Intelligent Transportation

Diange Yang, Ph.D

Professor

Dean of Department of Automotive Engineering (DAE), Tsinghua University

Email: ydg@mail.tsinghua.edu.cn

Alexandre Bayen

Liao-Cho Professor of Engineering

Director, Institute of Transportation Studies

Professor, Departments of Electrical Eng. and Computer Sciences, of Civil & Environmental Eng.

University of California, Berkeley

Email: bayen@berkeley.edu

Session Abstract

By 2050, 70% of the world population is likely to be urban, with many living in megacities of more than 10 million people. Numerous metropolitan areas in both U.S. and China experience massive traffic congestion cumulated over multiple modes of transportation, including road, transit and pedestrian. Combined with the population density increase, at the current rate, the number of vehicles is expected to rise from 800 million to 2.5 billion by 2050. Such a growth is unsustainable both from a mobility point of view and an energy point of view. But while these trends are extremely alarming, for the first time in many decades, the passenger and goods movement transportation system is experiencing massive disruptions, through three major changes that will impact mobility:

•   Connectivity and automation

•   Electrification of transportation

•   The shared economy

Connection and automation will dramatically change the technologies underlying the transportation system as we know it, while operations will be drastically with the rapid growth of the shared economy and its new paradigms. Ultimately when the three merge, leading to automated electrified shared vehicles, mobility patterns in large scale metropolitan cities will be significant affected by this new state of things. These innovations could lead toward dramatically different futures. One future could be more urban sprawl, energy use, greenhouse gas emissions, and unhealthy cities and individuals. The other future could bring significant public and private benefits, including more transport choices, greater affordability and accessibility, and healthier, more livable cities, along with less vehicle use and fewer greenhouse gas emissions. This session will explore the key technologies, policies and strategies that will put us on the latter path, focusing on potential synergies between electrification, automation, and vehicle and ride sharing. It will integrate technologies that contribute to policies with potential to enhance the synergies in pursuing the public interest. This session will provide a forum for participants to present some recent advanced developments

in U.S. and China about connected automated vehicles, autonomous driving and car sharing, and to discuss future innovative technologies in both products and processes for future collaborations.

The speakers will cover the three major disruptions described above, through various topics of interest. In particular, Dawn Woodard (Uber) will cover some of the mechanisms of the shared economy underlying dynamic pricing and ride matching in mobility as a service systems. Electrification topics will be covered by Chi Xie (Shanghai Jiao Tong University) specific to adoption of electric fleets of vehicles. Parallel learning theory and its application in intelligent vehicles will be discussed by Li Li (Tsinghua University), who will bridge this topic with automation. Demand/supply problems in transportation specific to parking (and thus mobility access) will be discussed by Li Li (Tsinghua University), who will bridge this topic with automation. Finally, futuristic aspects of transportation will be covered by Dan Work (University of Illinois at Urbana-Champaign), through new and disruptive results recently accomplished in the field of congestion reduction through automation and wave smoothing.