

The School of Informatics, Computing and Engineering (SICE)

INTELLIGENT SYSTEMS ENGINEERING COLLOQUIUM SERIES

Exploring the Power of Pervasive Sensing for IoT Security and Smart Healthcare

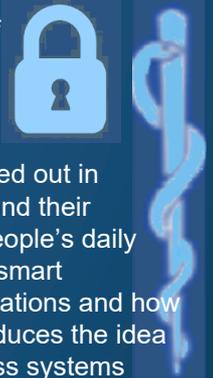
Jian Liu

Jian Liu is currently a Ph.D. candidate in the Wireless Information Network Lab (WINLAB), Rutgers University, under the supervision of Prof. Yingying (Jennifer) Chen. His research interests include Cybersecurity and Privacy, Mobile Sensing and Computing, Smart Healthcare, Internet of Things, and Connected Vehicles. During his Ph.D. study, he has published one book chapter, more than 35 papers in premium conferences and peer-reviewed journals including ACM MobiCom (2), ACM MobiSys (2), ACM MobiHoc (2), ACM CCS (1), IEEE INFOCOM (5), ACM UbiComp (2), and IEEE TMC (1), etc. He holds 3 US patents, one of which has been licensed to Aerial Technologies. He is a recipient of two Best Paper Awards from IEEE SECON 2017 and IEEE CNS 2018, Best-in-session Presentation Award from IEEE INFOCOM 2017, Best Poster Award Runner-up from ACM MobiCom 2016 and 2018. He is also a recipient of ECE Research Excellence Award in 2018 from Rutgers University. His research has received wide press coverage, including BBC News, Yahoo News, MIT Technology Review, NBC New York, WCBS TV and Voice of America TV, etc. For more information, please refer to: <http://www.winlab.rutgers.edu/~jianliu/>.



Abstract

With the advancement of mobile sensing and pervasive computing, extensive research is being carried out in various application domains such as Internet of Things (IoT), smart healthcare, connected vehicles, and their security issues. My research work explores the power of pervasive sensing technologies to benefit people's daily lives and make impacts on society advancement, especially in two emerging areas: IoT security and smart healthcare. Particularly, I study how to conduct user authentication on any solid surface for IoT applications and how to perform vital signs monitoring during sleep towards smart healthcare. The first part of my talk introduces the idea of extending user authentication beyond traditional touch screens to any solid surface for smart access systems (e.g., access to apartments, vehicles or smart homes). The system builds upon a touch sensing technique with vibration signals that can operate on surfaces constructed from a broad range of materials. It integrates passcode, behavioral and physiological characteristics, and surface dependency together to provide enhanced security for many IoT applications. The second part of my talk describes how to track human vital signs of breathing and heart rates during sleep, which serves as critical inputs for assessing the general physical health of a person and providing useful clues for diagnosing possible diseases. Different from previous work, our system re-uses existing WiFi network for tracking vital signs of breathing and heart rates concurrently without dedicated/wearable sensors or additional wireless infrastructure (e.g., USRP). The system exploits the fine-grained channel state information of WiFi signals to capture the minute body movements caused by breathing and heartbeats. The proposed system thus has the potential to be widely deployed in home environments and perform continuous long-term monitoring at a low-cost. Finally, I will share with you some new research directions I would like to pursue with the aim of influencing the future of smart cities, smart homes, and smart living.



MONDAY, MARCH 25, 2019

4:00 - 5:00 PM | Luddy Hall 4063



SCHOOL OF

INFORMATICS, COMPUTING, AND ENGINEERING