MHRD SPARC (Scheme for Promotion of Academic and Research Collaboration) supported a Three-day hands-on workshop on

Power converters, Charging circuits, and Controllers design for Electric Vehicles Charger

Organized by

Department of EEE in Association with the Centre for Electric Mobility (CEM)
SRM Institute of Science and Technology, Kattankulathur.

The SPARC-supported hands-on workshop was held from **December 12 to 14, 2024**, at **SRM Institute of Science and Technology (SRMIST)**, Kattankulathur. Organized by the **Department of Electrical and Electronics Engineering** in collaboration with the **Center for Electric Mobility (CEM)**, the workshop emphasized the design of power converters, charging circuits, and controllers for electric vehicle (EV) chargers.

Objective:

- To familiarize participants with the principles, challenges, and innovations in power converters, charging circuits, and wireless charging systems for electric vehicles.
- To equip attendees with hands-on experience in designing, simulating, and implementing EV charging technologies using state-of-the-art tools like Altair PSIM, OPAL-RT, and ANSYS Maxwell.
- To provide real-time training in FPGA programming and its applications in power electronics, enabling participants to develop efficient and reliable EV charging systems.

Workshop Brochure

Inauguration

Welcome Address: Dr. Sridhar. R Professor and Head Department of Electrical and Electronics Engineering SRMIST

About the SPARC Workshop: Dr. C. Bharatiraja Professor, (Indian PI - SPARC - PHASE IIB - P1848) Centre Head – Centre for Electric Mobility (CEM) Department of Electrical and Electronics Engineering SRMIST

Chief Guest Address: Dr. P. Sanjeevikumar Professor, University of South-Eastern Norway (International Co-PI- SPARC - PHASE IIB - P1848)

Felicitation Address:
Dr. K. Vijayakumar Professor and Dean SEEE, Department of Electrical and Electronics Engineering SRMIST.

Day 1: December 12, 2024

1. **Introduction to Wireless Charging Systems for EVs**
    - Speaker: Dr. C. Bharatiraja (SRMIST)
    - Overview of wireless charging technologies, their applications, and benefits in EVs.
2. **Power Converters for EVs**
    - Speaker: Dr. C. Bharatiraja (SRMIST)
    - Discussed various types of power converters used in EV systems.
3. **Simulation-Driven Design of Power Converters**
    - Speaker: Mr. Chandra Kumar (Altair Engineering)
    - Demonstrated the use of Altair PSIM for designing EV charging circuits

4. **Integration of Renewable energy in charging circuits**
    - Speaker: Mr. Navin Kumar (SRMIST)
    - Demonstrated using renewable energy in charging circuits, the EV ecosystem moves closer to achieving a carbon-neutral future, paving the way for sustainable mobility.
5. **Simulation-Driven Design of Power Converters**
    - Speaker: Dr. S. Thangavel (NIT Karaikal, Pondicherry)
    - Integration of control systems within the context of smart grids, focusing on the challenges, advancements, and opportunities in modern electrical systems.

Program Schedule and inauguration

Day 2: December 13, 2024

1. **Introductions to Inductive wireless charging system**
    - Speaker: Mr. Mahesh (BITS Pilani)
    - Covered fundamentals of inductive charging and its integration into EVs.

2. **Understanding Fast Charging and Wireless Charging**
    - Speaker: Mr. Mahesh (BITS Pilani)
    - Focused on state-of-the-art fast-charging solutions.

3. **Thermal management In EV Charging**

- Speaker: Mr. Nirmal Kumar (SRMIST)
- Importance of maintaining optimal temperatures in EV charging components to ensure efficiency, safety, and longevity

4. AI-based Controllers for Smart Charging

- Speaker: Mr. Nirmal Kumar (SRMIST)
- Integration of Artificial Intelligence (AI) with EV charging systems, focusing on the design and implementation of AI-based controllers to optimize smart charging processes

5. Bi-directional DC-DC Converters For EV-Charger

- Speaker: Mr.Ramanathan (SRMIST)
- Focused on the design, operation, and applications of bi-directional DC-DC converters in EV charging systems

6. Active Rectifiers in Charging Circuits

- Speaker: Mr. Aravind (SRMIST)
- The session focused on the principles, design, and applications of active rectifiers in modern EV charging infrastructure, highlighting their advantages over conventional rectifiers.

