Power and Energy Systems
School of Information Technology and Electrical Engineering
Academic Staff

Professor Tapan Saha
BSc Eng., M.Tech., PhD, Grad. Cert. (HE), FIEAUST, CPEng, IEEE Fellow, RPEQ
Leader, UQ Solar & Director of Australasian Transformer Innovation Centre
Tapan’s research interests include condition monitoring of electrical equipment and integration of renewable energy to the national grid.

Professor Neil Horrocks
BCom, GAICD, GEER
Centre Director, Redback Technologies Research Centre
Neil’s research interests include real-time data collection and analytics for low-voltage networks and visualisation of those insights for Network operators, industry and consumers.

Dr Chandima Ekanayake
BSc Eng, Tech. Lic, PhD, SMIEEE
Senior Lecturer
Chandima’s research interests are condition monitoring of power apparatus, alternatives for insulating oil, performance studies of HV insulators, high voltage engineering and impact of renewables on grid assets.

Dr Dan Martin
B.Eng. (Honours), PhD, MIEEE
Lecturer
Dan’s work surrounds determining the life remaining of power transformer insulation, and has worked with Energex, Ergon Energy, Powerlink Qld and TransGrid to deploy his technology into their network.

Dr Hui Ma
B.Eng., M.Eng, M.Eng (research), PhD, SMIEEE
Lecturer
Hui’s research interests include modelling, sensing, signal processing and machine learning applications in power system, high voltage engineering and electrical insulation, and wireless sensor networks.

Dr Negareh Ghasemi
B.Eng., M.Eng, PhD, MIEEE
Lecturer
Negareh’s research interests include Power Electronics and Control, Pulsed Power and Ultrasound Systems and their applications.

Dr Olav Krause
Dipl.-Ing. (M.Sc. Eng.), Dr.-Ing. (D.Eng.), MIEEE
Senior Lecturer
Olav’s main research activities are in monitoring and autonomous management of electrical power distribution networks with major contributions to the determination of network loadability limits, state and network parameter estimation.

Dr Ruifeng Yan
BEng, MEng, PhD, MIEEE
ARC DECRA Fellow & Lecturer
Ruifeng’s research areas are solar PV and wind technology, power transmission and distribution system analysis, and network operation and control.

Dr Wayne Tushar
BSc, PhD, SMIEEE
Advanced Queensland Research Fellow
Wayes’ main research interests include energy and storage management, peer-to-peer energy trading, renewable energy, smart grid, design thinking, and game theory.

Professor Firuz Zare
B.Eng, M.Sc, PhD, SMIEEE
ARC Future Fellow
As the ARC Future Fellow, Firuz’s main research fields are power electronics applications and control, renewable energy systems, harmonics in distribution networks, Electromagnetic Interfaces (EMI) and pulsed power systems.

Assoc. Professor Mithulananthan Nadarajah
B.Sc. (Eng.), M.Eng, PhD, Grad. Cert. (HE), SMIEEE
Mithulan’s research interests are grid integration of renewable energy, battery energy storage and electric vehicle charging stations.

Dr Rahul Sharma
B.Tech, Master of Engineering Science, PhD, MIEEE
Senior Lecturer
Rahul’s research interests include control systems, system modelling, fault diagnosis, real-time optimisation and applications to power systems and vehicle electrification.

Dr Hui Ma
B.Eng, M.Eng, M.Eng (research), PhD, SMIEEE
Lecturer
Hui’s research interests include modelling, sensing, signal processing and machine learning applications in power system, high voltage engineering and electrical insulation, and wireless sensor networks.

Dr Negareh Ghasemi
B.Eng., M.Eng, PhD, MIEEE
Lecturer
Negareh’s research interests include Power Electronics and Control, Pulsed Power and Ultrasound Systems and their applications.

Dr Olav Krause
Dipl.-Ing. (M.Sc. Eng.), Dr.-Ing. (D.Eng.), MIEEE
Senior Lecturer
Olav’s main research activities are in monitoring and autonomous management of electrical power distribution networks with major contributions to the determination of network loadability limits, state and network parameter estimation.

Dr Ruifeng Yan
BEng, MEng, PhD, MIEEE
ARC DECRA Fellow & Lecturer
Ruifeng’s research areas are solar PV and wind technology, power transmission and distribution system analysis, and network operation and control.
Dr Lakshitha Naranpanawe  
BSc Eng., PhD, MIEEE  
Postdoctoral Research Fellow  
Lakshitha’s research interests include condition monitoring of power transformers, generators, bare overhead conductors and other power system assets, developing vibro-acoustic condition monitoring techniques and applying FEM-based simulation techniques in condition monitoring of power system equipment.

Dr Mollah Rezaul Alam  
B.Econ, B.Econ Hons, PhD  
Postdoctoral Research Fellow  
Mollah’s research interests include characterization of power quality events, machine learning, pattern recognition, fault detection, classification and analysis considering the impacts of distributed energy resources and dynamic loads.

Dr Dr Feifei Bai  
BEng., PhD, MIEEE  
Advance Queensland Research Fellow  
Feifei’s research interests include solar PV integration to the power grid, PMU applications in distribution power networks, data-driven power system modelling and inter-area oscillation damping control.

Dr Dr Yi Cui  
BEng., MEng, PhD, MIEEE  
Research Fellow  
Yi’s research interests include wide-area monitoring and control, data analytics and machine learning of distribution networks, condition assessment and fault diagnosis of power transformers.

Dr Dr Hansika Rathnayake  
BSc Eng., PhD, MIEEE  
Postdoctoral Research Fellow  
Hansika’s research interests include control of active front end systems in renewable energy systems, electric machine drives, electromagnetic Interfaces (EMI) and power quality research.

Dr Dr Jalil Yaghoobi  
BEng., MEng, PhD, MIEEE  
Postdoctoral Research Fellow  
Jalil’s research interests include power quality of LV networks, power electronics, renewable energy integration in power systems, and power system voltage stability.

Dr Friska (Dendi) Pambudi  
BEng., PhD, MIEEE  
Research Fellow  
Friska is working as a software developer for the Australian Renewable Energy Agency (ARENA)-funded Solar Enablement Initiative (SEI) project.

Mr Ray Holzheimer  
BEng, RPEQ  
Manager - Australasian Transformer Centre  
Ray has over 40 years experience in the electrical industry, including power transformer design, manufacture and test, mining, water resources, transmission substation design, procurement and maintenance.

Gian-Marco Morosini  
Gian-Marco is part of the research team working on the Solar Enablement Initiative. The focus of his work is network development of and modelling for the State Estimation (SE) Algorithm at the core of the project as well as analysis of SE results.

