

**Panel Title: Distributed Control for Power Distribution Systems**

**Panel Organizer: Dr. Christopher S. Edrington, Warren H. Owen Distinguished Professor of Electrical and Computer Engineering, Clemson University, USA**

**When: Wednesday, March 11<sup>th</sup>, 2020 - 1.15 pm – 3.30 pm**

**Where: Bellsouth Auditorium**

**Abstract:**

Public policies and mandates, concerns associated with global climate change, as well as rising interest by public and private sectors have significantly increased the interest and focus on integration of renewable resources, decentralization, and transportation electrification. In addition, it is clear that the integration of new sources of energy have operational risk associated with them due to their intermittency and variability. Moreover, the desire to fulfill the vision of a smart grid is one in which resiliency is a major impact factor. This special session will focus on how distributed control strategies and methodologies can be leveraged to provide solutions to the aforementioned problems and associated goals.

Presentations for this panel session focus on distributed control, distributed optimization and management of smart grids. In particular solutions that are directly applicable to both islanded and non-islanded microgrid structures and power system distribution, where there is significant penetration of EV, PV, and/or other DER, are discussed.

**Panelist:**

**Presentation title: Optimal Energy Management in Hybrid AC-DC Microgrids Based on a Hybrid MCSA-ADMM Algorithm**

**Behnaz Papari, Robert Cox, and Huu Phuong Hoang, UNC-Charlotte and Clemson University, USA**



Behnaz Papari (S'11) received the Ph.D. degree in electrical and electronics engineering from Florida State University, USA in 2018. She is currently an Assistant Professor in Power Electronics & Engineering, and manager of the Duke Energy Smart Grid Lab. She is associated with the Energy Production and Infrastructure Center. She has expertise in power systems with an emphasis on modeling, analysis, control, planning, and optimization. Her specialties are distributed controls and decision analysis under uncertainty, applications on energy system modeling, and Stochastic optimization. Her research interests include renewable energy sources, power and energy management, control of stand-alone and utility-interactive energy systems, distributed control of smart grids, stochastic analysis, and real-time power distribution system simulation and hardware-in-the-loop instantiation.



Phuong H. Hoang is a Ph.D. student in The Holcombe Department of Electrical and Computer Engineering-Clemson University. Prior to joining Clemson University, he worked one year in the Center for Advanced Power Systems-Florida State University as Graduate Research Assistant and was advanced to doctoral candidacy at the university. He got an MS degree in Mechanical Engineering at Gwangju Institute of Science and Technology-South Korea where he worked in the topic of distributed optimization and control for energy networks.

**Presentation title: Plug-n-Play Alternating Projection Algorithm for Large-scale Security Constraint Optimal Power Flow**

**Tuyen Vu; Clarkson University, USA**



Tuyen Vu received his B.S. in electrical engineering from Hanoi University of Science Technology, Vietnam in 2012, and his Ph.D. in electrical engineering from Florida State University in 2016. From 2016 to 2017, he was a postdoctoral research associate at the Florida State University-Center for Advanced Power Systems. From 2017 to 2018, he was a Research Faculty at the same research center. Since July 2018, he has been an Assistant Professor at Clarkson University. His areas of interest include smart grid; power system dynamics, stability, and control; energy management and optimization; power systems cybersecurity, and integration of distributed energy resources.

**Presentation title: Decentralized operation of resource constrained microgrids – Simulation of large scale multi-agent framework using OPAL-RT**

**Sanaz Paran, Georgia Institute of Technology, USA**



Sanaz Paran received the B.S. degree from Shiraz University, Shiraz, Iran, in 2009, and the M.S. and Ph.D. degrees from Florida State University, Tallahassee, FL, USA, in 2013 and 2016, respectively, all in electrical engineering. She was a Graduate Research Assistant in Center for Advanced Power Systems, Florida State University, Tallahassee from 2011 to 2016. She is currently a Post-Doctoral Fellow with the Center for Distributed Energy, Georgia Institute of Technology, since September 2018. Her research interests include power hardware-in-the-loop applications, applied power electronics, intelligent control of distributed energy resources, and automotive and adaptive energy/power management for ac and dc microgrids.

**Presentation title : Distributed Constrained Optimization Over Networked Systems Via Singular Perturbation Method and Application to Economic Dispatch**

**Phuong H. Hoang, Gokhan Okzan, Behnaz Papari, and Chris S. Edrington, Clemson University, Florida State University, and UNC-Charlotte**



Christopher S. Edrington received his BS in Engineering from Arkansas State University in 1999 and his MS and PhD in Electrical Engineering from the Missouri University of Science and Technology in 2001 and 2004, respectively, where he was both a DoE GAANN Fellow, NSF IGERT Fellow and Grainger Foundation Fellow. He currently is the Warren H. Owen Distinguished Professor of Electrical and Computer Engineering at Clemson University and is the lead for the Energy Conversion and Integration group. His research interests include modeling, simulation, and control of electromechanical drive systems; applied power electronics; distributed control; integration of renewable energy, storage, and pulse power loads. Dr. Edrington has published over 170 papers (including 2 IEEE Prize Awards), has graduated 23 MS students and 16 PhD students (with 4 in process) and has 6 patents (in real-time stability and complexity metrics).

**Presentation Title: Real-Time Analysis of a Multi-Agent-Based Distributed Control Strategy for Islanded AC Microgrids**

**Ali Jafarian Abianeh and Farzad Ferdowsi; University of Louisiana – Lafayette**



Farzad Ferdowsi is an Assistant Professor in the Electrical & Computer Engineering Department of University of Louisiana. Prior to joining UL, he was as a Post-Doctoral Fellow and lecturer at Louisiana State University from 2017 to 2018. During his post-doc career at LSU, he was actively involved in collaborative research works with electric power industries in the State of Louisiana towards power grid modernization, efficient battery deployment in power systems and integration of solar in distribution networks. Dr. Ferdowsi received his Ph.D. degree from the Florida State University in 2017. From 2014 to 2017, he worked as a graduate researcher at the Center for Advanced Power Systems (CAPS).