

# IEEE BDA Webinar Series: Big Data & Analytics for Power Systems

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## Learning for Monitoring and Control in Power Distribution Grids

Prof. Vassilis Kekatos

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12:30 pm-1:45 pm, PST, Thursday, Oct. 17, 2019

(2:30 pm – 3:45 pm, CST) (3:30 pm - 4:45 pm, EST)

**Abstract:** Distribution grids are challenged by: c1) reduced observability, and c2) voltage fluctuations due to solar generation. This presentation explains how smart inverters can be used to tackle these two problems leveraging tools from statistical learning. Regarding challenge c1), we put forth a novel data acquisition scheme termed grid probing: We perturb the power injections of inverters and process the collected voltage data to unveil feeder topologies and estimate line impedances. We present identifiability results and three approaches for voltage analytics with complementary strengths. Regarding c2), we customize inverter control rules to hit the sweet spot between cyber requirements and voltage regulation performance. Using anticipated load and generation scenarios, inverter control rules are designed using kernel-based learning and support vector machines. By judiciously engineering the learning cost, we obtain parsimonious representations for inverter rules. Numerical tests showcase that the proposed control framework attains exemplary voltage regulation performance on a cyber budget.

**Bio:** Vassilis Kekatos is an Assistant Professor with the power systems group in the Bradley Dept. of ECE at Virginia Tech. He obtained his Ph.D. from the Univ. of Patras, Greece. He is a recipient of the NSF Career Award in 2018 and the Marie Curie Fellowship during 2009-2012. He has been a postdoctoral research associate with the ECE Dept. at the Univ. of Minnesota, and a visiting researcher with the Univ. of Texas at Austin and the Ohio State Univ. His research focus is on optimization and learning for future energy systems. He is currently serving in the editorial board of the IEEE Trans. on Smart Grid.

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