André Gebers  
André is working as a systems developer for the Australian Renewable Energy Agency (ARENA)-funded Solar Enablement Initiative (SEI) project. His interests lie in software development and Unix server administration.
Power and Energy Systems research activities are centred on dynamic analysis of renewable energy integration and condition assessment of critical electricity infrastructure. Power Systems are generally large, non-linear, interconnected and complex. There is a significant need for an improvement in the planning and operation of such power systems, in particular with high proliferation of distributed renewable energy sources in the Australian national electricity grid. The School’s research is specifically directed at the analysis and prediction of the dynamic behaviour of power systems for reliable and secure operations. Amongst the many options in this area, power system stability analysis tools and power systems control methodologies are the most important foci.

A significant proportion of the electricity infrastructure in Australia and other countries is aged and requires special attention. The focus is thus industry orientated research and aims to deliver next generation condition assessment techniques that comprise accurate modelling and interpretative tools for power transformers, underground cables and other plant assets. Australasian Transformer Innovation Centre has been established within the School of Information Technology and Electrical Engineering, which focuses on the asset management of power transformers in the modern electrical network. In this center, we apply innovative research and industry experience together with professional training to help members operate their transformer fleets sustainably and efficiently. Researchers in this area includes industry experts in transformer asset management, as well as researchers and educators from leading Australian universities.

Another major research focus area for the group is to study the visibility of low voltage and medium voltage electricity distribution network that determines the operational state of the network and forms the basis for automated management of the network using the state estimation algorithm. This algorithm would provide a platform for automated network management applications including the coordination of solar PV generation, demand side management, energy storage, electric vehicles and network loading during critical times to help reduce the need for capital-intensive network augmentations and associated electricity price increases.

The Power & Energy Systems Research group is actively involved with industry oriented challenges and enjoys strong industry collaboration in research both nationally and internationally. The area is also a major partner of the Australian Power Institute and Energy Networks Australia.

Another major research focus area for the group is in Power Electronics and Control, where a number of specific research topics are being investigated, which includes grid connected inverters for renewable energy systems, high efficient energy conversion systems (Motor-Drive Systems), grid robustness and power quality of future grids (0 – 2 kHz and 2 – 150 kHz), and impact of high penetration of grid-connected power electronics on distribution networks.

The Power & Energy Systems Research group is actively involved with industry oriented challenges and enjoys strong industry collaboration in research both nationally and internationally. The area is also a major partner of the Australian Power Institute and Energy Networks Australia.

Solar Research at UQ
University of Queensland has the largest university solar PV facilities in the world. In 2011 UQ has installed 1.3 MW rooftop PV stations across several buildings at the University’s St Lucia campus with more than 5000 polycrystalline silicon solar panels, covering a space equivalent to one-and-a-half rugby fields. Since then, UQ St. Lucia campus Solar PV installations have significantly grown in many other building roofs and totaled around 2.5 MW.

In 2015 UQ has installed 3.3 MW Solar Research Facility comprises more than 37,000 thin-film photovoltaic panels, mounted on 10ha former airstrip at the university’s Gatton Campus. This 3.3MW system comprises of 5 arrays - a dual tracking array, a single axis tracking array and 3 fixed tilt panel arrays. Multiple PV mounting technologies including fixed-tilt, single-axis and dual-axis tracker technologies are in operation side-by-side in the same field to investigate their performance. PV panels mounted on a single axis tilts from east to west throughout the day to maximise energy output. Dual Axis Tracking Array trackers are capable of a 340° slewing motion and 180° tilt that allow the panels to directly face the sun at all times and thus, maximize output power. A 600 kW, 760 kWh Battery Energy Storage System (BESS) has been integrated with the Gatton Solar Research Facility.

The University of Queensland will become the first major university in the world to offset 100 per cent of its electricity usage through its own renewable energy assets. A 64 megawatt (MW) solar farm will be in operation in 2020, which is just outside of Warwick, on Queensland’s Southern Downs. This PV Plant will be connected to the grid and will offset UQ’s carbon footprint, which will make UQ a carbon neutral energy user.

These solar plant facilities along with the state of the art renewable energy laboratory are providing a unique research opportunity to Power and Energy Systems researchers to understand the challenges and opportunities of solar PV integration to the electricity grid. Our group is working with local distribution utilities in Australia to solve some of the major integration challenges.

Industry 4.0 Energy Test Lab @ UQ
Following the Prime Minister’s Industry 4.0 Taskforce adoption of the ‘Industry 4.0 Testlabs strategic initiative’, in cooperation with the German Platform Industry 4.0, six Universities around Australia have been selected for the National Industry 4.0 Testlab pilot program. UQ is building an Energy testlab focusing on Green and Smart Energy – An IoT enabled digital manifestation of the entire electricity network portfolio for energy management, power system analysis, and sector specific cyber security. The testlab will serve as a point of engagement between SMEs and Researchers to enable knowledge transfer and collaboration to facilitate in-depth power and energy system research, research cyber resilience, and create engaging and deeply realistic teaching and learning experience for students. The testlab will integrate key technologies and expertise of electrical and mechanical engineering, big data, cyber security, design innovation, human-computer interaction, software programming, economics and policy design to UQ’s current strong focus in multi-disciplinary energy research.
The strong research output has continued in recent years and the productiveness of the group’s research activities can be attributed to the close links and generous support provided by the group’s industrial and academic research partners.

The group has two primary areas of focus in research. A number of academics are working on condition monitoring of ageing assets of electricity industry. This includes transformer, cables, overhead transmission/distribution conductors and other assets. The other is focused on renewable energy integration to the transmission and distribution grid. This includes power system analysis tools for solar PV, wind and other renewable energy integration into the national electricity.

Significant research is in progress to address the challenges of rooftop distributed solar PV and commercial/industrial solar PV integration to the distribution low voltage grid. The group has obtained significant financial support from both the Australian Research Council and national and international research partners.

Preventing transformer failures caused by silver sulphide (2017–2020)
This project investigates mechanisms leading to the loss of effective silver surface protection and the corrosion of OLTC silver contacts. The primary objectives of the project are:
- Investigate how to measure the barrier formed by a passivator on the surface of a metal and why this chemical attack occurs, the factors determining its rate, and how to limit the rate of degradation.
- Perform an investigation to understand why passivator is not effective in preventing damage to silver contact and why certain chemical components of mineral oil attack the silver.
- Produce a technique that the utilities can use to determine OLTCs which are at high risk of silver sulphide, and failure.

Researchers
- Professor Tapan Saha
- Dr Dan Martin
- Dr Hui Ma
- Mr Sameera Samarasinghe

Industry Partner
- Energy Networks Association Limited

Sustainable operation of transformers with better understanding of technical and economic constraints (ARC Linkage Project 2014–2019)
This project aims to develop new methodologies that industry can apply to maximize the usage of transformers. Through the innovative use of fiber optic sensing, new leakage current detection methods and use of advanced pattern recognition techniques, coupled with the research to understand the ageing processes of biodegradable oils, transformer lifespan can be accurately determined. The expected outcomes are new monitoring techniques and improved life-cycle costing for various transformers.