7. Real-Time Simulation with OPAL-RT

- Speaker: Ms. Priya (SRMIST)
- Highlighted modern approaches to power system studies using OPAL-RT.

8. Real-Time Simulation with OPAL-RT

- Speaker: Ms.Sujatha (SRMIST)
- Detailed session on the importance of real-time simulation in power system studies.

9. Design of Wireless Power Transfer Coils

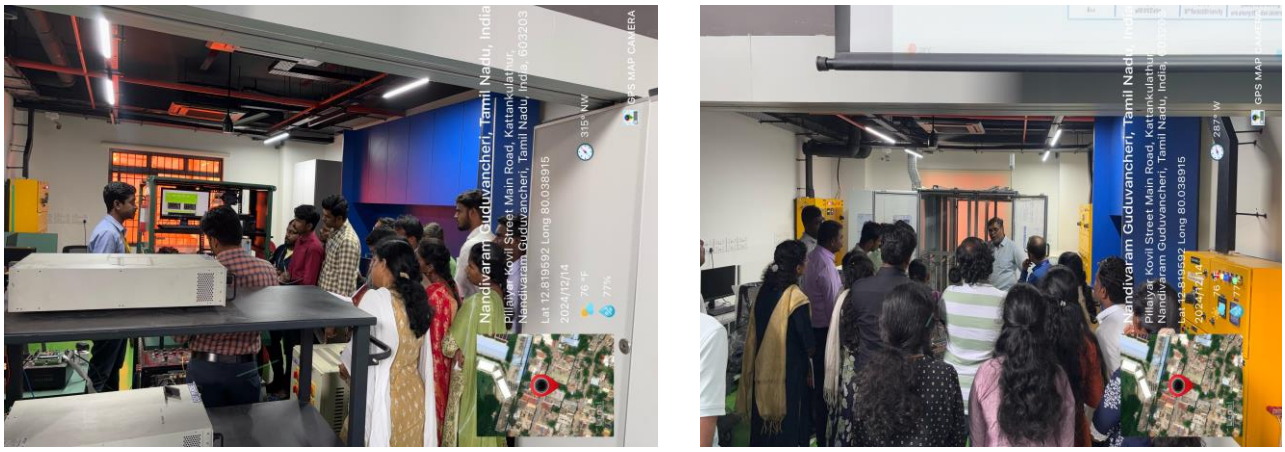
- Speaker: Mr. R. Nakkeeran (SRMIST)
- Explained coil design for efficient wireless power transfer using ANSYS Maxwell.

10. Resonant Converters for Wireless EV-Chargers

- Speaker: Mr.Ramanathan (SRMIST)
- Provided an in-depth exploration of resonant converters and their crucial role in enabling efficient wireless charging systems for EV

11. MMC for High Power EV Charging

- Speaker: Mr.Ramanathan (SRMIST)
- Provided information on how MMCs can handle high power levels efficiently and reliably, making them suitable for fast and ultra-fast EV charging stations



Day 3: December 14, 2024

1. **FPGA Fundamentals and Applications**
   - Speaker: Mr. J. Samuel Nelson (JSK Lab Instruments)
   - Introduced FPGA programming basics and its application in EV systems.
2. **FPGA Fundamental Programs**
   - Speaker: Mr.J. Nandha (JSK Lab Instruments)
   - Introduced Fundamental of FPGA programming basics and its application in EV systems.
3. **Hands-on Training in FPGA Programming**
   - Speaker: Mr. A. Raja Jinu (JSK Lab Instruments)
   - Practical session on FPGA-based systems for EVs.
4. **Power Electronics Converters in EV Power Train**
   - Speaker: Dr. P. Sanjeevikumar (University of South-Eastern Norway)
   - Discussed advanced switching techniques to enhance power converter efficiency.
5. **Soft Switching Techniques in Power Converters**
   - Speaker: Dr. P. Sanjeevikumar (University of South-Eastern Norway)
   - Discussed advanced switching techniques to enhance power converter efficiency.

