2019 Tennessee Tech College of Engineering New Faculty Research Seminar Series

Towards Connected, Smart, and Secure Cyber-Physical Critical Infrastructures

Presented by Muhammad Ismail Ph.D., Assistant Professor, Computer Science

Abstract: Powered by advanced communication and computational technologies, our world is steadily transforming into a huge cyber-physical system. In this talk, we focus our attention on the smart electric power grid as an example of a cyber-physical critical infrastructure. In this context, four design requirements must be satisfied, namely: seamless connectivity, smart operation, security robustness, and privacy preservation. We start this talk by modeling the physical layer of the smart grid using tools from stochastic geometry to reflect spatial and temporal information of the grid. Then, we explain how to satisfy the seamless connectivity requirement using cooperative networking in a heterogeneous wireless medium. Further, we demonstrate how to achieve the smart operational design requirement for efficient charging and discharging coordination of electric vehicles. We then focus our attention on the security design requirement using tools from deep machine learning to detect false data injection attacks in the smart grid. Finally, we discuss how to preserve the privacy of the users while gathering their information.

About the Speaker: Muhammad Ismail received the Ph.D. degree in Electrical and Computer Engineering from the University of Waterloo, in 2013. From 2013 to 2019, he used to work as a Research Scientist with Texas A&M University at Qatar. He authored and co-authored numerous book chapters, journal papers, conference papers, and tutorials. He is a co-recipient of the Best Paper Awards from the IEEE ICC 2014, IEEE Globecom 2014, SGRE 2015, GREEN 2016, and the IEEE Communication Society TCGCN in 2019. He is an IEEE Senior Member.

Wednesday, Sept. 24 2019, 4:30 to 5:30 p.m. Prescott Hall, Room 225

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