

**ONLINE FACULTY DEVELOPMENT PROGRAMME**

*on*

**"FUTURISTIC ELECTRIC TRANSPORTATION SYSTEMS"**

**(SEPTEMBER 20<sup>th</sup> -24<sup>th</sup>, 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.

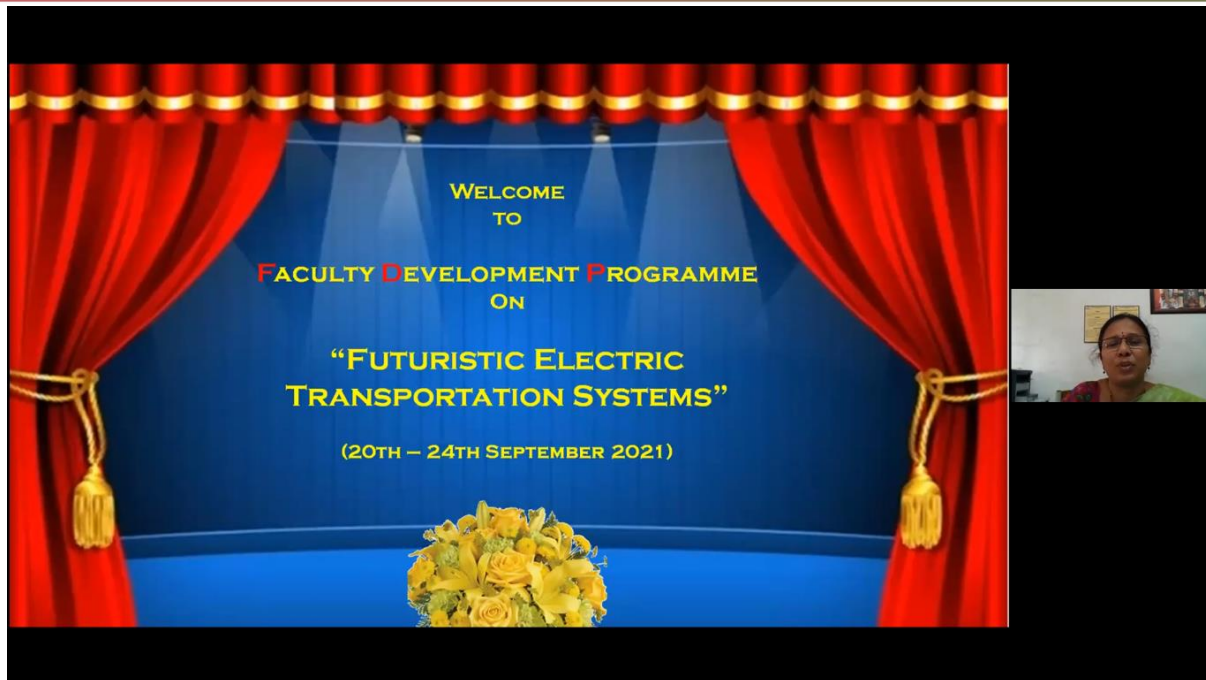
The inaugural function of the online FDP is scheduled on September 20, 2021 at 10:00 AM. In the inaugural function, **Ms. R. Sindhuja**, Assistant Professor, Department of EEE welcomed the chief guest **Dr. V. Chandrasekar**, Component Manager, Kone Elevators Pvt Ltd, Chennai and Guest of Honor **Prof. 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.



The slide features the Sree Vidyanikethan Engineering College logo and name at the top. Below it, the text reads: "We solicit your gracious presence on the occasion of *Inaugural Function* of **AICTE TRAINING AND LEARNING (ATAL) ACADEMY** SPONSORED **FACULTY DEVELOPMENT PROGRAMME ON 'FUTURISTIC ELECTRIC TRANSPORTATION SYSTEMS'**". The slide also includes the ATAL Academy logo and a small image of a person in a suit.

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

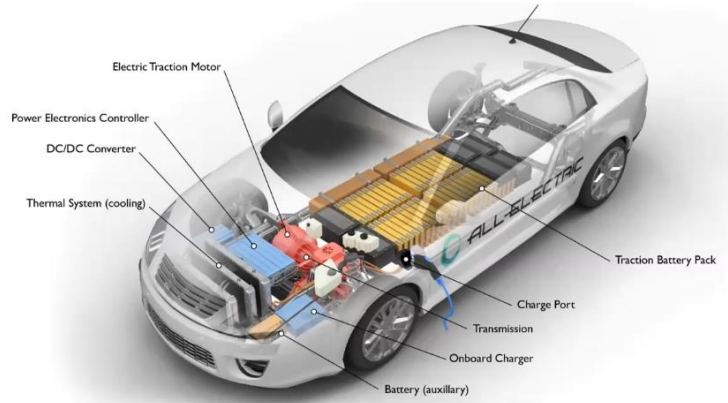


**Dr. M. S. Sujatha**, Professor & Head , Department of EEE is giving the welcome speech.



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

## ELECTRICAL VEHICLE MOTORS:



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

References

Background

Converter Synthesis

Practical Design Aspects

Experimental Results

**Ref:** Sajib Chakraborty, et.al., "DC-DC Converter Topologies for Electric Vehicles, Plug-in Hybrid Electric Vehicles and Fast Charging Stations: State of the Art and Future Trends", *Energies*, vol.12, 2019, doi: 10.3390/en12081569.

