

ECE SEMINAR



Dr. Lingjie Duan

Associate Professor

Singapore University of Technology and
Design(SUTD)

February 14th, 2:00 PM to 3:00 PM

Location: SEH B1220

**Mobile Crowdsourcing Mechanisms for D2D Resource
Sharing and Information Learning**

ABSTRACT

Mobile users in existing information systems face limited resources such as data plan, transmission bandwidth, computation capacity, and location-based information. Given that some users may not be utilizing fully their resources, device-to-device (D2D) resource sharing is a promising approach to exploit users' diversity in resource use and for pooling their resources or information. In this seminar, I first review that traditional resource allocation solutions are mostly centralized without considering users' local connectivity constraints, becoming not scalable for large-scale sharing. In addition, there may be sharing failure since selfish users will not truthfully report their actual valuations and quantities for buying or selling resources. Accordingly, I present a fast greedy algorithm based on maximum weighted matching to achieve guaranteed average allocative efficiency. Then, we combine it with a fully distributed pricing mechanism that adjusts the final trading prices for buying and selling resources in a way that buyers and sellers are incentivized to truthfully report their valuations and available resource quantities. Besides D2D resource sharing mechanisms, I also present crowdsourcing mechanisms to regulate information learning among mobile users in congestion games. In Google Maps and Waze, selfish users use myopic routing to jam each other, without learning time-varying traffic conditions of the non-shortest paths for future users. Our study extends the traditional congestion games fundamentally to create positive information learning generated by users themselves. I show that the myopic routing leads to arbitrarily large efficiency loss and propose a selective information disclosure mechanism to bound the loss well.

BIOGRAPHY

Lingjie Duan is an Associate Professor and Associate Head of the Engineering Systems and Design Pillar at Singapore University of Technology and Design(SUTD), which was established in collaboration with MIT. He received Ph.D. degree from The Chinese University of Hong Kong in 2012, and Bachelor of Electrical Engineering from Harbin Institute of Technology in 2008. He is actively working and contributing to the interdisciplinary research field "Network Economics", by combining computer networking with economics and algorithmic game theory. He received 2016 SUTD Excellence in Research Award, and the 10th IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award in 2015. He is an Associate Editor of IEEE Transactions on Mobile Computing, and was an Editor of both IEEE Transactions on Wireless Communications and IEEE Communications Surveys and Tutorials. He was also a Guest Editor of IEEE Journal on Selected Areas in Communications, IEEE Wireless Communications Magazine, and IEEE Transactions on Cognitive Communications and Networking. He serves as a General Chair of WiOpt 2023 Conference, Co-Chair of Cognitive Radio and Networks Symposium of IEEE ICC 2019, and Co-Chair of Future Trends and Emerging Technologies of VTC 2017.

Hosted by Dr. Tian Lu