2026 第九届 IEEE 国际无人系统大会
特邀专题简介表

特邀专题名称

人机混驾交通系统交互行为建模、优化与决策控制

组织者

1.梁晋豪，助理研究员，新加坡国立大学

2.冯吉伟，讲师，聊城大学

3.徐广飞，讲师，聊城大学

4.王法安，讲师，昆明理工大学

5.武健，教授，聊城大学

个人简介

梁晋豪,新加坡国立大学土木与环境工程系的助理研究员。他的研究兴趣主要集中在车辆动力学与控制、智能联网和自动驾驶车辆、电动车辆、车辆-道路协同控制等方面。在国际期刊和会议论文集上发表了 30 多篇论文，拥有 10 多项有关车辆系统动力学和控制的专利。他曾在第一届世界智能驾驶挑战赛上荣获自动紧急制动辅助系统（AEB）的领先奖。他还担任国际自动化与智能技术会议的国际程序委员会委员，并受邀担任 2023 年第六届国际机械工程与应用复合材料会议的演讲嘉宾。

冯吉伟，工学博士，聊城大学机械与汽车工程学院讲师，2024 年 12 月毕业于东南大学机械工程学院，师从殷国栋教授。目前主要研究领域包括车辆动力学与底盘动态协调控制、人机协同控制、车路协同控制以及自主决策与运动控制等方向，主持山东省自然科学基金青年项目 1 项，博士科研基金项目 1 项，获批山东省科技型中小企业创新能力提升项目 1 项，作为项目成员申请国家自然科学基金面向项目 2 项。在国际期刊和会议论文集上发表了 20 多篇论文；同时申请受理或授权发明专利 10 余件，在国内外顶级学术会议上进行口头汇报 4 次并获最佳会议论文 2 篇；此外，兼任 IEEE TTE、IEEE TIV 及 Energy 等国内外期刊审稿人。

徐广飞，工学博士，聊城大学机械与汽车工程学院讲师、硕士生导师，中国农业机械学会拖拉机分会委员、中国农业工程学会新能源农业装备工程专业委员会委员、中国农业机械学会及中国农业工程学会会员、山东省汽车工程学会会员、山东省农业机械学会会员、山东双力企业“科技副总”，主要从事拖拉机和车辆无人驾驶相关技术研究，主持一项山东省自然科学基金青年项目。发表 SCI/EI 论文 10 余篇，授权 5 项国家发明专利。2021 年荣获 WILEY 最高下载量论文奖，2022 年获山东省机械工业科学技术奖一等奖，2023 年获泰山农机科学技术奖二等奖，2024 年获山东省机械工业科学技术奖一等奖。

王发安，2022 年毕业于中国东南大学机械工程专业，获博士学位。现任昆明理工大学现代农业工程学院助理教授。主要研究方向为智能网联车辆协同定位、多源信息融合、协同控制等。

武健于 2015 年获得南京航空航天大学车辆工程博士学位，2016 年至 2018 年在清华大学开展了两年博士后研究，他目前是聊城大学的教授。在国际期刊和会议论文集上发表了 50 多篇论文，拥有 10 多项有关车辆系统动力学及控制的专利。他的研究兴趣包括人车系统动力学，人车自动化协作和共享控制。

特邀专题简介

随着智能交通和人工智能的发展，车辆自动化已成为改善交通安全和减轻驾驶员工作负担的有效方法。由于复杂的交通环境和法律问题，完全自动驾驶汽车在不久的将来很难实现。智能汽车的自动化水平在完全自动化之前仍处于人机共享阶段。人为因素问题是共享控制系统设计的关键，以确保车辆安全和驾驶员对辅助系统的接受度。此外，由于有人驾驶汽车（HDV）和自动驾驶汽车（AV）的共存，多车系统中的人机交互问题也是影响智能交通系统效率和安全性的重要因素。由于人类代理的意图和行为的随机性和多变性，这些场景带

