Registration Form
Advanced Current-fed Power Conversion Technologies for Residential Nanogrid and Transportation Electrification
Under
Global Initiative of Academic Networks (GIAN)
National Institute of Technology Mizoram
Chaltlang, Aizawl-796012, Mizoram, India

Name:

Designation:

Organization:

Mailing Address:

Phone No.:

E-mail:

RECOMMENDATION OF THE SPONSORING AUTHORITY
The application of Dr./Mr./Mrs./Ms _____ _____working as _____at _____is sponsored to attend the course on **Advanced Current-fed Power Conversion Technologies for Residential Nanogrid and Transportation Electrification** being organized by Department of Electrical Engineering, NIT Mizoram

Date:
Place:

Signature of supervisor/
Head of Dept./Institute/
Organization with seal

1. **Patron:**
   Prof. S. Sundar, Director

2. **Course Coordinators:**
   Dr. P. K. Biswas
   Email: pabitra.eee@nitmz.ac.in
   7085264167
   and
   Dr. Anagha Bhattacharya
   Email: anagha.eee@nitmz.ac.in
   8259030468
3. **Members:**
   Prof. S. Chatterjee
   Dr. Suman Majumder
   Dr. Ramesh Kumar
   Dr. Krishnarti De
   Dr. Sukanta Debnath
   Dr. Upama Das

Institute Address
National Institute of Technology Mizoram
Chaltlang, Aizawl—796012
Mizoram, India
Tel / Fax—0389-2391236 / 0389– 2391744

Registration Process:
1. One Time Web (Portal) Registration (https://gian.iitkgp.ac.in/GREGN/index)
2. Course Registration (Through GIAN Portal) Course code:191043D01
3. Course fee payment (After registration on GIAN portal, the course fee is to be paid online in the below account)
   A/C No.:33755447886
   A/C Name: NIT Mizoram
   Branch: Bawngkawn
   IFSC: SBIN0007059
4. Filled the Institute Registration form and

Please send a scanned copy of the Registration form and transaction slip to

pabitra.eee@nitmz.ac.in
anagha.eee@nitmz.ac.in

Advanced Current-fed Power Conversion Technologies for Residential Nanogrid and Transportation Electrification

Organized By

Department of Electrical Engineering
National Institute of Technology Mizoram
Chaltlang, Aizawl-796012
Mizoram, India

13-17 November 2023 (Virtual Mode)

For more details visit www.nitmz.ac.in
https://gian.iitkgp.ac.in/
The number of participants for the course will be limited to 100

GIAN – An overview

Global Initiative of Academic Networks (GIAN) is a new program in Higher Education approved by Govt. Of India to involve the internationally acclaimed talent pool of scientists and entrepreneurs, to encourage their engagement with the institutes of Higher Education in India which will lead to augmentation of the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence.

This has a particular aim to garner the best international experience into our systems of education that will enable interaction of students and faculty with the best academic and industry experts from all over the world and also to share their experiences and expertise.

About NIT Mizoram

NIT Mizoram was started in the year 2010 in the scenically beautiful state of Mizoram with an objective to impart education, research & training leading to B.Tech, M.Tech, M.Sc. & PhD. degrees. This institute has been declared as an Institute of National Importance by an Act of Parliament. Wrapped between clouds and mountain rocks, which adds to its beauty it is amongst the most educated states of our country with a literacy rate of 91%. It also beholds a very peaceful and calm environ-ment suitable for studies. The institute is situated in the capital city Aizawl which can be reached by Air through Kolkata / Guwahati. Silchar is the nearest railway station to Aizawl. The journey (by road) from Silchar to Aizawl may take approx. 6 Hrs.

Overview of Course

Residential Nanogrids and Electric Transportation are seen as effective alternative options to encourage clean environment, reduce emission, more choices to users against utility monopoly, continuous electricity supply, local generation, own back-up, and use of renewable energy sources against conventional fuel depletion threat. Power electronic systems are enabling technologies to promote such technologies to match the source and load profiles. High-frequency power electronics conversion units are preferred to realize low cost, compact, and light weight systems. However, to improve efficiency and reduce cooling/thermal requirements, soft-switching of semiconductor devices needs to be implemented. Current-fed power electronic systems have been demonstrated and justified for low voltage high current applications. Current-fed converters offer short circuit protection and voltage amplification due to input inductor. In addition, inductor is reliable and offers higher lifetime (relatively reduced degradation) compared to electrolytic capacitor used in voltage-fed converters. Alternative energy sources output (solar PV, fuel cells) is low voltage and the same is true for energy storage. Current-fed transformer less converters are able to boost the source voltage up to 10x. In addition, the variability of renewables varies voltage and current (so the power) output. Therefore, the power electronics interface should accommodate such variations with high performance over entire operating range. The major challenge is to maintain high efficiency with intermittent variability, load profile, and usage. Current-fed converters are superior in performance for such variations and specifications. The major challenge in current-fed is high voltage spike/overshoot across the semiconductor devices at turn-off owing to hard commutation. It needs additional snubber circuits reducing density, efficiency, as well as boost capacity. Advanced current-fed converters with novel modulation and impulse resonance achieve soft-commutation and natural voltage clamping of the devices without external snubber circuit making it snubber less. Soft-switching of all semiconductor devices is achieved and maintained over wide variation in source voltage and power. Similarly, the attributes of natural device voltage clamping and soft-commutation are also maintained. Conventional current-fed as well as voltage-fed PWM and resonant converters have soft-switching limitations and lose at light load and increased source voltage. Therefore, it is quite obvious that these converters cannot maintain for entire operating range of solar panel, fuel cells, batteries, etc. However, the proposed current-fed converters maintain their originality owing to proposed modulation. Soft-switching, natural voltage clamping, and soft-switching are inherent and maintained with wide variation

