Hamilton Institute

Networking Infrastructure and Data Management for Cyber-Physical Systems

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Abstract: A cyber-physical system (CPS) is a system featuring a tight combination of, and coordination between, the system°Øs computational and physical elements. A large-scale CPS usually consists of several subsystems which are formed by networked sensors and actuators, and deployed in different locations. These subsystems interact with the physical world and execute specific monitoring and control functions. How to organize the sensors and actuators inside each subsystem and interconnect these physically separated subsystems together to achieve secure, reliable and real-time communication is a big challenge.

In this talk, I will first present a TDMA-based low-power and secure real-time wireless protocol. This protocol can serve as an ideal communication infrastructure for CPS subsystems which require flexible topology control, secure and reliable communication and adjustable real-time service support. I will describe the network management techniques for ensuring the reliable routing and real-time services inside the subsystems and data management techniques for maintaining the quality of the sampled data from the physical world. To evaluate these proposed techniques, we built up a prototype system and deployed it in different environments for performance measurement. I will also present a light-weighted and scalable solution for interconnecting heterogenous CPS subsystems together through a slim IP adaptation layer. This approach makes the underlying connectivity technologies transparent to the application developers thus enables rapid application development and efficient migration among different CPS platforms.

Bio: Song Han received the BS degree in computer science from Nanjing University, Peoples Republic of China in 2003 and the MPhil degree in computer science from City University of Hong Kong in 2006. He is currently a PhD candidate in the Department of Computer Science at the University of Texas at Austin. His research interests include cyberphysical systems, real-time and embedded systems, database systems and wireless networks.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 2.00pm - 3.00pm

Travel directions are available at www.hamilton.ie

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