



## SMART HOME CYBERSECURITY: THREAT AND DEFENSE IN A CYBER-PHYSICAL SYSTEM

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**ABSTRACT:** The massive deployment of advanced metering infrastructure and home energy management system has mandated a transformative shift of the classical grid into a more reliable and secure grid. The smart home system is critical in this infrastructure as it controls all the end use components of a grid. Despite its importance, such a system is vulnerable to various cyberattacks such as energy theft and pricing hack. In this talk, I will describe several of our recent works on smart home cyberthreat analysis and defense technology development. I will first show that due to the interdependence between utility pricing and customer energy load, a cyberattacker could tamper smart meters for electricity bill increase and energy load unbalancing, and similarly energy theft could also potentially disturb the power system. I will then discuss some advanced control theoretic and algorithmic techniques developed in my group to defend against those cyberattacks, including stochastic differential dynamical system and partially observable Markov decision process based detection. I will conclude the talk with some of the ongoing research conducted in my group and our international collaborators.

**BIOGRAPHY:** Professor Shiyan Hu received his Ph.D. in Computer Engineering from Texas A&M University in 2008. He is currently a Visiting Associate Professor at Stanford University, and an Associate Professor in the ECE Department at Michigan Tech., where he is Associate Director of Michigan Tech Institute of Computing and Cybersystems. Prof. Hu's research interests include Cyber-Physical Systems, Cybersecurity, Computer-Aided Design of VLSI Circuits, and Embedded Systems, where he has published about 100 refereed papers, including 20+ in IEEE Transactions.

Prof. Hu is the Founding Chair for IEEE Technical Committee on Cybernetics for Cyber-Physical Systems. He is an ACM Distinguished Speaker, an IEEE Computer Society Distinguished Visitor, a recipient of National Science Foundation (NSF) CAREER Award, a recipient of ACM SIGDA Richard Newton DAC Scholarship (as the faculty advisor), an invited participant for Frontiers of Engineering Symposium by U.S. National Academy of Engineering, and a recipient of JSPS Faculty Invitation Fellowship. He is an Associate Editor/Guest Editor for 5 IEEE/ACM Transactions including TC, TCAD, TCAS, TII and TECS. He has served as General Chair, Technical Program Committee (TPC) Chair, TPC Subcommittee Chair, Session Chair, and TPC Member for various conferences for more than 70 times, which include the TPC Subcommittee Chair for DAC and ICCAD. He is a Senior Member of IEEE.