



## Research Seminar

# Robust IoT Communication and Sensing with Extreme Efficiency

Speaker: Dr. Zhao Renjie, Johns Hopkins University

Date: December 28, 2023 (Thur)

Time: 15:30 (HKT)

Mixed Mode: Tam Wing Fan Inno Wing Two, HKU & Zoom (Hybrid)

### Abstract

The Internet of Things (IoT) has the potential to revolutionize our world by connecting the physical and digital worlds. However, its current reliance on battery-powered devices limits scalability and raises environmental concerns. My research aims to overcome these challenges by developing battery-free, cost-effective IoT solutions, necessitating a rethinking of wireless networking. In Consumer IoT, I focused on ultra-low-power communication with novel radio architectures and an asymmetric communication scheme that enables existing Wi-Fi infrastructure to connect IoT devices. In Industrial IoT, I addressed reliability with a magnetic RFID system and robust RFID localization design, reducing object identification errors. These innovations resolve reliability issues that have hindered battery-free RFID adoption in the industry. Additionally, I've contributed to massive MIMO millimeter-wave software-defined radio and wireless brain-machine interfaces, opening new possibilities for next-gen IoT applications. By building on these innovations, we can unlock the potential of battery-free IoT, the Internet of Bodies, and experimental wireless infrastructures, offering a robust, sustainable, and scalable IoT future.

### About the Speaker:

Renjie Zhao is an assistant professor of computer science at the Johns Hopkins University. Renjie's research interests center around wireless networking and mobile computing, with a particular focus on next-generation wireless network architectures, novel radio hardware and software design, and ubiquitous communication and sensing systems. His research has been published in conjunction with several top conferences and journals, including ACM SIGCOMM, MobiCom, ToN, as well as USENIX NSDI. His work on massive MIMO millimeter-wave software radio won the Best Paper Award at MobiCom 2020; this project was additionally highlighted in GetMobile, the top pick of the ACM SIGMOBILE area. He received a bachelor's in electric power engineering and automation from Shanghai Jiao Tong University in 2018 before completing an MS (2020) and a PhD (2023) in electrical and computer engineering at the University of California San Diego.

**All are welcome!**

**For enquiries, please call 3917 2180 or email [enquiry@cs.hku.hk](mailto:enquiry@cs.hku.hk)**