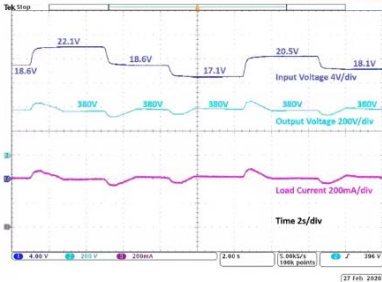
**Power Electronic Converter Interface for EVs**  
ATAL FDP on Futuristic Electric Transportation Systems – 20<sup>th</sup> Sep 2021, SVEC, Tirupati.

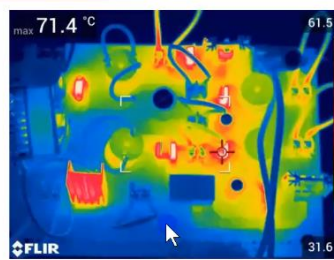
**Dr. M. Prabhakar, Professor (SELECT)**  
VIT Chennai, prabhakar.m@vit.ac.in

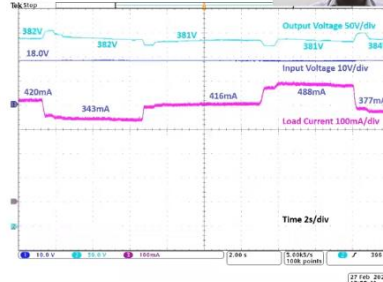
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**Dr. M. Prabhakar**, is explaining the concept of Power electronic converter interface for EVs.

References
Background
Converter Synthesis
Practical Design Aspects
Experimental Results









**Power Electronic Converter Interface for EVs**  
ATAL FDP on Futuristic Electric Transportation Systems – 20<sup>th</sup> Sep 2021, SVEC, Tirupati.

**Dr. M. Prabhakar, Professor (SELECT)**  
**VIT Chennai, prabhakar.m@vit.ac.in**

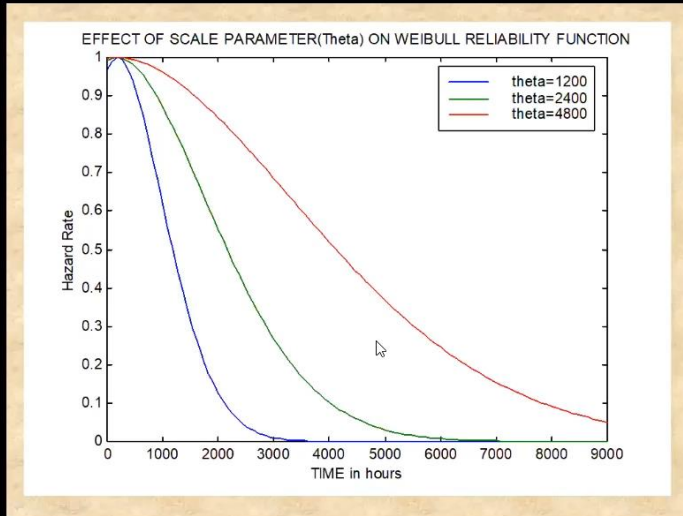
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**Dr. M. Prabhakar** is demonstrating the converter synthesis for EVs.

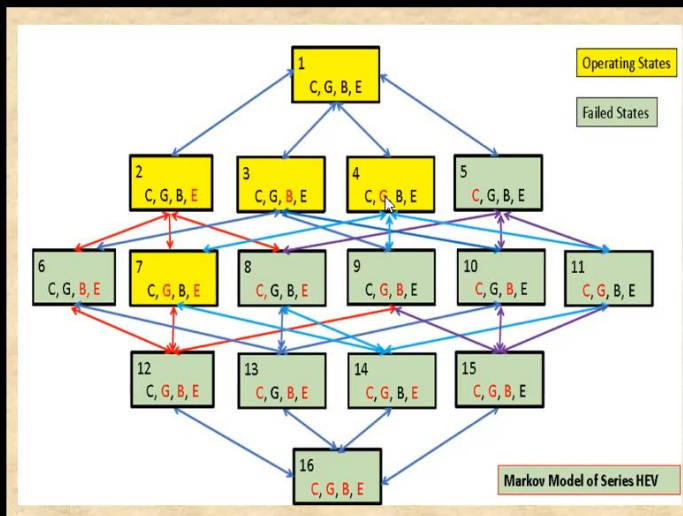
### September 20, 2021 (Day – 1, Technical Session – 2)

