AICTE Training and Learning Academy (ATAL)
Sponsored
Five Days
Online Faculty Development Program on

Internet of Things (IoT)

15th - 19th December 2020

Organized by
Energy Research Centre
Department of Electrical Engineering
Shri Ramdeobaba College of Engineering and Management,
Nagpur-440013
Website: www.rknec.edu

ATAL FDP on Internet of Things-15th to 19th December 2020

Preamble:

Growing demand for electricity, ever increased use of renewable energy sources, emergence of electrified transportation and innovations in Distributed generation and Smart grid are the main drivers in the development of today's energy applications. Making these applications more efficient and sustainable by using sensors, modern devices and data analytics is the need of the day. Internet of things (IoT) has capability to add sensing, data storage & analytics, decision making and actuation capabilities to millions of interacting devices in the electrical power system. Use of IoT devices can help to develop the smart energy applications with improved efficiency, enhanced productivity, decreased maintenance, better decision making, better work environment and creating new and innovative experiences.

This makes the Energy-Internet of Things (E-IoT) highly relevant in present energy scenario.

Topics covered :

Following topics areas are coverd in the Program:

- Introduction of IoT: Overview and Architecture,
- Introduction to IoT Platforms,
- Wide area monitoring & Advanced EMS,
- Energy Management using ESS & IoT,
- Electric Vehicles, Control of EV Charging stations,
- Smart Grids, Grid Interfacing of PV systems, DC Microgrid and IoT,
- Design of IoT systems for PV Energy harvesting
- Online IoT Laboratory session.

About Shri Ramdeobaba College of Engineering and Management, Nagpur

Shri Ramdeobaba College of Engineering and Management, Nagpur was established in 1984 and is the most sought after autonomous institute in central India. It is committed to excellence in technical education and research. The institute offers undergraduate, post graduate and doctoral programmes in engineering, management and computer applications. It is affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur and majority of its programmes are accredited by National Board of Accreditation, New Delhi. The college has been awarded 'A' grade by NAAC and ranks 112th in India based on the NIRF ranking. RCOEM adheres to the highest ethical standards and professional integrity. It has been selected as the top institution in Maharashtra by Rajiv Gandhi Science and Technology Commission (RGSTC) for the implementation of TIFAC project and MSME Internship scheme.

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Shri Ramdeobaba College of Engineering and Management, Nagpur-440013
Department of Electrical Engineering
Schedule of Online Faculty Development Program
Energy- Internet of Things (*E-IoT*)
(15th - 19th December 2020)

Date	9.45 am to 11.15 am	11.30 am to 1.00 pm	2.00 pm to 3.30 pm
15.12.2020 Tuesday	**Registration : 9.15am to 9.30 am** **Inaugural : 9.30 am to 9.50 am** **9.55 am to 11.15 am** **Energy Transition** (Dr. Pranavamoorthy Balasubramanian, EATON, Pune)	**Introduction to IoT: Overview and Architecture** (Mr.Vinit Kapoor, Persistent Systems Ltd.)	**Introduction to IoT Platforms** (Mr. Everhett Raman, Persistent Systems Ltd. Malashiya)
16.12.2020 Wednesday	**Innovative Industry Solutions in Advanced Energy Management System (AEMS)** (Dr.Saugata Biswas, GE, Redmond, USA)	**Cooperative Control of PV Systems** (Dr.C.N.Bhende, IIT Bhubaneswar)	**IoT Tools : Demonstration** (Edutech Learning Solutions Pvt. Ltd.)
17.12.2020 Thursday	**Introduction to Design Aspects of Electric Vehicle** (Dr.M.M.Renge, RCoEM, Nagpur)	**Control & Design Aspects of EV Charging Stations** (Dr.R.S. Wandhare, IIT Hyderabad)	**Aspects of Grid Interfacing of PV System.** (Dr.H.M.Suryawanshi, VNIT, Nagpur)
18.12.2020 Friday	**Design and Implementation of IoT solutions in Energy – Solar Energy Harvesting** (Mr.Vidyasagar, Embitel Systems, Bangalore)	**Energy Management using Energy Storage Systems & IoT** (Mr. Sumedh Puradbhat, EATON)	**Stress Management,** (Ms. Nanda Sugandh, The Art of Living, Bangalore)
19.12.2020 Saturday	**DC Microgrid for Rural electrification and IoT** (Dr.U.B.Mujumdar, RCoEM, Nagpur)	**Electric Vehicles (EVs) and Hybrid Electric Vehicles (HEVs): The Smart Charging with the Internet of Things (IoT)"** (Dr. Tushar Kanti Bera, NIT Durgapur)	**Examination and Valedictory**