Modules	• Introducing participants to Nanogrid, its components, operation, and enabling technologies • Introducing participants to Electric Transportation and enabling technologies • Exposing participants to High-Frequency Power Conversion and Soft-Switching Techniques • Introducing participants to state-of-the art voltage-fed and current-fed technologies: merits, demerits, and applications • Exposing participants to issues associated with traditional voltage-fed technologies and current-fed technologies, their comparison, and performance evaluation for Nanogrid and Electric Transportation applications • Introducing the concept and design of snubber less naturally commutated and impulse commutated current-fed topologies. • Introducing participants to the state of the art future current-fed technologies and their potential applications.
You should attend if…..	1. Students of B Tech/MSC/MTech/ME, Ph. D. in all disciplines of Engineering 2. Faculty from reputed academic and technical institutions. 3. Executives, engineers and researchers from industries, government, public sectors, and organizations including R&D laboratories.
Course Fees	1. **Participants from abroad**: US $300 2. **Industry/Research Organizations:** Rs. 5000/- 3. **Academic Institutions:** Rs. 2000/- 4. **Researcher Scholar & M.Tech students:** Rs.1000 5. **B.Tech students**: Rs.500 **(The course fee covers the course materials, access to all the sessions)**

The Faculties

Akshay Kumar Rathore is an IEEE Fellow and expert in power electronics and control of electrical motor drives. He is one among those receiving multiple international prestigious awards in his early young career and appointed to high level committees. He contributed to above 110 journal papers including 98 IEEE Transactions. He holds 1 granted patent that is licensed to WEG Brazil and commercialized in high power sectors. He is currently a full Professor and Program leader of Electrical Power Engineering at Singapore Institute of Technology, Singapore. 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 received his PhD degree in Power Electronics from University of Victoria, British Columbia, Canada in 2008. He had two subsequent postdoctoral research appointments with the University of Wuppertal, Germany, and the University of Illinois at Chicago, USA. He has served as an Assistant Professor at the National University of Singapore and as an Associate Professor at Concordia University, Montreal, Canada where he was listed in the Provost Circle of Distinction in 2021 and served as Graduate Program Director and Chair of Graduate Awards during 2020-21. 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 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.

Pabitra Kumar Biswas is an Associate Professor in Electrical and Electronics Engineering in National Institute of Technology, Mizoram, India. He has published a numbers of research papers in National/International Conference and Records/Journals. He has a book and more than 6 book chapters and filed three patents. He has completed one DST-SERB project. He has about 15 years of academic as well as research experience. He has guided 7 PhD students and more than 10 M.Tech students.. He has reviewed papers in reputed International Conference and Journals. He has successfully organized a GIAN course, two short term course (NaMPET) and three FDP (ATAL). He is Senoir member of IEEE and Fellow of Institute of Engineers and International Association of Engineers. He has received Best paper award and Best Researcher Award (International Scientist Awards on Engineering, Science and Medicine). His research interests include Electromagnetic Levitation System, Active Magnetic Bearing, Power electronics Converters, PMSM and BLDC Motor Drives, Electric Vehicles and Renewable energy.

Anagha Bhattacharya received his PhD. Degree in Electrical Engineering on 2022 from Jadavpur University and M.Tech from NIT Silchar. He is currently working as an Assistant professor in Electrical and Electronics Engineering in National Institute of Technology, Mizoram, India. He was Head of the Department in Electrical and Electronics Engineering in NIT MIZORAM. He has published a numbers of research papers in National/International Conference and Records/Journals. He has over 14 years of academic experience. He has about 14 years of academic as well as research experience. He has guided more than 5 M.Tech students and more than 10 UG students. He has reviewed papers in reputed International Conference and Journals. He has successfully organized a GIAN course and FDP (ATAL). His research interests include Microgrid,