Certificate and Feedback

Participants delivered feedback about the **MHRD SPARC (Scheme for Promotion of Academic and Research Collaboration) Supported Three-day Hands-on Workshop** on **Power Converters, Charging Circuits, and Controllers Design for Electric Vehicles Charger**, held from **12th to 14th December 2024**.

The event was organized by the **Department of Electrical and Electronics Engineering (EEE)** in association with the **Centre for Electric Mobility (CEM)**, SRM Institute of Science and Technology, Kattankulathur.

Participants praised the workshop for being highly organized and providing valuable technical insights. They expressed appreciation for the depth of knowledge imparted by the speakers, who explained the latest trends in power converters, charging circuits, and wireless charging technologies.

MHRD SPARC SUPPORTED
THREE-DAY HANDS-ON WORKSHOP

CERTIFICATE
OF PARTICIPATION

THIS CERTIFICATE IS PRESENTED TO

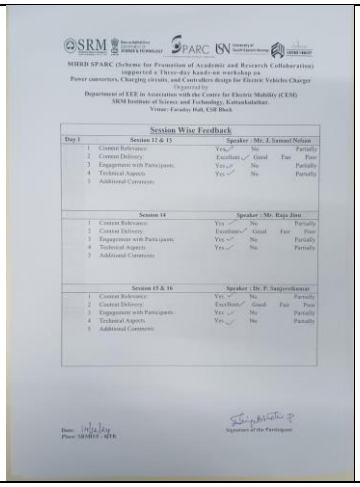
MADHAVAKUMAR K S

who has participated in the Three-Day Hands-on Workshop on **"Power Converters, Charging Circuits, and Controllers Design for Electric Vehicles Charger"** held from **12.12.2024 to 14.12.2024**, organized by Department of EEE in Association with Center for Electric Mobility (CEM) & SRM Institute of Science and Technology, Kattankulathur, Tamilnadu.

DR. C. BHARATIRAJA
Professor/EEE, SRMIST

DR. P. SANJEEVIKUMAR
Professor, USN, Norway

DR. S. THANGAVEL
Asso. Professor, NIT Puduchery



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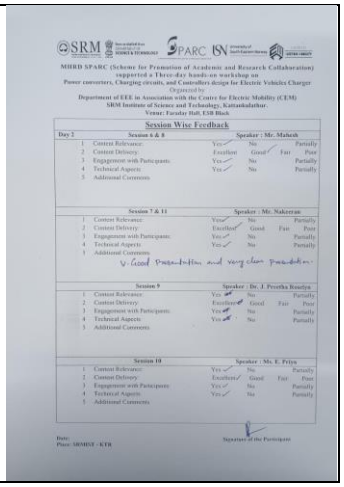
Venue: Faraday Hall, ESB Block

Session Wise Feedback

Day 1		Speaker : Mr. J. Samuel Nelson	
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent ✓ / Good / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:		
	Session 14	**Speaker : Mr. Raja Jinu**	
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent ✓ / Good / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:		
	Session 15 & 16	**Speaker : Dr. P. Sanjeevikumar**	
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent ✓ / Good / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:		

Date: 14/12/24
Place: SRMIST - KTR
Signature of the Participant



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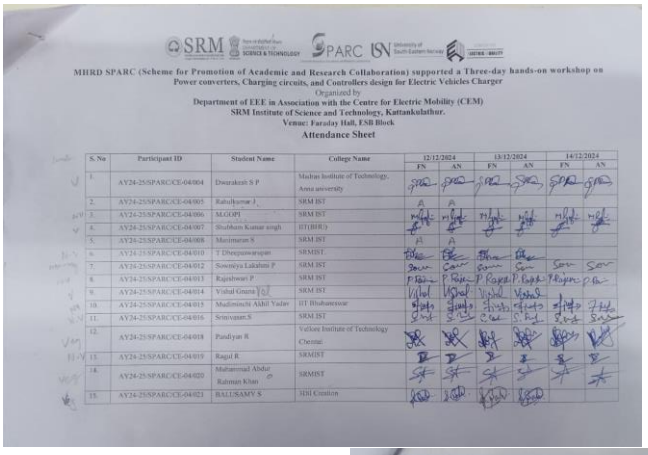
Session Wise Feedback

