Workshop on Traffic Simulation and Connected and Automated Vehicle (CAV) Modeling

A Virtual Meeting

November 16-18, 2020

All times are in Pacific Standard Time – California PST 7:00 a.m. and Eastern Standard Time – Washington, DC EST 10:00 a.m.

Description

Transportation system simulation is widely used to support the business processes of transportation agencies including those related to planning, design, operation, management, and safety of increasingly complex multi-modal transportation systems. The advent of connected, automated, shared, and electric (CASE) vehicles provide challenges to be addressed with simulation. This virtual workshop will bring together researchers, vendors, and users of transportation system simulation to identify persistent challenges, discuss solution approaches, present recent research findings, and identify future research needs related to traffic simulation modeling. The discussions will focus on the history, status, and future of traffic simulation, plus modeling of CAVs. The workshop includes invited panels, sessions based on a call for papers/posters, and breakout sessions.

Preliminary Agenda

As of 10/26/2020 and Subject to Change

DAY 1 – MONDAY, NOVEMBER 16, 2020

| 7:00 am – 8:30 am PST | Introduction and first panel: Traffic Simulation – Past, Present, and Future
| 10:00 am – 11:30 am EST | Welcoming Remarks and Introduction to the Workshop
| | • Workshop Introduction, Mohammed Hadi
| | • History of Simulation Workshops, Pitu Mirchandani
| | • History and Vision of Simulation Research, John Halkias
| | • FHWA Research on Emerging Technology Modeling, Gene McHale
| | • DOE Research on Emerging Technology Modeling, David Anderson
| | • European State and Direction of Simulation Modeling, Peter Vortisch
<p>| | • 3967: Beyond the Transportation System Simulation Manual – What is Next?, George List |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
</table>
| 9:00 am – 10:30 am PST | **Elements in Emerging Vehicle Analysis, Modeling, and Simulation**  
**Moderator: Loren Bloomberg**  
3960: Enabling Analysis, Modeling, and Simulation for Cooperative Automated Vehicle Application  
3971: Understanding Future Impacts of CAVs Through the MEP lens  
3951: Evaluating Benefits of Connected and Automated Vehicle Technologies to Prepare Future Deployment  
3958: Regional Impact of VOTT Shift due to CAV Technology  
3314: Trajectory-Level Data Collected Through Federal Highway Administration Projects |
| 12:00 pm – 1:30 pm EST | **Simulating Alternative Mobility Options**  
**Moderator: Peter Vortisch**  
3817: Solving TNC Vehicle Scheduling with Pickup Time Windows Using High Performance Computing Techniques  
3863: Micro-Simulation to Model and Evaluate TNC Activity, Curb Management, and Pedestrian Infrastructure in a Busy Multi-Modal Environment  
3949: Validating POLARIS Ride-hail Simulation through Back-casting in Chicago  
3964: Simulation Approach to Planning and Evaluating Autonomous Vehicle Ride Hailing in a Geo-Fenced Area  
3934: Using an Agent-Based Transportation Demand Model to Understand the Distributional Effects of Household Vehicle Automation On Mobility |
| 11:00 pm – 12:45 pm PST | **Interactive Session: National and State Guidance –Lessons Learned and Gap Identification**  
**Moderator: Sanhita Lahiri**  
Perspective from State agency based on what influenced the State to develop guidance for traffic analysis. The challenges and the lessons learned, and the needs and opportunities in the development of traffic analysis guidance. The session also addresses how can national guidance/standards help.  
**Panelists:**  
Sanhita Lahiri, Virginia Department of Transportation  
Raj Ponnaluri, Florida Department of Transportation  
Douglas Norval, Oregon Department of Transportation  
Vicki Haskell, Wisconsin Department of Transportation  
John Halkias, Federal Highway Administration  
James Sturrock, Federal Highway Administration  
**Session Format:** 10-15 minute presentations on DOT and FHWA guidance, focusing on above topics, followed by Roundtable discussions |
## DAY 2 – TUESDAY, NOVEMBER 17, 2020

### 7:00 am – 8:30 am PST

#### Workshop Emerging Concepts in Calibration and Validation of Traffic Simulation Models
**Moderator: David Hale**

This workshop will address emerging concepts in traffic simulation calibration such as vehicle trajectory-based calibration, calibration for future conditions, sensitivity of driver behavior to traffic density, consistency among resolutions, libraries of parameters, plus calibration of simulation models for cooperative automated vehicles (CAVs). Attendees will discuss simulation modeling calibration approaches such as pseudo-trajectory calibration, repositories for calibrated models, k-fold or n-fold validation, and real-world CAV data collection efforts.

