学术报告通知

报告人：谭睿(新加坡南洋理工大学)

题 目：Cyber-Physical Approaches to Sustainable Power Grids

时 间：2016 年 6 月 6 日(周一)9:00

地 点：电院群楼 2-406

邀请人：方涛教授

Abstract:

While power grids are evolving in the direction of cyber-physical systems, new computing methodologies must be developed to enhance grid sustainability by improving efficiency of energy consumption, reliability against natural faults, and cybersecurity regarding malicious attacks. This talk will present our recent research results on power grids efficiency, reliability, and cybersecurity. In particular, it will focus on the cybersecurity and countermeasures in automatic generation control (AGC), which is a fundamental closed-loop control system in all power grids that regulates grid frequency at a nominal value. The inputs to AGC, i.e., various measurements collected from geographically distributed sensors over computer networks, are susceptible to attacks. This work shows that, starting from little prior information and based on passively eavesdropped sensor measurements, an attacker can establish an accurate dynamic model for the impact of tampering with these sensor measurements on the grid frequency. Based on the model, the attacker can compute stealthy attack vectors that bypass various sensor data quality checkers and minimize the remaining time before the grid must apply remedial actions such as disconnecting customers. This work also develops algorithms to detect and profile such attacks. In addition, this talk will briefly present other projects on residential power disaggregation using a wireless sensor system, grid reliability enhancement by demand response, security of electricity real-time pricing, and security of traction power systems.

Biography:

Rui Tan is an Assistant Professor at School of Computer Science and Engineering, Nanyang Technological University, Singapore. Previously, he was a Research Scientist (2012–2015) and a Senior Research Scientist (2015) at Advanced Digital Sciences Center, a Singapore-based research center of University of Illinois at Urbana-Champaign (UIUC), a Principle Research Affiliate (2012–2015) at Coordinated Science Lab of UIUC, and a postdoctoral Research Associate (2010–2012) at Michigan State University. He received the Ph.D. (2010) degree in computer science from City University of Hong Kong, the B.S. (2004) and M.S. (2007) degrees from Shanghai Jiao Tong University. His research interests include cyber-physical systems, sensor networks, and pervasive computing systems. His papers in 2013 IEEE Intl. Conf. Pervasive Computing & Communications (PerCom) and 2014 ACM/IEEE Intl. Conf. Information Processing in Sensor Networks (IPSN) were Best Paper finalists. He has published 40+ research papers on prestigious conferences and IEEE/ACM transactions. He has also served on the TPC of IEEE Real-Time Systems Symposiums (RTSS), INFOCOM, ICPADS, EWSN, and etc.