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

海洋无人系统与具身智能

组织者

1. 彭周华，教授，大连海事大学

2. 刘陆，教授，大连海事大学

3. 崔荣鑫，教授，西北工业大学

4. 李铁山，教授，电子科技大学

个人简介

彭周华，大连海事大学教授，博士生导师，国家高层次青年拔尖人才，船舶导航系统国家工程研究中心副主任，大连市智能船艇集群控制与电气技术重点实验室主任，大连海事大学船舶电气工程学院院长。长期从事智能船舶建模、规划、控制、协同的理论和实践工作。主持承担科技部、基金委、军科委等国家级项目 12 项。在国内外重要学术期刊发表 SCI 论文 190 余篇，谷歌学术 H-指数 62。出版海洋航行器智能控制学术专著 3 部，授权发明专利 80 余项，授权软著权 7 项。以第一完成人获省部级科研奖励 4 项。获全国交通运输系统先进工作者，政府特殊津贴专家，辽宁省“兴辽英才计划”领军人才，交通运输部中青年创新领军人才，香江学者等学术荣誉。

刘陆，大连海事大学教授，博士生导师。面向国家海洋强国战略发展需要，长期致力于无人船制导与控制、多无人船集群协同控制的研究工作。主持国家自然科学基金青年基金项目 B 类、面上项目、青年项目、国家重点研发计划课题子课题等国家级项目 4 项。在海洋工程和控制领域重要期刊上发表 SCI 期刊论文 82 篇，出版无人船控制领域学术专著 3 部；授权国家发明专利 75 项。研究成果获辽宁省自然科学一等奖 1 项，航海学会青年科技奖 1 项，中国海洋工程科学技术一等奖 1 项，教育部自然科学二等奖 1 项，智能交通协会科技进步二等奖 1 项。获全球前 2%顶尖科学家，中国科协青年托举人才，辽

宁省兴辽英才青年拔尖人才，大连市杰出青年科技人才，CACRE 国际会议青年科学家等荣誉。

崔荣鑫，西北工业大学教授，国家级领军人才，某海军型号副总设计师，担任水下信息与控制全国重点实验室副主任，西北工业大学航海学院副院长。主要从事水下潜航器(机器人)自主控制研究以及系统集成等工作。先后主持国家自然科学基金联合基金重点支持项目(2 项)、国家重点研发计划课题、国防基础科研重点项目等国家级项目。以第一/通讯作者发表 SCI 论文 50 余篇，出版学术专著 1 部，授权发明专利 40 余项；担任《IEEE Trans. Neural Networks Leamn. Sys.》、《IEEE Trans. Syst. Man Cybern.-Syst.》等权威 SCI 期刊，以及《机器人》《西北工业大学学报》等国内重要期刊编委；担任中国海洋学会深海技术分会理事、陕西省海洋光学重点实验室学术委员会委员等职务。获得陕西省自然科学一等奖 1 项，陕西省自然科学二等奖 1 项，中国自动化学会自然科学一等奖 1 项，教育部自然科学二等奖 1 项。

李铁山，电子科技大学教授，博士生导师，IEEE 高级会员。长期从事非线性复杂系统智能控制、无人系统集群协同控制以及单/多海洋航行器运动控制等方面的研究工作。在 IEEE 汇刊等国际主流期刊、国内核心期刊及国际会议发表论文 400 余篇，其中 SCI 检索论文超过 200 篇，25 篇入选 ESI 高被引（前 1%）论文。2018 年-2023 年连续入选全球 ESI 高被引科学家。现任《IEEE Transactions on Systems, Man, and Cybernetics: Systems》高级编委、副主编，《哈尔滨工程大学学报》编委。主持国家自然科学基金重点项目 1 项、国家自然科学基金面上项目 4 项、863 计划项目 1 项。获辽宁省自然科学奖一等奖、海洋工程科学技术奖一等奖各 1 项、教育部自然科学奖二等奖 1 项、辽宁省自然科学奖二等奖 2 项等科研奖励。

特邀专题简介

海洋是地球上面积最广、资源最丰富、战略价值最重要的空间之一。随着国家对海洋强国战略的持续推进，海洋无人系统的研究与应用正迎来前所未有

的发展机遇。海洋无人系统涵盖无人水面艇、自主水下航行器、海上无人机及其协同集群等多种平台，在海洋资源勘探、海洋环境监测、水下目标探测、海上安全保障等领域具有广泛的应用前景。然而，海洋环境的高度复杂性与不确定性对无人系统的自主感知、智能决策与精准控制提出了极为严苛的挑战。近年来，具身智能作为新一代人工智能的重要方向，强调智能体通过与物理环境的交互来实现感知、认知与行动的深度融合，为海洋无人系统突破现有局限提供了全新的理论范式与技术路径。将具身智能的感知-决策-执行闭环机制引入海洋无人系统，有望推动系统自主认知能力的跨越式演进，显著提升无人系统在复杂海洋任务中的自适应能力与协同作业效能。