Researchers
- Professor Tapan Saha
- Dr Chandiha Ekanayake
- Dr Dan Martin
- Dr Hui Ma
- Mr Md Abdul Hafeez Ansari
- Dr Lakshitha Waniseka Naranpanawe
- Dr Junhyuck Seo

Industry Partners
- Powerlink Queensland
- TransGrid
- AusGrid
- Ergon Energy
- Wilson Transformer Company

The project aims to monitor and analyse power quality of grids within the frequency ranges of 0-2 kHz (existing regulations) and 2-150 kHz (new regulations). Power quality of grids deteriorate due to high penetrations of inverter based renewable energy systems. To estimate power quality of grids, a multi-domain simulation model based on grid configurations and operating conditions will be developed in this project. Developed methodologies will assist network service providers to better analyse harmonics and resonances within low and high voltage power systems and further support them to develop new planning guidelines and regulations to address power quality of grid connected solar inverters and wind turbines.

Researchers
• Professor Firuz Zare
• Professor Tapan Saha
• Dr Daniel Eghbal
• Mr Tayyab Rahman

Industry Partners
• Energy Queensland
• Powerlink Queensland

UQ Energy TESTLAB

UQ, as part of a new national $5 million pilot program, is building an Industry 4.0 Energy Testlab led by Professor Tapan Saha of the Power and Energy Systems Group. The lab, which will be completed by the end of 2019, will provide a physical space for businesses and researchers to trial, explore and showcase Industry 4.0 technologies and processes in the energy and cyber-physical security domain, enable educational institutions and industry, particularly small-to-medium enterprises, to collaborate, and develop skills needed to take full advantage of opportunities presented by Industry 4.0. Through the Industry 4.0, a grant of more than $500 million in software from Siemens will give University of Queensland students and researchers the access to advanced technology, building their skills in digital and data-driven industries.

Addressing Challenges for the Future Grids – Harmonics Standardization, ARC Future Fellowships (2016-2020)

Due to the global demand for energy saving and reduction of greenhouse gas emissions, utilization of renewable energy sources and efficient loads based on power electronics technology is increased in electricity networks. The negative aspects of this technology are very complex and not well known which affect reliability and robustness of the grids. The main aims of this project are to: a) develop advanced tools for a better understanding of power quality issues of the residential, commercial and industrial distribution networks in Australia b) investigate and develop novel techniques to improve power quality and reliability of the grids c) develop harmonics emission and immunity levels and modify the Australian standards accordingly.

Researcher
• Professor Firuz Zare
High-precision Condition Monitoring of Critical Equipment in Modern Distribution Networks
(Advance Queensland Industry Research Fellow Project 2019-2021)
This project aims to provide a cost-effective way to monitor and predict equipment conditions by leveraging big data measured via partner’s high-precision Distribution Phasor Measurement Units (D-PMUs). Using laboratory experimentation and advanced machine learning techniques to extract signatures of equipment conditions, the project will provide an online early-warning system to prevent impending failures. The outcome will deliver an innovative condition monitoring tool, which will strengthen the reliability of Queensland distribution networks, reduce electricity cost and achieve Queensland’s 50% renewable energy target by 2030.

Researchers
• Dr Feifei Bai
• Prof Tapan Kumar Saha
• Dr Ruifeng Yan

Industry Partners
• Noja Power
• Energy Queensland

Enabling high photovoltaic penetration in power distribution networks (2018-2020)
The rapid uptake of residential solar systems has resulted in extensive voltage management issues for power distribution grids. This project aims to develop a novel hybrid control method for network voltage regulation with high photovoltaic penetration. Without such technology, the further integration of solar photovoltaic into the power grid will become increasingly difficult. The outcome of this project will enable power utilities to cost-effectively regulate network voltage and ultimately remove barriers for future photovoltaic deployment. This will deliver significant economic benefits for both the wider community and utility providers, along with substantial environmental outcomes through increased use of sustainable energy sources.

This project greatly aligns with one of Australian Science and Research Priorities – Energy, and will advance power industries towards a more sustainable and resilient future.

Funding body
• ARC DECRA Scheme

Researcher
• Dr Ruifeng Yan (DECRA Fellow)

Increasing Visibility of Distribution Networks to Maximise PV Penetration Levels, ARENA Funded (2017-2019)
The Solar Enablement Initiative will provide improved visibility and understanding of electricity network performance and avoid undue restrictions being placed on the capacity of new Solar PV installations and their export into the Australian grid, thereby enabling an increase in the percentage of renewable energy connected to the grid.

Researchers
• Dr Olav Krause
• Friska (Dendi) Pambudi
• Andre Gebers
• Gian-Marco Morosini
• Ms Xiang Li

Industry Partners
• Australian Renewable Energy Agency (ARENA)
• Energy Networks Australia (ENA)
• Australian Power Institute (API)
• Energex
• UnitedEnergy
• TasNetworks
• Springfield Land Corporation
• Aurecon

This project aims to develop, implement and test an innovative state estimation algorithm for monitoring low voltage electricity distribution networks. The proposed system is an essential step to enable a range of smart network applications to manage peak network loads and increasing amounts of solar photovoltaic generation, and could defer or eliminate capital intensive network augmentations and associated customer electricity price increases.

Researchers
• Dr Olav Krause
• Professor Tapan Saha
• Professor Sebastian Lehnhoff

Industry Partners
• Ergon Energy
• Energex


Peer-to-Peer Energy Trading Schemes for Sustainable Cities, Advance Queensland Research Fellowship (2017-2020)

This project aims to address these issues by empowering individual users to participate in energy trading with each other and with the central energy supplier and increasing the flow of clean energy within the grid system. This fellowship aims to explore the technique of peer-to-peer (P2P) energy trading by managing storage devices at the different levels of the grid system and will propose scheduling mechanisms for individual users with distributed energy resources. This project will explore the potential of game theory, auction theory, and data science in designing suitable energy trading schemes with practical impacts, and propose a P2P energy trading scheme across various heterogeneous energy entities, through the novel integration of different approaches, which will also consider diverse practical constraints.

Researchers
• Dr Wayes Tushar
• Professor Tapan Saha

Industry Partner
• Redback Technologies

International Collaborators
• Princeton University, USA
• Singapore University of Technology and Design (SUTD), Singapore


This project will investigate how to effectively monitor and assess the condition of overhead conductor for an improved asset management of conductors in Australian networks. A comprehensive study will be performed to understand the conductor degradation mechanism and parameters that affects each types of degradation mechanism with the focus on the root causes of Australian conductor deterioration. A ‘health index’ method will be developed for conductor condition assessment improving the ability to predict the likelihood of conductor failure. A number of state-of-the-art conductor condition monitoring techniques will be evaluated for their suitability for Australian networks. With assistance from the industry partners, the ‘health index’ methodology and the new smart sensor based condition monitoring technique will be tested on a representative type of conductor.