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



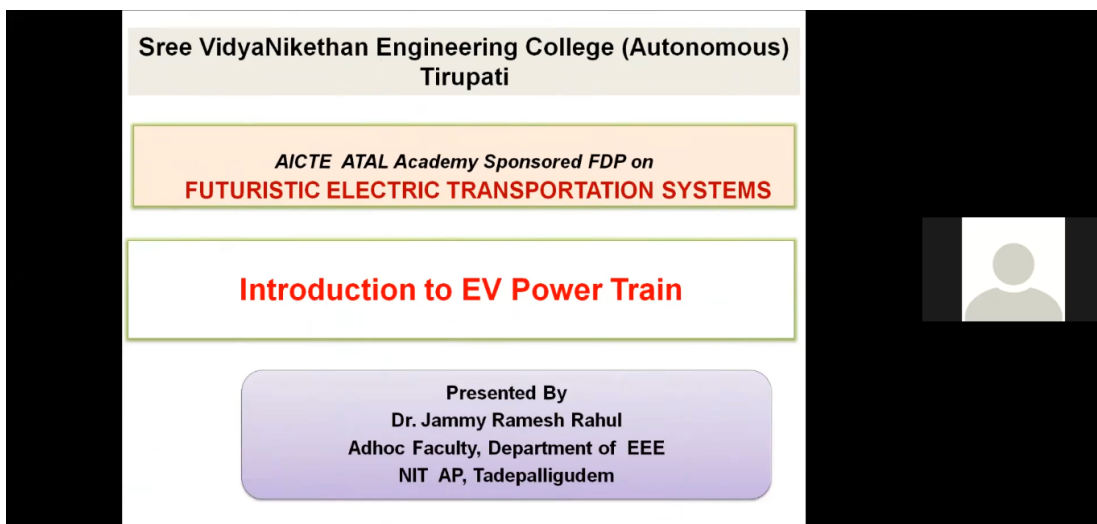
**Dr. N.M.G Kumar**, need of morkov model for series HEV.



**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



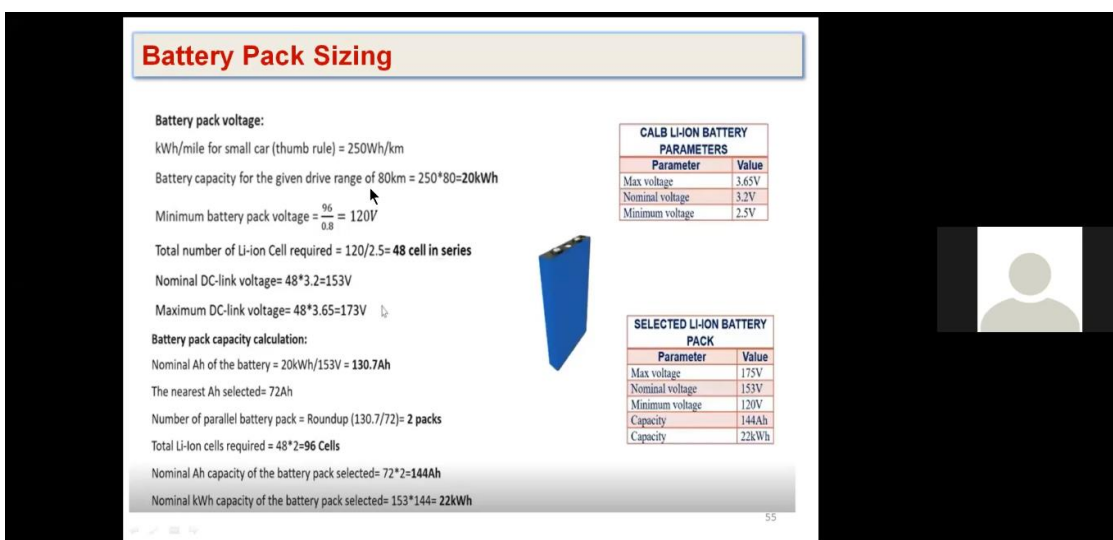
Sree Vidyanikethan Engineering College (Autonomous)  
Tirupati

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**FUTURISTIC ELECTRIC TRANSPORTATION SYSTEMS**

**Introduction to EV Power Train**

Presented By  
**Dr. Jammy Ramesh Rahul**  
Adhoc Faculty, Department of EEE  
NIT AP, Tadepalligudem

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



**Battery Pack Sizing**

Battery pack voltage:  
kWh/mile for small car (thumb rule) = 250Wh/km  
Battery capacity for the given drive range of 80km =  $250 \times 80 = 20\text{kWh}$   
Minimum battery pack voltage =  $\frac{96}{0.8} = 120\text{V}$   
Total number of Li-ion Cell required =  $120/2.5 = 48$  cell in series  
Nominal DC-link voltage =  $48 \times 3.2 = 153\text{V}$   
Maximum DC-link voltage =  $48 \times 3.65 = 173\text{V}$

Battery pack capacity calculation:  
Nominal Ah of the battery =  $20\text{kWh}/153\text{V} = 130.7\text{Ah}$   
The nearest Ah selected = 72Ah  
Number of parallel battery pack = Roundup  $(130.7/72) = 2$  packs  
Total Li-ion cells required =  $48 \times 2 = 96$  Cells  
Nominal Ah capacity of the battery pack selected =  $72 \times 2 = 144\text{Ah}$   
Nominal kWh capacity of the battery pack selected =  $153 \times 144 = 22\text{kWh}$

