IEEE ITSC 2025

Invited Session Proposal

- **Title:**

Trustworthy AI for Traffic Sensing and Control

- **Modality:**

Half-day

- **Scope:**

Motivation and general scope

The rapid integration of artificial intelligence (AI) into transportation systems holds great potential for transforming urban mobility, especially with the explosion of transportation data and the growing capabilities of autonomous vehicles. Unlike conventional strategies, AI-based traffic sensing and control leverage massive historical and real-time data collected from diverse sensors to train learning-based algorithms for accurate state estimation, prediction, and adaptive decision-making. These algorithms are well-suited to handle heterogeneous transportation data, interpret human-dominated environments, and make informed decisions, ultimately helping alleviate congestion in complex, dynamic urban transportation systems.

Despite these technological advances, the practical adoption of AI in transportation systems has lagged, largely due to concerns about trustworthiness. Specifically, the inherent "black-box" nature of many AI algorithms introduces substantial challenges related to safety assurance, fairness, robustness and interpretability. Furthermore, the strong dependence on vast amounts of data raises critical concerns about data privacy and cybersecurity. These challenges directly impact public trust and system reliability, posing significant barriers to the widespread implementation of AI in transportation systems.

This invited session seeks to bridge existing gaps in the design, deployment, and regulation of AI in traffic sensing and control, emphasizing robustness, ethical data practices, and protection against cyber threats. Contributions that connect theoretical advances, practical implementations, and policy frameworks are particularly welcome, with the overarching goal of ensuring that AI-driven systems align with societal values in transportation.

Relevance to the ITS community

The growing adoption of AI in traffic sensing and control is reshaping how Intelligent Transportation Systems (ITS) are designed, deployed, and managed. This invited session responds to the ITS community's urgent need to ensure that AI-powered solutions are not only effective but also safe, reliable, privacy-preserving, and ethically sound. By focusing on the intersection of technological innovation and societal considerations (including safety, data privacy, fairness, and cybersecurity, etc.), this session provides a valuable forum for researchers, practitioners, and policymakers to exchange ideas and co-develop frameworks that enhance public trust while advancing the performance of modern traffic systems.

Topics of interest for the invited session

- Safety-Critical AI in Traffic Control
- Privacy-Preserving AI for Transportation Systems
- Cybersecurity in AI-enabled Traffic Infrastructure and CAVs
- Interpretable Traffic State Estimation and Prediction
- Ethical and Fairness-aware AI in Traffic Sensing and Control
- Human Factors and User Acceptance
- Environmental Sustainability and Energy-Efficient AI
- Formal Method for AI Verification in Transportation System

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- **Organizers:**

Organizer 1
Kaidi Yang
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Kaidi Yang is an Assistant Professor in the Department of Civil and Environmental Engineering at the National University of Singapore. Prior to this, he was a postdoctoral researcher with the Autonomous Systems Lab at Stanford University. He obtained a PhD from ETH Zurich and M.Sc. and B.Eng. degrees from Tsinghua University. His main research interest is the operation of future mobility systems enabled by connected and automated vehicles (CAVs) and shared mobility.

Organizer 2
Nan Zheng
Monash University, Clayton, VIC, Australia
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Nan Zheng received a B.Sc. degree in transportation engineering from Southeast University, China, an M.Sc. degree in transportation engineering from Delft University of Technology, and a Ph.D. degree in transportation engineering from the École Polytechnique Fédérale de Lausanne (EPFL). He held a postdoctoral position at EPFL and the Federal Institute of Technology Zurich (ETHZ). He was an Associate Professor at Beihang University, Beijing, China. Since 2018, he has been a Senior Lecturer at the Institute of Transport Studies, Monash University. His research interests include traffic flow theory, traffic big data, urban traffic operation and control, multi-modal, and new-generation traffic management.

Organizer 3
Jingyuan Zhou
National University of Singapore, Singapore
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Jingyuan Zhou received a B.Eng. degree in Electronic Information Science and Technology from Sun Yat-sen University, Guangzhou, China, in 2022. He is currently working towards a PhD degree with the National University of Singapore. His research interests include safety-critical control and privacy computing of mixed-autonomy traffic systems.