来了严重的安全挑战，因此需要估计其先验未知的轨迹并将其集成到规划算法中。最近的一些研究已经意识到了这一点，并利用驾驶员-车辆动力学建模、车辆-行人博弈控制和风险评估技术开发了许多方法。尽管如此，驾驶员对交通流风险感知的特征仍需进一步探索，以增强机器对人类行为的准确理解。重型货车与自动驾驶汽车之间的博弈互动需要准确的风险感知预测。在人类社会行为的互动下，如何优化自动驾驶汽车的行为也是提高交通系统安全性和智能化水平的重要技术。我们希望以此次会议为基础，吸收和贡献智能交通领域的优秀见解，推动新时代智能交通的发展。

本特邀专题邀请以下与“人机混驾交通系统交互行为建模、优化与决策控制”主题相关的包含创新思想、概念、新发现、改进以及新应用的原创论文。

- 自动驾驶汽车的人为因素优化
- 智能汽车的人机动力学建模
- 交叉路口行人-车辆社会动力学建模
- 混合交通流中的风险感知预测
- 人类（驾驶员、行人）行为意图预测与风险评估
- 协作车辆
- 高级驾驶辅助系统
- 人工智能和机器学习在人车系统中的应用
- 多车系统中的人机博弈控制
- 安全可靠的自动驾驶算法

IEEE ICUS 2025
Invited Session Summary

Title of Session

Modeling, Optimization and Game Control of Human-Machine Interaction Behavior in Intelligent Transportation Systems

Organizers

1. Dr. Jinhao Liang
National University of Singapore, Singapore

2. Dr. Jiwei Feng
Liaocheng University, China

3. Dr. Guangfei Xu
Liaocheng University, China

4. Dr. Faan Wang
Kunming University of Science and Technology, China

5. Prof. Jian Wu
Liaocheng University, China

Biosketches of Organizers

Dr. Jinhao Liang is currently a Research Fellow with Department of Civil and Environmental Engineering, National University of Singapore, Singapore. His research interests have focused on the vehicle dynamics and control, connected and autonomous vehicles, electric vehicles, vehicle-road cooperative control, etc. Moreover, Dr. Jinhao liang has published more than 50 papers in Journals and proceedings of international conferences. 10+ patents on Vehicle System dynamics and control. He won the Leading Prize for Autonomous Emergency Braking (AEB) assistance system at the 1st World Intelligent Driving Challenge. He serves as a member of the international program committee for the 2024 International Conference on Automation and Intelligent Technology. Moreover, he is an invited speaker at the 2023 6th International Conference on Mechanical Engineering and Applied Composite Materials.

Jiwei Feng, Ph.D. in Engineering, Lecturer at the School of Mechanical and Automotive Engineering, Liaocheng University. Graduated in December 2024 from the School of Mechanical Engineering, Southeast University, under the guidance of Professor Yin Guodong. His current research focuses on vehicle dynamics and chassis dynamic coordination control, human-machine

collaborative control, vehicle-road collaborative control, autonomous decision-making, and motion control. He has led one Shandong Provincial Natural Science Foundation Youth Project and one Doctoral Research Fund Project, secured one Shandong Provincial Science and Technology SME Innovation Capacity Enhancement Project, and participated as a team member in two National Natural Science Foundation of China (NSFC) Oriented Projects. He has published over 20 papers in international journals and conference proceedings, filed or obtained more than 10 invention patents, delivered 4 oral presentations at top-tier international conferences, and received 2 best paper awards. Additionally, he serves as a reviewer for international journals including TTE, TIV, and Energy.