CALB LI-ION BATTERY	
PARAMETERS	
Parameter	Value
Max voltage	3.65V
Nominal voltage	3.2V
Minimum voltage	2.5V

SELECTED LI-ION BATTERY PACK	
Parameter	Value
Max voltage	175V
Nominal voltage	153V
Minimum voltage	120V
Capacity	144Ah
Capacity	22kWh

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

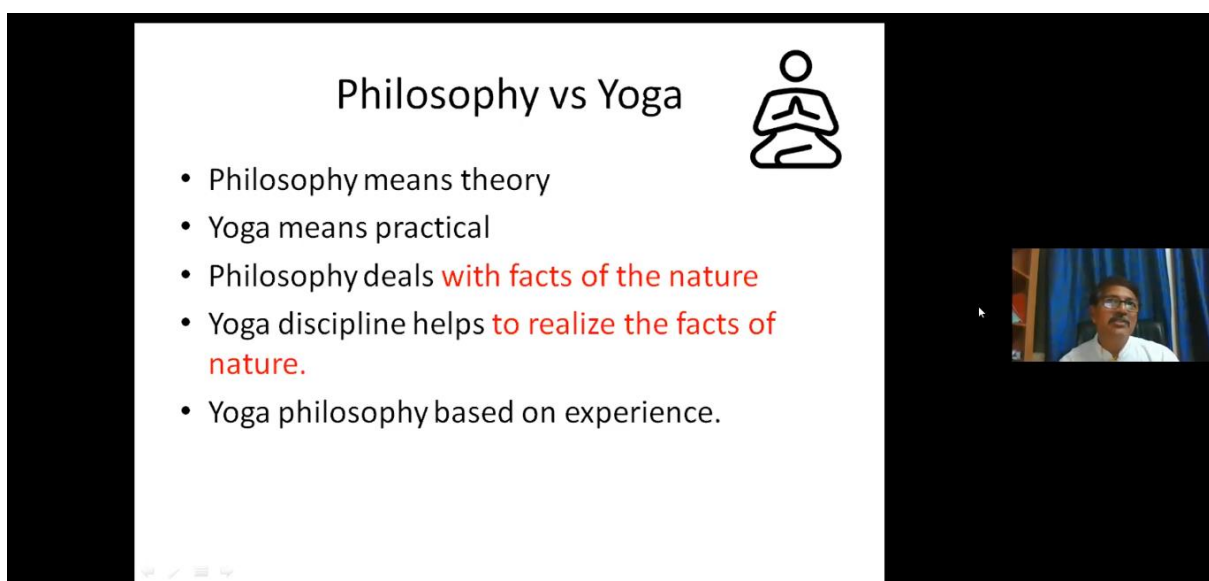
**September 21, 2021 (Day – 2, Technical Session – 4 )**

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

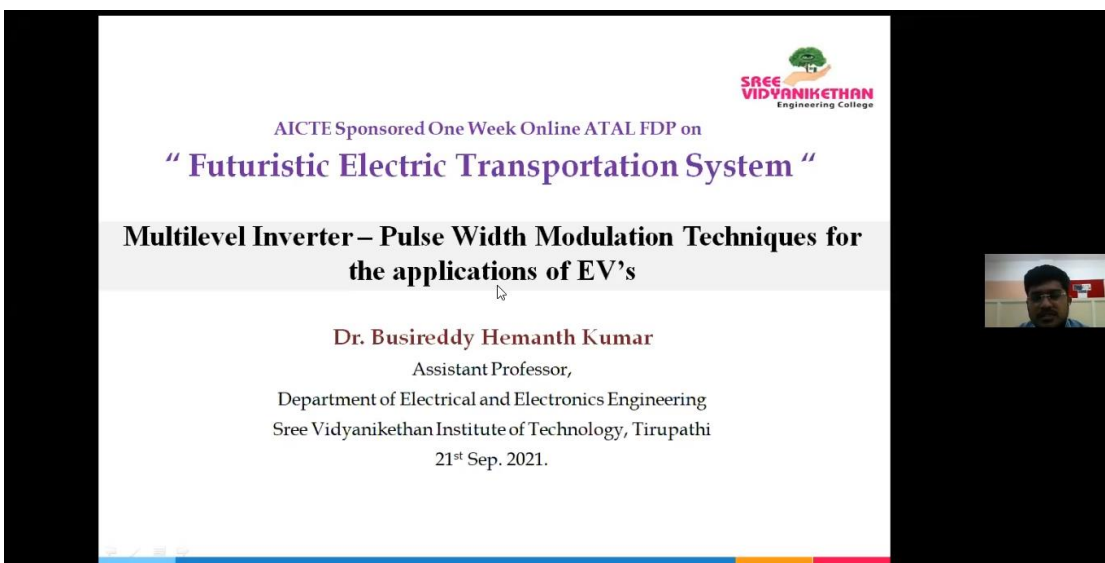



**Dr. Jeyaprakash** explaining the difference between philosophy and yoga

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

The session was started at 2.30 PM. In this session, **Dr. B .Hemanth Kumar**, assistant 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



