INVITED SEMINAR

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Protection and Survivable Control of Cyber-Physical-Social Systems (CPSS) Against Malicious Attacks and Adversary Intrusions

Abstract: Recent technological advances in control, computing, communications, and social networking have generated intense interest in development of a new generation of highly interconnected and sensor rich systems that are employed in a variety of applications involving cyber and physical systems as well as humans. These complex systems are becoming more distributed and computer networked which have necessitated development of novel computing, communicating, and social networking technologies that are pervasively human-centric and are ultimately envisaged to lead to a safer, more reliable and securer and better world. Due to major breakthroughs in software and cyber engineering technologies, embedded systems are increasingly being utilized in areas ranging from aerospace and next-generation transportation systems, to process and automation systems, to smart grid and smart cities, and broadly speaking to what is known as Cyber-Physical-Social Systems (CPSS) infrastructure. The envisaged CPSS considers humans as part of the overall system as opposed to considering them to belong to only the boundary of such systems. The envisaged CPSS infrastructure do more than ever require development of novel and proactive cyber protection technologies, as these systems are continuously being targeted by malicious attacks and intrusions by intelligent adversaries. The adversaries are capable of attacking core embedded control systems that are employed in all key CPSS infrastructure. These scenarios do not exist and are not possible or similar to security challenges that are present in traditional IT systems. In this talk we present a number of formal and theoretical frameworks for design of optimal integration of attack and intrusion protection and survivable and resilient control recovery methodologies for critical CPSS infrastructure.

Biography: K. Khorasani received the B.S., M.S., and Ph.D. degrees in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign in 1981, 1982 and 1985, respectively. From 1985 to 1988 he was an Assistant Professor at the University of Michigan at Dearborn and since 1988, he has been at Concordia University, Montreal, Canada, where he is currently a Professor and University Tier I Research Chair in the Department of Electrical and Computer Engineering and Concordia Institute for Aerospace Design and Innovation (CIADI). His main areas of research are in nonlinear and adaptive control, intelligent and autonomous control of networked unmanned systems, fault diagnosis, isolation and recovery (FDIR), diagnosis, prognosis, and health management (DPHM), satellites, unmanned vehicles, and neural network applications to pattern recognition, robotics and control, adaptive structure neural networks. He has authored/co-authored over 450 publications in these areas. He is currently serving as an Associate Editor of the IEEE Transactions on Aerospace and Electronic Systems.

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