

TEES Smart Grid Center

INVITED SEMINAR

Friday, November 11, 2022, 9:30am – 10:30am

Room 1107

Center for Infrastructure Renewal (CIR), Texas A&M University System

1041 RELIS Parkway, Bryan TX 77807

NREL'S CYBERPHYSICAL SYSTEMS SECURITY AND RESILIENCE RESEARCH

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Abstract

Security and resilience are complementary attributes of an energy system. Together they address resistance to, and dynamic recovery from, disruptions. The National Renewable Energy Laboratory (NREL) focuses on developing creative answers to today's energy challenges, and driving the clean energy transformation. Integrated energy systems are increasingly dependent on digitally interconnected energy assets. This can significantly improve resilience, but increases security risks—especially cybersecurity risks.

NREL's Cybersecurity Science and Simulation group delivers foundational research on these emerging complex systems. The team is applying machine learning, game theory, formal methods, zero knowledge proofs, and explainable AI to identify and manage vulnerabilities, and to enhance cyber resilience. Additionally, the group is leveraging domain models across the distributed clean energy spectrum, and NREL's unique laboratory assets, to develop a unique cyber range focused on securing the clean energy transformation. This research capability enables simulation of future energy systems for multiple use cases.

Dane will provide an overview of this work and recent results, as well as an outlook on what's coming next for NREL's cybersecurity research team.

Biography

Dane Christensen serves as manager for the Cybersecurity Science and Simulation Group at NREL. His research focuses on identifying and mitigating cross-infrastructure dependencies which result in unanticipated vulnerability to natural hazards and man-made threats as our energy systems modernize. Since joining NREL in 2008, Christensen primarily studied Internet of Things, data-driven controls and analytics, and grid-interactive residential building solutions. He led pioneering work in home energy management, resulting in a 2018 R&D100 award for the foresee™ technology. He has over 70 peer-reviewed publications, four issued patents, and several software copyrights and patents pending.

Christensen received a Ph.D. in mechanical engineering from University of California, Berkeley and a B.S. in mechanical engineering from Rice University.