ITSC 2019 Special Session Proposal

Title: Field Experiments on Connected and Autonomous Vehicles.

Scope: Connected autonomous vehicles (CAVs) have been increasingly investigated recently. Various analytical and simulation models have been proposed to describe dynamics, control and management problems from individual CAVs to large scale transportation system. Despite these fruitful developments, field experiments on CAVs validating and demonstrating modeling and simulation outcomes are relatively scarce, particular for problems in multiple-vehicle or traffic context. Without sufficient field studies, it remains inconclusive to validate the fundamental assumptions of these models, demonstrate the benefits of system-level models and transform modeling outcomes to implementable technologies and tangible societal impacts.

Realizing the importance of field experiments, a number of recent studies, especially from institutes with CAV testbeds (e.g., University of Michigan, Berkeley Path, Arizona State University, Turner Fairbank Highway Research Center, Chang'an University, Chalmers ASTAzero, Europe CAM, Volvo Drive Me), have conducted CAV field experiments. Different from classic experiments that focus on individual vehicle control in a relatively closed environment, recent experiments focus on interactions of multiple vehicles (even including human drivers) in an open road traffic context. These experiments have yield important results in addressing the aforementioned knowledge gaps and proving feasibility and benefits of CAV deployments in public roads. These important studies deserve dedicated venues for reporting these exciting findings to broach research community. The ITSC provides an ideal platform to open a world class venue as a special session promoting these experiments. Such a special session will make ITSC as one of the first platforms featured with spotlight sessions for CAV field experiments in multi-vehicle and traffic context. It will benefit a large group of audience including multi-disciplinary researchers, industry practitioners and governments at ITSC.

This session is jointly sponsored by the Transportation Research Board (TRB) Committee on Traffic Flow Theory and Characteristics (TFTC).

List of specific topics of interest: This special session is interested in but not limited to studies including a component of field experiments involving multiple vehicles on one or more of the following topic:

- Longitudinal control
- Lane changing
- Mixed traffic
- Freeway CAV control
- Coordination with signals
- Speed harmonization
- Stability analysis

A history of the special session: Although there are a number of autonomous vehicle related sessions, the organizers did not see any existing ITSC session focusing on field experiments.

Expected number of manuscripts submitted for consideration: Given that there are already tens of CAV testbeds across the world, this special would expect receiving 10~20 manuscripts. Some potential authors would be:

- Dan Work, Vanderbilt University
- Raphael Stern, University of Minnesota
- Xiaoyun Lu, Berkeley Path
- Gene McHale, Turner Fairbank Research Center
- Gabor Orosz, University of Michigan
- Zhigang Xu, Chang'an University
- Jia Hu, Tongji University
- Alireza Talebpour, Taxes A&M
- Jonas Sjöberg, Chalmers University of Technology
- Anders Lindström, Swedish National Road and Transport Research Institute
- Bart van Arem, Delft University of Technology
- Meng Wang, Delft University of Technology
- Jian Wu, ZENUITY AB
- Sigma Dolins, Research Institute of Sweden

Dissemination plan: Via relevant email lists (e.g., Transportation Research Record Highway Automation Committee and Traffic Flow Theory and Characteristics Committee) and invite potential authors.

Contact detail:

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Bio: Xiaopeng (Shaw) Li received the B.S. degree in civil engineering from Tsinghua University, Beijing, China, in 2006, and the M.S. degrees in civil engineering and applied mathematics, and the Ph.D. degree in civil engineering from the University of Illinois at Urban-Champaign, Urbana, IL, USA, in 2007, 2010, and 2011, respectively. He is currently an Associate Professor in the Department of Civil and Environmental Engineering, University of South Florida (USF), Tampa, FL, USA. He serves as an Associate Editor for the Department of Transportation Systems Analysis for IIE Transactions and he is on the editorial boards for Transportation Research Part B and Transportation Research Part C. He received the US National Science Foundation CAREER Award. Dr. Li's research focuses analysis, modelling management of transportation and other interdependent infrastructure systems featured with emerging technologies such as connected and autonomous vehicles, electric vehicles, modular pods and shared mobility.

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Bio: Xiaobo Qu is a professor and leader of Urban mobility systems research group. Xiaobo Qu's research is focused on practically improving transport safety, efficiency, equity, and sustainability through traffic flow and network modelling/optimization. He has done comprehensive works with regards to connected and automated vehicles, traffic flow theory, and highway management. He has been awarded many prestigious awards including Ministry of Transport (Singapore) Minister's Innovation Award, Australian Department of Education Endeavor, Cheung Kong Research Fellowship and Australian Research Council Discovery Project Awardee.

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Bio: Dr. Soyoung Ahn is an Associate Professor in the Department of Civil and Environmental Engineering at the University of Wisconsin - Madison. She received her Ph.D. (2005) in Civil and Environmental Engineering from the University of California, Berkeley. Her research and teaching interests are in traffic flow theory and operations, particularly in the context of connected and automated vehicles. She is the current chair of Transportation Research Board (TRB)'s Traffic Flow Theory and Characteristics Committee and a member of the International Advisory Committee for the International Symposium on Traffic and Transportation Theory (ISTTT). She is also an Associate Editor for Transportation Research Part C: Emerging Technology and an Editorial Board Editor for Transportation Research Part B: Methodological. She is a recipient of a National Science Foundation CAREER award.

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Bio: Dr. Birger Löfgren is focused on innovation development in public, private and research sectors. He joined RISE Viktoria in February 2017 to catalyse technology in real life settings. Previous positions include project manager at SKF Group, assistant director of research at Chalmers University of Technology and Senior Development Manager at the regional development office at Region Halland. He is now leading the innitiative of the field experiments and tests for self-driving automated shuttle buses in Gothenburg.