UCF DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCEINCE

Spring 2015 Seminar Series

Presented by the ECE Division

A UNIFYING FRAMEWORK FOR IDENTIFYING STEALTHY ATTACKS ON CPS

WEDNESDAY FEBRUARY 25, 2015

3:00 PM – HEC 450

As Cyber-Physical Systems (CPS) continue to integrate into our physical world, ensuring their safety and security become crucial goals. Due to their real-time, energy and safety constraints, coupled by their reliance on communication mediums that are subject to interference and cyber attacks, the projected complexities in CPS will far exceed those of traditional computing systems. Such increase in complexity widens the malicious opportunities for adversaries and with many components interacting together, distinguishing between normal and abnormal behaviors becomes quite challenging. In this talk, I will present a unifying approach for identifying attacks that target CPS. The attack policies are obtained as solutions to various Markov Decision Process (MDP) problems, in which a decision to interfere with a signal is based on the current state of the system as well as on the cost of the attack. Through applying approximate policy iteration methods, efficient attack policies that only interfere with a selective set of signals between the CPS components are exposed. These policies maximize damage while minimizing exposure and detection. This talk will focus on two instantiations: (1) pheromone-based coordination methods that are used in reconnaissance, surveillance, and search missions in multi-agent systems and (2) traffic optimization methods employed in intelligent transportation systems.

DR. MINA GUIRGUIS

Texas State University

Mina Guirguis is an Associate Professor of Computer Science at Texas State University, which he joined in 2006. His research is broadly driven by the interplay of security, networks and stochastic control with research contributions in the areas of Cyber-Physical Systems (CPS), Networks and Computing Systems, and Mobile Cloud Computing. His research work has been published in over forty refereed papers, posters and journals, and one book chapter. Guirguis' research and educational activities are funded with over $2.9M in grants from the NSF, DoD, AFOSR, IEEE, Cisco and Texas State. Guirguis received the NSF CAREER award in 2012.

Guirguis has been a visiting faculty researcher at the Air Force Research Laboratory (AFRL) in the summers of 2012 and 2013. During the academic year 2014/2015 he joined the Mobile and Pervasive Computing Group in the ECE Dept. at UT Austin. Guirguis has a wide range of industrial experience at various companies including Fortress Technologies and Microsoft. He has served on various Technical Program Committees for many conferences, on NSF panels and on the Editorial Board for the International Journal on Advances in Networks and Services.

Guirguis earned his B.Sc. in Computer Science and Automatic Control at Alexandria University in 1999, his M.A. in Computer Science at Boston University in 2005 and his Ph.D. in Computer Science at Boston University in 2007.

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