Researchers
• Professor Tapan Saha
• Dr Hui Ma
• Dr Lakshitha Naranpanawwa
• Mr Colin Lee
• Mr Keith Callaghan

Industry Partners
• Energy Networks Australia (ENA)
• API Partners
Synchrophasor Measurement Data Applications for Distributed Energy Resource Connection and Distribution System Management (ARENA Project)

The aim of this project is to investigate and develop possible synchrophasor data applications to actively manage distribution networks and release more capacity for connecting renewables. This project will study the impact of renewables on the distribution grid, investigate the benefit of Synchrophasor Measurement Data for renewable integration, and develop load and DER models.

Researchers
- Professor Tapan Saha
- Dr Ruifeng Yan
- Mr David Amoateng
- Mr Manikandan Padmanaban

Industry Partners
- Noja Power
- Energy Queensland

Recently completed projects and their funding sources

- Development of Smart Power Transformers with Intelligent Monitoring, Diagnostic and Life Management Systems (ARC Linkage Project)
- Investigation of Stability and Power Quality Issues from the Wide Spread Photovoltaic Integration into Electricity Distribution Networks, (ARC Linkage Project)
- Queensland Geothermal Energy Centre of Excellence (Queensland Government)
- Evaluation of the Impact of Demand Response Program on Transmission Network Planning (TransGrid)
- Optimum Location of FACTS Devices with Advanced Control Scheme for Improving the Security of Complex Power Grid (ARC Linkage Project)
- Control Methodologies of Distributed Generation for Enhanced Network Stability and Control (CSIRO Intelligent Grid Cluster Project)
- Investigation of Key Factors Affecting Advanced Planning Tools for the Prevention of System-Wide Blackouts of Large Power Systems (ARC Discovery project)
- Emergency Control of Power Systems (ARC Discovery Project)
- Condition Assessment of Medium-Voltage XLPE-Insulated Cables Degraded by Water Treeing (ARC Linkage project)
- Innovation in Power System Asset Management (UQ VC’s Strategic Fund)
- Investigation of Demand Diversity and New Generation Entry into Electricity Market Simulation Tools (ARC Linkage Project)
- The Polarisation Based Diagnostics of Power Transformers (ARC Linkage Project)
- An Investigation of the Impacts of Increased Power Supply to the National Grid by Wind Generators on the Australian Electricity Industry (ARC Linkage Project)
The Australasian Transformer Innovation Centre

Australia’s Leading Transformer Research Centre: Filling Australia’s critical need for Transformer Innovation and Education. Collaborative initiative by Australia’s Transformer experts from research and industry. Over $1 million jointly committed and being invested to establish the centre including:

- Wilson Transformer Company donated natural ester oil filled research transformer
- Dynamic Ratings state-of-the-art on-line condition monitoring system
- Reinhausen’s latest generation tap changers and education
- University of Queensland new Long Pocket Transformer Laboratory with state-of-the-art research equipment
- Collaborative effort by UQ, QUT, UNSW and Griffith researchers

The research programme is designed to create innovations that meet the evolving needs of industry including:

- Decreasing the risk of transformer failure during normal and contingency events
- Reducing maintenance costs and extending life with improved condition monitoring.
- Investigating improved operation, performance and risks with natural esters oil
- Increasing transformer utilisation and working transformers smarter
- Investigating effects of renewable generation on transformer life and cyclic rating

Some examples of currently conducted R&D projects including:
- Optimizing network ratings for power transformers retrofilled with vegetable oil
- Development of PD Analytic Tools for Ester Fluid Filled Transformers
- Criteria for Retro filling Transformers with Ester Fluids
- Asset Management of Network Power Transformers in the Presence of High Penetrations of Solar and Wind Generation

The Centre houses:
- Research-grade power transformer donated by Wilson Transformer Company
- Sensory technology provided by Dynamic Ratings

Other commercial grade equipment to carry out testing and research include:
- Omicron DIRANA (FDS and PDC combined)
- Frequency response analysis equipment
- Partial discharge monitoring
- Ageing facilities
- Polarisation depolarisation currents and return voltage measurement
- Frequency domain spectroscopy
- Vaisala water activity measurement probes
- Fibre optic equipment to measure temperature and water content of insulation
- Thermal infrared camera for studying heating and temperature rise
The Centre offers innovation and CPD programmes purpose built for the industry’s future needs and delivered by acclaimed transformer experts. The programmes bring a total focus on best practice asset management and high performance. Member organisations will reap the benefits of this focus through reduced costs, increased asset performance, reliability and asset management breakthroughs.

Basic transformer courses will include transformer theory and applications, procurement, design, operation, maintenance and condition monitoring techniques. Advanced courses will include transformer ageing, failure analysis, specifying for requirements, dynamic loading, and condition-based maintenance. Courses will be delivered by transformer experts from universities, transformer manufacturers and transmission and distribution companies.

In these 2 day intensive courses the delegates will be given an overview on how to make the best use of their transformer assets. The course has been set up to be delivered jointly by industry and academic staff, where the delegates enjoy the best of both worlds in course relevance, depth and structure. In general, academic staff will discuss the fundamental background to the various concepts while industry staff show how to apply these concepts to real-life situations.

Some examples of delivered CPD courses including:

**Power Transformer Testing – Cradle to Grave**

(1–2 July 2019)
- Transformer Testing Standards/ Factory Acceptance Testing (FAT)
- Common FAT HV testing – How to perform and interpret the results
- Routine maintenance testing and diagnostic tests to find the faults
- Temperature rise testing and sound power tests
- Detailed study of a range of offline common electrical tests carried out on power transformers
- Field Diagnostic testing

Course was delivered by:
Ray Holzheimer (UQ), Florian Predl (OMICRON), Joe Tusek (Verico), Troy Petersen (Powerlink), Tim Macklin (Powerlink), Chandima Ekanayake (UQ)

**Power Transformer Mineral and Ester Oils**

– Analysis and Management (11–12 February 2019)
- Mineral Oils
  - Implementing Life cycle Oriented Maintenance of transformer oils
  - Getting the most from your oil laboratory provider
  - Natural and Synthetic Esters
  - Retrofitting with esters
  - Sampling/testing oils in the field, laboratory testing, interpreting the results