- 3780: A Methodology for Vehicle Trajectory-Based Calibration of Microsimulation Models, David Hale
- Region-Wide Calibration of Bottleneck Capacity and Demand-Capacity Functions in a Multi-Resolution Traffic Simulation Framework, Xuesong Zhou
- Calibration Framework for Simulation Tools to Manage Uncertain Future Conditions, Hani Mahmassani
- Appropriate Settings for Car-Following Model Calibration, Vincenzo Punzo and Zuduo Zheng
- Heterogeneity of Parameters and Their Impact on String Stability, Marcello Montanino

### 9:00 am – 10:30 am PST

#### Cooperative Driving Automation and Associated Applications, Part 1
**Moderator: Kaan Ozbay**

- 3909: SCoPTO: Signalized corridor management with vehicle trajectory prediction and optimization under mixed-autonomy traffic environment
- 3944: Car-following and Lane-Changing Behavior in Mixed Traffic – Modeling and Field Experiments
- 3972: May I join you? A Cooperative Vehicle Platooning to Minimize the Disturbance from Joining a Platoon
- 3970: The Impact of Lane Changes on the Traffic Flow with Connected Automated Vehicles
- 3980: Freeway Cooperative Merge Control via Cooperative Multi-agent Deep Reinforcement Learning

#### Infrastructure Support Simulation
**Moderator: George List**

- 3952: Can GNSS support platooning in mixed traffic?
- 3924: Simulation-Based Cyberattack Assessment Platform for Connected and Automated Vehicles
- 3977: Impact of Sensing Range on the Performance of Real-Time Traffic Signal Control
- 3914: The Effects of Vehicle-to-Infrastructure Communication Reliability on Performance of Signalized Intersection Traffic Control
- 3945: Simulation of Connected And Automated Vehicles (CAV) Mobility Data Sharing Using Blockchain

### 11:00 am – 12:45 pm PST

#### Breakout Sessions

**Breakout Rooms**
- Emerging Vehicle Technology
  **Moderator: James Sturrock**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAY 3 – WEDNESDAY, NOVEMBER 18, 2020</strong></td>
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| 7:00 am – 8:30 am PST | **Multi-Resolution and Agent-Based Modeling**  
  **Moderator: Randy Johnson**  
  3901: Twenty Hours of Insight from the World’s Foremost Experts on Multiresolution Modeling  
  3939: The Application of Multi-Resolution Modeling of Active Transportation and Demand Management Strategies on I-380  
  3941: Modeling Framework of Connected and Automated Vehicles For Multi-Resolution Simulation Models  
  3968: Hybrid and Distributed Macroscopic Traffic Simulation with Open Traffic Models  
  3938: Efficient agent-based model of network trip flow with general demand patterns  |
| 10:00 am – 11:30 am EST | **Cooperative Driving Automation and Associated Applications, Part 2**  
  **Moderator: Rachel James**  
  3772: Longitudinal Control of Vehicles in Traffic Microsimulation  
  3929: Evaluation of CAV Platooning on Uninterrupted Freeway Merge Bottleneck Capacity Using VISSIM  
  3974: Impact of Commercially Available Automated Vehicles on Capacity and Operations  
  3926: Capacity Impacts of Adaptive Cruise Control Vehicles At Bottlenecks  
  3911: Application of Dynamic Lane Assignment to Combined Flexible Lane Assignment and Reservation-based Intersection Control  
  3910: Development of a Framework for CAV Modeling in Simulation and Application  |
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| 9:00 am – 10:30 am PST | Effects of CV-Based Applications on Performance  
Moderator: Meenakshy Vasudevan  
3930: Evaluation of the Operational Effects of Autonomous and Connected Vehicles through Microsimulation  
3950: Modeling Speed Adaptation of Connected Drivers with Infrastructure-to-Vehicle Variable Speed Advisory  
3913: A Hardware-in-the-Loop Simulation System for Assessing Intersections with Cooperative Traffic Signal Control and Connected Automated Vehicles  
3220: Benefits of Connected Vehicle Signalized Left-Turn Assist: Simulation-Based Study  
3976: Mobility Implications of CAV Lane Reservation In Mixed Traffic Environment |
| 12:00 PM – 1:30 PM EST | Multimodal Modeling  
Moderator: Joshua Auld  
3917: ASPIRES: Airport Shuttle Planning and Improved Routing Event-driven Simulation  
3919: Development of Guidelines for Implementation of Freight and Transit Signal Priorities in Urban Corridors  
3925: An HPC-enabled SUMO Simulation Framework for Evaluating Future Travel Modes Choices at Dallas/Fort Worth Airport  
3955: Transit Frequency Setting Using Optimization, Activity-Based Demand Models, and Multimodal Assignment and Simulation  
3932: Usage of Microscopic Traffic Simulation to Quantify Traffic Impact of Autonomous Maintenance Technology |
| 11:00 am – 1:00 pm PST | Moderator: Mohammad Hadi  
Briefings by Breakout Session Moderators and Discussion of the Findings  
Traffic Simulation Committee  
Next Steps and Closing Remarks |