Day 2		Session 6 & 8	Speaker : Mr. Mahesh
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent / Good ✓ / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:		
	Session 7 & 11		**Speaker : Mr. Nakeeran**
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent ✓ / Good / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:	V. Good Presentation and very clear Explanation.	
	Session 9		**Speaker : Dr. J. Preetha Roselyn**
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent ✓ / Good / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:		
	Session 10		**Speaker : Ms. E. Priya**
1	Content Relevance:	Yes ✓	No / Partially
2	Content Delivery:	Excellent / Good ✓ / Fair / Poor	
3	Engagement with Participants:	Yes ✓	No / Partially
4	Technical Aspects:	Yes ✓	No / Partially
5	Additional Comments:		

Date:
Place: SRMIST - KTR
Signature of the Participant

List of the candidates



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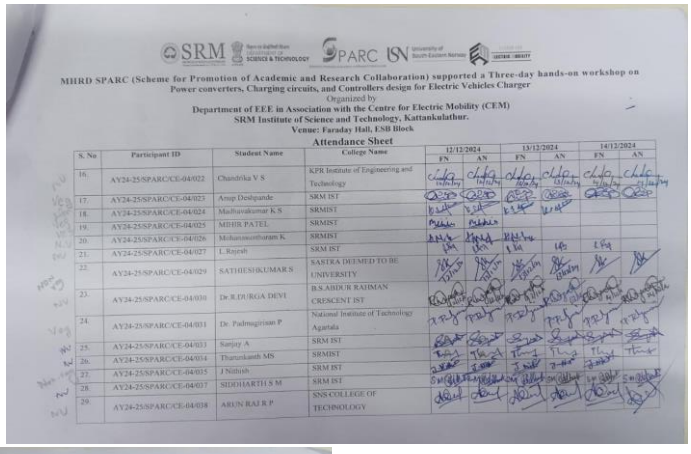
Attendance Sheet

S. No	Participant ID	Student Name	College Name	12/12/2024 FN	12/12/2024 AN	13/12/2024 FN	13/12/2024 AN	14/12/2024 FN	14/12/2024 AN
1.	AY24-25/SPARC/CE-04/004	Dwarakesh S P	Madras Institute of Technology, Anna university						
2.	AY24-25/SPARC/CE-04/005	Rahulkumar J	SRM IST						
3.	AY24-25/SPARC/CE-04/006	M.GOPI	SRM IST						
4.	AY24-25/SPARC/CE-04/007	Shubham Kumar singh	IIT(BHU)						
5.	AY24-25/SPARC/CE-04/008	Mozimeran S	SRM IST						
6.	AY24-25/SPARC/CE-04/010	T Dheepanwarajan	SRMIST						
7.	AY24-25/SPARC/CE-04/012	Sowmiya Lakshmi P	SRM IST						
8.	AY24-25/SPARC/CE-04/013	Rajeshwari P	SRM IST						
9.	AY24-25/SPARC/CE-04/014	Vishal Gnana	SRM IST						
10.	AY24-25/SPARC/CE-04/015	Madireddy Akhil Yadav	IIT Bhubaneswar						
11.	AY24-25/SPARC/CE-04/016	Srinivasan.S	SRM IST						
12.	AY24-25/SPARC/CE-04/018	Pandiyan R	Vellore Institute of Technology Chennai						
13.	AY24-25/SPARC/CE-04/019	Ragul R	SRMIST						
14.	AY24-25/SPARC/CE-04/020	Muhammad Abdul Rahman Khan	SRMIST						
15.	AY24-25/SPARC/CE-04/021	BALUSAMY S	SRM Cention						



