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 10/5/20 and Subject to Change

DAY 1 – MONDAY, NOVEMBER 16, 2020

<table>
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<tr>
<th>7:00 am – 8:30 am PST</th>
<th>Introduction and Opening Session</th>
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<tr>
<td>10:00 am – 11:30 am EST</td>
<td>Traffic Simulation: Past, Present, and Future</td>
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**Moderator:** Mohammed Hadi, Florida International University
- Mohammed Hadi – Welcome Remarks and Introduction to the Workshop
- Pitu Mirchandani – History of Simulation Workshops
- John Halkias - History and Vision of Simulation Research
- Gene McHale – FHWA Research on Emerging Technology Modeling
- David Anderson – DOE Research on Emerging Technology Modeling
- Peter Vortisch – European State and Direction of Simulation Modeling
- 3967: George List – Beyond the Transportation System Simulation Manual: What is Next?
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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| 9:00 am – 10:30 am PST | Concurrent Sessions  
Elements in Emerging Vehicle Analysis, Modeling, and Simulation  
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  
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 am – 12:45 pm PST | Interactive Session  
National and State Guidance: Lessons Learned and Gap Identification  
*Moderator: Sanhita Lahiri, Virginia DOT*  
Perspective from state the 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: Florida DOT, Oregon DOT, Virginia DOT, Wisconsin DOT, and FHWA (TBA)*  
*A 10-15 minute presentation of DOT and FHWA guidance, focusing on above topics, followed by roundtable discussions.*  |
| 1:00 pm-2:30 pm PST | SimCap Overview  
This **Sim**ulation & **Cap**acity Analysis User(s) Group (SimCap) quarterly meeting will review the latest activities of the public agency and consultant members, discuss strategies for expanding and improving SimCap, and provide technical discussions and presentations. SimCap consists of a volunteer network of professionals working across geographic and organizational boundaries to share information, experiences, and to disseminate, promote, and develop guidance and best practices in the application of traffic simulation and capacity analysis tools, methods, and related practice areas.  |
## DAY 2 – TUESDAY, NOVEMBER 17, 2020

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<th>Time</th>
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| 7:00 am – 8:30 am PST | Workshop Emerging Concepts in Calibration and Validation of Traffic Simulation Models  
*Moderator: David Hale, Leidos, Inc.*  
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.|
| 10:00 am – 11:30 am EST | 3780: A Methodology for Vehicle Trajectory-Based Calibration of Microsimulation Models |
| 9:00 am – 10:30 am PST | Concurrent Sessions  
**Cooperative Driving Automation and Associated Applications, Part 1**  
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**  
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  
- Emerging Vehicle Technology  
- Researching Solutions to Gaps that are Facing Simulation Modeling  
- Multi-Modal and Mixed Traffic Models  
- Simulation to Support Performance-Based Decisions |
| 2:00 pm – 3:45 pm EST | Breakout Sessions  
- Emerging Vehicle Technology  
- Researching Solutions to Gaps that are Facing Simulation Modeling  
- Multi-Modal and Mixed Traffic Models  
- Simulation to Support Performance-Based Decisions |
### Technology Presentations

**Advancement in Modeling Emerging Technologies**
- Jochen Lohmiller, PTV – Advances in Modeling Emerging Technology
- Tamara Djukic and Jordi Casas, AIMSUN – Holistic Approach for Simulation and Modelling of C-ITS Services
- Dan Morgan, Caliper Corporation – Impacts of Connected and Autonomous Vehicles Under Supply Uncertainties
- Michael Mahut, INRO – Advances in Large Scale Traffic Simulation and Dynamic Traffic Assignment

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### DAY 3 – WEDNESDAY, NOVEMBER 18, 2020

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<tr>
<td>7:00 am - 8:30 am PST</td>
<td><strong>Multi-Resolution and Agent-Based Modeling</strong></td>
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<tr>
<td>10:00 am - 11:30 am EST</td>
<td>3901: Twenty Hours of Insight from the World's Foremost Experts on Multiresolution Modeling</td>
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<td>3939: The Application of Multi-Resolution Modeling of Active Transportation and Demand Management Strategies on I-380</td>
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<td>3941: Modeling Framework of Connected and Automated Vehicles For Multi-Resolution Simulation Models</td>
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<td>3968: Hybrid and Distributed Macroscopic Traffic Simulation with Open Traffic Models</td>
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<td>3938: Efficient agent-based model of network trip flow with general demand patterns</td>
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**Cooperative Driving Automation and Associated Applications, Part 2**
- 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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<td><strong>Effects of CV-Based Applications on Performance</strong></td>
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<td>12:00 pm - 1:30 pm EST</td>
<td>3930: Evaluation of the Operational Effects of Autonomous and Connected Vehicles through Microsimulation</td>
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<td>3950: Modeling Speed Adaptation of Connected Drivers with Infrastructure-to-Vehicle Variable Speed Advisory</td>
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<td>3913: A Hardware-in-the-Loop Simulation System for Assessing Intersections with Cooperative Traffic Signal Control and Connected Automated Vehicles</td>
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<td>3976: Mobility Implications of CAV Lane Reservation In Mixed Traffic Environment</td>
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**Multimodal Modeling**

- 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

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<th>11:00 am – 1:00 pm PST</th>
<th>Closing Session</th>
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<td>2:00 pm – 4:00 pm EST</td>
<td>• Briefings by Breakout Session Moderators and Discussion of the Findings</td>
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<td>• Traffic Simulation Committee (ACP80) Meeting</td>
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<td>• Next Steps and Closing Remarks</td>
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