2025 第八届 IEEE 国际无人系统大会
特邀专题简介表

特邀专题名称
无人系统的自主定位、建图与导航

组织者

1.徐阳，助理研究员，浙江大学

2.李亮，研究员，浙江大学

3.李硕，研究员，浙江大学

4.贾泽华，讲师，海南大学

5.柳雄顶，特聘副教授，杭州电子科技大学

个人简介

徐阳，浙江大学控制学院助理研究员/博士后，浙江大学博士，悉尼科技大学 CSC 联合培养博士，入选 2024 年中国博士后创新人才支持计划（"博新计划"）。主要从事机器人 SLAM 与规控研究，近年来以第一作者在机器人领域国际权威刊物 IEEE Trans./RA-L/ICRA/IROS 等发表论文十余篇，授权国家发明专利 3 项，主持国家自然科学基金青年项目、中国博士后科学基金面上资助等项目，参与科创 2030-新一代人工智能重大项目、国家重点研发计划、NSFC 联合重点/面上等多项国家级项目。担任机器人权威会议 IEEE ICRA 和 IEEE RO-MAN 编委，ICUS 2024 PC Member、ICRA 2024 分会场主席等，担任十余个主流刊物审稿人，现为中国自动化学会共融机器人专委会委员，中国指挥与控制学会集群智能与协同控制专委会委员。

李亮，浙江大学百人计划研究员、博士生导师，入选国家高层次青年人才计划，浙江大学启真优秀青年学者，2013 年本科毕业于哈尔滨工业大学，2018 年获上海交通大学博士学位。2019 年至 2022 年分别在荷兰埃因霍温理工大学、英国伦敦大学学院从事博士后研究工作。主要研究方向为移动机器人、无人驾驶、SLAM 中的特征提取、特征匹配、位姿图优化、多传感器融合等研究。作为核心成员曾参与 Drive4All、Frontiers in Autonomous Systems

Technology(FAST)、GIFT-Surg 等无人车/机器人项目多项，主持国家自然基金项目、国家重点研发计划重点专项课题、CCF-腾讯犀牛鸟基金。在机器人领域权威期刊 IEEE T-RO、RAL、TIP 等发表论文二十余篇，担任智能车领域旗舰期刊 IEEE Transactions on Intelligent Transportation Systems 编委、ICRA/IROS 等机器人领域权威会议 Associate Editor。

李硕，浙江大学百人计划研究员、博士生导师，2013 年和 2016 年本、硕毕业于西北工业大学，2020 年博士毕业于荷兰代尔夫特理工大学航空工程系（师从 Prof. Guido de Croon），2020 年至 2021 年于英国爱丁堡大学担任博士后研究员（合作导师 Prof. Michael Mistry），2022 年加入浙江大学控制科学与工程学院"网络传感与控制"课题组。目前的研究方向为微小无人机（群）在不确定环境下的高速飞行、四足机器人和无人机群在不确定环境中的协同探索等。长期致力于研究计算资源受限下的微小无人机（MAV）自主竞速，2019 年开发出 72g 自主竞速无人机并被包括 IEEE Spectrum 在内的多家媒体报道，2016 年获 IROS 自主竞速无人机比赛第二名，以第一作者/通讯作者在 JFR、RAS、ICRA 等发表多篇论文，长期担任 TRO、JFR、RAL、RSS、ICRA、IROS 等期刊/会议审稿人。

贾泽华，海南大学人工智能系副系主任，讲师，硕士生导师，海南省高层次人才。2017 年于中南大学获学士学位，2023 年于上海交通大学自动化系获博士学位（导师：张卫东教授），2021-2022 年于加拿大维多利亚大学进行联合培养（导师：施阳教授）。长期从事海洋无人系统自主控制与协同等相关研究，近年来在国际权威期刊 IEEE TCYB、IEEE TVT、OE 等期刊发表学术论文 20 余篇，授权国家发明专利 5 项。曾获福建省科技进步一等奖、中国航海学会科技进步一等奖等，受邀担任多个国际会议分会主席，担任 IEEE TIE、IEEE TII、IEEE TITS、IEEE TCST、IEEE JAS、Ocean Engineering 等多个主流期刊/会议审稿人，现为《无人系统技术》青年编委，中国自动化学会、中国航海学会会员。