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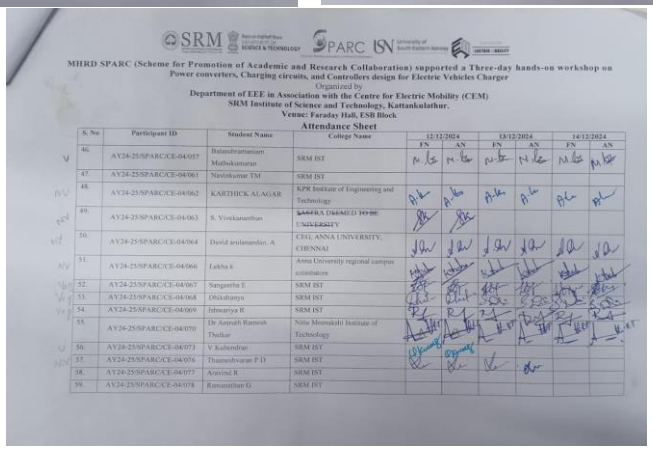
16.	AY24-25/SPARC/CE-04/022	Chandrika V S	KPR Institute of Engineering and Technology						
17.	AY24-25/SPARC/CE-04/023	Anup Deshpande	SRM IST						
18.	AY24-25/SPARC/CE-04/024	Madhavakumar K S	SRMIST						
19.	AY24-25/SPARC/CE-04/025	MIHIR PATEL	SRMIST						
20.	AY24-25/SPARC/CE-04/026	Mohanasoundharam K	SRMIST						
21.	AY24-25/SPARC/CE-04/027	L Rajesh	SRM IST						
22.	AY24-25/SPARC/CE-04/029	SATHEESHKUMAR S	SASTRA DEEMED TO BE UNIVERSITY						
23.	AY24-25/SPARC/CE-04/030	Dr.R.DURGA DEVI	B.S ABDUR RAHMAN CRESCENT IST						
24.	AY24-25/SPARC/CE-04/031	Dr. Padmagirisan P	National Institute of Technology Agartala						
25.	AY24-25/SPARC/CE-04/033	Sanjay A	SRM IST						
26.	AY24-25/SPARC/CE-04/034	Tharunkanth MS	SRMIST						
27.	AY24-25/SPARC/CE-04/035	J Nithish	SRM IST						
28.	AY24-25/SPARC/CE-04/037	SIDDHARTH S M	SRM IST						
29.	AY24-25/SPARC/CE-04/038	ARJUN RAJ R P	SNS COLLEGE OF TECHNOLOGY						



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46.	AY24-25/SPARC/CE-04/057	Balasubramaniam Muthukumaran	SRM IST						
47.	AY24-25/SPARC/CE-04/061	Nasimkumar TM	SRM IST						
48.	AY24-25/SPARC/CE-04/062	KARTHICK ALAGAR	KPR Institute of Engineering and Technology						
49.	AY24-25/SPARC/CE-04/063	S. Vivekanandhan	SASTRA DEEMED TO BE UNIVERSITY						
50.	AY24-25/SPARC/CE-04/064	David arulanandan. A	CEG, ANNA UNIVERSITY, CHENNAI						
51.	AY24-25/SPARC/CE-04/066	Lekha k	Anna University regional campus coimbatore						
52.	AY24-25/SPARC/CE-04/067	Sangeetha E	SRM IST						
53.	AY24-25/SPARC/CE-04/068	Dhilshanya	SRM IST						
54.	AY24-25/SPARC/CE-04/069	Ishwariya R	SRM IST						
55.	AY24-25/SPARC/CE-04/070	Dr Amruth Ramesh Thelkar	Nitte Meenakshi Institute of Technology						
56.	AY24-25/SPARC/CE-04/073	V Kulendran	SRM IST						
57.	AY24-25/SPARC/CE-04/076	Thamesh varan P D	SRM IST						
58.	AY24-25/SPARC/CE-04/077	Aravind R	SRM IST						
59.	AY24-25/SPARC/CE-04/078	Ramanathan G	SRM IST						