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

感知驱动的智能自主机器人运动规划与控制

组织者

1. 刘向阳，讲师，合肥工业大学
2. 冒建亮，副教授，上海电力大学
3. 苏金亚，教授，东南大学
4. 杨　俊，博士，香港科技大学（广州）

个人简介

刘向阳，合肥工业大学讲师。2016 年 6 月获中国地质大学（武汉）自动化专业学士学位，2022 年 6 月获东南大学控制科学与工程专业博士学位，2022 年 7 月至 2026 年 1 月就职于华为技术有限公司中央研究院，2026 年 1 月入职合肥工业大学自动化系。目前，在 IEEE 汇刊、Automatica 等国际刊物发表学术论文多篇，授权国家发明专利多项。研究方向为抗干扰控制、预测控制、机器人视觉伺服系统。

冒建亮，上海电力大学副教授，江苏省科技副总、江苏省“双创博士”。分别于 2011 年、2014 年和 2018 年在东南大学获得自动化专业学士学位、控制工程硕士学位和控制理论与控制工程博士学位。主要研究方向为模型预测控制、强化学习、视觉交互控制及其在机器人系统中的应用。主持国家自然科学基金、上海市科委项目，以及国家电网、南方电网产学研合作项目等科研项目 9 项。以第一作者或通讯作者在 TRO、TCST、TIE、TCYB 等期刊发表 SCI 论文 16 篇；获授权国家发明专利 23 项、美国发明专利 1 项，参编机器人巡检行业标准 2 项。现任 Intelligence & Robotics 和 AI and Autonomous Systems 期刊青年编委。

苏金亚，东南大学青年首席教授、博士生导师，国家级青年人才，首届江苏青年科技人才U35培育学者，斯坦福全球前2%科学家榜单学者，小米青年学者。2016年博士毕业于英国拉夫堡大学（师从陈文华教授），随后在拉夫堡大学、埃塞克斯大学、阿伯丁大学先后任博士后、讲师、高级讲师。主要研究方向为AI在自主无人系统智能规划与控制的应用，主持10余项项目，发表学术论文110篇，其中SCI期刊论文70余篇，IEEE ICRA/IROS/CDC等旗舰会议40余篇，谷歌学术引用超过5000次，获Unmanned Systems等7篇最佳论文奖。担任Engineering青年编委、PRECEDE2025技术委员会主席、美国控制会议PC成员。

杨俊，香港科技大学（广州），IET Fellow，AAIA Fellow。2006年获东北大学自动化专业学士学位，2011年获东南大学控制理论与控制工程专业博士学位。2011年至2020年，历任东南大学自动化学院讲师、副教授、教授。2020至2026年，历任英国拉夫堡大学航空与汽车工程系高级讲师、准教授。现就职香港科技大学（广州）机器人与自主系统系。主要研究方向有扰动观测器、运动控制、机电一体化、机器人技术及自动化。曾获英国工程与物理科学研究委员会（EPSRC）新研究者奖。担任IEEE TAC/TIE/TMECH等国际刊物的AE/TE。

特邀专题简介

当前，机器人技术发展快速，在无人系统得到广泛应用。然而，机器人在复杂、动态、非结构化环境中，仍面临感知精度不足、环境适应性薄弱、控制性能欠佳等突出瓶颈，难以满足极端场景下的高精度作业、自主避障、实时响应等需求，技术突破与行业交流已成为迫切需求。自主智能机器人的感知与控制能力，是其实现自主决策、灵活适配、高效执行的核心支撑，直接决定无人系统的作业效能与应用边界，尤其在复杂场景中，二者的协同优化更是破解应用痛点的关键。基于此，特举办本专题报告，其目的在于聚焦感知与控制核心技术，汇聚行业专家分享前沿成果，搭建技术交流与成果共享平台，探索技术优化路径，推动技术落地与创新升级。本专题报告有利于

提升机器人自主运行能力，为无人系统领域应用提供关键技术支撑。

本特邀专题旨在邀请“感知驱动的智能自主机器人运动规划与控制”主题的原创研究论文，特别关注创新思想、控制算法、理论分析以及应用实例等方面的研究进展，推动机器人技术在无人系统中更好应用。

- “机理+数据”驱动的机器人系统建模
- 基于传感器融合的自主机器人导航与运动规划
- 自主智能机器人强化学习与自适应控制
- 复杂环境下自主智能机器人抗干扰控制
- 智能自主机器人智能决策、规划与避障
- 非结构化环境下的人机交互
- 智能自主机器人安全与防护机制
- 智能自主机器人系统应用研究

IEEE ICUS 2026
Invited Session Summary

Title of Session

Perception-Driven Planning and Control of Intelligent Autonomous Robots Motion

Organizers

1. **Dr. Xiangyang Liu**
   Hefei University of Technology, China
2. **Assoc. Prof. Jianliang Mao**
   Shanghai University of Electric Power, China
3. **Prof. Jinya Su**
   Southeast University, China
4. **Dr. Jun Yang**
   Hong Kong University of Science and Technology (Guangzhou), China

Biosketches of Organizers

Xiangyang Liu is a Lecturer at Hefei University of Technology. He obtained his B.Sc. degree in Automation from China University of Geosciences (Wuhan) in 2016, and his Ph.D. degree in Control Science and Engineering from Southeast University in 2022, and then he joined the Central Research Institute of Huawei Technologies Co., Ltd. From January 2026, he is in the Department of Automation, Hefei University of Technology. He has published some papers in international journals such as IEEE Transactions and Automatica, and holds several invention patents. His research interests include anti-disturbance control, predictive control, robot visual servo system control, etc.

