Sensing and Inference in Mobile Cyber-Physical Systems

Presented by:
Dr. Shahriar Nirjon
Networking and Mobility Lab
Hewlett-Packard Labs, Palo Alto, CA

Abstract:
In this talk, I will describe my approach of addressing these two challenges in mobile cyber-physical systems. First, I will describe my recent work on a GPS based indoor localization service. This work challenges the common belief that the GPS receivers do not work indoors. The solution relies on hardware-software symbiosis where a high-gain directional antenna and signal processing algorithms are used to estimate the GPS coordinates with a median error of less than 10 m. I will then describe two of my works on acoustic sensing and inference on mobile devices. The first work is a system, called MUSICAL-HEART, which is a biofeedback-based, context-aware music recommender system for mobile devices. The other acoustic sensing work, called the AUDITEUR platform, is targeted towards more generic classes of acoustic events.

Towards the end of my talk, I will show video and web demonstrations of three application-specific medical cyber-physical systems: A dementia prescreening application (MOBI-COG), an aggressive action inference system for demented elderly (KINTENSE), and a mobile-cloud based comprehensive Asthma monitoring system (ASTHAM-GUIDE). I will wrap-up my talk after presenting my vision of creating a people-centric, multilayer, large-scale sensing and inference system that leverages the Internet of Things.

Speaker Bio:
Dr. Shahriar Nirjon is a Research Scientist in the Networking and Mobility Lab at the Hewlett-Packard Labs in Palo Alto, CA. Shahriar is interested in building practical cyber-physical systems that involve embedded sensors and mobile devices, mobility and connectivity, and mobile data analytics. Research challenges that he deals with include practical issues in physical world sensing, user-contexts and mobility, real-time issues, and resource constraints of the embedded platform.

Shahriar received his Ph.D. in Computer Science from the University of Virginia in 2014 under the supervision of Prof. John A. Stankovic. Shahriar has won a number of awards, including two Best Paper Awards – at the Mobile Systems, Applications and Services (MOBISYS 2014), and the Real-Time and Embedded Technology and Applications Symposium (RTAS 2012). Shahriar has worked as a Research Intern at Microsoft Research, Redmond, WA (Summer 2013) and at Deutsche Telekom Lab, Los Altos, CA (Summer 2010). Several of his work have been highlighted in the electronic and print media, including – the Economist, the New Scientist, and the BBC.