

POWER ⚡ AUGUST

Virtual Seminar Series



August .6 Fri
2pm-3pm (Taiwan Time)

Photovoltaic Systems as Virtual Energy Storage for Frequency Support



Speaker: Dr. Yongheng Yang
Zhejiang University, China

Please register →

August .11 Wed
3pm-4pm (Taiwan Time)

A SmartPV Roof Tile and Non-Planar Photovoltaic Systems



Speaker: Dr. Robert Balog
Texas A&M University, College Station, TX, USA
Texas A&M University at Qatar

August .19 Thu
2pm-3pm (Taiwan Time)

Transport Electrification and Renewable Energy Conversions – a push in the right direction (for the advancement of Electric Machines and Drives)



Speaker: Dr. Rukmi Dutta
University of New South Wales,
Sydney, Australia

August .24 Tue
1pm-2pm (Taiwan Time)

Semiconductor DC breaker using SiC power devices for low-voltage applications



Speaker: Dr. Keiji Wada
Tokyo Metropolitan University, Japan

POWER AUGUST

Virtual Seminar Series

Photovoltaic Systems as Virtual Energy Storage for Frequency Support

The still increasing penetration of renewable energy systems challenges the stability of the grid. Accordingly, towards the integration of more electronics- or inverter-based renewable generation systems, including photovoltaic (PV) systems, many advanced grid supportive functions have been developed. In recent years, relevant and stringent requirements have been released to guide the integration of solar PV systems. Such inverter-based systems have a distinct difference, i.e., low inertia or non-inertia systems, compared to the conventional synchronous generators, potentially leading to frequency instabilities. To tackle the frequency stability issue, many efforts, e.g., by means of like virtual synchronous generator control and the integration of energy storage, have been made in recent years. Among those, a flexible active power control scheme is gaining much attention, when compared with the integration of energy storage. In this talk, the active power control strategies for PV systems will be briefly reviewed, and then, the focus will be put on the power reserve control for PV systems. This enables the PV systems to operate as virtual energy storage units that can flexibly and cost-effectively provide grid frequency support, enhancing the grid integration of PV systems.



Date : August 6, Friday
Time : 2pm-3pm (Taiwan Time)

Speaker : Dr. Yongheng Yang
Zhejiang University, China

Yongheng Yang (SM17) received the B.Eng. degree in Electrical Engineering and Automation from Northwestern Polytechnical University, China, in 2009 and the Ph.D. degree in Energy Technology from Aalborg University, Denmark, in 2014. He was a postgraduate student with Southeast University, China, from 2009 to 2011. In 2013, he spent three months as a Visiting Scholar at Texas A&M University, USA. Since 2014, he has been with the Department of Energy Technology, Aalborg University, where he became a tenured Associate Professor in 2018. In January 2021, he joined Zhejiang University, China, where he is now a ZJU100 Young Professor at the Institute of Power Electronics.

Dr. Yang was the Chair of the IEEE Denmark Section (2019-2020). Currently, he is the secretary for the Technical Committee of Sustainable Energy Systems (TC5) of the IEEE Power Electronics Society (PELS). He is an Associate Editor for several IEEE Transactions/Journals and a Deputy Editor of the IET Renewable Power Generation for Solar Photovoltaic Systems. He received the 2018 IET Renewable Power Generation Premium Award and was an Outstanding Reviewer for the IEEE TRANSACTIONS ON POWER ELECTRONICS in 2018. In addition, he has received two IEEE Best Paper Awards. He is the recipient of the 2021 IEEE Richard M. Bass Outstanding Young Power Electronics Award. His current research is to develop innovative power converters with advanced control for reliable, stable and electronics-based grids.

Seminar Chair: Prof. Yu-Chen Liu, National I-Lan University



A SmartPV Roof Tile and Non-Planar Photovoltaic Systems

With the latest advances in photovoltaic material science technology, solar cells can now be curved, conformal coated, and even painted onto arbitrary surface geometries. This facilitates a paradigm shift from the traditional, building-applied, rigid planar modules to non-planar, structurally-integrated photovoltaic systems. PV arrays on curved surfaces enable new concepts for PV applications but also present new challenges for balance-of-system components, electrical interconnections, and power conditioning electronics. Non-uniform insolation across the PV surface complicates maximum power point tracking, which is well-known for planar PV but more complicated when the non-planar morphology inherently introduce the partial shading and thermal variations. Yet, these non-planar surfaces offer opportunities to increase energy harvest and shape the time-of-day generation profile, all while creating an architecturally appealing – even invisible – energy system. This talk will include results from a recent research project which investigated a smart solar roof tile in the form-factor of the traditional terracotta roof tile.



