

**Seminar:**

**Dr. Miao Wang, University of Waterloo and McMaster University  
Impact of Mobility on Vehicular Network Performance and Applications  
Friday March 9, 12 Noon, 202 ECEC**

**Abstract:** The research in Internet of Things (IoT) is expanding beyond the traditional focus towards exploiting the Internet of Vehicles (IoV) for next-generation vehicular applications. Empowered by the advanced sensing, storage, pre-processing and mobile networking capabilities of IoV, tremendous amount of data could be collected on almost every aspect of vehicles and their surroundings. By analyzing the collected big data, vehicular cyber-physical systems could have substantial enhancements, such as vehicular ad hoc networks (VANETs), intelligent transportation system (ITS), and electrical vehicle (EV) charging system in smart grid. As growing urbanization yields an increasing population of vehicles in large smart cyber cities, the rising challenges of communication and computing of big data and the tangible opportunities within reach motivate us to develop enhanced techniques and new solutions to support a myriad of IoV and even IoT applications.

In this talk, we investigate how vehicle mobility differentiation can impact the performance in three typical vehicular cyber-physical systems, i.e., pure VANET, VANET-enhanced ITS, and fast EV charging systems. First, in pure VANET, our work shows that the network data traffic can be balanced and the network throughput can be improved with the help of the vehicle mobility differentiation. Furthermore, leveraging vehicular communication capabilities, mobility differentiation aware real time path planning can be designed to smooth the vehicle traffic in an ITS, through which the traffic congestion in urban scenarios can be effectively relieved. In addition, with the consideration of the range anxiety caused by mobility differentiation, coordinated charging can provide efficient charging plans for EVs to improve the overall energy utilization while preventing an electric power system from overloading.

In summary, among the works presented in this talk, the analysis developed in pure VANET is fundamental as well as practical to reveal the relationship between the mobility of vehicles and the network performance in VANETs. The strategies proposed in VANET-enhanced ITS and EV charging systems provide inspiring insights for leveraging the vehicle mobility differentiation to improve the system performance in order to approach the respective system capacities.

**Bio:** Miao Wang received her B.Sc. degree from Beijing University of Posts and Telecommunications and M.Sc. degree from Beihang University, Beijing, China, in 2007 and 2010, respectively, and the Ph.D. degree in electrical and computer engineering from the University of Waterloo, Waterloo, ON, Canada, in 2015. She is currently working as the postdoctoral fellowship with the Department of Electrical and Computer Engineering, University of Waterloo and McMaster University, ON, Canada. Her current research interests include Internet of things (e.g., Internet of Vehicles or V2X) with Big data analytics and Cloud computing, mobility-aware performance analysis in vehicular cyber physical systems, with emphasis on vehicular ad hoc networks (VANETs), intelligent transportation system (ITS), and electric vehicle charging system in smart grid. Dr. Wang received the Best Paper Award as the first author at Globecom 2014, and the National Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship (PDF) funding in 2016.