Guangfei Xu, Ph.D. in Engineering, Lecturer and Master's Supervisor at the School of Mechanical and Automotive Engineering, Liaocheng University. Member of the Tractor Branch of the Chinese Society of Agricultural Machinery, Member of the New Energy Agricultural Equipment Engineering Committee of the Chinese Society of Agricultural Engineering, Member of both the Chinese Society of Agricultural Machinery and the Chinese Society of Agricultural Engineering, Member of the Shandong Society of Automotive Engineering, Member of the Shandong Society of Agricultural Machinery, and “Vice President of Science and Technology” at Shandong Shuangli Enterprise. Primarily engaged in research on tractor and vehicle autonomous driving technologies, he has led one Shandong Provincial Natural Science Foundation Youth Project. He has published over 10 SCI/EI papers and holds 5 authorized national invention patents. In 2021, he received the WILEY Highest Downloaded Paper Award. In 2022, he was awarded the First Prize of Shandong Provincial Machinery Industry Science and Technology Award. In 2023, he received the Second Prize of Taishan Agricultural Machinery Science and Technology Award. In 2024, he was honored with the First Prize of Shandong Provincial Machinery Industry Science and Technology Award.

Faan Wang, received Ph.D. degree in mechanical engineering from Southeast University, Nanjing, China, in 2022. He is currently an Assistant Professor with the Faculty of Modern Agriculture Engineering, Kunming University of Science and Technology, Kunming. His current research interests include cooperative localization, multi-source information fusion, and coordinated control of intelligent networked vehicles.

Jian Wu received the Ph.D. degree in Vehicle Engineering from Nanjing University of Aeronautics and Astronautics in 2015, and did two years research at Tsinghua University as a postdocor from 2016 to 2018. He is a Professor at Liaocheng University. Prof. Jian Wu has published more than 50 papers in Journals and proceedings of international conferences. 10+ patents on Vehicle System dynamics and control. His research interests include driver-vehicle system dynamics, driver-vehicle automation collaboration and shared control.

Details of Session

With the development of intelligent transportation and artificial intelligence, the vehicle automation has become an effective approach to improve traffic safety and reducing driver workload. Due to the complex traffic environment and legal issues, fully autonomous vehicles will be difficult to realize in the near future. The automation level of intelligent vehicles remains in the human-machine shared stage before full automation. Human factor issues are key to the design of shared control systems to ensure vehicle safety and driver acceptance of assistance systems. Furthermore, due to the coexistence of human-driven vehicles (HDVs) and autonomous vehicles (AVs), human-machine interaction issues in multi-vehicle systems are also important factors affecting the efficiency and safety of intelligent transportation systems. These scenarios pose serious security challenges due to the randomness and variability of human agents' intentions and behaviors, thus requiring their a priori unknown trajectories to be estimated and integrated into planning algorithms. Some recent works have been aware of this and develop many methods with the driver-vehicle dynamics modeling, vehicle- pedestrian game control, and risk evaluation technique. Nevertheless, the characteristics of drivers' risk perception of traffic flow still need to be further explored to enhance the machine's accurate understanding of human behavior. The gaming interaction between HDVs and AVs requires accurate risk-aware prediction. Under the interaction of human social behavior, how to optimize the actions of autonomous vehicles is also an important technology to improve the safety and intelligence level of the transportation system. Based on this session, we want to absorb and contribute excellent insight in ITS, and promote the development of intelligent transportation in new era.

The invited session invites original papers of innovative ideas and concepts, new discoveries and improvements, and novel applications relevant to the following selected topics of "Modeling, Optimization and Game Control of Human-Machine Interaction Behavior in Intelligent Transportation Systems".

- Human Factor Optimization for Autonomous Vehicles
- Human-machine Dynamics Modeling for Intelligent Vehicles

- Pedestrian-Vehicle Social Dynamics Modeling at Intersections
- Risk-Aware Prediction in a Mix Traffic Flow
- Human (Driver, Pedestrian) Behavioral Intention Prediction and Risk Assessment
- Cooperative Vehicles
- Advanced Driver Assistance Systems
- Application of AI and Machine Learning for Driver-Vehicle System
- Human-Machine Game Control in a Multi-Vehicle System
- Safe and Trustworthy Autonomous Driving Algorithm