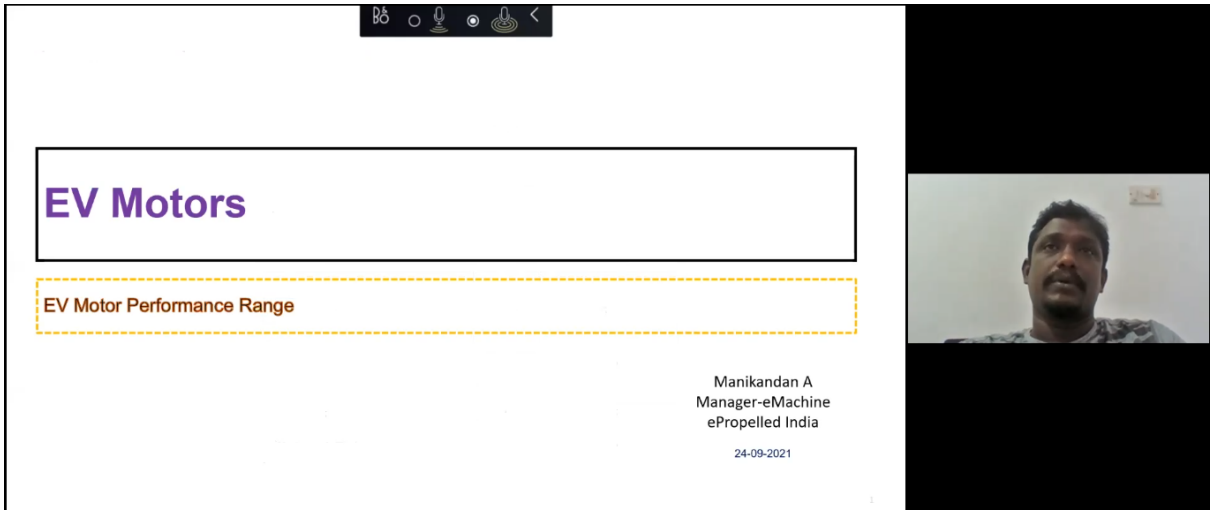


Dr. K. Narasimha Raju, explaining the model based estimation technique.

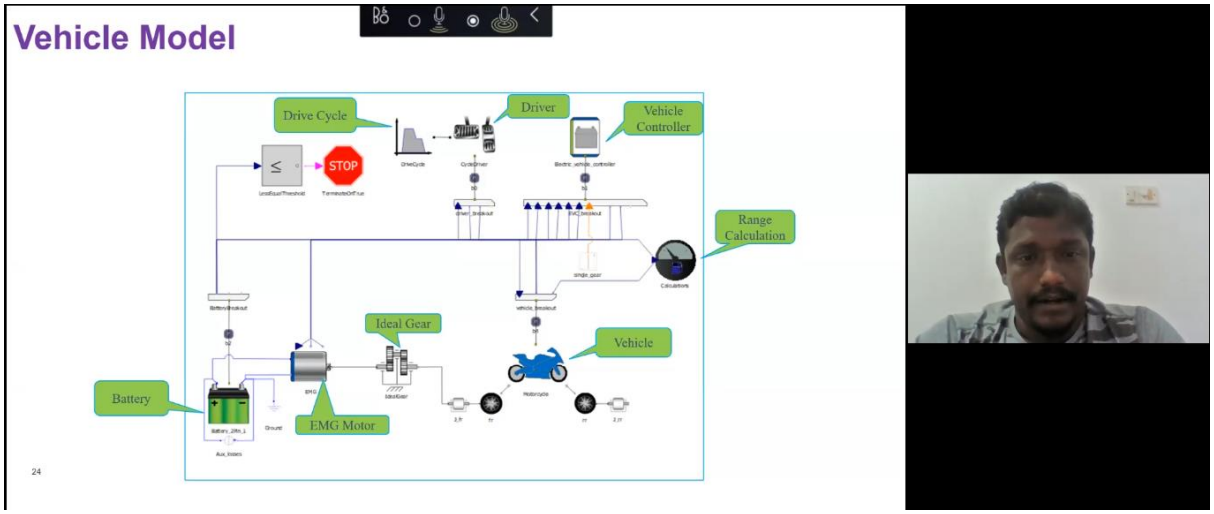
September 24, 2021 (Day – 5, Technical Session – 13)