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Speakers

Energy Transition
Dr. Pranavmoorthy Balasubramanian, Technology manager – DERMS and Grid Intelligence at Eaton Research Labs, Pune.

Dr. Pranav received B.E. and M.E. degrees from Anna University, India and Ph.D. degree in Electrical Engineering from Arizona State University, USA with emphasis on power systems optimization and control. Prior to joining Eaton, he worked at Midcontinent Independent System Operator (MISO), USA, with responsibility for real-time operations and conducting impact assessment studies for frequency response and renewable integration.

Abstract: This talk coverd aspects related to the shift in the energy mix - energy sector's transition from fossil fuel based energy production and consumption to electrification powered by renewable energy sources. The potential impacts of increasing penetration of renewables on the conventional grid and the complexities associated within planning and operations. The recent technology trends that are enablers for decentralization and the potential opportunities going forward.

Introduction to IoT: Overview and Architecture
Mr. Vinit Kapoor, Chief Architect with Persistent Systems Ltd.

Mr. Vinit Kapoor has overall 20+ years of experience of working in the Industry. His current area of work includes Architecting for Cloud technologies covering SaaS applications, microservice, and event-driven architectures. Apart from this, he has been working with IoT solutions for energy monitoring and operations intelligence systems. He has done Master's from IIT Bombay and B.E. from VNIT in Computer Science.

Abstract: This talk covered an overview of IoT from multiple dimensions and motivation around IoT technology and certain market aspects associated with it. Next, it covered an overview of the IoT technology in general covering aspects such as network protocols, gateways, IoT Platforms, and device management. Later it covered some of the real-life IoT use cases and how those can be solved using IoT technology. Use cases from fields such as smart cities, vehicle telematics, heavy vehicle machinery monitoring, smart energy management, and industrial operations Intelligence also been covered.

Introduction to IoT Platforms
Mr. Everhett Raman, Persistent Systems Ltd. Malashiya

Everhett Raman is currently working at Persistent Systems Malaysia as Solution Architect. He has 16 years of workingexperience in the IT industry. He is an AWS Certified Solution Architect and has designed a couple of solutions in this platformHe has a honours degree in Computer Science from De Montfort University.

Abstract: As the audience becomes familiar with the fundamental of IoT (from the previous session), this session walked through a real-world situation where much emphasis was given to integrating IoT Platform with other IT services to create B2B/B2C marketplace. Also, In the session, the functional and technical architecture has been presented and discussed in detail for backing the working concept.

Innovative Industry Solutions in Advanced Energy Management System (AEMS)
Saugata S. Biswas, Manager of Electrical Power System Software Engineering team at GE Grid Solutions (of GE Digital) at Bothell, Washington, USA,

Dr. Saugata ompleted his PhD Degree in Electrical Engineering & Computer Science at Washington State University (WSU), USA in 2014.
He has 8 US patents for his innovative work in different research topics. He has also authored several papers that have been published in high impact journals and conferences like IEEE, etc. He has published multiple book chapters (for Wiley Publications, Springer Publications, etc.), and technical research reports (for US Department of Energy, etc.).

