UCF DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

# Spring 2016 Seminar Series

## CYBER-PHYSICAL NETWORKED SYSTEMS FOR VEHICLE SAFETY AND EFFICIENCY

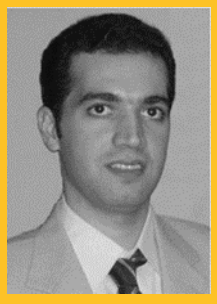
TUESDAY MARCH 1, 2016

11:00 AM – HEC 356

Sustainable socio-economic development relies on technological advances in fields such as transportation and energy distribution. Such advancements are expected to happen through the development of Cyber-Physical Systems (CPS), which bring the power of computing and communication technologies to the large scale physical systems that define our modern world. In this talk, we look at the example of an intelligent transportation system for cooperative vehicle safety, and analyze the tight coupling of the components of this system. Due to the immense complexity of these CPSs, design and optimization of such systems for efficient coordination, communication, and control is a challenging task. We formulate the design problem of the cooperative vehicle safety as the problem of tracking dynamical systems over a network that is coupled with these dynamical systems. We show that in principle the right modeling and abstraction of the CPS components will allow breaking this complex problem into solvable smaller sub-problems. The first sub-problem is vehicle tracking under network constraints. The second sub-problem is optimal network management under vehicle tracking load assumptions. We then generalize this concept to model-based information networking and control using stochastic hybrid systems, and show its application to other vehicle automation problems. We describe experiment results from both prototype implementation and large scale simulations. We conclude the talk by examining the more general and larger scale issues of providing safety and efficiency through transportation and energy domain Cyber-Physical Systems.


### DR. YASER P. FALLAH

West Virginia University

Yaser P. Fallah is an Assistant Professor in the Department of Computer Science and Electrical Engineering, West Virginia University (WVU). Prior to joining WVU in 2011, he was an Assistant Research Scientist at the University of California - Berkeley (2008-2011), College of Engineering and Institute of Transportation Studies. His current research activities, supported by NSF (CAREER award), industry(General Motoros, Toyota, Hyundai-Kia), USDoT and USDoE grants, are in the areas of networked cyber physical systems (CPS), stochastic modeling of CPS, intelligent transportation systems, and smart energy systems. Dr. Fallah received his B.Sc. in Electrical Engineering (Electronics) from Sharif University of Technology in 1998. He worked as a digital hardware engineer in industry until 2000. He received his M.S. and Ph.D. in Electrical and Computer Engineering from the University of British Columbia, Canada, in 2001 and 2007 respectively. He was with IBM Canada prior to his PhD studies (2002-2003). Dr. Fallah has received numerous competitive awards including the NSF CAREER award, Canadian national NSERC postdoctoral fellowship, Bell Canada graduate award, and NSERC graduate scholarship. Dr. Fallah is an editor of IEEE Transactions on Vehicular Technology, and a member of the steering committee of IEEE Connected Vehicle Initiative. He chaired the technical program of 2014 and 2011 IEEE Wireless Vehicular Communication conferences.