



Report

One-Day Workshop on

"Modelling and Simulation of Battery Bank from Cell to Pack for Electric Vehicles"

sponsored by MITS ISTE Student Chapter

Organised by Department of Electrical & Electronics Engineering

In Association with

ISTE student chapter, MITS-Madanapalle

Date: 16.11.2024

Time: 10.00 AM

Venue: Microsoft Teams (Virtual)

Submitted by: Mr. M. Venkatesh, Assistant Professor, Dept. of EEE, MITS-Madanapalle

Convenor(s):

1. Mr. M. Venkatesh, AP/EEE
2. Dr. Vineet Kumar, AP/EEE

Brochure:



MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS INSTITUTION)
Madanapalle - 517325, Anantapuramu Dist., Andhra Pradesh, India

One-Day Workshop
sponsored by
MITS ISTE Student Chapter
on
"Modeling and Simulation of Battery Bank from Cell to Pack for Electric Vehicles"
Organized by
"Department of EEE and MITS ISTE student chapter"

Date: 16.11.2024 Venue: Seminar Hall
Audience: Students, faculty, and ISTE members

Objectives and Topics: Workshop Objectives:

- Introduction of battery fundamentals and modeling techniques for EV applications.
- Provide hands-on experience with MATLAB/Simulink for battery simulations.
- Cover scaling methods from cell to pack with a focus on BMS essentials.
- Guide in performance analysis to optimize battery efficiency and lifespan.

Topics Covered:

- Battery technology overview and EV role.
- Cell modeling techniques (electrochemical, ECM, thermal).
- Battery pack configuration and scaling.
- MATLAB/Simulink for simulation.
- BMS essentials and thermal management.
- Hands-on session: battery pack simulation from cell to pack.

Resource Person Details:
Dr. Bansilal Bairwa
Assistant Professor, Dept. of EEE
REVA University

Dr. Bansilal Bairwa is an Assistant Professor in Electrical and Electronics Engineering at REVA University with over 4 years of experience. Known for his impactful research in EV battery modeling, thermal management, and smart firefighting systems, Dr. Bairwa has received Best Paper Awards for his work on lithium-ion battery models for EVs. His key projects include adaptable EVs for the physically challenged and cost-effective hybrid bikes for rural areas. Dr. Bairwa, who holds a Ph.D. from NIT Surathkal, actively collaborates with industry, bridging academia and practice, and serves as GATE Coordinator and an IEEE and SESI member.

Attendance: 61 participants including faculty.

Event Link: <https://shorturl.at/Dw9jr>

The Event is started at 10.00AM with a welcome address to all the Participants and the resource person **Dr. Bansilal Bairwa** is an Assistant Professor in School of Electrical and Electronics Engineering at REVA University, Bengaluru by the **Dr. Vineet Kumar**, Assistant Professor, Department of EEE, MITS-Madanapalle.

Dr. A.V. Pavan Kumar, Head of the Department of EEE, was invited to share his insights on the One-Day Workshop titled "Modelling and Simulation of Battery Bank from Cell to Pack for Electric Vehicles." He encouraged the students and external participants to make the most of this opportunity to gain expertise in the field of EV battery modelling.

Mr. M. Venkatesh, Assistant Professor in the Department of EEE, provided a brief introduction to the resource person. Following this, the session was handed over to **Dr. Bansilal Bairwa**, Assistant Professor in the School of Electrical and Electronics Engineering at REVA University, Bengaluru

The resource person began the session by expressing his heartfelt gratitude to the participants, organizing committee, HoD, Principal, and the management of MITS Madanapalle for providing him with the opportunity to share his knowledge and experience on "Modelling and Simulation of Battery Bank from Cell to Pack for Electric Vehicles."



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The resource person covered topics related to “Modelling and Simulation of Battery Bank from Cell to Pack for Electric Vehicles.” The session began with an introduction to MATLAB basics for modelling battery packs, followed by hands-on training for the participants.

The following topics were discussed with the students to enhance their foundational skills in battery bank modelling.





1. Introduction of battery fundamentals and modelling techniques for EV applications.
2. Provide hands-on experience with MATLAB/Simulink for battery simulations.
3. Cover scaling methods from cell to pack with a focus on BMS essentials.
4. Guide in performance analysis to optimize battery efficiency and lifespan.