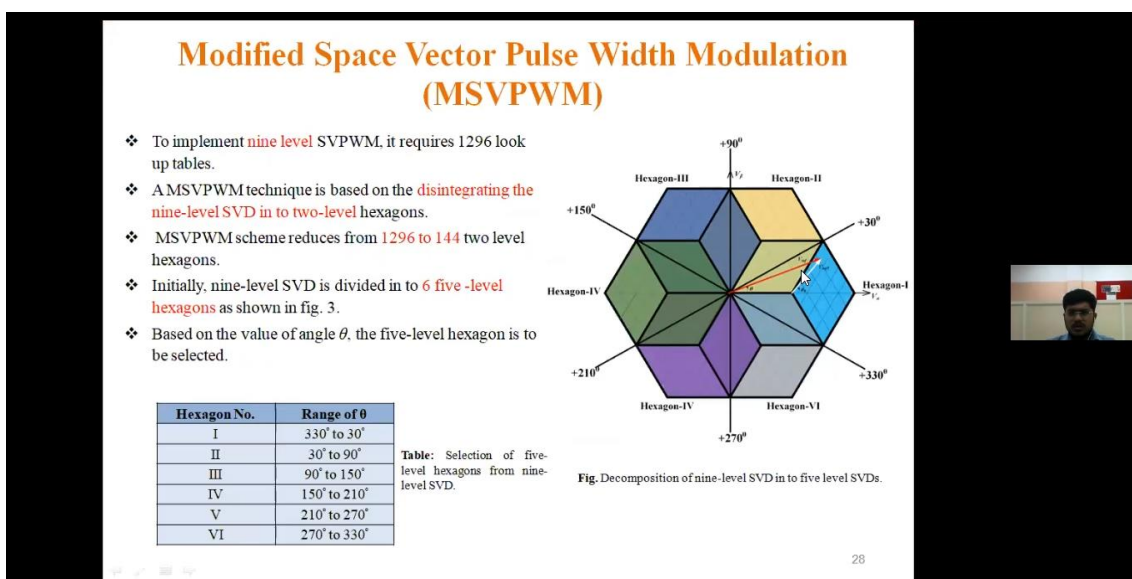


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**“ Futuristic Electric Transportation System “**

**Multilevel Inverter – Pulse Width Modulation Techniques for the applications of EV's**

**Dr. Busireddy Hemanth Kumar**  
Assistant Professor,  
Department of Electrical and Electronics Engineering  
Sree Vidyanikethan Institute of Technology, Tirupathi  
21<sup>st</sup> Sep. 2021.

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



**Modified Space Vector Pulse Width Modulation (MSVPWM)**

- ❖ To implement **nine level** SVPWM, it requires 1296 look up tables.
- ❖ A MSVPWM technique is based on the **disintegrating the nine-level SVD in to two-level hexagons**.
- ❖ MSVPWM scheme reduces from **1296 to 144** two level hexagons.
- ❖ Initially, nine-level SVD is divided in to **6 five -level hexagons** as shown in fig. 3.
- ❖ Based on the value of angle  $\theta$ , the five-level hexagon is to be selected.

Hexagon No.	Range of $\theta$
I	330° to 30°
II	30° to 90°
III	90° to 150°
IV	150° to 210°
V	210° to 270°
VI	270° to 330°

Table: Selection of five-level hexagons from nine-level SVD.

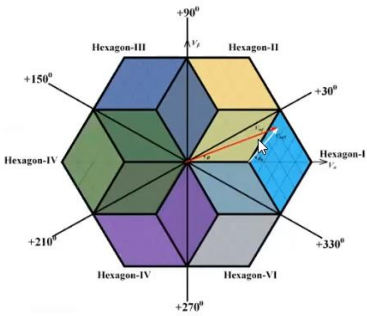


Fig. Decomposition of nine-level SVD in to five level SVDs.

**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

**Dimensions of BLDC**

$W_{st}$  – slot width top  
 $W_t$  – tooth width  
 $W_{bi}$  – back iron length  
 $d_s$  – slot depth  
 $W_{sb}$  – slot width bottom

22 September 2021 carunaic@srmist.edu.in 25

**Dr. C. Carunaiselvane** is explaining the procedure of dimensioning BLDC motor.

**Cogging Torque Reduction**

Skewing stator stack or magnets  
 Using fractional slots per pole  
 Optimizing the magnet pole arc shape  
 Using different magnets which have different Remanence values

