Cyber-physical systems: Analysis and Design

Peng Shi
School of Electrical and Electronic Engineering
University of Adelaide, Australia

Cyber-physical systems (CPS), such as smart grids and intelligent transportation systems, are complex systems where software and hardware components are seamlessly integrated toward performing well-defined tasks. However, this integration increases the vulnerability of CPS with higher possibility of cyber-attack that could cause severe consequences to economics, society, and human beings. Hence, cyber-security is critical and important in CPS. In this talk, the security of CPS is discussed from the perspectives of attackers. We will introduce the background of CPS and security issues, and some existing work on cyber-attacks. We then present our recent work on the design of stealthy hybrid attacks to CPS, which enables attackers to launch hybrid cyber-attacks more effectively to maximize system performance degradation with less chance to be detected.

Peng Shi received the PhD degree in Electrical Engineering from the University of Newcastle, Australia, the PhD degree in Mathematics from the University of South Australia, the Doctor of Science degree from the University of Glamorgan, UK, and the Doctor of Engineering degree from the University of Adelaide, Australia. He is now a Professor at the School of Electrical and Electronic Engineering, and the Director of Advanced Unmanned Systems Laboratory, at the University of Adelaide, Australia. His research interests include systems and control theory and applications to autonomous and robotic systems, cyber-physical systems, and multi-agent systems. He received the MA Sargent Medal Award from Engineers Australia in 2022 to recognize his longstanding eminence in science; the Life-time achiever Leader-Board acknowledgement and the Field Leader Honor from THE *AUSTRALIAN* from 2019-2022; and the Highly Cited Researcher recognition from Web of Sciences every year since 2014. Currently he serves as the Editor-in-Chief of IEEE Transactions on Cybernetics, a Senior Editor of IEEE Access, and Associate Editor of IEEE Transactions on (Artificial Intelligence; and Circuits and Systems—I); Automatica; and Information Sciences. His professional services also include as the President of the International Academy for Systems and Cybernetic Sciences, the Vice President of IEEE SMC Society, and IEEE SMC Distinguished Lecturer. He is a Fellow of IEEE, IET, IEAust and CAA, a Member of the Academy of Europe, and an Honorary Member of the Romanian Academy of Scientists.