



शिक्षा मंत्रालय
MINISTRY OF
EDUCATION

**GLOBAL INITIATIVE OF ACADEMIC NETWORKS (GIAN),
MINISTRY OF EDUCATION, GOVT. OF INDIA,
SPONSORED COURSE ON**

Multi Agent and Microgrid Concepts



Date:
02-06-2022
to
06-06-2022

Mode of Course
Hybrid

Organized by:
Department of Electrical Engineering,
Malaviya National Institute of Technology Jaipur,
Rajasthan - 302017, India.
www.mnit.ac.in



About GIAN

Govt. of India approved a new program titled Global Initiative of Academic Networks (GIAN) in Higher Education aimed at tapping the talent pool of scientists and entrepreneurs internationally to encourage their engagement with the institutes of Higher Education in India so as to augment the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence.




About MNIT Jaipur

The institute was established in 1963 as Malaviya Regional Engineering College Jaipur. On June 26, 2002 it was given the status of National Institute of Technology and proclaimed 'Institute of National Importance'. It is fully funded by the Ministry of Education (MoE), Government of India. It offers post-graduate and undergraduate courses (B.Tech., M.Tech., MBA, M.Sc. & Ph.D.) in leading fields of engineering, technology, architecture, management & science. It has state of art laboratory facilities along with excellent infrastructure for research, consultancy and developmental activities besides imparting regular teaching & learning process. Located in the central location of Jaipur city, its campus is spread over 325 acres of lush greenery. It has a residential campus offering accommodation to faculty, staff and students. The campus provides all essential amenities for community living like staff clubs, hospital, bank, post office, community centre, school, staff residences, gymnasium, playing fields, guest houses, 24 hours internet connectivity, and canteen.



About Department of Electrical Engineering

It is one of the oldest departments of the institute, offering a fine blend of experience and innovation in teaching. Presently it is offering an undergraduate programme in Electrical Engineering and three postgraduate programmes in Power Systems Engineering, Power Electronics and Drives and Power Systems Management (PSM). PSM is one of its kind program established in 2018 for capacity building in areas of regulatory, markets, and managerial issues of evolving power sector. The department provides a life-long learning experience, through its state of art laboratories, a vast pool of courses, and industry orientation. Having strong collaborative framework with reputed universities in India and abroad, the department offers ample opportunities for individual growth.



About Course

Fuelled by ideas of decentralized monitoring and control of smart and micro grid systems and constrained by concerns for sustainability and resiliency, the realm of power system is currently undergoing a significant paradigm shift worldwide. In many areas of developed and developing countries, electricity delivery system is aging at a rapid rate. Also, population growth has caused entire transmission and distribution system to be pushed to the brink of failure, given its fragile state. To add to the fragile status, the consumers are connecting more and more electronic devices into their home. These new home appliances create different system dynamics and in addition electric utilities are now required to integrate a more significant percentage of the share of renewable sources into their system. Due to the variable and intermittent nature of renewables, reliability and efficiency of electric power grid is challenged and hence demands improvements or other changes in order to mitigate these challenges. Therefore, operation of grids as subsystems called micro grids can be one potential solution.

Microgrids significantly increase efficiency and reliability of power grid from generation to consumers. Microgrid, however needs a greater control requirement since it can operate isolated from grid in an islanded operation. Decentralized monitoring and control will be imperative for microgrid operations. Multi-agent system composed of multiple interacting agents is critical for achieving decentralized monitoring and control in real-time. A multi-agent system is a computerized system composed of multiple interacting intelligent agents. Multi-agent systems can solve problems that are difficult or impossible for an individual agent or a monolithic system to solve. These newer subsystems controlled by decentralized approaches signal the next decade of reformation in power grid as the world's systems become increasingly digital.

Course Details

Lecture Schedule (20 hours course), four hours of lecture per day

Day 01

- Introduction to Agents, Agents in Software
- Types of Agents and their behaviors
- Agent development software - JADE
- Interfaces with Power System simulation software MATLAB
- Quiz

Day 02

- Agents in Power Systems
- Introduction of Agent applications in power systems
- Time-domain numerical techniques
- Physics-based natural models
- Resistive Companion Modeling methods for linear devices
- Resistive Companion Modeling methods for non-linear devices
- Quiz

Day 03

- Network matrix automation, Numerical solution of state equations
- Modeling of power electronic converters
- Solution of linear DC Circuit analysis
- Simulation of nonlinear circuits
- Multi Agent System architecture, MAS customer model implementation
- Quiz

Day 04

- Introduction to Smart Grid
- Introduction to Microgrid
- Distribution System Modeling and Analysis
- Introduction to EPRI's OpenDSS Open Source Microgrid Dynamic Simulation Platform
- Microgrid Small Signal and Large Signal Modeling
- Quiz

Day 05

- Parking lot placement for Electric Vehicles in Microgrid System
- Optimization of the controller for Microgrid
- Demand Response Modeling and Analysis on IEEE 8500 Node System
- Multi-Agent-based Reconfiguration for Restoration of Distribution Systems with
- Distributed Generators
- Quiz



Prabha Bhawan, MNIT, Jaipur

Who Can Attend

Executives, engineers and researchers from service and government organizations including R&D laboratories, student at all levels (BTech/MSc/MTech/PhD) and faculty from academic institutions.

