2024 年第七届 IEEE 国际无人系统大会

特邀专题简介表

特邀专题名称

限定场景无人驾驶技术与应用

组织者

1. 王亚飞，副教授，上海交通大学

2. 陈志军，教授，武汉理工大学

3. 边有钢，副教授，湖南大学

4. 赵鑫鑫，副教授，北京科技大学

个人简介

王亚飞：上海交通大学机械与动力工程学院副教授/博导，国家级高层次青年人才、交通运输部青年拔尖人才。研究方向为无人驾驶矿车、车路协同感知定位。现任上海交通大学智能网联电动汽车创新中心副主任、机械与动力工程学院智能汽车研究所书记。主持科技部重点研发计划课题、国家自然科学基金和企事业单位合作项目 40 余项，发表论文 100 余篇，申请/授权国内外发明专利 50 余项。现任《IEEE Vehicular Technology Magazine》副主编、《汽车工程学报》青年编委、《汽车工程》青年编委、中国汽车工程学会青委会副秘书长等职。

陈志军：博士，教授，现担任武汉理工大学智能交通中心交通信息与智能系统所副所长，IEEE Transactions on Intelligent Transportation Systems、Transportation Research Part F 等交通领域国际期刊审稿人。自 2011 年起作为主要完成人参与我国第一个车路协同项目“863 计划项目车路交互式行车安全系统关键技术”，主持参与国家自然科学基金、国家自然科学基金重点项目等国家级车路协同、车联网和智能汽车项目 10 余项。目前主持国家自然科学基金 2 项、国家重点研发计划子课题 1 项、湖北省科技重大专项子课题 1 项、中国工程院咨询项目子课题 1 项、中央高校基本科研业

务费专项资金项目 3 项、企业合作项目 10 余项。在 IEEE Transactions on Intelligent Transportation Systems 、Journal of Intelligent Transportation Systems、Accident Analysis and Prevention、Knowledge-Based Driving Decision Method 等交通领域的期刊上发表学术论文 60 余篇，授权发明专利 20 余项、软件著作权 12 项、出版著作 2 篇。

边有钢：湖南大学机械与运载工程学院副教授/博士生导师，整车先进设计制造技术全国重点实验室学术骨干，国家级高层次青年人才。现任湖南省制造业创新中心（智能运载系统）副主任、湖南大学无锡智能控制研究院技术总监。致力于智能控制、协同控制及其在道路/水下运载装备运动控制中的应用，主持国家自科基金、国防基础科研、湖南省科技重大专项等项目/课题 10 余项，发表学术论文 80 余篇，授权发明专利 30 余项。担任中国汽车工程学会汽车智能交通分会青年学术专家组专家。

赵鑫鑫:北京科技大学副教授。2009 年和 2015 年分别获得北京科技大学车辆工程学士学位和机械工程博士学位，博士期间赴加拿大滑铁卢大学访学，现为北京科技大学车辆工程系副教授。主要研究方向为大功率工程车辆动力系统与控制、高效传动系统建模与控制、先进混合动力能量管理控制。主持国家自然科学基金 2 项，江苏省博士后基金项目 1 项，参与国家重点研发计划、省部级科技项目 10 余项，发表学术期刊论文 20 余篇，获江苏省“双创博士后”荣誉称号，曾获中国仿真学会科学技术奖、中共发明协会发明创业成果奖等。

特邀专题简介

在矿山、港口和园区等限定场景下，无人驾驶车辆与其他交通参与者的接触风险较小，因此更加适合自动驾驶技术应用落地。另一方面，限定场景也因为其场景的特殊性，给感知、定位、决策、规划、控制和调度等关键环节带来了挑战。因此，需要针对传感器感知技术、实时决策算法、自主控制系统等开展研究，满足限定场景对功能需求和相关作业规范的要求，实现安全、高效、精准的无人智能化运行，进而加速推动无人驾驶技术在特定场景的落地应用。

本特邀专题邀请以下与“限定场景无人驾驶技术与应用”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。

- 露天矿山、港口、封闭园区等限定场景无人驾驶技术应用落地
- 限定场景下的先进传感器感知技术
- 限定场景下的决策规划技术
- 限定场景下的动力学模型及自主控制系统
- 限定场景下的多车协同技术
- 限定场景下的建图定位技术

