上海交通大学自动化系
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系统控制与信息处理教育部重点实验室
Key Laboratory of System Control and Information Processing, Ministry of Education

学术报告会

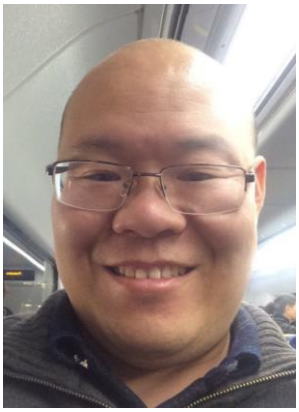
时　间：6月25日(周一) 11:00-12:00

地　点：电院群楼2-410会议室

Optimising traffic flow dynamics via trajectory control of connected and automated vehicles

Xiaobo Qu

Chalmers University of Technology



Abstract:

Fully realising the fact that our urban mobility systems will be undergoing a revolutionary change, many nations have invested huge amount of money in this area for emerging technologies, notably connected and automated vehicles (CAVs). In this research, we will explore the adaptation between traffic flow dynamics and transport infrastructure by designing proper trajectory control mechanism. Two control paradigms are examined: decentralized control is more likely to lead to local optimum instead of system optimality, while the centralized control has questionable applicability to real world practices in real time. In this research, we propose a decentralized control framework that is able to reach near system optimality. In the control framework, we will first develop a real-time control framework that is able to deal with how a vehicle ought to take actions in an environment so as to maximize its long-term performance based on the obtained output in a centralized bi-level model. The algorithms of optimal control attempt to find a (control) strategy that is able to select the optimal actions (i.e. speeds/vehicle operational parameters). CAVs will firstly be trained in an offline environment to learn how they ought to behave based on the output from the centralized bi-level models. The training results will then be used in real-time decentralized control that is able to give a satisfactory output in real-time.

Biography:

Dr Xiaobo Qu is a Professor and Chair of Urban Mobility Systems at Chalmers University of Technology. His research is focused on practically improving transport safety, efficiency, equity, and sustainability through traffic flow and network modelling and optimization. He has authored or co-authored over 60 journal articles published by leading international peer reviewed transportation journals such as Transportation Research Part A, Part B, Part C, Part E, Accident Analysis and Prevention, ASCE - Journal of Transportation Engineering, and Risk Analysis. He is a recipient of Ministry of Transport (Singapore) Minister's Innovation Award in 2009, President's Graduate Fellowship (Singapore) in 2010-2011, Griffith University Pro-Vice Chancellor Research Excellence Award (Group Category) in 2015, Australian Department of Education and Training Endeavor Cheung Kong Research Fellowship in 2016, and Australian Research Council Discovery Project Awardee in 2017. He is currently an Associate Editor for IEEE Transactions on Cybernetics (Impact Factor: 7.384, JCR Q1), ASCE Journal of

Transportation Engineering, Part A: Systems (Impact Factor: 0.962, a flagship journal of ASCE), IEEE Intelligent Transportation Systems Magazine (Impact Factor: 3.654, JCR Q1), ASCE ASME Journal of Risk and Uncertainty in Engineering Systems, and Journal of Intelligent and Connected Vehicles.