

Workshop title

Testing and Evaluating Connected and Automated Vehicles Using Emerging Simulation Technologies

Workshop proposer(s)

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Abstract

Automated driving systems (ADS) and vehicular connectivity technologies will dramatically transform the transportation systems and have the potential to improve transportation system performance. Researchers, technology developers, and transportation agencies should be able to evaluate and identify which applications best address the unique transportation problems, without conducting large-scale field experiments. For this purpose, innovative analysis, modeling, and simulation (AMS) tools are urgently needed, and they include software packages, methodologies, and procedures.

From the perspective of transportation system AMS, traditional tools are not well suited for evaluating connected and automated vehicle (CAV) applications due to their inability to incorporate vehicle connectivity as well as autonomy. There are not so many existing guides on how these tools can be extended to develop and evaluate CAV applications. Additionally, calibration of the behavioral models used in traffic simulation, e.g., CAV behavior and human driving behavior in response to CAVs, needs naturalistic driving data (NDD) to ensure the validity of the modeling and simulation. From the perspective of testing ADS, the necessity of using high-resolution automated driving simulators is broadly understood, though hundreds of millions of miles need to be tested. In contrast to simulation approaches for traditional vehicles, automated vehicle simulations must consider the environment to a much greater degree. Also, simulation must be considered as one tool in the toolbox along with closed track and/or open-road testing. In fact, novel hybrid testing strategies may combine closed track or open road testing with simulation in new ways.

This workshop session will be an ideal venue for the community to discuss new simulation methodologies and tools that can be applied by industry, government, and academia, to evaluate ADS performance and impact on overall traffic systems. The session also aims to identify challenges as well as research needs, aiming to encourage cross-disciplinary collaborations.

Keywords

- Simulation and Modeling
- ITS Field Tests and Implementation
- Automated Vehicle Operation, Motion Planning, Navigation

Topics of interest

- Automated driving simulation and parameter development/validation
- Application of automated driving simulator for safety and mobility testing



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- Microscopic traffic simulation for evaluating CAV impacts in transportation systems
- Data collection and calibration of microscopic simulation models
- Cross-platform simulation of CAV and traffic network
- Human-machine driver behavior and interaction in a mixed traffic stream
- Hardware/vehicle in the loop simulation
- Human in the loop simulation
- Digital twin and parallel driving simulation
- Methodologies for testing scenario generation