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

具身智能无人系统：从感知到行动

组织者

1. 周栋，副研究员，哈尔滨工业大学/香港中文大学
2. 邵翔宇，副教授，哈尔滨工业大学
3. 王艳坤，副研究员，哈尔滨工业大学
4. 姚蔚然，教授，哈尔滨工业大学
5. 于忠良，讲师，重庆大学
6. 孙光辉，教授，哈尔滨工业大学

个人简介

周栋，博士，哈尔滨工业大学副研究员。2023 年获哈尔滨工业大学控制科学与工程学科博士学位，目前是哈尔滨工业大学计算学部博士后，香港中文大学机械自动化工程系荣誉博士后。主要从事空间智能感知、深度强化学习、具身智能等领域的研究，主持国自然青年科学基金 1 项、横向项目 4 项，申请国家发明专利 10 余项，获得黑龙江省技术发明二等奖 1 项（排名第三）。目前，已在 IEEE Transactions on Aerospace and Electronic Systems、IEEE Transactions on Instrumentation and Measurement、IEEE Robotics and Automation Letters 等国际权威期刊和会议发表学术论文 30 余篇，担任 Advanced Equipment、Mechatronics Technology 等国际期刊青年编委，ICUS、DDCLS、IJCAI 等国际会议专题主席。

邵翔宇，博士，哈尔滨工业大学航天学院副教授、博士生导师。分别于 2018 年及 2022 年获哈尔滨工业大学硕士学位和博士学位，主要从事空间机器人、软体机器人、双足/人形机器人、分数阶控制及滑模控制相关领域的研究。主持/联合主持国家自然科学基金青年项目、四川省自然科学基金、苏州市揭榜挂帅项目、中国博士后特别资助、中国博士后面上资助、黑龙江省博士后面上资助等

10 余项，参与国家重点研发、国自然重点项目等。目前已在 IEEE/ASME Transactions on Mechatronics、IEEE Transactions on Industrial Electronics、IEEE Robotics and Automation Letters 等国际期刊及会议发表论文 20 余篇，出版英文专著 2 部，申请国家发明专利 10 余项。获黑龙江省“青年科技人才托举工程”、国家资助博士后研究人员计划、黑龙江省优秀博士学位论文、哈尔滨工业大学优秀博士学位论文等荣誉，担任多个国际期刊青年编委、20 余期刊审稿人。

王艳坤，博士、副研究员，分别于 2016 年和 2020 年获东北大学学士学位与硕士学位，2025 年获中国哈尔滨工业大学控制科学与工程系博士学位。其研究方向包括多传感器融合定位与建图及机器人自主导航。获中国创新创业大赛金奖等奖项 10 余项，目前在 Measurement, Information Sciences, IEEE Transactions on Intelligent Vehicles 等期刊和会议发表学术论文 10 余篇，获 4 项国家发明专利。

姚蔚然，博士，哈尔滨工业大学航天学院教授、博士生导师，自主智能无人系统工信部重点实验室副主任，国家级高层次青年人才，中国科协"青年人才托举工程"入选者，黑龙江省“复杂信息架构无人系统”春雁团队带头人，哈工大“启航学者”“青年拔尖人才”入选者。主要研究方向是无人系统自主决策、多机器人任务规划与控制等，发表论文 50 余篇，出版专著 2 部，授权国家发明专利 30 余项。主持国家自然基金面上、青年项目，国家部委基金项目、重大项目子课题，黑龙江省优青项目等，参与国家重点研发计划、自然基金重点项目等。曾获国家技术发明二等奖（4/6）、国家部委技术发明一等奖（4/6）、黑龙江省技术发明二等奖（2/8）等。

于忠良，博士，重庆大学弘深青年教师。长期从事智能机器人感知系统应用、视觉-语言大模型应用。作为项目负责人主持军委科技委联合基金项目、入选国家博士后创新人才支持计划等。发表 IEEE Trans 等国际权威期刊论文 10 余篇，担任 IEEE

