WASHINGTON STATE UNIVERSITY
School of Electrical Engineering and Computer Science

LEVERAGING DATA TO ENHANCE POWER DISTRIBUTION GRID MODELING AND OPERATION

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OVERVIEW

Recent years have seen a dramatic growth of smart sensors in power distribution grids. The new sensing capabilities, offered by smart meters, micro-phasor measurement units, and SCADA, have extended utilities' visibility to grid edges. However, the power industry faces new challenges in managing the massive amount of data and extracting useful and actionable information from the measurements. This talk will present two use cases of distribution grid data. The first one is using SCADA data for measurement and verification (M&V) of conservation voltage reduction (CVR). CVR is a popular energy efficiency measure that reduces energy consumption and peak load, through feeder-level voltage reduction. CVR M&V is to quantify its energy savings or peak reductions, which is required by regulatory agencies. However, CVR M&V is challenging due to the stochastic nature of consumer loads and the fact that distinguishing the changes in load consumption due to voltage reduction from other impact factors is difficult. The talk will present state-of-the-art methods to quantify CVR effects and the verification results using real utility data. The second one is using smart meter data and a customized physics-inspired neural network (PINN) to estimate secondary distribution grid voltages, thus, facilitating the solar hosting capacity analysis.

BIO

Dr. Zhaoyu Wang received the B.S. and M.S. degrees in electrical engineering from Shanghai Jiao Tong University, and the M.S. and Ph.D. degrees in electrical and computer engineering from Georgia Institute of Technology. He is the Northrop Grumman Endowed Associate Professor with Iowa State University. His research interests include optimization and data analytics in power distribution systems and microgrids. He was the recipient of the National Science Foundation CAREER Award, the Outstanding Young Engineer Award from IEEE Power and Energy Society (PES), the Northrop Grumman Endowment, College of Engineering's Early Achievement in Research Award, and the Harpole-Pentair Young Faculty Award Endowment. He is the Principal Investigator for a multitude of projects funded by the National Science Foundation, the Department of Energy, National Laboratories, PSERC, and Iowa Economic Development Authority. He is the TCPC of IEEE Power System Operation, Planning and Economics (PSOPE) Committee, the Chair of PSOPE Awards Subcommittee, and the Vice Chair of IEEE Distribution System Operation and Planning Subcommittee. He has served as an Associate Editor of IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Open Access Journal of Power and Energy, and IEEE Transactions on Sustainable Energy.