



## PSERC WEBINAR

# Measurement-based Estimation and Control of Power Distribution Systems: Theory and Experimental Validation

**Rahul Gupta**

Washington State University

Key operational functions in power systems, such as optimal power flow, network reconfiguration, state estimation, fault location, etc., depend critically on the knowledge of accurate power system models. However, these models are often inaccurate due to various kinds of errors, such as outdated datasheets, incomplete or erroneous records, equipment ageing, and changing operating conditions (e.g., weather effects). These challenges highlight the need for robust parameter identification techniques.

This talk presents different challenges and techniques for estimating power system parameters using synchrophasor and smart meter measurements. The talk first presents methods for identifying state-independent models, including branch and shunt parameters, as well as state-dependent models, such as voltage-to-power sensitivity coefficients. It highlights a key challenge: direct use of these estimates in control applications may lead to infeasible decisions. To address this, we present a robust framework that explicitly accounts for uncertainty in measurement-based estimates, which was validated on a real microgrid testbed. Finally, we introduce an approach for distribution system state estimation under conditions of limited measurements, enabling reliable monitoring and control in data-scarce environments.

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**OCTOBER 8, 2025**

[LINK TO WEBINAR](#)

**1:00-2:00 P.M. ET**

(10:00-11:00 A.M. PT)

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Rahul Gupta is an Assistant Professor at the School of Electrical Engineering and Computer Science (EECS) at Washington State University (WSU), Pullman, WA. He received his B.Tech. degree in electrical engineering from the NIT, Rourkela, in 2014, and the M.Sc. and Ph.D. degrees in electrical engineering from EPFL, Lausanne, Switzerland, in 2018 and 2023, respectively. Following his Ph.D., he carried out his postdoctoral research at the School of Electrical and Computer Engineering, Georgia Institute of Technology, until 2024, supported by a grant from the Swiss NSF. His research focuses on the operation and planning of active distribution networks, addressing various kinds of uncertainties, measurement and model-less control schemes, power system parameter estimation, and synthetic network generation.