Transactions on Aerospace and Electronic Systems/IEEE Transactions on Neural Networks and Learning Systems 等权威期刊审稿人。

孙光辉，男，博士、教授、博士生导师、国家级高层次青年人才。从事视觉伺服控制系统、柔性航天器及滑模控制理论及应用领域的研究。在 Automatica、IEEE Transactions 系列汇刊、AIAA 系列汇刊等权威期刊发表论文 50 余篇；获授权发明专利 40 余项；主持国家自然科学基金等基金 10 余项，获黑龙江省自然科学一等奖和黑龙江省技术发明一等奖各一项。曾担任 Journal of The Franklin Institute 等期刊客座主编，担任国家自然基金、国家重点研发计划项目、香港科技创新项目等项目评审专家。

特邀专题简介

目前，具身智能无人系统正在以其强大的感知与决策能力，引领着下一代技术的发展。如何通过感知系统获取环境信息、如何基于这些信息进行规划与决策，并通过精确的控制系统完成自主行为，已成为研究的关键问题。面对复杂开放环境，具身智能无人系统仍面临许多挑战，包括多模态数据处理、具身大模型开发、动态规划与决策优化等。

本特邀专题旨在聚焦“具身智能无人系统”领域，深入探讨从感知到行动的全流程问题，重点关注具身智能如何推动无人系统在复杂环境中的感知、规划与操控能力的提升。我们诚邀来自学术界与工业界的专家学者，提交与主题相关的原创论文，涵盖以下研究方向：

- 面向开放世界长程任务的自主移动作业机器人
- 多场景任务驱动的灵巧具身无人机
- 动态环境下四足机器人感知、规划与控制
- 微小卫星集群自主作业规划与协同控制
- 面向工业装配的视觉-触觉-语言-动作大模型

IEEE ICUS 2026
Invited Session Summary

Title of Session

Embodied intelligent unmanned System: From Perception to Action

Organizers

1. Assoc. Prof. Dong Zhou
Harbin Institute of Technology & The Chinese University of Hong Kong, China

2. Assoc. Prof. Xiangyu Shao
Harbin Institute of Technology, China

3. Assoc. Prof. Yankun Wang
Harbin Institute of Technology, China

4. Prof. Weiran Yao
Harbin Institute of Technology, China

5. Asst. Prof. Zhongliang Yu
Chongqing University, China

6. Prof. Guanghui Sun
Harbin Institute of Technology, China

Biosketches of Organizers

Dong Zhou, Ph.D., is an Associate Professor at Harbin Institute of Technology. He obtained his Ph.D. in Control Science and Engineering from Harbin Institute of Technology in 2023. Currently, he is a postdoctoral researcher at the School of Computer Science, Harbin Institute of Technology, and an Honorary Postdoctoral Fellow at the Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong. His main research areas include space intelligent perception, deep reinforcement learning, and embodied intelligence. He has led one National Natural Science Foundation of China (NSFC) Youth Science Fund project and four horizontal projects, applied for more than 10 national invention patents, and received the second prize of the Heilongjiang Provincial Technology Invention Award (ranked 3rd). To date, he has published over 30 academic papers in prestigious international journals and conferences, such as IEEE Transactions on Aerospace and Electronic Systems, IEEE Transactions on Instrumentation and Measurement, and IEEE Robotics and Automation Letters. He serves as a youth editorial board member for international journals such as Advanced Equipment and Mechatronics Technology, and has been a session chair for international conferences, including ICUS, DDCLS, and IJCAI.

Xiangyu Shao, Ph.D., received the master's and doctor's degrees in Control Science and Engineering from the school of Astronautics, Harbin Institute of Technology (HIT), Harbin, China, in 2018 and 2022, respecively. From 2021 to 2022, he was a Visiting Scholar with the Department of Cognitive Robotics (3ME), Delft University of Technology, Delft, the Netherland. In 2023, he joined the Department of Control Science and Engineering, HIT, as an Assistant Professor. Since 2025, he has served as an Associate Professor (Qihang Scholar) and doctoral supervisor. He is also a research staff of the Key Laboratory of Autonomous Intelligent Unmanned Systems (AIUS), MIIT, China. His research interests include space robotics, soft robotics, bipedal/humanoid robotics, fractional-order control, and sliding mode control. He has published more that 20 research articles, applied over 10 invention patents.

