

Energy and Power Group

WEEKLY SEMINAR SERIES – SPRING 2019

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REVIEW OF CYBER-PHYSICAL MODELING FOR POWER SYSTEM SECURITY



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Abstract

Power system is one of the mission critical infrastructure prone to persistent cyber attacks. Preventing the grid from cyber intrusion as well as ensuring reliability under the state of compromise is highly essential. Developing a cyber-physical testbed ensures a feasible way for the researcher to test their proposed algorithms such as a secured AC-OPF solution or an Intrusion Detection System for Man-in-the-Middle (MiTM) attack, before deploying them in utilities. Hence, a testbed architecture is proposed where various cyber-physical models for situational awareness and optimal response could be tested. We develop the prior work done on Cyber Physical Situational Awareness (CyPSA) and Security oriented Cyber-physical Contingency Analysis, to explore its strength and weakness to improve the models. Further, we propose a hierarchical MDP based optimal response system for power system contingency. Finally, a theoretical data fusion approach, based on Dempster-Shafer Theory is explored which would combine evidences from cyber and physical side sensors to validate a hypothesis on a certain event such as FDI attack is caused through MiTM or misoperation of breaker due to relay faults.

Biography

Abhijeet Sahu is a first year Ph.D. student in Electrical Engineering at Texas A&M University. He received his B.tech degree in Electronics and Communications from National Institute of Technology, India, in 2011 and the M.Sc degree in Electrical Engineering from Texas A&M University in 2018. His M.Sc thesis on "Design of Real-Time simulation testbed for Advanced Metering Infrastructure (AMI) Network" was supervised by Dr. Ana Goulart and Dr. Karen Butler-Purry. Currently, he is working on developing cyber-physical models for cyber attack prevention and cyber-compromised grid resilience under Dr. Katherine Davis. He worked for four years as an IT and Communication Engineer at National Thermal Power Corporation (NTPC) Limited, New Delhi from 2011-2015. He interned with Real Time Power Inc. as a software developer in 2017. His current research interests include Network Security, Power-Grid Critical Infrastructures, Cyber-Physical model building for intrusion detection and response.