Organizer 4
Qiqing Wang
National University of Singapore, Singapore
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Qiqing Wang received his B.Eng. degree in the School of Transportation Science and Engineering from Harbin Institute of Technology, Harbin, China, in 2022. He is currently working towards a PhD degree with the National University of Singapore. His research interests include intelligent transportation systems, traffic control, data collaboration, and privacy.

Organizer 5
Jinhao Liang
National University of Singapore, Singapore
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Jinhao Liang received the B.S. degree from School of Mechanical Engineering, Nanjing University of Science and Technology, Nanjing, China, in 2017, and Ph.D. degree from School of Mechanical Engineering, Southeast University, Nanjing, China, in 2022. Now he is a Research Fellow with Department of Civil and Environmental Engineering, National University of Singapore. His research interests include vehicle dynamics and control, autonomous vehicles, and vehicle safety assistance systems.

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- **List of potential contributors (including as much detail as possible):**

So far, we have obtained confirmations from the following authors who will contribute to the invited session. The confirmed contributions span vast topics on safety, privacy, and cybersecurity in AI-enabled traffic sensing and control. Other potential contributors, such as Gioele Zardini (MIT, USA), Raphael Stern (University of Minnesota, USA), Xin Pei (Tsinghua University, China), and Nan Zheng (Monash University, Australia), have expressed their interest in submitting a paper to the invited session.

1. **Title**: Pathfinders in the sky: Formal decision-making models for collaborative air traffic control in convective weather
   Authors:
   Jimin Choi (1), Kartikeya Anand (1), Huy Tran (2), and Max Z. Li (1)
   Affiliations:
   (1) University of Michigan, MI, USA
   (2) University of Illinois at Urbana-Champaign, IL, USA

2. **Title**: An Adaptive Federated Learning Framework with Differential Privacy for Traffic Flow Prediction
   Authors:
   Bing Song, Sisi Jian
   Affiliation:
   Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong SAR

3. **Title**: High-Speed Obstacle Avoidance Control for MDED-HDV via Stability Region
   Authors: Ruiqi Fang
   Affiliations:
   Southeast University, Nanjing, China

4. **Title**: Exploiting Adjacent Vehicle Interactions to Mislead Trajectory Predictions
   Authors:
   Zhanbo Sun (1,2), Yueyuan Du (1), Ang Ji (1), Rong Zhao (3), Feilong Wang (1)
   Affiliations:
   (1) School of Transportation and Logistics, Southwest Jiaotong University, Chengdu, China
   (2) National Engineering Laboratory of Integrated Transportation Big Data Application Technology, Chengdu, China
   (3) Department of Industrial Engineering, Dongguan University of Technology, Dongguan, China

5. **Title**: Multimodal Fusion-Based 3D Occupancy Prediction for Autonomous Driving
   Authors:
   Zhichao Liu
   Affiliations:
   School of Mechanical Engineering, Southeast University, Nanjing, China
   Summary: This study proposes a 3D occupancy prediction framework leveraging multimodal sensor fusion (LiDAR, camera) to enhance environmental perception in complex autonomous driving scenarios. By integrating point cloud and image features, the method addresses the limitations of single-modality systems under occlusion or poor lighting conditions, achieving state-of-the-art performance on the nuScenes dataset.

6. **Title**: Preventing Intersection Spillback: A Safe Reinforcement Learning Approach to Traffic Light Control
   Authors:
   Jingyuan Zhou, Qiqing Wang, Kaidi Yang
   Affiliations:
   National University of Singapore, Singapore

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- **Intended audience and expected attendance of the invited session:**

Researchers and Academics: Scholars exploring AI algorithms, data analytics, and system architectures for transportation.

Industry Professionals: Developers and engineers from automotive, technology, and infrastructure companies are involved in advancing AI-based traffic solutions.