Course was delivered by:
Chian Yaw (Nynas Singapore), Philippe Reboul (Nynas Australia), Jayaram Baniya (Energy Q), Tony Tuong Ngo (Powerlink Queensland), Prof Tapan Saha (UQ), Ray Holzheimer (UQ), Dr Russell Martin (M&I Materials, UK), Antony Giacomini (TJH2b)
- Understand the basic principles of tap changers, including oil, vacuum
- Learn the basic arrangement of regulating windings, benefits and issues of oil and vacuum diverters
- Understand tap changer designs and applications, differences between diverter and selector type, Loading capability
- Become familiar with OLTC maintenance for oil and vacuum types
- Witness live of diverter maintenance, steps to take for high diverter moisture content
- Participate in a forum for OLTC fault investigation and supply restoration
- Understand MR & ABB retrofit options where oil diverters are replaced by vacuum
- Understand the benefits of dynamic resistance tests
- Be exposed to how some utilities are implementing life cycle oriented maintenance of tap changers
- Moisture tolerance, Life extension
- Learn about OLTC failures due to silver sulphide formation

Course was delivered by:
Dr. Thomas Smolka (Reinhausen Australia), Anders Hakansson (ABB Singapore), Rob Milledge (ABB Australia), Dr. Wenyu Guo (OMICRON), Dr. Hui Ma (UQ), Dr. Dan Russell (Energy Queensland), Mike Elms (Western Power), Ross Kempnich (Essential Energy).

Contact: transformer@itee.uq.edu.au

Power Transformer HV Bushings – Design, Maintenance and Risk Mitigation (12–13 November 2018)
- HV Bushings Design
- Bushing testing in the field
- Bushing failure statistics
- Mechanism of bushing failures
- How to detect bushing failures and carry out condition assessment using off line techniques
- Implementing Life cycle Oriented Maintenance of Bushings-Utility Experience
- How to detect bushing failures and asses the condition using online techniques
- Implementing Life cycle Oriented Maintenance of Bushings-Utility Experience

Course was delivered by a unique mix of nine industry and academic experts:
Rob Milledge (ABB Australia), Joe Tusek (Verico), Dr. Dan Martin (UQ), Prof. Tapan Saha (UQ), Dr. Hui Ma (UQ), Dr. Wenyu Guo (OMICRON), Mark Cotton (Ausnet), Brian D. Sparling (Dynamic Ratings), Bo Zou (Dynamic Ratings), Rafael Mattos (Reinhausen Australia), Mike Elms (Western Power), Carlos Santos (Western Power), Ross Kempnich (Essential Energy).
The Australasian Transformer Innovation Centre members

Industry Collaborations (present & past)
- Energy Queensland
- Australian Energy Market Operator (AEMO)
- Powerlink Queensland
- TransGrid
- AusGrid
- CS Energy
- Stanwell Corporation
- Ergon Energy
- Energex
- The Australian Power Institute
- CIGRE Australia
- Maschinenfabrik Reinhausen
- TasNetworks
- Nynasw
- Weidmann
- ActewAGL
- Wilson Transformer Company
- Aurecon
- TRUenergy Pty Ltd
- Vestas International Wind Technology A/S
- Hydro Tasmania
- United Energy
- ABB
- Essential Energy
- Maxivar
- K-Bik Power Pty. Ltd.
- Budin – Philipp Partners
- Dynamic Ratings
- Endeavour Energy
- SA Power Networks
- Siemens

University Collaborations
- University of New South Wales, Sydney, Australia
- QUT, Brisbane, Australia
- Jadavpur University, India
- IIT Kharagpur, India
- IIT Bombay, India
- Xi’an Jiaotong University, Xi’an, China
- South West Jiao Tong University, China
- Hunan University, China
- TU Dortmund University, Germany
- University of Texas at Austin, USA
- AIT, Bangkok
- University of Michigan, USA
- Griffith University, Brisbane, Australia
- SUTD, Singapore
- University of Oxford, UK
- Princeton University, USA
- IIT Delhi
Current Competitive Fellowships

ARC Future Fellow: Dr Firuz Zare
Addressing challenges for the future grids:
Harmonics standardisation. The main aim of this project is to deliver appropriate frequency standardisation to protect electricity grids and support the use of renewable energy sources. Globally, there is no harmonic standardisation within the frequency range of 2-150 kHz, which can significantly affect the reliability of electricity networks and smart grids. Electricity networks are increasingly using renewable energy sources and an efficient loads approach based on power electronics technology. However, this can affect grid reliability and robustness. The project aims to develop advanced tools to better understand the power quality issues of Australian residential, commercial and industrial distribution networks. It also aims to develop novel techniques to improve power quality and reliability of the grids, and to develop harmonics emission and immunity levels to modify the Australian standards accordingly.

ARC Discovery Early Career Researcher Award (DECRA) Fellow: Dr Ruifeng Yan
Present electricity supply models are based on centralized and fossil-fuel-based supply, with very high cost and poor environmental sustainability. This project aims to address these issues by empowering individual users to participate in energy trading with each other and with the central energy supplier, and increasing the flow of clean energy within the grid system. This fellowship closely works with Redback Operations Pty Ltd to explore the technique of peer-to-peer (P2P) energy trading by managing storage devices at the different levels of the grid system and will propose scheduling mechanisms for individual users with distributed energy resources. However, P2P trading involves energy management across various heterogeneous entities with different properties and energy objectives. Hence, this project will explore the potential of game theory, auction theory, and data science in designing suitable energy trading schemes with practical impacts, and propose a P2P energy trading scheme across various heterogeneous energy entities, through novel integration of different approaches, which will also consider diverse practical constraints.

Advance Queensland Early Career Fellow: Dr Wayes Tushar
Enabling high photovoltaic penetration in power distribution networks. This project aims to develop a novel hybrid control method for power distribution grid network voltage regulation with high photovoltaic penetration. The outcome of this project will enable power utilities to cost-effectively regulate network voltage and ultimately remove barriers for future photovoltaic deployment. This will deliver significant economic benefits for both the wider community and utility providers, along with substantial environmental outcomes through increased use of sustainable energy sources.

Advance Queensland Early Career Fellow: Dr Feifei Bai
With more solar photovoltaic integration into distribution networks, there has been an acceleration in electrical equipment ageing. This project aims to provide a cost-effective way to monitor and predict equipment conditions by leveraging big data measured via partner NOJA Power high-precision Distribution Phasor Measurement Units. This project will provide an online early-warning system to prevent impending failures. The outcome will deliver an innovative condition monitoring tool, which will strengthen the reliability of Queensland distribution networks.
Teaching and Learning

The Power and Energy Systems group is actively involved in teaching in undergraduate and postgraduate engineering programs.

Coursework

Academics contribute specialist courses in power systems and broad power engineering areas of electrical engineering based specialisations.