Mr. A. Manikandan, Manager, E-Propelled Pvt Ltd, Chennai acted as a resource person for the technical seesion 12 of the Day-5 was started at 12:00 AM and he delivered a session on EV motor performance range. The topics that are discussed in this session are:

- Vehicle model (two and three wheeler)
- Importance of battery in range analysis
- Efficiency map analysis
- Computation fluid dynamic analysis
- Cogging torque



Mr. A. Manikandan, is explaining EV motor performance range



Mr. A. Manikandan, is explaining vehicle model

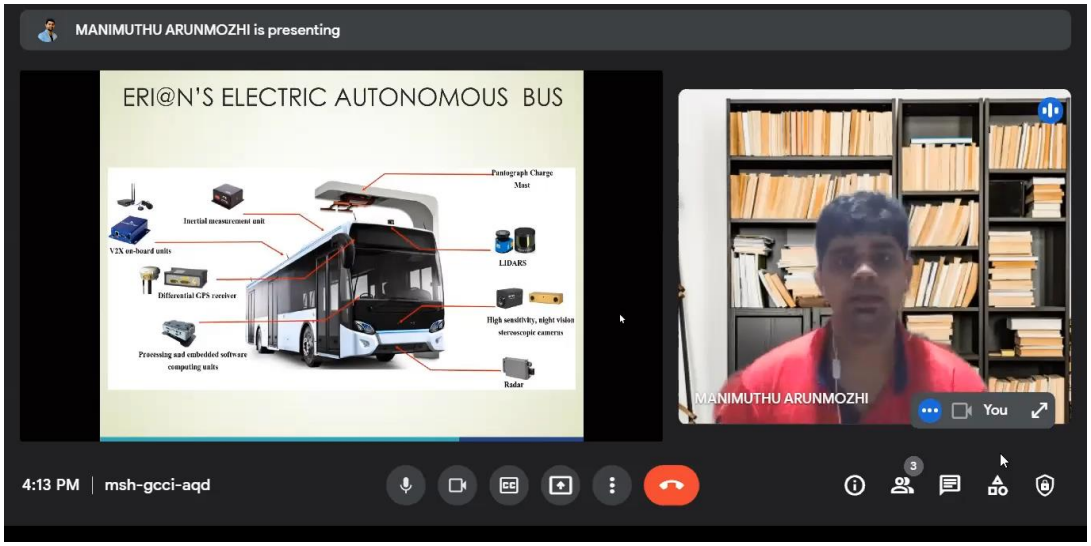
September 24, 2021 (Day – 5, Technical Session – 14)

Dr. A. Manimuthu, Research Fellow, Research Fellow, NTU, Singapore acted as a resource person for the technical seesion 14 of the Day-5 was started at 2:30 PM and he delivered a session on Technology Road map for Futuristic Transportation Systems.

. The topics that are discussed in this session are:

- Introduction to digital world
- Digital transformation
- Smart internet of things (IOT)
- Road map
- Autonomous vehicle systems

Dr. A. Manimuthu, is explaining Technology Road map for Futuristic Transportation Systems



Dr. A. Manimuthu, is explaining Autonomous vehicle systems

VALEDICTORY FUNCTION

The valedictory function of AICTE Training and Learning (ATAL) Academy sponsored online Faculty Development Programme (FDP) on "FUTURISTIC ELECTRIC TRANSPORTATION SYSTEMS" was started at 4.30 PM on September 24, 2021. In the valedictory function, **Dr. A. Manimuthu** invited as the chief guest.

Dr. M. S. Sujatha, Professor & Head , Department of EEE is giving the welcome speech

The participants during valedictory function of ATAL 5 day FDP on futuristic electric transportation systems

Dr. S. Prabhu, Coordinator, ATAL FDP has proposed a report of ATAL 5 day FDP on futuristic electric transportation systems.

Initially, the coordinator thanked the Core team of ATAL for sponsoring the FDP to organize at national level and also for their suggestions, support and guidance to conduct the FDP. He delivered the 5 day ATAL FDP report and later, he thanked the participants of various engineering colleges and government institutions across the country for their enthusiastic participation. At the end, he conveyed his heartfelt thanks to the management, Sree Vidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh, the Principal, Head of the Department, EEE, Co-coordinators for their constant support to make this event a grand success. **Dr. N.M.G Kumar,** Co-Coordinator, Professor, Department of EEE, Sree Vidyanikethan Engineering College delivered the vote of thanks.

S. Prabhu

Signature of coordinator

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