Advanced Permanent Magnet Machine-drive Technologies for Transport Electrification and Renewable Energy

Overview

To mitigate the climate change issues, sustainable industrial development will be essential. Since nearly half of the generated electrical energy of the world is consumed by the industrial motor-drive systems, improved performance and efficiency of these systems are paramount. In addition, the newly proposed transport electrification and renewable energy systems for the sustainable development also demands high performing electrical machines and drives. The permanent magnet (PM) machine is the most efficient high performing among all existing electric machines. Hence, the PM machine is the preferred choice for many high-performance industrial drives, electric vehicle, all-electric aircrafts, drones, flywheel energy storage, generators for renewable energy such as wind and wave.

It will be highly beneficial for current and future engineering graduates to understand the fundamentals of the permanent magnet machines and drive systems, as it is the future technology of choice. The course will begin with the basic working principle and finish with the most recent advancements. The course materials will be tailored in a way that it will be suitable to both beginners and professionals. The course will aim to provide full comprehensive knowledge about PM machine and drive technology to the attendees.

Objectives

The primary objectives of the course are as follows:

- Expose participants to the fundamentals of PM machines and drive technology,
- Build in confidence and capability amongst the participants in the industrial adoption of PM machine and drives technology and provide guidance for troubleshooting in design and control of PM machine drive systems.
- Provide exposure to practical problems and their solutions, through case studies in design and control of PM machines,
- Enhance the capability of the participants to in design and control of PM machines applicable to emerging technologies.

Dates	**21st -25th March 2022**
Place	Department of Electrical Engineering, National Institute of Technology Silchar
Modules	• Introduction to fundamentals of three-phase electric machines, permanent magnet materials, types of permanent magnet machines and their working principles. • Geomatrical defination and dimensions for analytical design model, analysis of electromagnetic performances • Design methods – analytical modeling • Design methods –finite element analysis based • Design challenges for emerging applications such as electric vehicle, wind energy conversion. • Introduction to design optimization methods • dq theory, dq-model of PM machine, fundamentals of a PM machine drive system, • Introduction to field oriented control (FOC). • Recent advances in PM machine designs and future challenges
Who can participate	• Interested graduate students, research scientists and industry professionals working in the energy industry. • Some undergraduate students with prior exposure to at least one of the courses on "Power systems", "Power electronics", "Electrical machines", "Renewable energy". • Researchers in the fields of Electrical engineering, Electrical and electronics engineering. • The teachers/professors in the fields of Electrical engineering. • Student or faculty from academic institution interested in exposure to recent research developments in the power systems, power electronics, electrical machines, wind energy conversion system, electric vehicles, or non-conventional energy generation. **Participation from outside NIT Silchar will be given preferences.**
Fees	• Participant from abroad USD 250 • Industry research organization INR 5000 For Academic Institutions • Faculty: INR 2000 • External Students: INR 500 • Internal PG & PhD Students: INR 500 • Internal UG Students: Nil

The Expert

Assoc Prof Rukmi Dutta presently working as an Associate Professor in Energy system research group, School of Electrical Engineering and Telecommunications at University of New South Wales (UNSW) Sydney, Australia. She had received the PhD degree in Electrical Engineering from UNSW, Sydney, Australia, 2007 and the BE degree in Electrical Engineering from Assam Engineering College, Guwahati University, Assam, India,1996. Before the present position, A/Prof Dutta worked as an Electrical Engineer at CMG Pty Ltd (currently Regal Beloit Australia) and as an Associate lecturer at UNSW, Australia. She also worked briefly as a research assistant at Institute of Industrial Science of Tokyo University, Japan and as an electrical engineer at Reliance Industry Ltd, India.

A/Prof Dutta is a senior member of IEEE since 2015 and an active member of several IEEE technical committees. She is the current Vice-Chair of the IEEE IAS Electric Machine Committee (EMC). She is also the Regional Distinguished Lecturer of IEEE Region 10. A/Prof Dutta is an associate editor of two prestigious IEEE journals – IEEE Transactions on Industrial Applications Society (2018- present) and IEEE transactions on Energy Conversions (2019- present). She is also a guest- editor of ELSEVIER's Renewable and Sustainable Energy Reviews (RSER). She had served as an editor of several other technical journals including the special issue of MDPI's Energies. Dr Dutta's overall research output comprises of 1-scholarly book, 3 book chapters, 30 journal articles (Scopus indexed), and 91 conference articles (Scopus indexed) with 1420 citations and h-index of 21 (Google Scholar, January 2022). She has attracted over $10 Million (AUD) for her research from the Australian Research Council's discovery projects, Australian Government Industry connection funds and from various competitive research grants. She is currently supervising 6 PhDs, 1 post-doctoral fellow, and in the past, supervised 15 PhDs and 3 MPhils to completions.

