AI FOR CYBER-PHYSICAL POWER SYSTEMS OPERATION AND CONTROL WITH DERS

~ by ~

DR. JUNBO ZHAO

Mississippi State University

Tuesday, February 9 • 11:00 AM – Noon (PT) • TEAMS ONLY

[Link to TEAMS meeting]

OVERVIEW

The increasing penetration of stochastic and uncertain inverter-based distributed energy resources (DERs), such as wind and solar PVs, has a considerable influence on the power system dynamics, and the total inertia of the power grid is reduced significantly, causing reliability and resiliency concerns. On the other hand, the power industry is transforming itself from a hierarchical, passive, and sparsely sensed engineering system into a flat, active, and ubiquitously sensed cyber physical system. The emerging multi-scale data from phasor measurement units, SCADA, smart meters, weather, and electricity markets offers tremendous opportunities and challenges. Machine learning and big data analytics algorithms and applications for unlocking the potential of big data in smart grid are paid increasingly attention in recent years. This talk will present a set of AI developments for power system operation and controls with DERs, including event detection and disturbance identification, probabilistic transient stability prediction, preventive control considering uncertainties, optimal power flow, as well as some distribution system applications, i.e., topology identification, distribution system state estimation, Vol-VAR control and optimization, microgrid energy management, etc.

BIO

Dr. Zhao is currently an Assistant Professor at Mississippi State University. He earned his PhD from the Department of Electrical and Computer Engineering, Virginia Tech, in 2018. He is currently the chair of the IEEE TF on Power System Dynamic State and Parameter Estimation and the IEEE TF on Cyber-Physical Interdependency for Power System Operation and Control, the Secretary of the IEEE Bulk Power System Operation Subcommittee and the IEEE Task Force on Synchrophasor Applications in Power System Operation and Control. He has published 3 book chapters and more than 100 peer-reviewed journal and conference papers, where more than 50 appear in IEEE Transactions. He serves as the editor of *IEEE Transactions on Power Systems*, *IEEE Transactions on Smart Grid* and IEEE Power and Engineering Letters.