Program outcome:

1. Participants gained a thorough understanding of battery bank modelling and simulation, from individual cell design to complete battery pack assembly, specifically for electric vehicles (EVs).
2. The workshop provided practical training on using MATLAB for simulating and modelling battery packs, enabling participants to apply theoretical concepts in a real-world software environment.
3. Students and external participants developed essential skills in EV battery modelling, a critical area in modern electrical engineering, preparing them for advancements in EV technology and industry demands.
4. The resource person demonstrated analytical methods and simulation approaches for addressing challenges in battery pack design and optimization.
5. The workshop inspired participants to explore research opportunities and innovative solutions in the field of electric vehicle battery systems

The session concluded with a vote of thanks delivered by **Dr. Vineet Kumar, Assistant Professor, Department of EEE, MITS-Madanapalle.** He expressed his gratitude to the management, Principal, Vice-Principals, HoD, and everyone who contributed directly or indirectly to the successful organization of the event.

Photos:

 <p>MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE (UGC-AUTONOMOUS INSTITUTE)</p> <p>One-Day Workshop sponsored by MITS ISTE Student Chapter</p> <p>on "Modeling and Simulation of Battery Bank from Cell to Pack for Electric Vehicles"</p> <p>Organized by "Department of EEE and MITS ISTE student chapter"</p> <p>Date: 16.11.2024 Venue: Seminar Hall Audience: Students, faculty, and ISTE members</p> <p>Objectives and Topics: Workshop Objectives:</p> <ul style="list-style-type: none"> • Introduction of battery fundamentals and modeling techniques for EV applications. • Provide hands-on experience with MATLAB/Simulink for battery simulations. • Cover scaling methods from cell to pack with a focus on BMS essentials. • Guide in performance analysis to optimize battery efficiency and lifespan. 	<p>Topics Covered:</p> <ul style="list-style-type: none"> • Battery technology overview and EV role. • Cell modeling techniques (electrochemical, ECM, thermal). • Battery pack configuration and scaling. • MATLAB/Simulink for simulation. • BMS essentials and thermal management. • Hands-on session: battery pack simulation from cell to pack. <p>Resource Person Details: Dr. Bansilal Bairwa Assistant Professor, Dept. of EEE REVA University</p>  <p>Dr. Bansilal Bairwa is an Assistant Professor in Electrical and Electronics Engineering at REVA University with over 4 years of experience. Known for his impactful research in EV battery modeling, thermal management, and smart firefighting systems, Dr. Bairwa has received Best Paper Awards for his work on lithium-ion battery models for EVs. His key projects include adaptable EVs for the physically challenged and cost-effective hybrid bikes for rural areas. Dr. Bairwa, who holds a Ph.D. from NIT Suratkal, actively collaborates with industry, bridging academia and practice, and serves as GATE Coordinator and an IEEE and SESI member.</p>	<p>About the department:</p> <p>The Department of Electrical & Electronics Engineering was established in the year 1998 and has been playing a vital role in producing value-based professionals ever since. The department offers an undergraduate program in Electrical & Electronics Engineering with an intake of 60 to cater to the ever-challenging needs of technical excellence in all areas such as Power systems, Control Systems, Power Electronics, Digital Signal Processing, Robotics & Drones, and also in the emerging areas of electrical engineering such as Renewable Power Generation, Smart Grids, Electric & Hybrid Vehicles. The B.Tech. program under the department has been continuously accredited and re-accredited by the National Board of Accreditation (NBA) since 2019 and Under Tier-1 in 2019. The most recent NBA accreditation, in 2022, was under TIER I.</p> <p>Registration Details: https://forms.gle/crhgfsajom2drdm87</p> <p>Scan code for Registration</p> 	<p>Contact Us Dr. Vineet Kumar drvineetkumar@mits.ac.in Ph: 8580427176 Mr. Venkatesh M Ph: 6381050998</p> <p>Chief Patron Dr. N. Vijaya Bhaskar Choudary Secretary & Correspondent</p> <p>Patron Mrs. Keerthi Nadella Executive Director</p> <p>Program chair Dr. C. Yuvaraj Principal</p> <p>Chief Convener Dr. A.V Pavan Kumar Professor & Head /EEE</p> <p>Convener(s):</p> <ol style="list-style-type: none"> 1. Mr. Venkatesh M, Asst. Prof, Dept. of EEE 2. Dr. Vineet Kumar, Asst Prof, Dept. of EEE <p>Follow Us on:</p>  <p>www.mits.ac.in</p>
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Zoom meeting interface showing a presentation slide with a car on a road. The slide title is "Simulation of Battery Bank from Cell to Pack for Electric Vehicles".