Jianliang Mao is an Associate Professor at Shanghai University of Electric Power. He obtained his B.Sc. degree in Automation, M.Sc. degree in Control Engineering and Ph.D. degree in Control Theory and Control Engineering from Southeast University in 2011, 2014 and 2018 respectively. His research interests focus on model predictive control, reinforcement learning, visual interactive control and their applications in robotic systems. He has presided over 9 scientific research projects including grants from the National Natural Science Foundation of China, Shanghai Science and Technology Commission, and industry-university-research programs sponsored by State Grid and China Southern Power Grid. As the first or corresponding author, he has published 16 SCI papers in IEEE TRO, TCST, TIE, TCYB and other renowned journals. He holds 23 authorized

Chinese invention patents and 1 U.S. invention patent, and has compiled 2 industry standards for robot inspection. He currently acts as a young editorial board member of Intelligence & Robotics and AI and Autonomous Systems.

Jinya Su is a Youth Chief Professor at Southeast University. He is a former Senior Lecturer at the University of Aberdeen and an Honorary Senior Lecturer at the University of Essex. He received his PhD from Loughborough University in 2016 under the supervision of Professor Wen-Hua Chen, and subsequently held research and faculty positions at Loughborough, Essex, and Aberdeen. His research focuses on AI-enabled planning and control for highly autonomous unmanned systems and their applications. He has led more than 10 research projects, published over 110 papers, including more than 70 SCI journal articles and 40+ papers at flagship conferences such as ICRA, IROS, and CDC, with over 5,000 Google Scholar citations. He has received seven best paper awards.

Jun Yang received the B.Sc. degree in automation from the Department of Automatic Control, Northeastern University, Shenyang, China, in 2006, and the Ph.D. degree in control theory and control engineering from the School of Automation, Southeast University, Nanjing, China, in 2011.He was with the School of Automation, Southeast University, as a Lecturer from 2011 to 2014, an Associate Professor from 2014 to 2018, and a Full Professor from 2018 to 2020. From 2020 to 2026, he was with the Department of Aeronautical and Automotive Engineering, Loughborough University, Loughborough, U.K., where he served as a Senior Lecturer and was promoted to Reader in 2023.He is currently with the Robotics and Autonomous Systems Thrust, Systems Hub, The Hong Kong University of Science and Technology (Guangzhou), Guangzhou, China. His research interests include disturbance observer, motion control, mechatronics, robotics, and automation. Dr. Yang was the recipient of the EPSRC New Investigator Award. He is an Associate Editor or Technical Editor for the IEEE Transactions on Automatic Control, the IEEE Transactions on Industrial Electronics, and the IEEE/ASME Transactions on Mechatronics. He is a Fellow of the IET and AAIA.

Details of Session

Currently, robot technology is developing rapidly and has been widely applied in unmanned systems. However, in complex, dynamic and unstructured environments, robots still face prominent bottlenecks such as insufficient perception accuracy, weak environmental adaptability and poor control performance, which are difficult to meet the needs of high-precision operations, autonomous obstacle

avoidance, real-time response and other requirements in extreme scenarios. Technological breakthroughs and industry exchanges have become an urgent need. The perception and control capabilities of autonomous intelligent robots are the core support for them to achieve autonomous decision-making, flexible adaptation and efficient execution, directly determining the operational efficiency and application boundaries of unmanned systems. Especially in complex scenarios, the coordinated optimization of the two is the key to solving application pain points. Based on this, this special report is specially held. Its purpose is to focus on the core technologies of perception and control, gather industry experts to share cutting-edge achievements, build a platform for technical exchange and achievement sharing, explore technical optimization paths, and promote technology landing and innovation upgrading. This special report is conducive to improving the autonomous operation capability of robots and providing key technical support for applications in the field of unmanned systems.

This invited special topic aims to invite original research papers on the theme of "Perception-Driven Planning and Control of Intelligent Autonomous Robots Motion", with special attention to research progress in innovative ideas, control algorithms, theoretical analysis and application examples, so as to promote the better application of robot technology in unmanned systems.

- Robot system modeling driven by "mechanism + data"
- Autonomous robot navigation and motion planning based on sensor fusion
- Reinforcement learning and adaptive control of autonomous intelligent robots
- Anti-disturbance control of autonomous intelligent robots in complex environments
- Decision-making, planning and obstacle avoidance of intelligent autonomous robots
- Human-computer interaction in unstructured environments
- Safety and protection mechanisms of intelligent autonomous robots
- Research on the application of intelligent autonomous robot systems