Variations in design for Reducing Cogging Torque

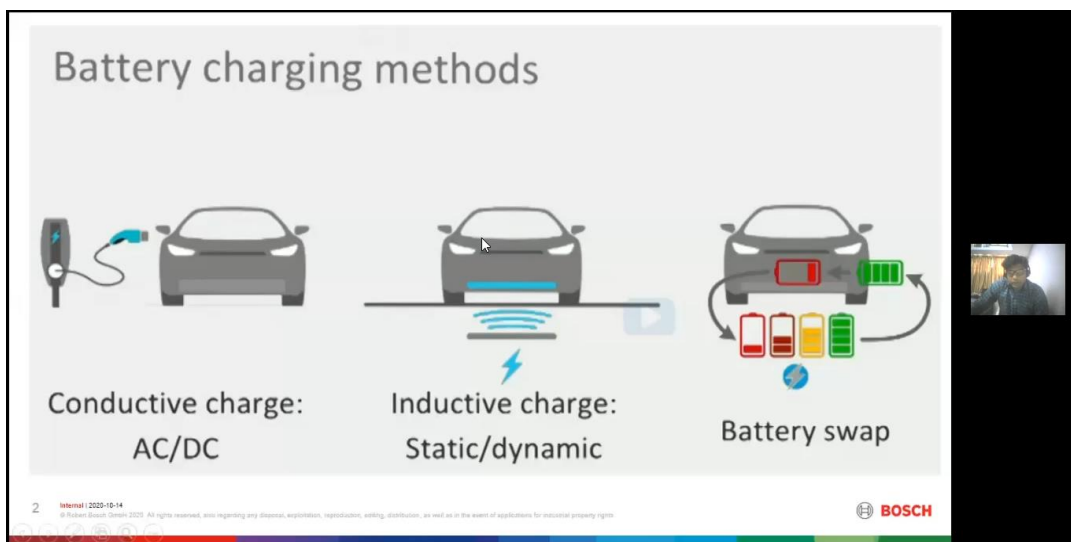
22 September 2021 carunaic@srmist.edu.in 46

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

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

The session 2 of the Day-3 / technical session 7 was started at 12:00 Noon. **Mr. A. Pradeep, Specialist, charging techniques, roborb bosch india Pvt Ltd** acted as a resource 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**, explaining the types of charging techniques.

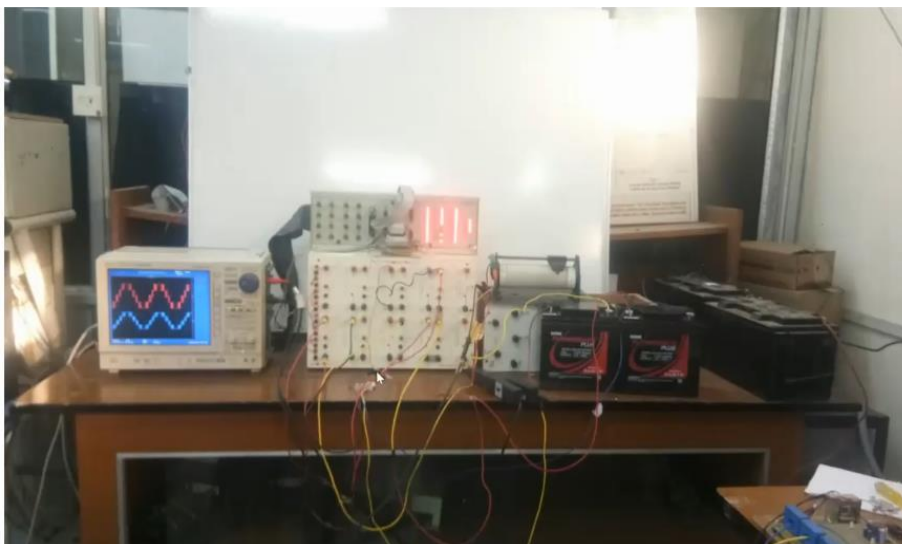


**Mr. A. Pradeep**, explain the concepts of power train design

**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, Tirupati 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

**Proposed Grid Connected Solar PV System**



**Fig. 22.** Prototype of MMLI based grid connected solar PV system

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

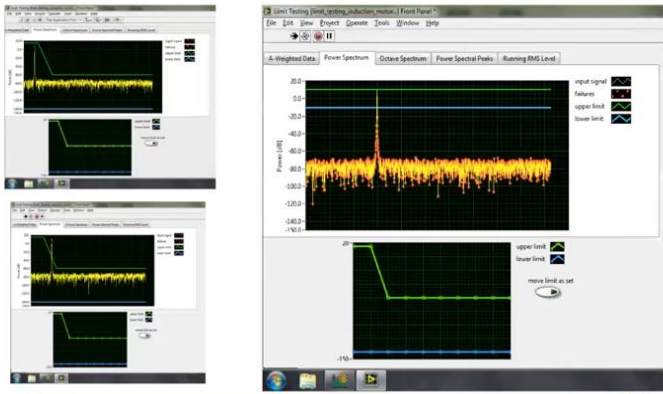

**September 23, 2021 (Day – 4, Technical Session – 9 )**

**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 partial 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.

Fault Detection and Condition Monitoring of Induction Motors

**Multiple Fault Detection System**

**Results with LabVIEW cRIO: Threshold monitoring**

85

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

Fault Detection and Condition Monitoring of Induction Motors

**Virtual Instrument Panel**

Flux & Vibration Signals

3 Phase Stator/ Current Signals

Sensor Signals

Number of samples

Frequency Resolution

Data Acquisition

Scan Rate

Channel

Bearing Fault Frequencies

Eccentricity Frequencies

cRIO FPGA

Windowing

Fault Intensity/ Threshold

Spectrum Analysis

Main VI


Stator Fault Frequencies

Rotor Fault Frequencies

Fault Indicator

Block diagram of the Virtual Instrument Panel with FPGA

73



**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 session 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 partial 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