Yankun Wang, Ph.D., associate researcher, received his bachelor's degree and master's degree from Northeastern University in 2016 and 2020, respectively, and earned his Ph.D. in Control Science and Engineering from Harbin Institute of Technology, China, in 2025. His research focuses on multi-sensor fusion localization, mapping, and autonomous robot navigation. He has won over 10 awards, including the Gold Prize in the China Innovation and Entrepreneurship Competition. To date, he has published more than 10 academic papers in journals and conferences such as Measurement, Information Sciences, and IEEE Transactions on Intelligent Vehicles, and holds 4 national invention patents.

Weiran Yao received the bachelor's (with Hons.), master's, and doctor's degrees in aeronautical and astronautical science and technology from the School of Astronautics, Harbin Institute of Technology (HIT), Harbin, China, in 2013, 2015, and 2020, respectively. From 2017 to 2018, he was a Visiting Scholar with the Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, ON, Canada. In 2020, he joined the Department of Control Science and Engineering, HIT as an Assistant Professor. He was then promoted to an Associate Professor in 2021, and then promoted to a Full Professor in 2024. At present, he is also a research staff of the Key Laboratory of Autonomous Intelligent Unmanned Systems (AIUS), MIIT, China. Yao's research interests include autonomous decision-making of unmanned systems, multi-robot task planning and control, etc. He has published two research monographs and more than 30 research articles. He applied for more than 30 invention patents. In 2022, he was the winner

of the Young Elite Scientist Sponsorship Program by China Association for Science and Technology.

Zhongliang Yu, Hongshen Young Teacher of Chongqing University. He has long been engaged in the application of intelligent robot perception system and the application of visual-linguistic large model. As a project leader, he presided over the joint fund project of Military Science and Technology Commission, and was selected for the Postdoctoral Fellow-ship Program of CPSF. He has published more than 10 papers in international authoritative journals such as IEEE Trans. He serves as a reviewer for IEEE Transactions on Aerospace and Electronic Systems/IEEE Transactions on Neural Networks and Learning Systems.

Guanghui Sun, received the B.S. degree in Automation and the M.S. and Ph.D. degrees in Control Science and Engineering from Harbin Institute of Technology, Harbin, China, in 2005, 2007, and 2010, respectively. He is currently a Professor in the Department of Control Science and Engineering, Harbin Institute of Technology. His research interests include fractional-order systems, nonlinear control systems, visual servo control system, flexible spacecraft, and sliding mode control with its application. He has published more than 50 papers in Automatica, IEEE Trans., AIAA series, et al.

Details of Session

Currently, embodied intelligent autonomous systems are leading the development of next-generation technologies with their powerful perception and decision-making capabilities. How to acquire environmental information through perception systems, how to perform planning and decision-making based on this information, and how to achieve autonomous actions through precise control systems have become key research challenges. In the face of complex, open environments, embodied intelligent autonomous systems still face many challenges, including multimodal data processing, development of large embodied models, and dynamic planning and decision optimization.

This invited session aims to focus on the field of "embodied intelligent autonomous systems," delving into the full process from perception to action. The session will emphasize how embodied intelligence can enhance the perception, planning, and manipulation capabilities of autonomous systems in complex environments. We cordially invite experts and scholars from academia and industry

to submit original papers related to the theme, covering the following research directions:

- Autonomous mobile robotic systems for long-horizon tasks in open-world environments
- Agile embodied drones for multi-scenario task-driven operations
- Perception, planning, and control of quadruped robots in dynamic environments
- Autonomous task planning and collaborative control of micro-satellite swarms
- Vision-tactile-language-action large models for industrial assembly