WASHINGTON STATE UNIVERSITY
School of Electrical Engineering and Computer Science

# Towards Situation-Aware Resilient Power Grids for Massive Renewable Energy Integration

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**Via TEAMS** Click here to join the meeting

## OVERVIEW

The operation of modern power grids is increasingly challenged by the massive integration of volatile renewable energy as well as high-impact events such as natural disasters and cyber-attacks. The conventional rule-based operational paradigm is no longer a viable solution, and real-time situational awareness must be obtained from massive and heterogeneous sensor data streams to support intelligent decision-making and control. This talk will address two main pillars of the situational awareness required by a resilient and renewable power grid of the future. 1) Physics-informed adaptive data fusion for reliable interpretation of heterogeneous and imperfect data. Key methodologies allowing for the integration of grid physics with sensor data will be presented, including adaptive state estimation under unknown measurement error statistics, cyber-physically discriminative anomaly detection, and deep-learning-based forecasting of distributed renewable energy and load. 2) Resilient cyber-physical infrastructure for timely, economical, and uninterrupted data collection and transfer. Novel concepts for enhancing resilient data delivery will be introduced, including cross-domain sensor network planning for pre-disaster hardening, observability-aware network routing for peri-disaster adaptation, and observability-oriented network restoration for post-disaster recovery. Extensive case studies will be presented to demonstrate the proposed concepts and methodologies.

## BIO

Dr. Yuzhang Lin is currently an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Massachusetts, Lowell. He obtained his Bachelor and Master's degrees from Tsinghua University, Beijing, China in 2012 and 2014, respectively, and his Ph.D. degree from Northeastern University, Boston, MA in 2018, where he received the prestigious Outstanding Graduate Student Research Award. Since then, he has been a tenure-track Assistant Professor at the University of Massachusetts Lowell. His research interests focus on smart power grid and renewable energy systems, especially in the aspects of data-driven modeling, situational awareness, cyber-physical resilience, and machine learning applications. He has published 5 book chapters and 40 journal papers, and his research has been widely supported by federally funding agencies including NSF, DOE, and ONR. He currently serves as the Co-Chair of the IEEE Power & Energy Society (PES) Task Force on Standard Test Cases for Power Systems State Estimation, and the Secretary of the IEEE PES Distribution System Operation and Planning Subcommittee. He is a recipient of the NSF CAREER Award.