



MHRD, Govt. of India under the scheme Global Initiative for Academic Network (GIAN) sponsored Advanced Course on

Evolution of Power Electronics for Electric Vehicles Charging Infrastructure

2nd January to 6th January, 2023

Organized By:

Department of Electrical Engineering

Malaviya National Institute of Technology, Jaipur (Rajasthan)

Overview:

The demand for charging infrastructure, including charging stations in parking structures and garages is more important as the electric vehicles (EVs) on the road multiply. For long distance commuters, an available charging station may be a critical requirement to ensure the ability to finish the round trip and make it home. Even when charging is not critical, many EV drivers may plug in to alleviate range anxiety or to shorten the charge discharge cycle and decrease battery wear. A scarcity of charging stations may make EVs less convenient and contribute to range anxiety resulting in less people embracing the use of electric vehicles. Furthermore, if charging infrastructure is available at work, smaller batteries and therefore less expensive vehicles are required to meet consumer's needs. The demand of electric vehicles also increases day by day. The evolution of on-board and off-chargers are now the hot bed for research. Specially in India as Government has already launched many schemes in this area (for eg. FAME etc). The structure of on-board and off-board chargers depends on its components and it designing. The evolution in power electronic switches also enhance the efficiency of the charger. But their selection plays an important role in the overall performance of the charger configuration. The selection of charging configuration depends on the function of its different power units. DC-DC converter is one of the main power units of the charging configuration, its designing for different charging methods such as; unidirectional, bidirectional, and wireless charging pursues the different designing methods which affect the performance of the charger. The investigation of these different charging configurations and their cost now becomes the major area where the popularity of these charger configurations is decided by their cost followed by efficiency.

This course is designed to teach how to implement on-board and off-board chargers for vehicular applications. It will help to prepare today's students for the future workforce as power electronics design engineers in vehicular industry which is the demand of the present scenario.

Objectives of the Course	<ol style="list-style-type: none"> 1. Exposing participants to the state-of-the art of power electronics converters for electric vehicle. 2. Introduce recent advances in power electronics circuit topologies and challenges regarding electric vehicle infrastructure implementation. 3. Introduce the status of the selecting components and switches for designing the topology. 4. Explain challenges and special considerations for selection of gate drivers with the performance of the switch for the full-load variation (battery charging application). 5. Discuss reliability issues and circuit design for improved reliability.
Course Duration	<ul style="list-style-type: none"> • Duration: From 2nd January to 6th January, 2023. • Mode: Online mode.
Course Contents	<ul style="list-style-type: none"> • Basic of Power Electronics and its role in Electric Vehicles. • Electric Vehicle Charging methods. • Converter topologies for battery charging applications. • Challenges of Power Electronics for Electric Vehicle applications.
Who should attend the Course	<ul style="list-style-type: none"> • Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories. • Student at all levels (B.Tech/M.Sc/M.Tech/Ph.D) or Faculty from reputed academic institutions and technical institutions.
Course Fees	<p>The participation fees for taking the course are as follows:</p> <ul style="list-style-type: none"> • Participants from abroad: US\$100 • Industry/Research Organizations: Rs. 2950 /- • Faculty from Indian academic Institutions: Rs.1180 /- • Research Scholars and students: Rs.590 /- <p>(Including GST)</p> <p>Note: The above fee includes all instructional materials, tutorials and assignments. (Exclusive of GIAN Portal Registration fee)</p>
Account Details	<p>Participants are requested to transfer the registration amount in the following account:</p> <p>Account Name: Registrar (Sponsored research) MNIT Jaipur Account no: 676801700388; Bank name: ICICI Bank Ltd., MNIT Jaipur IFCS code: ICIC0006768 Branch name: MREC branch, Malaviya National Institute of Technology Jaipur, J.L.N.Marg, 302017.</p> <p>Please email the snapshot of transaction and the signed registration form to Dr. Arun Kumar Verma at seasrlab.ee@mnit.ac.in .</p>

Contact at:

