



## PSERC WEBINAR

# A Convex Design in Structural Deep Neural Network for Controlling Renewables

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Presentation Abstract: Achieving robust integration and control of energy system grids amidst the growing deployment of distributed energy resources (DERs) requires a resilient strategy to address reliability and security challenges. The intricate nature of this task becomes evident in scenarios where certain grids exhibit partial unobservability and face data intrusion, rendering the control of DERs challenging. Recent data-driven approaches have struggled to balance optimality and generalizability simultaneously, not to mention the additional challenge of operating through compromises. To address these issues, we propose a structural deep neural network framework that enforces a convex structure and maintains physical consistency. Such a design ensures optimal control even in unforeseen operating conditions, crucial for the dynamic landscape of distributed and intermittent power generation. Additionally, our study demonstrates the framework's efficacy in optimal system operation against strong attacks breaching measurements, guaranteeing sustainability in adversarial conditions. Validation of our proposed methods is conducted using a utility-connected hardware-in-the-loop microgrid and real data from utility deployments, showcasing applicability in diverse scenarios such as cities, remote communities, and e-mobility.

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[LINK TO WEBINAR](#)

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

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

**Yang Weng** Yang Weng received Ph.D. in Electrical and Computer Engineering from Carnegie Mellon University (CMU). Upon graduation, he joined Stanford University as a Postdoctoral Fellow at the Precourt Institute for Energy. He is currently an Assistant Professor in the School of Electrical, Computer, and Energy Engineering at Arizona State University (ASU). Yang's research interests are power systems, data science, and cybersecurity. He is the consortium chair for Energy Cyber, a joint center established by the US Department of Energy and the Israel Ministry of Energy. Yang received the NSF CAREER Award, Amazon Research Award, Outstanding IEEE Young Professional Award, Outstanding Faculty Mentor Award, and Centennial Award for Teaching.