柳雄顶，杭州电子科技大学特聘副教授，硕士生导师。2024 年博士毕业于华南理工大学自动化科学与工程学院，同年入职杭州电子科技大学自动化学院（人工智能学院）。主要研究领域为多智能体系统协同控制，随机系统控制，网络化系统控制。主持浙江省自然科学基金/浙江省省属高校基本科研业务费项目和横向项目 3 项，参与浙江省重点项目和横向项目多项。在 IEEE Transactions on Control of Network Systems, IEEE Transactions on Systems, Man, and Cybernetics: Systems, International Journal of Robust and Nonlinear Control, Applied Intelligence 等杂志发表论文 20 余篇。担任 IEEE Transactions on Control of Network Systems, International Journal of Robust and Nonlinear Control 等多个国际期刊的审稿人，现为 IEEE 会员，中国自动化学会会员。

特邀专题简介

　　随着近年来人工智能技术的快速发展，地面机器人、无人机、无人潜航器等无人系统愈发智能化和自主化，而无人系统面临的任务场景和作业环境也愈发复杂多变，对无人系统的自主环境感知能力，尤其是对自主定位、环境地图构建和自主导航能力提出了更高要求，这也成为国内外无人系统领域的研究热点和难点。在此背景下，本专题将着重探讨无人系统同步定位与建图（SLAM）和导航等相关理论与技术的最新进展，从无人系统的单体智能到多体协同，从常规环境到未知复杂环境，从传统方法到数据驱动，乃至视觉语言导航方法，旨在促进无人系统自主定位、建图与导航等新技术、新研究及相关行业应用。

　　本特邀专题邀请以下主题相关的新思想、新概念、新发现、改进以及新应用的原创学术论文，包括但不限于：

- 无人系统的定位与建图（视觉、激光、声学等）

- 无人系统的环境自主探索

- 无人系统的多机协同 SLAM

- 无人系统的感知-规控一体化

- 无人系统自主路径规划

- 大模型驱动的自主感知与导航

- 视觉语言导航 (VLN)

Title of Session
Autonomous Localization, Mapping and Navigation of Unmanned Systems

Organizers

1. Dr. Yang Xu

   Zhejiang University, China

2. Prof. Liang Li

   Zhejiang University, China

3. Prof. Shuo Li

   Zhejiang University, China

4. Dr. Zehua Jia

   Hainan University, China

5. Dr. Xiongding Liu

   Hangzhou Dianzi University, China

Biosketches of Organizers

Dr. Yang Xu has been an assistant researcher and postdoctoral fellow at the College of Control Science and Engineering, Zhejiang University, since 2023. He obtained his Ph.D. from Zhejiang University in 2023 and was a joint Ph.D. student at the University of Technology Sydney, Australia. His primary research focuses on robotic SLAM, exploration, and path planning. He has published over ten papers in leading robotics journals such as IEEE Trans./RAL/ICRA/IROS. He has led several research projects granted by NSFC and China Postdoctoral Foundation, and participated in several national projects, including the Science and Technology Innovation 2030 Major Project and NSFC joint key/general projects. He has served as the Associate Editor for IEEE ICRA (2025), RO-MAN (2024/2025), and session chair/co-chair for ICRA 2024 and ICUS 2024. He is also a reviewer for over 20 mainstream journals. He was the recipients of the 2024 China Postdoctoral Innovation Talents Support Program and Zhejiang University Academic Rising Star Program for Ph.D. students.

Prof. Dr. Liang Li is a Hundred Talents Program researcher and Ph.D. supervisor at Zhejiang University. He is a recipient of the National High-Level Young Talent Program and the Qi Zhen Outstanding Young Scholar at Zhejiang University. He received his bachelor's degree from Harbin Institute of Technology in 2013 and his Ph.D. from Shanghai Jiao Tong University in 2018. From 2019 to 2022, he conducted postdoctoral research at Eindhoven University of Technology in the Netherlands and University College London in the UK. His primary research areas include mobile robotics, autonomous driving, feature extraction and matching in SLAM, pose graph optimization, and multi-sensor fusion. As a core member, he has participated in several unmanned vehicle/robot projects, including Drive4All, Frontiers in Autonomous Systems Technology (FAST), and GIFT-Surg. He has led projects funded by the National Natural Science Foundation and the CCF-Tencent Rhino-Bird Fund. He has published over twenty journal and conference papers, with several first-author papers in leading robotics journals such as IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters (RA-L), and IEEE Transactions on Image Processing (TIP). He serves as an Associate Editor for the flagship journal in the intelligent vehicle field, IEEE Transactions on Intelligent Transportation Systems, and as an Associate Editor for major robotics conferences such as ICRA/IROS.