Course Fee Structure

Participation fees is as follows (Excluding GIAN Portal Registration fee):

Participants	Type	Mode	
		Including 18% GST	
		Online	Offline*
From Abroad	Students, Academicians and Industry Personnel	US\$15	US\$15
From India	Industry Personnel	INR 1000	INR 1000
	Faculty from Academic Institutes	INR 500	INR 500
	Students	INR 500	INR 500
	Students from host Institute(MNIT Jaipur)	INR 200	INR 200

*Registration fee for offline mode includes all instructional materials, computer use for tutorials and assignments and tea on all days. The participants will be provided with accommodation on payment basis based on availability as per Institutes rules. GST needs to be paid.

How to Register

- One time registration at the GIAN portal of IIT Kharagpur is mandatory for every participant. Follow the instructions at <https://gian.iitkgp.ac.in/GREGN/index> to register and pay Rs. 500 fee.
- Next, register for the course by paying the Registration Fee through NEFT as per the following details:
 - Name of Account Holder: "Registrar (Sponsored Research), MNIT Jaipur"
 - Account No.: 676801700388
 - Bank: ICICI Bank Ltd.
 - Branch: MNIT, Malaviya National Institute of Technology, Jaipur
 - IFSC Code: ICIC0006768
 - MICR No. 302229031
- After paying the Registration Fee, it is mandatory for the participants to register at the registration link <https://forms.gle/qw94zC8udUU5nQai9>
- Seats are limited and will be available on a First Come First Served basis.
- Shortlisted participants will be informed by email till 28th May 2022.
- It is compulsory for participants to be present in all sessions and submit all assignments in order to receive the certificate.



Hostels, MNIT,Jaipur

Teaching Faculty



Dr. Jignesh Solanki

Dr. Jignesh Solanki is a faculty member in the Lane Department of Computer Science and Electrical Engineering since 2009. He received his Ph.D. from Mississippi State University in 2006. He worked in Open System International Inc. as a senior engineer in Power System Research and Development department for several years after his Ph.D. His research interests lie in the area of distribution automation for smart grids and intelligent applications for power systems. His research work has been published in prestigious conferences and journals, including IEEE Transactions, IET, ASNE, Springer, Elsevier's and IEEE PES conferences. National and International researchers have cited his work hundreds of times. His mentees are working in power industry and academia. He served as a chairman of the IEEE PES PEEC student activities subcommittee, where he was responsible for organizing student programs of student housing, student poster competition, and student-industry-faculty-luncheon program at IEEE PES general meetings and IEEE PES transmission and distribution conferences. During his time in the committee, he served 4600 national and international students. He also served as a chairman of the IEEE PES microgrid control taskforce and as a general chairman of the 49th North American Power Symposium, which West Virginia University hosted. He has served as a panellist for the National Science Foundation and Department of Energy. He has also hosted and conducted several panel sessions in several different international conferences. He was a recipient of the IEEE Multiagent Systems Working Group Award, in 2008 and received an IEEE PES recognition award for his service in 2012 and 2018. Dr. Solanki is also a recipient of Statler College Outstanding Educator Award at West Virginia University in 2020.

Coordinators



Dr. Rohit Bhakar

Dr. Rohit Bhakar is an Associate Professor in Department of Electrical Engineering and Centre for Energy and Environment. He leads the Power Management Research Group, which runs first of its kind M.Tech. in India, on Power System Management. Having a wide research experience on multiple aspects of power engineering, ranging from network pricing, electricity markets, risk management, grid integration of renewables, frequency regulation, renewable forecasting, long term system planning, energy storage planning and low carbon policy. He has supervised over 12 PhDs, and 36 M.Tech. dissertations and published over 175 papers in top rated journals and conferences. His current research interests include local energy market designs, multi energy systems, block-chain applications to energy systems, ramp forecasting, virtual energy storage and virtual power plants.



Dr. Prerna Jain

Dr. Prerna Jain is an Associate Professor at Department of Electrical Engineering, Malaviya National Institute of Technology Jaipur. Her area of specialization is Power Systems. As a senior faculty member of Power Management Research Group in the Department of Electrical Engineering, she researches on various facets of power engineering like electricity markets, risk management, AI applications to power system, deregulated power system operation and power system planning. She has published over 50 papers in journals and conferences. Her current research scholars are in the area of transactive energy management, power system flexibility quantification and electricity market price forecasting.

CHIEF PATRON

Dr. R.K. Tyagi

Chairman, Board of Governors, Malaviya National Institute of Technology Jaipur

PATRON

Prof. N. P. Padhy

Director, Malaviya National Institute of Technology Jaipur

CONVENER

Prof. Rajiv Tiwari

Professor and Head, Department of Electrical Engineering

LOCAL GIAN COORDINATOR

Prof. Vijay Janyani

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Vivekanand Lecture Theatre Complex, MNIT, Jaipur