Policy Makers and Regulators: Government officials shaping regulations and standards for safe and ethical AI deployment in ITS.

While exact numbers can vary based on the conference scale and concurrent sessions, a typical invited session of this nature can draw around 40–60 participants, encompassing a balanced mix of researchers, practitioners, and policymakers.

- **Contact details of the main proposers (email & mobile number):**

Kaidi Yang (email: ykaidi@nus.edu.sg, mobile number: +65 9095 3291)
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Jingyuan Zhou (email: jingyuanzhou@u.nus.edu, mobile number: +65 8864 9511)
Qiqing Wang (email: qiqing.wang@u.nus.edu, mobile number: +65 8790 3815)
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Call for Invited Session Proposals

IEEE International Conference on Intelligent Transportation Systems (ITSC 2025)

Gold Coast, Australia | November 18 – 21, 2025

The IEEE ITSC 2025 Technical Program Committee (TPC) solicits for **Invited Session Proposals** on cutting-edge research topics, industry applications, and emerging innovations in Intelligent Transportation Systems (ITS). The **ITSC Invited Sessions** provide a platform for focused discussions on key challenges, advancements, and interdisciplinary perspectives within the ITS community. Interested organizers are invited to submit their invited session proposals in the topic areas listed in the **Call for Papers** of the conference.

The invited session proposals should align with the conference theme:
*"**Innovative Solutions for Future Transportation**"*

Scope & Topics

Proposed sessions should focus on ITS-related topics, including (but not limited to):

- Advanced ITS Mobility Systems
- Air, Road, and Rail Traffic Systems
- Autonomous Vehicle Systems
- Cooperative and Connected Vehicles
- Cyber-Physical Systems and IoT
- Emerging ITS Technologies and Innovations
- Human Factors and Vehicle Interaction
- Infrastructure and ITS Technologies
- Intelligent Waterborne Systems
- ITS Field Tests and Implementation
- ITS Validation and Verification
- Logistics and Intelligent Freight
- Public Transport and Mobility Services
- Safety, Security, and Privacy
- Sensing, Perception, & Scene Understanding
- Traffic Data Analytics and Machine Learning

Proposal Submission Guidelines

Each Invited Session Proposal must include the following:

- **Title** – A concise and clear session title.
- **Scope** (Max. 1 pages), covering:
  - Motivation and general scope
  - Relevance to the ITS community
  - Topics of interest
- **Organizers** – Names, affiliations, emails, and short bios.
- **List of Potential Contributors** – Including tentative paper titles, authors, and affiliations (if available).
- **Intended Audience & Expected Attendance** – Identify the target audience and estimated participation.
- **Contact Details** – Provide full contact information of the proposers.

Please Note: Proposals must be submitted through the **PaperPlaza Portal**.

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Important Notes:

- Proposals that do not follow the required format or are incomplete will not be evaluated.
- Invited sessions must have at least 6 accepted papers (half-day) or 10 accepted papers (full day).
    - If a proposal does not meet the threshold, it will either not be allocated or the TPC may add additional papers from the main track to the session to ensure that the final program is properly balanced across parallel rooms.

Important Dates

- Proposal Deadlines:
    - Deadline for submitting proposals: March 23, 2025
    - Notification to proposers: March 26, 2025
- Papers Deadlines:
    - Submission Deadline: May 1, 2025
    - Notification of Acceptance: July 1, 2025
    - Final Paper Submission: July 15, 2025

Please Note: There will be no deadline extensions for any of these dates.

Submitted papers will go through the normal review process, and **proposers** will be invited to serve as **Associate Editors (AEs)** as part of the TPC. However, this does not imply that only papers from their respective sessions will be allocated; rather, session papers will be considered in the context of the overall conference program.

Review Process & Acceptance Criteria

Proposals will be evaluated based on:

- Relevance to the conference scope and theme
- Novelty and significance of the topic
- Quality and diversity of proposed contributions
- Potential impact and community interest

Further enquiries can be forwarded to: **program@2025.ieee-itsc.org**

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