NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

C S   S E M I N A R

Title: **Radio-based Device-free Activity Recognition with Radio Frequency Interference**

Speaker: Dr. Wen Hu
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Date/Time: 16 July 2015, Thursday, 02:00 PM to 03:30 PM

Venue: Executive Classroom, COM2-04-02

Chaired by: Dr Chan Mun Choon, Associate Professor, School of Computing
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Abstract:

Activity recognition is an important component of many pervasive computing applications. Device-free activity recognition has the advantage that it does not have the privacy concern of using cameras and the subjects do not have to carry a device on them.

Recently, it has been shown that channel state information (CSI) can be used for activity recognition in a device-free setting. With the proliferation of wireless devices, it is important to understand how radio frequency interference (RFI) can impact on pervasive computing applications. In this talk, I will present our recent investigation in the impact of RFI on device-free CSI-based location-oriented activity recognition. We conduct experiments in environments without and with RFI. We present data to show that RFI can have a significant impact on the CSI vectors. In the absence of RFI, different activities give rise to different CSI vectors that can be differentiated visually. However, in the presence of RFI, the CSI vectors become much noisier and activity recognition also becomes harder. Our extensive experiments show that the performance of state-of-the-art classification methods may degrade significantly with RFI. We then propose a number of counter measures to mitigate the impact of RFI and improve the location-oriented activity recognition performance. Our evaluation shows the proposed method can improve up to 10% true detection rate in the presence of RFI. We also study the impact of bandwidth on activity recognition performance. We show that with a channel bandwidth of 20 MHz (which is used by WiFi), it is possible to achieve a good activity recognition accuracy when RFI is present.

Biodata:

Dr. Wen Hu is a senior lecturer at School of Computer Science and Engineering, the University of New South Wales (UNSW). Much of his research career has focused on the novel applications, low-power communications, security and compressive sensing in sensor network systems and Internet of Things (IoT). Hu published regularly in the top rated sensor network and mobile computing venues such as ACM/IEEE IPSN, ACM SenSys, ACM transactions on Sensor Networks (TOSN), Proceedings of the IEEE, and Ad-hoc Networks.

Hu was a principal research scientist and research project leader at CSIRO Digital Productivity Flagship, and received his Ph.D from the UNSW. He is a recipient of prestigious CSIRO Office of Chief Executive (OCE) Julius Career Award (2012 - 2015) and multiple CSIRO OCE postdoctoral grants.

Hu is a senior member of ACM and IEEE, and serves on the organising and program committees of networking conferences including ACM/IEEE IPSN, ACM SenSys, ACM MobiSys, IEEE ICDCS, IEEE LCN, IEEE ICC, IEEE WCNC, IEEE DCOSS, IEEE GlobeCom, IEEE PIMRC, and IEEE VTC.