**COLLOQUIUM**

Department of Computer Science and Engineering

University of South Carolina

**Towards Secure and Reliable Self Managing Computing Systems: A Model-based Approach**

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Time: **10:30-11:30am**

Place: **Swearingen 1A03 (Faculty Lounge)**

# Abstract

Modern computing systems support a range of mission-critical information technology applications crucial to commerce and banking, transportation, and command and control systems, to name just a few. Consequently, their reliable design and operation have significant economic and social impact. To operate such systems effectively while maintaining their availability and security multiple operational data and parameters must be analyzed in real-time and dynamically tuned to adapt to abnormal conditions such as failures or cyber-attacks. As system and application scales increase, ad hoc heuristic-based approaches to system adaptation and management quickly become ineffective. Model-based technologies help address this problem by enabling design-time and run-time analysis, and providing means to automate the development, verification, deployment and real-time adaptation of computing systems.

This presentation introduces recent work on developing model-based approaches for systematic design of reliable and secure self-managing computing systems. The developed approaches use mathematical models to represent the system reaction to both control and environment inputs. In these approaches, the system management problems of interest are posed as a sequential and discrete optimization under uncertainty. Results of this work show that model-based techniques can be effectively applied to maintain the security and reliability of complex modern computing systems. The presentation introduces several implementations of this model-based technology and discusses future related research directions.

**Sherif Abdelwahed** is an Associate Director of the Distributed Analytics and Security Institute (DASI) and an Associate Professor in the Electrical and Computer Engineering Department at Mississippi State University (MSU) where he teaches and conducts research in the area of computer engineering, with specific interests in cyber-security, autonomic computing, real-time systems, modeling and analysis of discrete-event and hybrid systems, model-integrated computing, and formal verification. He received his Ph.D in 2002 from the Department of Electrical and Computer Engineering at the University of Toronto. Prior to joining Mississippi State University, he was a research assistant professor at the Department of Electrical Engineering and Computer Science and senior research scientist at the Institute for Software Integrated Systems, Vanderbilt University, from 2001-2007. From 2000-2001 he worked as a research scientist with Rockwell Scientific Company. He established, collaboratively, the first NSF I/UCRC center at Mississippi State University, the Center for Autonomic Computing. He is currently the co-director of this center. He co-chaired several international conferences and conference tracks, and has served as technical committee member at various national and international conferences. He received the StatePride Faculty award for 2010 and 2011, the Bagley College of Engineering Hearin Faculty Excellence award in 2010, and recently the 2016 Faculty Research Award from the Bagley College of Engineering at MSU. Dr. Abdelwahed has more than 140 publications and is a senior member of the IEEE.