- ELEC3300 Energy Conversion & Utilisation
- ELEC4300 Power Systems Analysis
- ELEC4302 Power Systems Protection
- ELEC4400 Power Electronics
- ELEC4320 Asset Management & Condition Monitoring
- ELEC7309 Power System Planning and Reliability
- ELEC7310 Electricity Market Operation and Security
- ELEC7313 Renewable Energy Integration: Technologies to Technical Challenges
- ELEC7051 Transformer Technology Design & Operation

Further information can be obtained from www.itee.uq.edu.au/future-students

Some recent winners of ES Cornwall Scholarships:
- Christopher Du Plessis from AEMO
- Tara-Lee MacArthur from Ergon Energy
- Alexandra Price from Energex

Scholarships

API Bursaries

The UQ Power and Energy Systems group is one of the founding university partners of the API’s Undergraduate Bursary Awards Program. This is a collaborative program between the API, universities and industry that has supported hundreds of outstanding power engineering undergraduates during their university course encouraging them to study and pursue subjects to pursue a career in the power engineering industry.

api.edu.au/bursary

ES Cornwall Scholarships

The UQ Power and Engineering group is also proud to fund and manage the ES Cornwall Memorial Scholarship, which for more than 55 years has underpinned the early career development of aspiring industry engineers through supporting and mentoring their overseas employment in the electric power industry.

$3,500 per month for up to 18 months.

escornwall.com.au

Engineers Australia Queensland Electrical Branch Medal

This is awarded annually to a UQ student with a medal and $500 from the EESA. Recipients are assessed based on GPA, involvement in Power Engineering courses and thesis submission.

www.engineersaustralia.org.au

UQ Graduate School Postgraduate Scholarships for Higher Degree Research

The UQ Graduate School offers a number of scholarship opportunities that provide financial support for tuition fees, living costs and travel to enable research candidates to focus on their research and achieve the best results.

Further details about the scholarships can be viewed at www.uq.edu.au/grad-school

UQ PhD and MPhil Scholarship information can be obtained from the link graduate-school.uq.edu.au/scholarships
National and International Collaborations

The Power and Energy Systems research group has strong links with the local electricity industry and active research collaborations with a number of national and international universities.

Professional activities
(IEEE, Engineers Australia & CIGRE)

The Power and Energy Systems group is an active contributor to the world’s leading technical forums for the electric power industry. This includes:

- CIGRE, the world’s leading technical association for large electric power systems, covering 90 countries.
- IEEE and IEEE Power & Energy Systems Society – with more than 426,000 IEEE members in more than 160 countries
- Engineers Australia - national forum for the advancement of engineering and the professional development of members.

Professor Saha is an Australian CIGRE Panel member of A2 Transformer and D1 Materials and Emerging Test Techniques. PES research group academics regularly publish papers at the CIGRE biennial Paris Sessions. Dr. Olav Krause is a member of C6.

The group is a strong supporter of the Queensland Chapter of IEEE-PES with a number of members serving on the Queensland Committee and many technical papers published at IEEE-PES international conferences. Professor Saha is the current Chair of IEEE PEs Chapter and has served the IEEE Queensland Section as Chair for two terms.

Dr Chandima Ekanayake is the current IEEE PES Qld SEction Vice Chair and UQ Students Branch Counsellor.

Group members are also active contributors to Engineers Australia. Professor Saha is the current Board Member of Electrical College of Engineers Australia and has been serving the Queensland Electrical Branch for many years. He is also an Editorial Board Member of AJEEE Journal published by Engineers Australia.

Redback Technologies

One of the UQ Power and Energy System group’s latest industry partner is Redback Technologies Pty Ltd, a new Start-Up company that is developing and supplying innovative and intelligent inverters “with a difference” for household PV systems. Redback System provides intelligent technology that gives the power to store, monitor and manage home’s solar energy. We have been working with Redback and other Industry partners to Plan a Ground breaking development that will enable households to compete with traditional higher cost Supply-side solutions to power system Security needs and wholesale Markets. Our group is working with Redback in a $4 million Advance Queensland Platform Technology Program project that will lead to the development of a smart energy monitoring platform that will give customers the ability to instantly analyse and control energy consumption. Redback managing director Philip Livingston said the smart power monitoring platform would enable home owners and businesses to understand and control their energy usage and will help networks to more efficiently manage the grid, allowing for increased penetration of renewables. The UQ research team is working on the project in collaboration with industry partners including Redback Technologies, Energy Queensland and Springfield City Group. UQ Power and Energy Systems Group Leader Professor Tapan Saha said the platform would bring enormous benefit to customers managing their own energy consumption: “This will help to increase penetration of renewables in to the grid and tackle some of the key energy challenges the industry is facing.”

Researchers

- Professor Neil Horrocks
- Professor Tapan Saha
- Dr Ruifeng Yan
- Dr Rahul Sharma
- Dr Yi Cui
- 2 PhD students
Transformers
The power transformer condition monitoring group has been supported by the Australasian Transformer Innovation Centre. The Centre is supported by many utilities, national and international manufacturers and universities. Current centre members include Wilson Transformer, The Australian Power Institute, CIGRE Australia, Reinhaurauen, United Energy, Dynamic Ratings, SA Power Networks, Powerlink, TasNetworks, Essential Energy, MAXIVAR, K-BIK Power, Energy Queensland, NYNAS, WIEDMANN, ABB, Transmission & Distribution Publisher, Budin-Phillipp Partners and ETEL Transformers. Current ARC research projects are supported by utilities AusGrid, Energex, Ergon Energy, Powerlink Queensland and TransGrid, and by the Wilson Transformer Company.

The group focuses on developing the technologies required by the industry to optimise the management of their transformer fleet. This is becoming even more important since the industry is under pressure to reduce costs.

The recent successes of the group include: delivering software to the utilities which estimate the life remaining of transformer insulation (and therefore of the whole transformer), and providing a holistic monitoring system which uses algorithms developed from the research. So far, the group’s software is currently in use with the utilities, where their feedback is invaluable in determining future direction.

UQ Supporting the Australian Power Institute (API)
The API is an Australian National Organisation, strongly supported by the Australian Power Industry and committed to working collaboratively with Australian Power Engineering Universities to ensure that the Power industry has access to the required quantities of power engineering graduates with the necessary engineering skills to meet industry’s needs now and into the future.

The API, together with the University of Queensland and Powerlink Queensland, established the API/Powerlink Australian Chair in Electricity Transmission at the University of Queensland, which ended in 2017.

UQ’s Power Energy Systems group has been selected as one of the most qualified and experienced universities in Australia to support API and the power industry in the development of research projects nominated by API and industry.

AURTRA: Power & Energy Systems Commercialisation
Based on 25 years of transformer research, some IPs were licenced to AURTRA, which is now commercialising their hardware and software technology for asset management in the Power distribution industry.

AURTRA was incorporated in 2016 and has built its IP upon a foundation of technology from the University of Queensland.