Zoom meeting interface showing a presentation slide with a list of items. The slide title is "Simulation of Battery Bank from Cell to Pack for Electric Vehicles".

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Zoom meeting interface showing a presentation slide with a list of items. The slide title is "Simulation of Battery Bank from Cell to Pack for Electric Vehicles".

Zoom meeting interface showing a presentation slide with a table and handwritten notes. The slide title is "Simulation of Battery Bank from Cell to Pack for Electric Vehicles".

C-RATES

A C-rate is a measure of the rate at which a battery is discharged relative to its maximum capacity. A 1C rate means that the discharge current will discharge the entire battery in 1 hour.

Handwritten notes: $I = \frac{Q}{t}$, Capacity, Load current, Discharge

C Rating	Time	Amp	C Rating	Time	Amp
1C	1 Hour	350Ah	1C/2 = 0.5C		
2C		175Ah	C/5 = 0.2C		
5C		70Ah	C/10 = 0.1C		
10		35Ah			

Zoom meeting interface showing a presentation slide with a flowchart. The slide title is "Simulation of Battery Bank from Cell to Pack for Electric Vehicles".

Factors affecting EV battery performance

- Ambient Temperature
- P_r Losses
- C-Rate
- Ageing

Battery modeling challenges for electric vehicle applications

- Proper sizing of the storage
- Parameter identification
- Pre-mature failure prediction for stack level architecture
- State estimation under real-time conditions
- Lifetime improvement under rigorous drive conditions
- Stack level health assessment

Handwritten notes: Q_{max} , Q_{min} , Q_{avg} , $Q_{max} - Q_{min}$, Q_{avg}

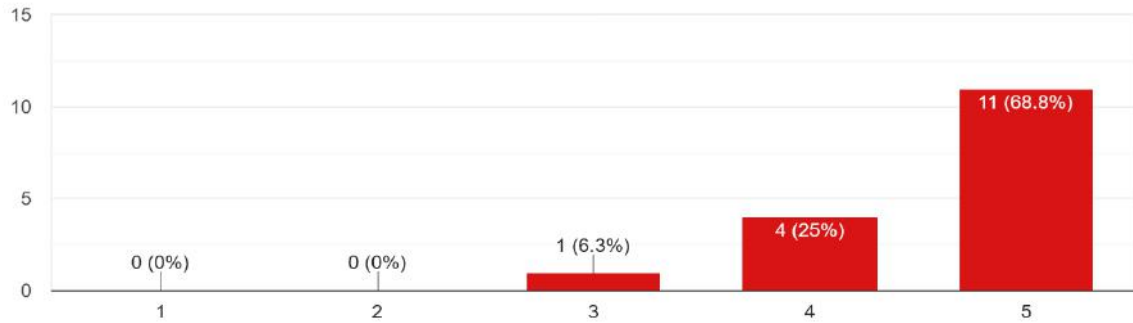
Zoom meeting interface showing a presentation slide with a grid of icons. The slide title is "Simulation of Battery Bank from Cell to Pack for Electric Vehicles".



Feedback Analysis:

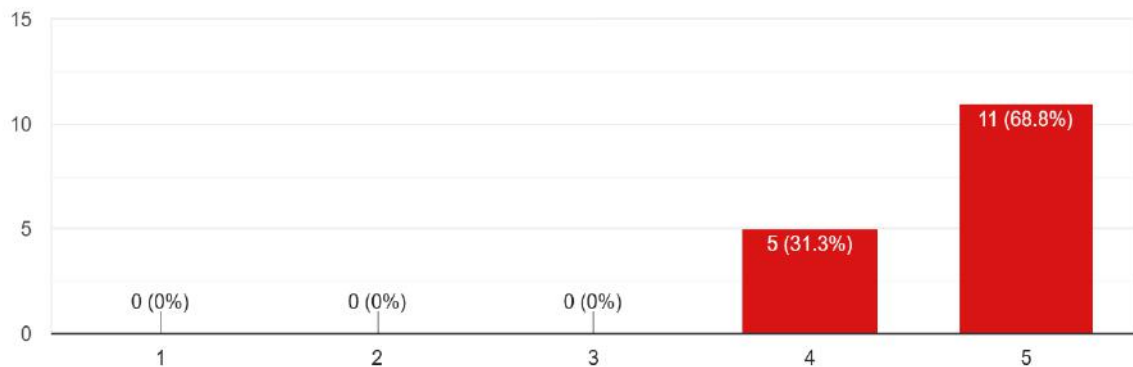
1. The interactive session was scheduled at a suitable time