**Motors for Electric Vehicle and Hybrid Electric Vehicle**

Dr. Sashidhar Sampathirao  
School of Electrical Sciences



Indian Institute of Technology Goa



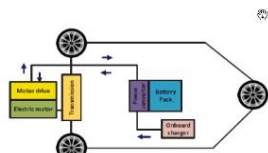
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**Dr.Sashidhar Sampathirao**, is explaining concepts on motors for electric vehicle and hybrid electric vehicle

**E-rickshaw**



**Figure 34.** 3-D view and dimensions of the proposed e-rickshaw.



**Figure 35.** Block diagram of the proposed e-rickshaw.

- Auto-rickshaw is a major mode of transportation in India.
- In-wheel motor of propulsion → e-rickshaw.
- E-rickshaw → helpful from environment and economy perspective.
- Magnet less and PM based machines are popular for EV application.
- Reduction in the cost of motors.



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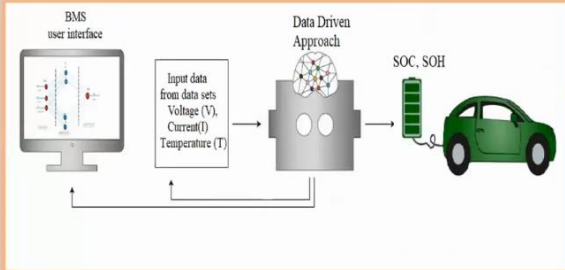
**Dr.Sashidhar Sampathirao**, is explaining concepts on motors in E-rickshaw

**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

## SOC Estimation using Machine learning techniques





**Dr.K.Narasimha Raju**  
Professor  
EEE Department  
K L University  
Connect at:  
[narasimharaju\\_eee@kluniversity.in](mailto:narasimharaju_eee@kluniversity.in)  
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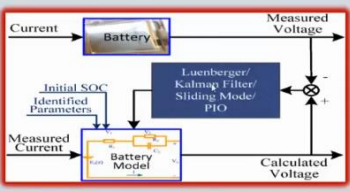
(Deemed to be University U/S 3 of UGC Act; 1956)





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

## Model based estimation method:

- Involve modelling of the electrical, chemical or a combination of both properties pertaining to a specific battery.
- Requires derivation of circuit models that replicates dynamics of battery.
- Various models seen earlier
  - ✓  $R_{int}$  model
  - ✓ RC and Thevenin model
  - ✓ Hysteresis & ESC (enhanced self correcting) model





**Department of Electrical and Electronics Engineering**

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**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 session 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

**EV Motors**

EV Motor Performance Range

Manikandan A  
Manager-eMachine  
ePropelled India

24-09-2021

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

**Vehicle Model**

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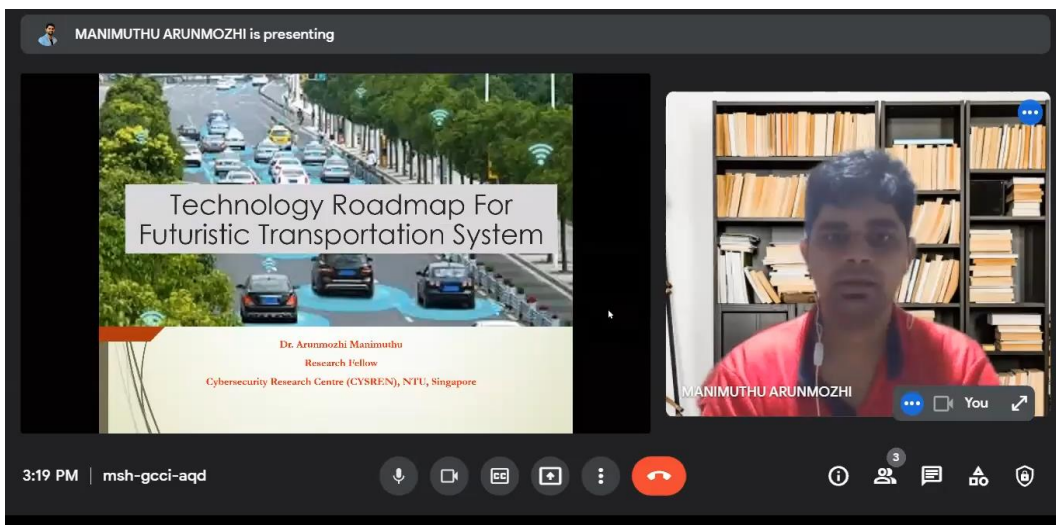
**Mr. A. Manikandan**, is explaining vehicle model