Abstract: As we know, Power System Operations are going through massive changes worldwide so as to meet the new and emerging challenges. Such challenges are typically posed by various different factors such as increasing power demand, changing generation mix, ageing power grid assets, and climate change leading to severe weather conditions, all of which can severely affect grid operations if they are not dealt with effectively. While such emerging challenges may not be easy to meet, but they do open up new opportunities for the power system research community in Academia and Industry to rise up to the occasion and provide innovative solutions.

Cooperative Control of PV Systems
Chandrashekhar N. Bhende, Associate Professor, IIT, Bhubaneswar

Chandrashekhar N. Bhende received PhD degree from Indian Institute of Technology Delhi, India in 2008. In June 2008 he went to University of Wollongong, Australia for Post-Doctoral Research and in Dec. 2008, he joined as Assistant Professor in Indian Institute of Technology Guwahati, India. In 2010, he moved to School of Electrical Sciences, Indian Institute of Technology Bhubaneswar, India and presently serving as Associate Professor there.

Abstract: His talk covered about the different types of strategies and techniques for cooperative control of distributed generation in general and photovoltaic systems in particular. After that I will present some of my work which I carried out recently.

IoT Tools : Demonstration
Bhavin R. Darji, Edutech Learning Solutions Pvt. Ltd.

Embedded Engineer with Edutech Learning Solutions Pvt. Ltd. since 2015.
Holds M E (Electronics & Communication) from GTU, Gujarat .
Currently working on Nvidia based platform, worked with STM32F4 ARM-Cortex-m4 based kit and also have brief knowledge of ARM architecture. His area of Interest includes IOT, ARM Microcontrollers, Embedded GPU hardware and applications

Abstract: His talk covered the topics like Introduction to IoT, Introduction to Open HAB Introduction to RPi Gateway, Introduction to EPB1768/EPBM4 node, Introduction to Eclipse IDE,Hands-on session for controlling and monitoring LEDs, Relay, ADC, DC Motor Serially and Ethernet using local server and cloud. Hands-on for controlling and monitoring of sensors and actuators using local server and cloud. Hands-on for Implementing IoT Services, Hands-on for controlling and monitoring sensors and actuators using wireless protocol (Bluetooth) from local server and cloud. Hands-on for controlling and monitoring sensors and actuators using Google assistant from the cloud.

Control & Design Aspects of EV Charging Stations
Dr.R.S. Wandhare, Assistant Professor, IIT Hyderabad

Dr. Rupesh Wandhare received Ph.D. in 2014 from Department of Electrical Engineering, IIT, Bombay. His PhD research focus was PV penetration issues in a weak power system. He is a cofounder of Kinetica Solar Pvt Ltd
His areas of research are Power Electronics, Electric Drives, Renewable Energy Sources, Distributed Energy Generation, Standalone and Hybrid Energy Generation and Microgrid.

Abstract: Due to continuously increasing cost of petroleum and environmental concerns, many advance countries rigorously pursuing the design of electric vehicle and its infrastructures such as charging stations. In this presentation, the focus is on a hardware and software design of a high capacity charging stations for cars and commercial vehicles. The board level details are provided for typical driver circuits, signal conditioning circuits for current and voltage measurements, SMPS, human machine interface, and typical microcontrollers. The basic power converter control strategy is explained which will help to understand the control of more complex power converters.

Aspects of Photovoltaic System Grid Interfacing
Dr. H. M. Suryawanshi, Professor (HAG),VNIT,Nagpur

He received M. E. degree in Electrical Engineering from Indian Institute of Science, Bangalore, in 1994 and Ph. D. degree by Nagpur University, Nagpur (India) in 1999. He is currently working as Professor (HAG) in the Department of Electrical Engineering, Visvesvaraya National Institute of Technology, Nagpur, (India) and Chair Professor of Indian National Academy of Engineering (INAE).

Abstract: For efficient utilization of non-conventional energy sources, power electronic interfaces are necessary. DC/DC converters are an integral part of these power electronics interface units. They act as a front-end converter to interface various low voltage energy sources like solar PV, fuel cells, battery bank, ultra-capacitors etc. to dc grid. These front-end converters must have high efficiency, high voltage step up capability, high power density and reliability. Realizing the need, various coupled inductor based high voltage gain dc/dc converter topologies for DG systems and battery charging.