Course Coordinator

Dr. Lalit Chandra Saikia presently working as Associate Professor in Electrical Engineering at National Institute of Technology (NIT) Silchar, India. He received the B.E (Electrical Engineering) from Dibrugarh University, India and Master of Technology (Power systems) from IIT Delhi, India in 1993 and 2007 respectively. He completed his PhD degree from NIT Silchar in 2012. After completion of BE degree, he served as Rig Engineer (Electrical) in oil well drilling till 1997. In 1997, he joined as lecturer in the department of Electrical engineering, Jorhat Engineering college, Assam, India and worked till December 1999. In 2000, he joined in the department of Electrical Engineering, NIT Silchar. He served several administrative positions like Head of the department, Associate Dean, Nodal officer TEQIP-II etc. at NIT Silchar. He was a member of board of governor (BoG) of NIT Silchar from May 2016 - May 2018. He had published 57 numbers SCI Indexed journal, and 57 IEEE/IET conference papers, 16 book chapters. He had produced 8 PhD with good numbers of Publications. He is a Senior member of the IEEE. His research interests include power system operation and control, power quality, distributed generation, application of soft computing Techniques in Power system, electrical machines etc.

1. First, ‘web register’ at GIAN ‘Courses Registration Portal’: http://www.gian.iitkgp.ac.in/GREGN/index by paying requisite fees. If you’re already registered, skip this step.
2. Then, log in, click ‘Course Registration’ tab on the GIAN Portal, and ‘check box’ to select this course **(# 191031D01) “Advanced Permanent Magnet Machine-drive Technologies for Transport Electrification and Renewable Energy”** from the list. Click ‘save’ to register, and ‘Confirm Course(s)’ to confirm.
3. Now, pay the requisite Course Fee online in favour of the **Director, NIT Silchar, India, Bank Account No: 10521277057, IFSC Code: SBIN0007061, MICR Code: 788002004**. You’ll need this during the next step. Also, please retain the receipt for on-spot submission.
4. Next, fill out the form given below, sign it. Send the scan copy of the filled in form with scanned copy of course fee transaction slip to the course coordinator e-mail address (**lcsaikia@yahoo.com**, or **lcsaikia@ee.nits.ac.in**). This is for the Course Coordinator’s record. Now, await the Course Coordinator’s confirmation.
5. Next, fill out the form here: **https://forms.gle/EdtiahKdXVuWbG6U8,** and click ‘submit’. This is for the Course Coordinator’s record. Now, await the Course Coordinator’s confirmation.

P.S: Registering on the GIAN portal does not guarantee participation in the course. Please do not confuse with web registration with course registration. You might have been ‘shortlisted’ after paying the 500/-, but your selection is subject to paying the requisite course fee to NIT Silchar. For successful enrolment, make sure you’ve made both the payments. Number of participants for the course is limited to 50, and the registration will be open till the seats are filled. For queries and clarifications, write to the Course Coordinator at: **lcsaikia@yahoo.com** or **lcsaikia@ee.nits.ac.in**

GIAN: Global Initiative of Academic Network

Name of the course: Advanced Permanent Magnet Machine-drive Technologies for Transport Electrification and Renewable Energy

(Course ID: 191031D01)

Dates: 21st March – 25th March 2022

Department of Electrical Engineering, NIT Silchar, Assam, India

REGISTRATION FORM

1. **GIAN Portal Application Number:**
2. **Full Name:**
3. **Category (Industry/Academic/Student):**
4. **Organization:**
5. **Address:**

6. **Email Id:**
7. **Mobile Number:**
8. **Highest Academic qualification:**
9. **Payment option and details:**

a. **Online Transaction:**

Transaction ID/Ref No.	Bank Name	Date	Amount

Date:

Place

Signature of the Applicant