More information can be obtained from www.aurtra.net.
Facilities

The teaching and research in power and energy systems is supported by sophisticated laboratory facilities.

Renewable Energy Laboratory
The Power and Energy Systems group has developed a state of the art renewable energy laboratory with funding from AGL Solar Flagship Education Infrastructure Fund.

The lab is equipped with modern renewable energy research facilities including:

- Two Real Time Digital Simulator racks
- Power Amplifiers
- Solar Emulator
- STATCOM
- Battery Storage
- Battery simulator
- Wind turbine control setup (With dSPACE)
- Most commercial power systems analytical tools

Power Systems & Power Quality Laboratory
The power system simulation laboratory has analytical software tools to simulate, plan, design and control complex interconnected power systems with state of the art solutions.

The analytical tools available at PSS-L can solve power system problems in wide range of time frames, from micro seconds to steady state and study impact of renewable energy integration, Custom Power devices, etc. Some of the software tools available at the PSS-L are listed below.

Apart from the above tools, the powerful server located at the PSS-L carries a number of test power systems, both at transmission and distribution level typically used for research in power and energy system research.

- PSS/E
- DSAT tools
- PowerWorld
- DigSILENT Power Factory
- PSCAD/EMTDC
- SINCAL
Machines Laboratory
UQ has developed the Machines Laboratory as an online laboratory – in which real laboratory experiments can be accessed through the Internet using the MIT’s iLab environment.

This laboratory has a number of conventional laboratory experiments (Transformer & AC circuits) and a number of online machines experiments (AC, DC and Synchronous machines) using iLabs, which can be shared across university or across the world.

The iLabs vision is to share expensive equipment and educational materials associated with lab experiments as broadly as possible within higher education and beyond.

This is the only online machines laboratory in the country and is jointly funded by the Australian Power Institute and the University of Queensland.

Intelligent Plant Diagnostics Laboratory
A well-equipped insulation diagnostics laboratory, which is very actively used for insulation degradation and over-stress measurements.

This lab includes a lightning impulse voltage generator, single and multiple impulse current generators, 300kV AC transformer system, Recovery Voltage and Polarisation / Depolarisation current measurement system, frequency domain dielectric spectroscopy equipment with HV variable frequency power supply, Partial Discharge Measurement System, thermal imaging camera and Frequency Response Analyser.

Intelligent Plant Diagnostic laboratory has a special accelerated ageing experimental facility at Long Pocket. This laboratory is suitable for long term ageing experiments under controlled moisture and temperature for transformers and other insulation materials.

Solar PV demonstration system
A PV demonstration setup consists of PV array and troubleshooting system. The system provides hands-on skills and troubleshooting ability across the types of PV systems commonly used such as standalone and grid-connected. It is used for teaching connection, operation, programming, and troubleshooting of AC/DC and grid-connected PV systems.

The PV array has capability of connecting PV panels in series and parallel.

This system contains a mobile workstation, component panels with breakers, combiner box, MPPT charge controller, lamps, batteries, meters, grid-connected inverter, a fault insertion system. The system can be used to show the different effects (shading, angle tracking, heating and cooling of panels) on the PV power output.

The PV demo system is used for teaching and demonstrating the connections, operation and troubleshooting. Specially, students or researchers can gain practical knowledge to get the further exposure in PV system.

Intelligent Plant Diagnostic laboratory has a special accelerated ageing experimental facility at Long Pocket. This laboratory is suitable for long term ageing experiments under controlled moisture and temperature for transformers and other insulation materials.
Professor Tapan Saha: Current Editorial roles, keynote presentations and IEEE Distinguished Lectures:

- Editorial Board Member of the IEEE Transactions on Power Delivery
- Editorial Board Member of the IEEE Transactions on Sustainable Energy
- Associate Editor, Australian Journal of Electrical and Electronics Engineering
- Associate Editor, IEEE Transactions on Dielectric and Electric Insulation

Keynote Presentations and Distinguished Lectures:

- 2018 10th International Conference on Electrical and Computer Engineering (ICECE), BUET Dhaka Bangladesh: Keynote Speech
- International Conference on Energy and Power Engineering (ICEPE) 2019, BRAC University, March 2019, Plenary Session speaker
- IEEE PES Innovative Smart Grid Technologies (ISGT) Asia 2019, Chengdu, China May 2019: Keynote Speaker

IEEE Distinguished Lectures:

- IEEE PES Bangladesh Chapter: Ahsanullah University of Engineering and Technology, Dhaka, December 2018
- IEEE PES Bangladesh Chapter: BRAC University, Dhaka Bangladesh, December 2018
- IEEE PES Malaysia Chapter April 2019
- University of Malaya April 2019
- University of Melbourne July 2019

Professor Tapan Saha receives IEEE Fellowship

Professor Tapan Saha has been named a 2019 Fellow of the Institute of Electrical and Electronics Engineers (IEEE). Professor Saha was the only person in Queensland to receive the IEEE Fellowship in 2019, which recognised his contribution to the monitoring and assessment of power transformers.

Prof Saha was delighted to see the highest recognition of his research impact and industry contribution from the largest and most prestigious professional organisation in his area of research.

Professor Saha has been a Professor of Electrical Engineering since 2005 and has published more than 500 papers in journals and peer reviewed conferences. “I have been very fortunate to work with many bright minds including my current and past HDR students and more than 20 Post-Doctoral fellows. “In reality, this achievement has only been possible due to their combined contributions in my academic career” Prof Saha said.

Professor Saha is recognised as an international expert in condition monitoring of transformers and is well known internationally by practicing utility engineers, manufacturers and in academia. In recent years, he has further diversified his research into the challenges of solar PV integration to electricity grids. “UQ has provided me an outstanding teaching and research environment and support, where I have been able to build the largest and strongest power and energy systems research group in the country,” he said.

“As a Fellow, I hope to continue providing excellent teaching and research in electrical engineering, in particular tackle the challenging issues of renewable energy integration to the electricity grid and ageing assets,” he said.