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

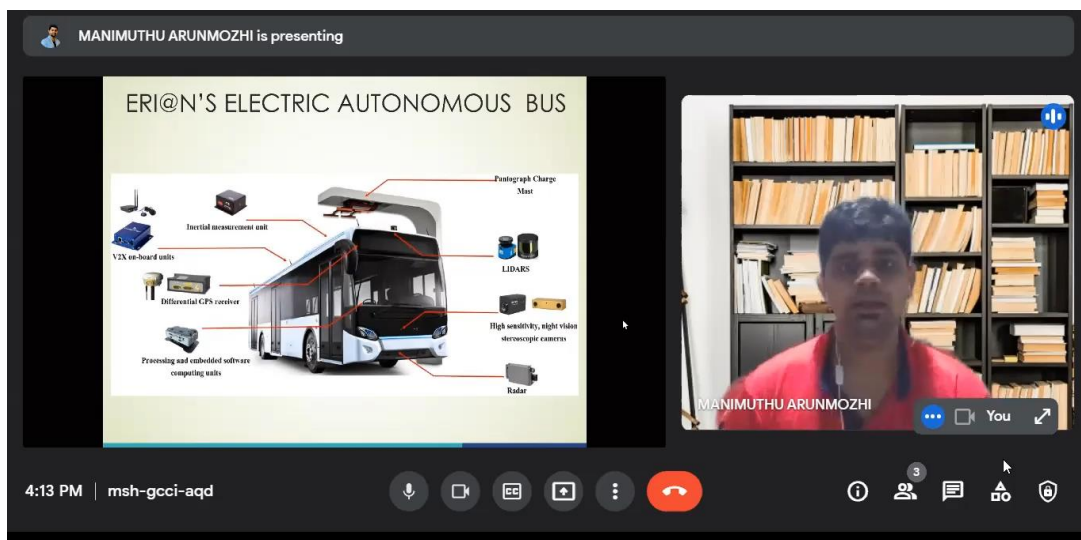
**Dr. A. Manimuthu**, Research Fellow, Research Fellow, NTU, Singapore acted as a resource person for the technical session 14 of the Day-5 was started at 2:30 PM and he delivered a session on Technology Road map for Futuristic Transportation Systems.

. 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



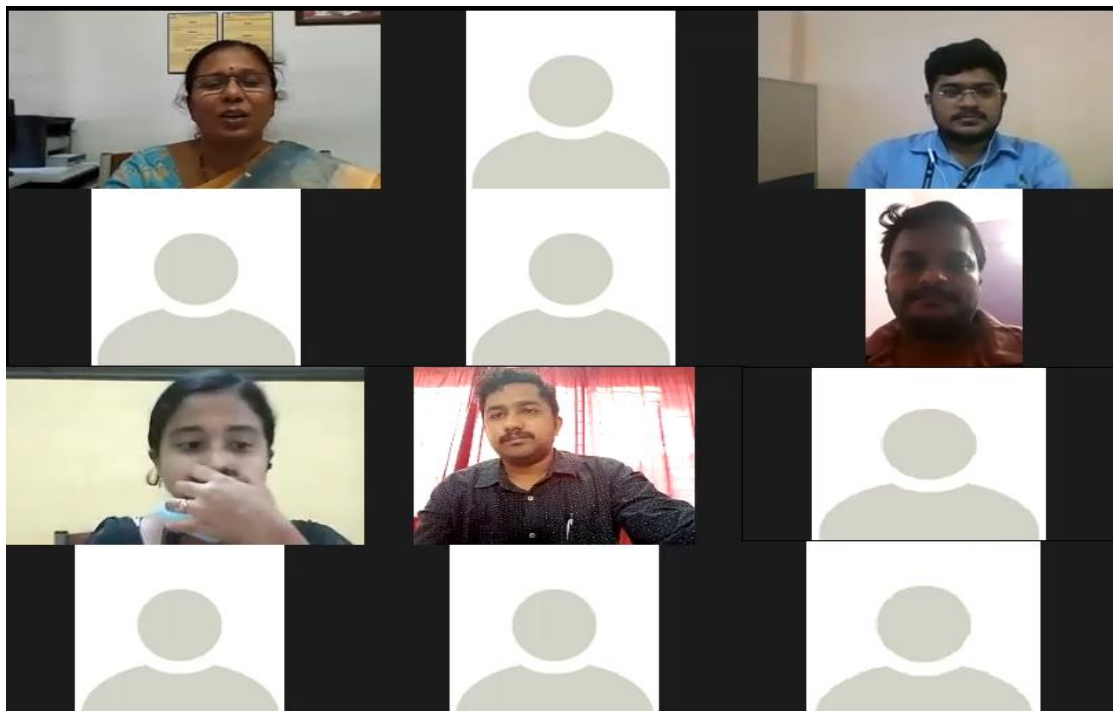
**Dr. A. Manimuthu**, is explaining Autonomous vehicle systems

**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.



**Signature of coordinator**

**Department of Electrical & Electronics  
SREE VIDYANIKETHAN ENGG. COLLEGE  
A. Rangampet-517102.  
A. P. (India)**