

The School of Informatics, Computing, and Engineering (SICE)

INTELLIGENT SYSTEMS ENGINEERING COLLOQUIUM SERIES

Enabling Smart Spaces Through Super-Resolution Ubiquitous Sensing

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Chi Zhang received his Ph.D. degree from University of Wisconsin-Madison's Department of Electrical and Computer Engineering in December, 2017. His research interests lie broadly in the area of mobile and ubiquitous computing systems, with past works addressing wireless networks, energy efficiency, mobile interaction, indoor localization, and ubiquitous privacy. His works consistently appeared on top conferences in the field, such as ACM MobiCom and MobiSys, and the work on infrastructure-free precision indoor localization system was one of the 6 finalists of the Wisconsin Alumni Research Foundation Innovation Award, which was selected from more than 400 promising technologies in 2016.



Abstract

Our living spaces are increasingly augmented by smart things, which can sense our locations, identities, activities, and thus enable seamless interaction between the physical environment and us. Ultimately, the smart things will transform the ordinary environments into "smart spaces" that can automate human life. However, to date, the smart spaces vision has been heavily relying on dedicated infrastructures or sensors, which incur non-negligible cost and require heavy human intervention, breaching the key promise of smartness. In this talk, I will introduce a new line of ubiquitous sensing techniques that realize smart spaces through legacy infrastructures and smartphone sensors. These techniques employ novel sensor processing algorithms to extract intelligent observations that are invisible to human or conventional sensors. As an example, I will first introduce LiTell, a system that transforms incumbent lighting infrastructure into location landmarks, in order to provide accurate and reliable location information in indoor environment. I will further introduce LiShield, which protects the visual privacy of physical environment against unwanted camera photographing. These systems open up new possibilities for realizing smart spaces based on ordinary low-profile things. Finally, I will conclude the talk with future research challenges and opportunities in embracing everyday objects into the smart spaces.

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