Date : August 11, Wednesday
Time : 3pm-4pm (Taiwan Time)

Speaker : Dr. Robert Balog

Texas A&M University, College Station, TX, USA
Texas A&M University at Qatar

Robert S. Balog received the B.S. degree in electrical engineering from Rutgers, The State University of New Jersey, New Brunswick, NJ, USA in 1996, and the M.S. and Ph.D. degrees in electrical engineering from the University of Illinois at Urbana-Champaign, Urbana, IL, USA, in 2002 and 2006, respectively. He joined Texas A&M University, College Station, TX, USA, in 2009 where he is currently a tenured full Professor in the Department of Electrical and Computer Engineering, Director of the Renewable Energy and Advanced Power Electronics Research Laboratory (www.REAPERlab.com), and co-director of the National Science Foundation Industry/University Cooperative Research Center on Next Generation Photovoltaics. He also holds a joint faculty appointment with Texas A&M University at Qatar, where he is currently in-residence, and a courtesy joint appointment in the Department of Multidisciplinary Engineering in College Station campus. Prior to joining A&M, from 1996 to 1999 he was an Engineer with Lutron Electronics, Coopersburg, PA, USA where he developed lighting controls and systems. From 2005 to 2006, he was a Research Consultant with the U.S. Army Corp of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory, Champaign, IL, USA where he was involved in researching concepts for military microgrids. From 2006 to 2009, he was a Senior Engineer at SolarBridge Technologies, Champaign, IL, USA where he was a co-inventor and lead the technical development team for a module-integrated microinverter he developed while a graduate student at the University of Illinois. As a non-equity technology founder, he invented the original technologies, directed the initial engineering team, and was part of the executive team that secured the \$6 million Round A funding from a Tier I venture capital firm. His current research interests include power electronic converters and balance-of-systems technologies for solar photovoltaic energy, microinverters for ac photovoltaic modules, arc fault detection for dc and photovoltaic systems, highly reliable electrical power and energy systems including dc microgrids, and power electronics at the grid edge including reactive power and harmonic power compensation in distribution systems.

Dr. Balog is a Registered Professional Engineer in the states of Illinois and Texas. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) where he is currently serving as a Distinguished Lecturer for the Power Electronics Society (PELS) and co-Chair of the Mentorship Committee. He has previously served as an elected Member-at-Large of the Administrative Committee, chair of the Membership committee, and inaugural chair of the Graduates of the Last Decade committee (now called Young Professionals). He was the Technical Program Chair for the 2016 IEEE Energy Conversion Congress and Exposition which is internationally recognized as one of the two flagship conferences on power electronics. He received the inaugural IEEE Joseph J. Suozzi INTELEC Fellowship in 2001 for his work on power electronics in telecommunications systems. Has been a member of Eta Kappa Nu, Sigma Xi, National Society of Professional Engineers, American Solar Energy Society, and Solar Electric Power Association. He was recognized as an external member of the Hungarian Academy of Science in 2011 and was the recipient of the 2011 Rutgers College of Engineering Distinguished Engineer Award. Dr. Balog is an inventor on 20 issued U.S. patents and received a 2017 Texas A&M System Technology Commercialization Patent Award. He has published nearly 200 peer-reviewed conference and journal papers, is co-author of the book "Microgrids and other Local Area Power and Energy Systems" published by Cambridge University Press in 2016 and has written multiple book chapters. His h-index is 43 and has been cited over 6,800 times in the scientific literature.

Seminar Chair: Katherine A. Kim, National Taiwan University



POWER AUGUST

Virtual Seminar Series

Transport Electrification and Renewable Energy Conversions – a push in the right direction (for the advancement of Electric Machines and Drives)

Sustainable industrial growth with due consideration to the environment is the driving force behind several emerging trends in the industrial world. Among these trends, electrification of transport and renewable energy conversions are at the forefront. Many of these emerging applications have highly demanding performance criteria for electric machines and drive systems. Such demanding criteria are driving the recent advancements in the field of electric machines and drives. This talk will discuss the advancements and the novel solutions that are being proposed in the field of electric machines and drive systems giving particular focus to the permanent magnet motor and drive technologies.



Date : August 19, Thursday
Time : 2pm-3pm (Taiwan Time)

Speaker : Dr. Rukmi Dutta

University of New South Wales, Sydney, Australia

Rukmi Dutta has received the PhD degree in Electrical Engineering from the UNSW Sydney, Australia, 2007 and the Bachelors of Engineering degree also in Electrical Engineering from Assam Engineering College of Guwahati University, India, 1996. Currently, she is an Associate Professor at UNSW, Sydney, Australia. Before joining UNSW, she worked as an Electrical Engineer at CMG Pty Ltd (now Regal Beloit Australia), as a Research Associate at the Institute of Industrial Science (IIS) of Tokyo University, Japan and as an Assistant Manager at Reliance Industry Ltd, India. Her research interests are the Design and Control of Permanent Magnet Machines, Electrical Drive Systems, Renewable Energy generation and distribution.

Seminar Chair: Katherine A. Kim, National Taiwan University



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POWER AUGUST

Virtual Seminar Series

Semiconductor DC breaker using SiC power devices for low-voltage applications

Recently, research and developments discuss about DC power distribution systems. In order to ensure the reliability of the system, it is essential to install circuit breakers. In general, mechanical circuit breakers have been used, but they have disadvantages such as limited interruption frequency and slow interruption time. Due to improve these issues, circuit breakers that use only semiconductors have been proposed. In this presentation, the feasibility study of the semiconductor circuit breaker will be introduced.



Date : August 24, Tuesday
Time : 1pm-2pm (Taiwan Time)

Speaker : Dr. Keiji Wada
Tokyo Metropolitan University, Japan

Keiji Wada received a Ph.D. degree in electrical engineering from Okayama University, Japan, in 2000. From 2000 to 2006, he was an Assistant Professor with Tokyo Metropolitan University and the Tokyo Institute of Technology. He became an Associate Professor in 2006 and a Professor in 2021 with Tokyo Metropolitan University. His current research interests include gate-drive circuits, electromagnetic interference filters, and a power converter circuit. He is a senior member of IEEJ and IEEE.

Seminar Chair: Yu-Shan Cheng, National Taiwan Ocean University

