



IEEE ITSC 2025

Invited Session Proposal

- **Title:** Emerging Trends in AV Research
- **Modality:** Half-day (e.g., 3 hours plus breaks)
- **Scope:**

- **Motivation and general scope**

Research on autonomous vehicles (AVs) is crucial to understanding their technological, economic, and societal impacts before large-scale deployment in the transportation network. AVs have the potential to enhance road safety, reduce traffic congestion, and improve mobility and accessibility. However, their integration also presents challenges, including AV testing and validation, AV and human interactions, and connected AVs in mixed traffic and their management.

Continuing research effort is needed and essential to address these complexities, ensuring that AV deployment aligns with sustainable urban planning, equitable access to mobility, and minimal disruption to existing multimodal transport systems. We will focus on a few emerging AV research trends in this session and discuss how future AV research can help policymakers and engineers make informed decisions to maximise the benefits of AVs while mitigating unintended consequences.

- **Relevance to the ITS community**

This session will be highly relevant to the ITS community as pressing research challenges in the context of AV technology development, adoption and deployment will be presented, and potential solutions proposed that will help shape the future of AV development and integration. The session will provide a platform for fostering discussions between academic researchers, industry practitioners and policymakers, on how ITS can leverage cutting-edge AV research to inform infrastructure planning, regulatory frameworks, and the development of seamless, human-centred mobility solutions.

- **Topics of interest for the invited session**

AV testing and validation: Extensive testing of AVs has been conducted through simulations, closed-course testing, and real-world trials in various cities worldwide. However, despite these advancements, the question remains on how to explore and manage the full complexity, diversity and unpredictability of the real-world environment at scale.

AV and human interactions: Research into the interactions between AVs and humans - whether these be AV passengers or other drivers, pedestrians, cyclists, or other road users - is critical to ensuring safe and seamless AV integration into existing transport systems. Intensive research efforts continue to understand these interactions including new opportunities of using emerging techniques and tools (such as virtual or augmented reality, large language models, etc.) to explore more natural and dynamic interactions between humans and AV interfaces.

Connected Autonomous Vehicles (CAVs): Extensive research has been conducted to enhance the understanding of managing and operating CAV-integrated systems while strategically planning



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for their adoption. We welcome discussion on innovative models and algorithms for traffic operations, management, and planning for maximising the potential of CAVs to improve network efficiency, sustainability, and resilience.

- **Organisers:**

Name: Prof. Hai L. Vu

Affiliation: Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

Email: hai.vu@monash.edu

Bio:

Hai L. Vu is a Professor of Intelligent Transport Systems and Deputy Dean (Research) in the Faculty of Engineering, Monash University. He is a recipient of the 2012 Australian Research Council (ARC) Future Fellowship and the Victoria Fellowship Award for his research and leadership in Intelligent Transport Systems (ITS) with strong international research credentials in transport modelling and optimisation of both data and road traffic networks. Prof Vu is a recognised expert with 25 years of experience in the areas of ITS, transportation network modelling, V2X communications and connected autonomous vehicles (CAVs) from which he has published over 250 scientific journals and conference papers.

Name: Dr Wynita M. Griggs

Affiliations: (i) Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia; (ii) Department of Electrical and Computer Systems Engineering, Monash University, Australia

Email: wynita.griggs@monash.edu

Bio:

Wynita is a Lecturer in both the Department of Civil and Environmental Engineering, and the Department of Electrical and Computer Systems Engineering, at Monash University, in Clayton, Victoria, Australia. Her research interests include mathematical control theory (dissipative systems, stability, ergodic control of agent ensembles, robust control), and intelligent transportation systems (V2X communications and CAVs, vehicle-/pedestrian-in-the-loop simulation, applications of control theory in ITS). She has published 44 peer-reviewed scientific research papers to date, and has 4 patents.

Name: Prof. Zuduo Zheng

Affiliation: School of Civil Engineering, The University of Queensland, Australia

Email: zuduo.zheng@uq.edu.au

Bio:

Dr. Zuduo Zheng is a Professor in the School of Civil Engineering, the University of Queensland and the Chair (Deputy) of Transport Academic Partnership sponsored by Queensland Department of Transport and Main Roads. His research primarily focuses on traffic flow theory and understanding emerging, disruptive, and intelligent mobility technologies' impact on traffic efficiency, traffic safety, energy consumption, vehicle emissions, etc. He is currently a member of the College of Experts, the Australian Research Council. He has won many awards, and serves/served as editor, guest editor or editorial board member of several journals, including Transportation Research Part C, Analytic Methods in Accident Research, IEEE Transactions on Intelligent Transportation Systems, Transportation Research Part B, etc. He is also passionate about practicing and promoting reproducible research and open science.

Name: A/Prof. Nan Zheng

Affiliation: Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

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Bio:

Nan is an Associate Professor at Monash University. He has developed research progressively on autonomous driving safety utilising human-centric approaches. His work has also focused on autonomous



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vehicle applications and commercialisation, for example unmanned transportation solutions in controlled environments such as industrial parks and open-space mining sites.

Name: A/Prof. Dong Ngoduy

Affiliation: Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

Email: dong.ngoduy@monash.edu

Bio:

Dong is currently an Associate Professor at Monash University, Australia. He is the co-author of over 100 journal articles in the field. He conducts research on connected and autonomous vehicles, traffic flow theory and simulation, applications of AI and machine learning to transportation, and network optimisation. He has also been a member of several journal editorial boards in the field and a member of the Peer Review College of the U.K. Research Council (EPSRC).

- **List of potential contributors:**

Measure Robustness in Fusion Perception Systems for Autonomous Driving, Thai M. Nguyen et al., Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

Exploring LLM-Powered Human Interactions with Shared Autonomous Vehicles: An Open-Source Conversational Dataset and Applications, Lirui Guo et al., Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

Impact of Drivers' Take-Over Manoeuvres on Automated Vehicles' Traffic Flow Dynamics, Zuduo Zheng et al., School of Civil Engineering, The University of Queensland, Australia

Safety Testing and Validation for Autonomous Vehicles using Large-Scale and High-Fidelity Simulation, Zheng Xu et al., Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

A Sequencing Game Approach for Eco-Friendly Platoon Merging in a Mixed-Connected Environment, Yue et al., Monash Institute of Transport Studies, Department of Civil and Environmental Engineering, Monash University, Australia

- **Potential sponsors:**

This session will be sponsored by the Monash Institute of Transport Studies (ITS), Monash University, Australia.

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

Intended Audience

This session is designed for an audience from both academia and industry, including:

- Academic researchers in ITS, AVs and transportation engineering.
- Industry practitioners who are working on technology deployment and transportation planning related to AVs and their technologies.
- Government, policymakers and relevant regulatory bodies concerning the use and deployment of new technology including AVs.

Expected Audience

For a half-day session, we expect up to 30 participants with at least 4-5 research presentations followed by a panel discussion involving academics and industry/government representatives.



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