Snapshot of Professor Tapan Saha’s activities in the last year

2. Visited UCSI University in Malaysia to attend their graduation ceremony as a distinguished guest.
3. Visited IIT Delhi as a UQ delegate to launch the joint PhD program between UQ and IIT Delhi and establishment of IITDAR. Also delivered a seminar on the first inaugural energy workshop.
4. Visited James Cook University of North Queensland to deliver Peter Arlett memorial lecture.
5. Visited Dhaka Bangladesh and delivered a keynote/plenary lecture in ICECE 2018. Also delivered Two IEEE PES Distinguished Lectures at BRAC university and Ahsanullah University of science and technology.
6. Visited Dhaka Bangladesh in March 2019 to attend ICEPE 2019 and organised two plenary sessions and chaired 2 sessions.
7. Visited Beijing, China to deliver one keynote and one Beijing Jiao Tong special session lectures at an international conference. Also visited the Tsinghua University and delivered an IEEE PES Distinguished lecture at the department of electrical engineering.
8. Visited University of Malaya to review the department of electrical engineering teaching:curriculum, research and external engagement. Also delivered a research seminar at the department of electrical engineering, university of Malaya for HDR students and staff. Delivered an IEEE PES Distinguished lecture at the IEEE Malaysia Chapter of PES.
9. Delivered a keynote speech at the Innovative Smart Grid Technologies Asia 2019 Conference at Chengdu, China which was attended by more than 800 delegates.
10. Visited Southwest Jiaotong University (SWUTU) and delivered a research seminar to 100+ HDR students and staff.
Current Research Higher Degree Students (Full-time)

Mr Ahmad Abdullah
Mr Umer Akram
Mr Abdulrahman Alduraibi
Mr Davood Solati Alkaran
Abdulrhman Alshareef
Mr Saeed Alzahrani
Mr David Amoateng
Mr Md Abdul Hafeez Ansari
Mr Gawasingha Aravinda
Mr Emad Areed
Mr Imran Azim
Mr Anupam Dixit
Mr Amir Ganjavi
Ms Indira Alcaide-Godinez
Mr Huajie Gu
Mr Mohammad Habibullah
Mr Md Monirul Islam
Mr Md Naz Niamul Islam
Mr Kiarash Gharani Khajeh
Ms Xiang Li
Mr Yu Luo
Mr Muhammad Muneer
Mr Manikandan Padmanaban
Mr Jakob Pallot
Mr Muhammad Qamar Raza
Mr Sameera Samarasinghe
Mr Herlambang Setiadi
Mr Ebby Thomas
Ms Nimisha Upadhayay
Mr Lei You
Mr Ruiyuan Zhang
Mr Xia Zhong
Mr Xin Zhong
Mr Aobo Zhou

Recent Awards

Power and Energy Systems – RHD students

- IEEE PES Travel Award 2019: Md Abdul Hafeez Ansari, Sameera Samarasinghe, Imran Azim
- UQ Graduate School Candidate Development Award 2019: Md Abdul Hafeez Ansari
- IEEE PES QLD chapter travel prize 2018: Huajie Gu, Junhyuck Seo
- UQ Graduate School Candidature Travel Award 2018: Md Monirul Islam
- EAIT Postgraduate Engineering Conference 2018: Aobo Zhou
- Best Poster Award in EECON 2018: Amit Dhoke
- IEEE International Conference on Applied System Innovation held on May 13-17, 2017: Herlambang Setiadi
- Best Poster Award in ISGT Asia 2017: Amit Dhoke
- IEEE Student Travel Award for ISGT 2017: Amit Dhoke
- 3rd Best Paper Award in AUPEC 2017: Ebby Thomas, Rahul Sharma and Yoni Nazarathy
- IEEE Power & Energy Society General Meeting 2017 Travel Award: Md Qamar Raza
- CSIRO Top-up Scholarship: Md Qamar Raza
- Dean's Award for Outstanding Higher Degree by Research Theses – Dr Yi Cui
- EAIT Postgraduate Engineering Conference 2017: Md Hafeez Ansari, Lakshitha Wanisekara Naranpanawe, Junainah Sardi, Juliana Nunes, Asif Islam
- Graduate School International Travel Award (GSITA): Amit Dhoke, Shohana Deeba, Lakshitha Wanisekara Naranpanawe

Current Research Higher Degree Students (Part-time)

Mr Hashemi Ford
Mr Shanker Lamichhane
Mr Saeid Veysi Raygani
Research Higher Degree students

Mr Ahmad Abdullah
Harmonics and Power Quality Analysis, Modelling and Measuring of Low Voltage Grids

Mr Mohsen Ahmadi
Design of an Intelligent Charging Station for Electric Vehicles and Evaluating its Effects on Maintaining the Stability, Voltage Profile and Power Quality of the Distribution Network

Mr Umer Akram
Frequency and voltage regulation using hybrid energy storage system

Mr Abdulrahman Alduraibi
How would modern power converters improve energy efficiency of grids

Mr Davood Solati Alkaran
Optimal Operation and Control of Active Front End systems, Smart Microgrids and Grids

Mr Saeed Alzahrani
Stability Performance of Power System In Present of Large-Scale Photovoltaic Power Plants

Mr David Amoateng
Synchrophasor Data Analytics Applications for Smart Grid Distribution Systems

Mr Md Abdul Hafeez Ansari
Fibre Optics Based Condition Monitoring of Transformer Insulation

Mr Gawasingha Aravinda
Deterioration of High Voltage Cables, Terminations and joints Under High-Frequency Voltage Components

Mr Emad Areed
The combined effects of PV and wind turbines penetration on the power system behaviour

Mr Imran Azim
100% Renewable Powered Autonomous Microgrids Integrated with Battery Storage

Mr Amir Ganjavi
Dynamic stability and control of power electronic systems, power converters (DC-DC converter, Inverter, Rectifier), and electromagnetic interference (EMI)

Ms Indira Alcaide-Godinez
Wind Turbine and Solar PV Inertial Control to support Frequency Response in a High Renewable Energy Penetration Power System

Mr Huajie Gu
Optimal energy management in smart grids with renewables

Mr Mohammad Habibullah
DC Microgrid: Stability, Power Quality & Fault Analysis

Mr Md Monirul Islam
Power system stability assessment with high penetration of PV generation integrated with transformerless inverter
Mr Kiarash Gharani Khajeh
Stability analysis of grid-connected inverters to mitigate the high frequency harmonics in the range of 2 to 9 KHz due to grid impedance variation

Ms Xiang Li
Load Modeling in State Estimation for Distribution System

Mr Yu Luo
Wind farm integration via VSC-HVDC

Mr Muhammad Muneer
Transformer condition Monitoring using vibration patterns

Mr Manikandan Padmanaban
Remote monitoring of distribution transformers

Mr Md Naz Niamul Islam
Hierarchical Capacity Constrained State Optimization of Distribution System

Mr Sameera Samarasinghe
Preventing transformer failures by silver sulphide corrosion

Mr Hermalbang Setiadi
Coordinated Control of BES and PSS for Small Signal Stability Enhancement in Power System with High Penetration of RE

Mr Ebby Thomas
Stochastic optimisation of demand side management

Ms Nimisha Udadhayay
The combined effects of PV and wind turbines penetration on the power system behaviour

Mr Lei You
Power System Operation and Planning Considering Renewable Energy Integration

Mr Ruiyuan Zhang
Energy Smart Management based on Advanced Data Analysis

Mr Aobo Zhou
Comprehensive analysis on renewable energy management and Demand Response (DR) in the micro-grid