Micro Energy Grids

2-Day Workshop

About the Speaker

Hossam Gaber, Professor, Director of Smart Energy Systems Lab

PhD, P.Eng., Distinguished Lecturer, IEEE NPSS

Email: Hossam.gaber@ontariotechu.ca, Web: https://hossamgaber.com/

Dr. Gabbar is a full Professor in the Faculty of Energy Systems and Nuclear Science, and cross appointed in the Faculty of Engineering and Applied Science, at Ontario Tech University (UOIT), where he has established the Energy Safety and Control Lab (ESCL), Smart Energy Systems Lab, and Advanced Plasma Engineering Lab. He is the recipient of the Senior Research Excellence Aware for 2016, UOIT. He is recognized among the top 2% of worldwide scientists with high citation in the area of energy. He is a Distinguished Lecturer of IEEE NPSS. He is leading national and international research in the areas of smart energy grids, energy safety and control systems, and waste to energy using advanced plasma technologies. Dr. Gabbar obtained his B.Sc. degree in 1988 with first class of honor from the Faculty of Engineering, Alexandria University (Egypt). In 2001, he obtained his Ph.D. degree from Okayama University (Japan). From 2001 till 2004, he joined Tokyo Institute of Technology (Japan), as a research associate. From 2004 till 2008, he joined Okayama University (Japan) as an Associate Professor, in the Division of Industrial Innovation Sciences. From 2007 till 2008, he was a Visiting Professor at the University of Toronto. He also worked as process control, safety, and automation specialist in energy and oil & gas industries. Dr. Gabbar has more than 290 publications, including patents, books / chapters, journal, and conference papers.

Workshop Description

Smart Energy Systems Lab

This course will provide students with knowledge and skills in engineering design of micro energy grids, including conceptual design and detailed planning, design, control, configuration, operation, and management. The applications of micro energy grids include urban and smart cities, as well as transportation infrastructures. The course will include renewable hybrid energy systems with interconnected micro energy grids. Students will learn requirements engineering, functional modeling of micro energy grids with different thermal, power, and fuel loads and distributed energy resources of generation, conversion, storage, and their integration with utilization. Students will practice modeling and simulation of micro energy grids with hybrid energy systems and their integration with loads in regions, buildings, and transportation. In addition, students will learn integration of small modular reactors (SMR), micro modular reactors (MMR) and integration with power plants in normal and emergency situations. In addition, students will discuss energy systems, technologies, and implementations.

Who Should Attend?

Academia:

Researchers in the areas of electrical, energy, transportation systems

Industry:

Energy systems engineers

Energy managers in facilities and factories

Utilities, power generation, energy suppliers / trade

Energy technology providers, energy automation, control, protection

Energy systems designers, planners

Maintenance companies of energy facilities and infrastructures

Government / Regulators / Energy Licensers

Why to Attend?

- Understand foundations of MEG for integrating DER in distribution and energy networks
- Understand foundations of ESN-Energy Semantic Network and their use to plan interconnected MEGs
- Analyze risks of integrating DER, DG, gas-power technologies within MEG
- Practice risk management framework and hazard scenarios in energy networks

- Understand safety and protection layers for resilient interconnected MEG
- Evaluate fault propagation and monitor safety performance indicators for effective MEG management
- Practice MEG applications on transportation, water networks, residential and industrial facilities

Contents:

On the successful completion of the course, attendees will be able to learn different engineering design, control, and operation of micro energy grids with distributed energy resources and their mapping to micro energy grid loads. Attendees will be able to practice different examples and case studies to practice different design features and scenarios of micro energy grids, while evaluating performance measures related to energy supply, utilization with conservation strategies. The following are the main learning outcomes to be acquired by the end of the course:

- Practice Engineering Design of Micro Energy Grids
- Practice and Apply Micro Energy Grid Modeling and Simulation
- Learn Micro Energy Grid Configuration and Operation Scenario Synthesis
- Understand and Evaluate Micro Control Strategy Synthesis and System Design
- Understand Thermal-Fuel-Power Technologies and Performance Assessment
- Understand Energy and Renewable Hybrid Energy Systems Design and Operation Practices
- Learn Micro Energy Grid Monitoring and Measurement Techniques and Practices
- Practice Micro Energy Grid Load / Supply / Generation Forecasting Methods
- Understand Energy Conservation Strategies within Micro Energy Grids
- Understand Risks, Safety, and Resiliency Practices and Methods with Micro Energy Grid Design and Operation

-