IEEE ICUS 2024
Invited Session Summary

Title of Session

Automated Driving Technology and Application in Limited Scenarios

Organizers

1. Assoc. Prof. Yafei Wang

Shanghai Jiao Tong University, China

2. Prof. Zhijun Chen

Wuhan University of Technology, China

3. Assoc. Prof. Yougang Bian

Hunan University, China

4. Assoc. Prof. Xinxin Zhao

University of Science and Technology Beijing, China

Biosketches of Organizers

Yafei Wang is an Associate Professor at Shanghai Jiao Tong University, and he is mainly interested in automated driving for special vehicles, vehicle-road collaboration and positioning technologies. His research is funded by MOST, NSFC, JKW, and industrial collaborators, and he published over 100 papers. He is currently an Associate Editor of IEEE Vehicular Technology Magazine, Youth Editor of "Automotive Engineering" and "Journal of Automotive Engineering", he also serves as Vice Secretary General of the Youth Committee of the Chinese Society of Automotive Engineering, Member of the Vehicle Control and Intelligence Committee of the Chinese Society of Automation, and Member of the Intelligent Driving Committee of the Chinese Society of Artificial Intelligence.

Zhijun Chen, Professor, Ph.D., currently serves as the Deputy Director of the Institute of Traffic Information and Intelligent Systems, Intelligent Transportation Systems Research Center, Wuhan University of Technology., and reviewer for IEEE Transactions on Intelligent Transportation Systems, Transportation Research Part F and other international journals in the field of transportation. Since 2011, he has participated in the first Cooperative Vehicle Infrastructure System project in China: the key technology of vehicle-road interactive driving safety system

of the 863 programs, and he has participated and presided over more than 10 national projects on vehicle-road collaboration, vehicle networking and intelligent vehicles, such as the National Natural Science Foundation of China (NSFC) and the Key Project of NSFC. At present, he has presided over 2 projects of National Natural Science Foundation of China, 1 sub-project of National Key R&D Program, 1 sub-project of Hubei Provincial Science and Technology Major Project, 1 sub-project of Chinese Academy of Engineering Consulting Project, 3 projects of Central Universities Basic Research Business Fund, and more than 10 projects of enterprise cooperation. He has published more than 60 academic papers in journals of transportation field such as IEEE Transactions on Intelligent Transportation Systems, Journal of Intelligent Transportation Systems, Accident Analysis and Prevention, Knowledge-Based Driving Decision Method, etc. He has authorized more than 20 invention patents, 12 software copyrights and published 2 academic monographs.

Yougang Bian is an Associate Professor/PhD Supervisor with College of Mechanical and Vehicle Engineering of Hunan University. He received the B.E. and Ph.D. degrees from Tsinghua University, Beijing, China, in 2014 and 2019, respectively. He was a visiting scholar with the Department of Electrical and Computer Engineering, University of California at Riverside, from 2017 to 2018. His research interests include distributed control, cooperative control, and their applications to connected and automated vehicles. He is a recipient of the Best Paper Award at the 2017 IEEE Intelligent Vehicles Symposium

Xinxin Zhao, Associate professor. In 2009 and 2015, she received the bachelor's degree in vehicle engineering and Doctor's degree in Mechanical Engineering from University of Science and Technology Beijing respectively. During the doctoral period, she went to the University of Waterloo as a visiting student. She is now an associate professor in the Department of Vehicle Engineering of University of Science and Technology Beijing. Her research interests include power system design and control for construction vehicle, high-efficiency powertrain system modeling and control, and advanced hybrid power energy management and control. She has hosted National Natural Science Foundation projects, Jiangsu Province Postdoctoral Fund project, and participated in more than 10 National key research and development plan and provincial and ministerial science and technology projects. She published more

than 20 academic journal papers, won the honorary title of Jiangsu Province "Double Innovation postdoctoral", and won the Science and Technology Award of China Simulation Society and the Invention and Entrepreneurship Achievement Award of China Invention Association.

Details of Session

In limited scenarios such as mines, ports, and parks, unmanned vehicles have a lower risk of contact with other traffic participants, making them more suitable for the application of autonomous driving technology. On the other hand, limited scenarios bring challenges to perception, positioning, decision-making, planning, control and scheduling, due to their unique nature. Therefore, it is necessary to study sensor sensing technology, real-time decision-making algorithm, autonomous control system, etc., to meet the requirements of functional requirement and relevant operation specifications for limited scenarios, achieve safe, efficient and accurate unmanned intelligent operation, and further accelerate the application of automated driving technology in limited scenarios.

This special session invites the following original papers related to the theme of "Automated Driving Technology and Application in Limited Scenarios", including innovative ideas, concepts, new discoveries, improvements and new applications:

- Implementation of autonomous driving technology applications in limited scenarios such as open-pit mines, ports, industrial zones, and underground areas
- Advanced sensor sensing technology in limited scenarios
- Decision-making and planning technology in limited scenarios
- Dynamic model and autonomous control system in limited scenarios
- Multi-vehicle collaboration technology in limited scenarios
- Mapping and positioning technology in limited scenarios