Dr. Arun Kumar Verma

Assistant Professor

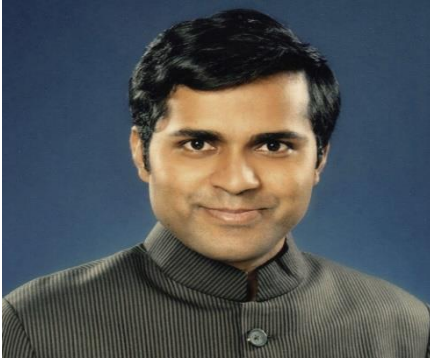
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International Expert:



Dr. Akshay Kumar Rathore

Dr. Akshay Kumar Rathore (IEEE Fellow) is an Associate Professor in the Department of Electrical and Computer Engineering at Concordia University, Montreal, Canada and currently, a Professor of Electrical Power Engineering at Singapore Institute of Technology, Singapore. He is an expert in power electronics and control of electrical motor drives. He received the Gold Medal for securing the highest academic standing in his Master's degree among all electrical engineering specializations at Indian Institute of Technology (BHU) Varanasi, India. He had two subsequent postdoctoral research appointments with the University of Wuppertal, Germany (2008-2009), and the University of Illinois at Chicago, USA (2009-2010).

His research is mainly focused on the analysis and design of novel current-fed converters (topologies and modulation), soft-switching design and modulation schemes for the dc/dc converters, pulsating DC link (electrolytic capacitorless) inverters, multilevel inverters, and control of motor drives. He supervised 11 PhD theses and 14 MAsc (research) theses on novel power electronics circuit design for solar, fuel cells, electric vehicles charging (grid and solar based plug-in and wireless), and motor drives applications. He has one approved European Patent commercialized by WEG Brazil and developed above 99% neutral-point-clamped multilevel inverter based medium voltage induction motor drive system.

Dr Rathore is a recipient of the 2013 IEEE IAS Andrew W. Smith Outstanding Young Member Achievement Award, 2014 Isao Takahashi Power Electronics Award, 2017 IEEE IES David Irwin Early Career Award, 2019 IEEE IES Publications Service Recognition Award, 2020 IEEE IAS Outstanding Area Chair Award, 2020 IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems and 2021 Nagamori Award. He published about 285 research papers in international journals and conferences, including 96 IEEE TRANSACTIONS. He has co-authored 3 book chapters.

He is currently serving as the Awards Department Chair of the IEEE Industry Applications Society, AdCom Member-at-Large and Fellow Evaluation Committee member of the IEEE Industrial Electronics Society. He is serving as the Chair of IEEE IAS Renewable and Sustainable Energy Conversion Systems Committee. He served as the Chair of IEEE IAS Montreal Chapter from 2017-2021 and received the best Chapter award in 2017 from IEEE Montreal Section for its activities. He served as the Paper Review Chair (eq. to co-EIC) of IEEE Transactions on Industry Applications (2016-17 and 2020-21), Editor-in-Chief of IEEE IES Technology News (2016-18), Associate Editor of various journals, i.e., IEEE Transactions on Industrial Electronics (2014-19), IEEE Transactions on Industry Applications (2013-present), IEEE Transactions on Transportation Electrification (2014-19), IEEE Journal of Emerging Selected Topic in Power Electronics (2013-19), IEEE Transactions on Vehicular Technology (2016-19), IEEE Transactions on Sustainable Energy (2014-2021) and IET Power Electronics (2015-19). He edited 5 special issues on the topics of electric transportation, EV charging, marine systems, more electric aircraft, machine learning in power electronics, and renewable energy conversion in different IEEE Transactions as a guest associate editor and as guest-EIC of 2 special issues. He served as the distinguished lecturer (2017-18) and prominent lecturer (2019-21) of the IEEE IAS society.

Course Coordinators:

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2nd January to 6th January, 2023

Registration Form

Name (In Block Letters):

Designation:

Qualification:

Institution:

Address:

Email address:

Mobile No:

Details of Demand Draft:

DD No/ Transaction ID:

Bank Name:

Amount Rs:

Date:

Signature of the Candidate

**Participants are also required to fill an online registration form by clicking on the following link: <https://forms.gle/BWSPcuXzkbCq4ePF9>