



MODEL-BASED SECURITY FOR HIGH-CONSEQUENCE ENERGY SYSTEMS

~ by ~

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University of Idaho ~ Moscow

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OVERVIEW

A growing set of national security concerns regarding critical energy infrastructure pose significant risk to grid operators, owners and investors. Responsive cybersecurity, or more broadly, digital system flexibility in the face of malign influence, is critical to the prevention of large-scale system failure, particularly with respect to high-consequence and exquisite (i.e., sophisticated, expensive, custom, high-performance) energy systems. A natural dilemma stems from the general applicability constraint of most modern security tools; ubiquitous software implemented on a wide range of hardware, interconnected through the global information infrastructure, is by its universal design unable to leverage hardware-specific details for a cyber-physical security solution.

New ideas regarding cyber-physical security are presented; classical physics and engineering design concepts such as resonances and characterized nonlinearities, along with high-fidelity system models validated *a priori*, lay new ground upon which detection and mitigation techniques may tread. In fact, a feature rendering these ideas unpopular among many theoreticians proves most useful to the practitioner – that is, solutions to exquisite system problems are less likely to be broadly generalizable, but the designer of last-line-of-defense systems appreciates the competitive head-start. Dr. Roberson draws from his engineering expertise, as well as experiences serving as a White House Fellow, on the Defense Science Board, and as an advisor to the Air Force Chief Scientist, to examine these ideas.



BIO

Dr. Roberson is Assistant Professor of Electrical & Computer Engineering at the University of Idaho, having recently returned from serving as a White House Fellow at the U.S. Department of Defense. He is an Associate of the Center for Advanced Energy Studies where he directs a research team focused on electrical grid security and stability, is an advisor to the Air Force Chief Scientist, and recently served on the DoD Defense Science Board. He is also a Nuclear Engineering Affiliate Faculty and holds a joint appointment with the Idaho National Laboratory in National & Homeland Security. Dr. Roberson has collaborated with national laboratories, electric utilities, private stakeholders, and universities to address 21st century energy system threats, and his engineering courses are designed to prepare students for careers in this rapidly-evolving area. Before joining the University of Idaho, he was with Sandia National Laboratories.

To better serve his region, he promotes STEM education through secondary school outreach and public speaking engagements to spark the curiosity of young scientists. He also acts as an advisor to regional energy infrastructure programs and several tech startups.

Dr. Roberson earned his PhD in Electrical Engineering with a Graduate Minor in Statistics at the University of Wyoming, where he won the Fisher Innovation Challenge for contributions to energy storage control, and holds a BS in Electrical Engineering, Minor Mathematics, from the same institution. In his free time, he is an avid outdoorsman and motorcyclist and can be found playing guitar or painting during the winter months.