Prof. Dr. Shuo Li, a Hundred Talents Program researcher and doctoral supervisor at Zhejiang University, graduated with a bachelor's and master's degree from Northwestern Polytechnical University in 2013 and 2016. In 2020, he obtained his doctoral degree from the Department of Aeronautical Engineering at Delft University of Technology in the Netherlands (supervisor: Prof. Guido de Croon). From 2020 to 2021, he worked as a postdoctoral researcher at the University of Edinburgh in the UK (co-supervisor: Prof. Michael Mistry). In 2022, he joined the "Network Sensing and Control" research group at the School of Control Science and Engineering, Zhejiang University. His current research involves high-speed flight of small unmanned aerial vehicles (UAVs) in uncertain environments, collaborative exploration of quadruped robots and UAV swarms in uncertain environments, etc. He focuses on the autonomous racing of micro unmanned aerial vehicles (MAVs) under limited computing resources for a long time. In 2019, he

developed a 72g autonomous racing drone, which was reported by multiple media outlets including IEEE Spectrum. In 2016, he won second place in the IROS autonomous racing drone competition. As the first author/corresponding author, he has published multiple papers in JFR, RAS, ICRA, and has served as a reviewer for journals/conferences such as TRO, JFR, RAL, RSS, ICRA, and IROS.

Dr. Zehua Jia received the B.Eng. degree in detection, guidance, and control techniques from Central South University, Changsha, China, in 2017, and the Ph.D. degree in control science and engineering from Shanghai Jiao Tong University, Shanghai, China, in 2023. He is currently a lecturer with the School of Information and Communication Engineering, Hainan University, Haikou, China. From 2021 to 2022, he was a visiting scholar at the Department of Mechanical Engineering, University of Victoria, BC, Canada. His research interests include model predictive control, nonlinear control, and cooperative control with applications to intelligent marine systems. He has published more than 20 academic papers in international authoritative journals such as IEEE TCYB, IEEE TVT, OE, etc., and authorized 5 national invention patents. He was awarded the first prize of Fujian Provincial Science and Technology Progress Award, the first prize of China Navigation Society Science and Technology Progress Award, etc., and has served as the session chair for multiple international conferences and a reviewer for multiple journals/conferences such as IEEE TIE, IEEE TII, IEEE TITS, IEEE TCST, IEEE JAS, Ocean Engineering, etc. Currently, he is a young editorial board member of Unmanned Systems Technology and a member of CAA and CIN.

Dr. Xiongding Liu is an associate professor and master's supervisor at Hangzhou University of Electronic Science and Technology. He received his Ph.D. degree from the School of Automation Science and Engineering, South China University of Technology in 2024, and then joined the School of Automation (School of Artificial intelligence) of Hangzhou Dianzi University. His main research fields are cooperative control of multi-agent systems, stochastic system control and networked system control. He has conducted over three research projects, including Zhejiang Natural Science Foundation, the Fundamental Research Funds for the Provincial Universities of Zhejiang, and participated in the Zhejiang Province Science Foundation key projects. He has published more than 20 papers,

such as IEEE Transactions on Control of Network Systems, IEEE Transactions on Systems, Man, and Cybernetics: Systems, International Journal of Robust and Nonlinear Control, Applied Intelligence and other journals. He is a reviewer of IEEE Transactions on Control of Network Systems, International Journal of Robust and Nonlinear Control, and now is a member of IEEE and the Chinese Association of Automation.

Details of Session

In recent years, with the rapid development of artificial intelligence technologies, unmanned systems such as ground robots, drones, and unmanned underwater vehicles have become increasingly intelligent and autonomous. The task scenarios and operational environments faced by these unmanned systems have also become more complex and dynamic. This has imposed higher requirements on the autonomous environmental perception capabilities of unmanned systems, particularly in terms of autonomous localization, environmental mapping, and navigation. These challenges have emerged as prominent research hotspots and difficulties within the field of unmanned systems, both domestically and internationally. Against this backdrop, this invited session will focus on the latest advancements in theories and technologies related to Simultaneous Localization and Mapping (SLAM) and navigation for unmanned systems. Topics will span from the intelligence of individual unmanned systems to multi-agent coordination, from conventional environments to unknown complex environments, and from traditional methods to data-driven, even Visual Language Navigation (VLN) approaches. The aim of this invited session is to promote new technologies, research, and applications in autonomous localization, mapping, and navigation of unmanned systems.

We invite original academic papers presenting new ideas, concepts, discoveries, improvements, and applications related to the following topics, including but not limited to:

- Localization and mapping of unmanned systems (vision/laser/acoustic, etc.)

- Autonomous exploration of unmanned systems

- Multi-agent collaborative SLAM of unmanned systems

- Perception-action integration of unmanned systems

- Path planning of unmanned systems

- Large Language Model-driven autonomous perception and navigation

- Visual Language Navigation (VLN)