Design and Implementation of IoT solutions in Energy – Solar Energy Harvesting
Mr.Vidyasagar, Embitel Systems, Bangalore

Vidya Sagar is leading team of engineers developing cutting-edge technology solutions in the area of IoT in Industrial and Automotive projects. Vidya Sagar has 20 years of industry experience in Embedded Systems, IoT, Industrial Automation & Connected Vehicles. He has M.Sc Tech from NIT Warangal. Earlier he worked with companies like Philips, Wipro & Cute Solutions

Abstract: IoT solution for leading IPP in renewable energy to optimize solar energy harvesting. The solution involved design, development & validation of following components for tracker controller, gateway, cloud platform and SCADA.

Energy Management using Energy Storage Systems & IoT
Mr. Sumedh Puradbhat, Senior Engineer, EATON Technologies, Pune

Sumedh is working with Eaton Technologies Pvt. Ltd. as Senior Engineer with research and development department in the areas of Microgrid planning, microgrid optimal control, energy storage systems, hardware in loop systems. He has M.Tech. Energy systems engineering from IIT Bombay and currently pursuing sponsored part time PhD from IIT Bombay in the area of "Energy management in Microgrid"

Abstract: Energy storage system (ESS) is an important component in modern power distribution system. This session will elaborate on the basics of ESS, their applications and how they bring about the economic benefits to the owner. The session will also cover the ESS installations carried out by Eaton at different locations, along with the considerations and examples of techno-economic analysis. The session will also touch upon the ESS in Indian context.

Ms. Nanda Sugandh
Life Transformer, Yoga instructor & Speaker

Ms.Nanda Sugandh is a fulltime senior faculty-member with The Art of Living Foundation. A notfor-profit, educational and humanitarian NGO (Non- Governmental Organization) engaged in stress- management and service initiatives. The Organization operates in 152 countries and has touched the lives of 370 million people.

Abstract: Stress Management

Low Voltage DC Microgrid for Rural Electrification and IoT
Dr.Uday B.Mujumdar, Associate Professor, RCoEM, Nagpur

Dr.Mujumdar completed his graduation in Electrical Engineering from VNIT Nagpur and received doctoral degree from Nagpur University, Nagpur. His area of research and development includes the power converters, Industrial automation and embedded systems. He has completed several Industrial consultancy projects. His solutions are implemented in the field.

Abstract: In this era of Smart and Intelligent Power Grid, there is big population who is deprived of Electrical power, especially in remote and rural areas. This talk has covered the development of DC Microgrid for remote and rural electrification. Sustainability of such projects depend on effective monitoring and timely maintenance. Use of Internet of Things (IoT) for performance monitoring has also been discussed.

Electric Vehicles (EVs) and Hybrid Electric Vehicles (HEVs): The Impacts on Power System, Smart Charging and the Internet of Things (IoT)
TUSHAR KANTI BERA, NIT Durgapur (WB)

Dr. Tushar Kanti Bera completed his Ph.D. in the field of "Biomedical Engineering" from the Dept. of Instrumentation and Applied Physics (AIP), Indian Institute of Science (I.I.Sc.) Bangalore, India. At present, Dr. Bera is working as an Assistant Professor, in the Dept. of Electrical Engineering, National Institute of Technology Durgapur (NITDgp).

Abstract: Electric Vehicles (EVs) and Plug-In-Hybrid Electric Vehicles (PHEVs) are introduced to reduce consumption of fossil fuel and to reduce environmental pollution. EVs run with electrical power which is kept stored in the rechargeable batteries and PHEVs can run on both. The issues related with the demand for electric power imposed by the huge number of EVs and PHEVs on the stability of the power grid, role of renewable energy sources and Internet of Things has been discussed in this session by Dr.Tushar Kanti Bera.

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Glimpse of FDP