16 responses



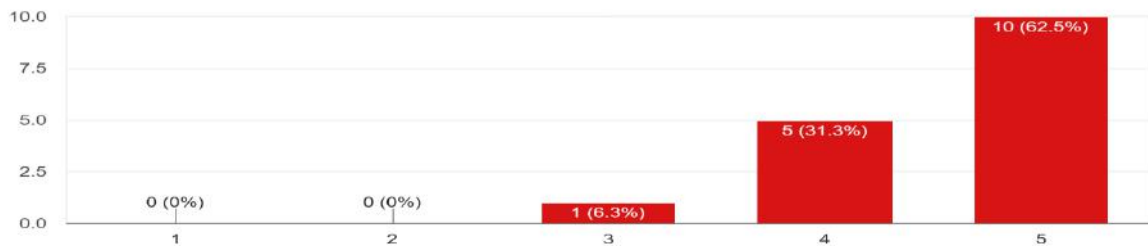
2. The interaction was useful and resource person explanation.

16 responses



3. The information in the interaction was presented in a clear and organized manner.

16 responses



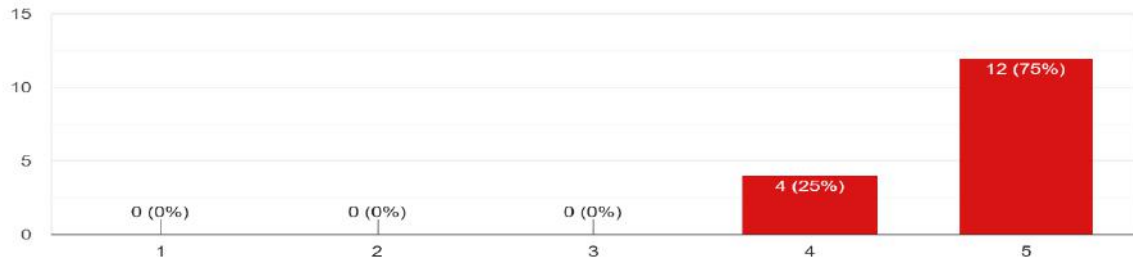


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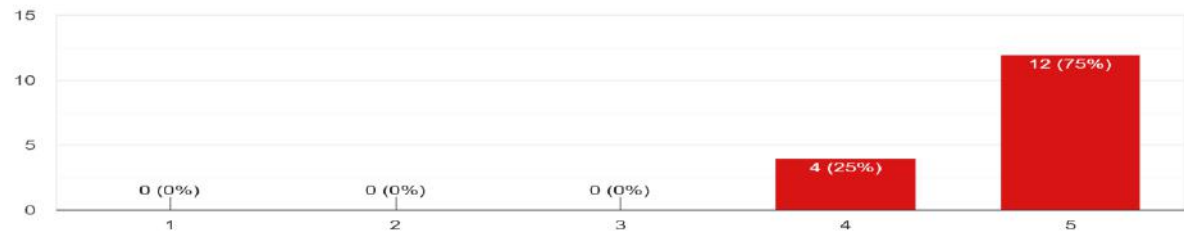
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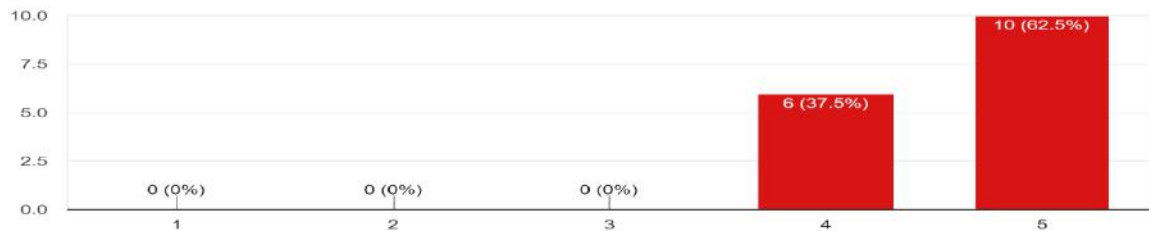
4. The presenter responded to questions in an informative, appropriate and satisfactory manner.
16 responses



5. your impression of facilities provided by the institute for interaction.
16 responses



6. Overall, the session was informative and valuable.
16 responses



Signature of the Coordinator

Signature of HoD, EEE