本特邀专题旨在汇聚海洋无人系统与具身智能领域的前沿研究成果，搭建跨学科、跨领域的学术交流平台，共同推动具身智能技术在海洋无人系统中的深度融合与创新应用，为海洋探测、资源开发与国家安全提供重要的理论基础与技术支撑。

本特邀专题诚邀涵盖以下主题的高水平原创论文：

- 面向复杂海洋环境的多模态感知与目标识别
- 海洋无人系统自主决策与任务规划
- 海洋无人平台智能制导与运动控制
- 海上有人/无人协同与人机共融交互
- 多无人海洋系统协同控制与集群智能
- 面向海洋任务的具身智能、大模型与强化学习方法

IEEE ICUS 2026
Invited Session Summary

Title of Session

Marine Unmanned Systems and Embodied Intelligence

Organizers

1. Prof. Zhouhua Peng
Dalian Maritime University, China
2. Prof. Lu Liu
Dalian Maritime University, China
3. Prof. Rongxin Cui
Northwestern Polytechnical University, China
4. Prof. Tieshan Li
University of Electronic Science and Technology of China

Biosketches of Organizers

Prof. Zhouhua Peng currently serves as the Dean of the Marine Electrical Engineering at Dalian Maritime University, and the Director of the Key Laboratory of Dalian Key Laboratory of Swarm Control and Electrical Technology for Intelligent Ships. Professor Peng has been conducting research in the field of modeling, planning, control, and coordination of multiple autonomous surface vehicles/intelligent ships. He has presided over 12 national-level projects. He has published more than 190 SCI papers, with an H-index of 62 in Google Scholar. He has published 3 academic monographs and obtained more than 80 authorized invention patents. Honors include being selected as a National Young Top Talent, an Advanced Worker in the National Transportation System, a recipient of the Special Government Allowance, a Leading Talent of the Xingliao Talent Program in Liaoning Province, and a Leading Innovative Talent in the Ministry of Transport。

Lu Liu is a Professor and doctoral supervisor at Dalian Maritime University. In response to the national strategy for building a powerful maritime nation, she has long been engaged in research on guidance and control of unmanned surface vehicles, as well as cooperative control of multi-vehicle clusters. She has presided over four national-level research projects, including the Young Scientists Fund of the National Natural Science Foundation of China (Category B), General Program, Young Scientists Fund, and sub-projects of the national key R&D

programs. She has published 82 SCI-indexed journal papers in key journals in the fields of ocean engineering and control, and authored 3 academic monographs on unmanned surface vehicle control. A total of 75 national invention patents have been granted. Her research achievements have won numerous awards, including 1 First Prize of Liaoning Provincial Natural Science Award, 1 Young Scientist Award from the Chinese Institute of Navigation, 1 First Prize of China Ocean Engineering Science and Technology Award, 1 Second Prize of the Ministry of Education Natural Science Award, and 1 Second Prize of the Science and Technology Progress Award from the China Intelligent Transportation Systems Association. She has been honored as one of the World's Top 2% Scientists, supported by the Young Talent Support Program of the China Association for Science and Technology, recognized as a Young Top-notch Talent of Liaoning Provincial Xingliao Talents Program, Distinguished Young Scientific and Technological Talent of Dalian City, and Young Scientist of the CACRE International Conference.

Rongxin Cui is a Professor at Northwestern Polytechnical University, a National-level Leading Talent, Deputy Chief Designer of a naval model project, Deputy Director of the National Key Laboratory of Underwater Information and Control, and Deputy Dean of the School of Marine Engineering at NPU. His main research focuses on autonomous control and system integration of underwater vehicles (robots). He has led national-level projects including two NSFC Joint Fund Key Support Projects, a National Key R&D Plan project, and a key national defense basic research project. As first/corresponding author, he has published over 50 SCI papers, authored 1 academic monograph, and holds over 40 authorized invention patents. He serves on the editorial boards of authoritative SCI journals such as IEEE Transactions on Neural Networks and Learning Systems and IEEE Transactions on Systems, Man, and Cybernetics: Systems, as well as domestic journals including Robot and Journal of Northwestern Polytechnical University. He also serves as a council member of the Deep-Sea Technology Branch of the Chinese Society for Oceanography and an academic committee member of the Shaanxi Provincial Key Laboratory of Marine Optics. He has received 1 First Prize of Shaanxi Provincial Natural Science Award, 1 Second Prize of Shaanxi Provincial Natural Science Award, 1 First Prize of Chinese Association of Automation Natural Science Award, and 1 Second Prize of Ministry of Education Natural Science Award.。

Tieshan Li is a Professor and doctoral supervisor at the University of Electronic Science and Technology of China, and a Senior Member of IEEE. His long-term research covers intelligent control of nonlinear complex systems, cooperative control of unmanned system swarms, and motion control of single/multiple marine vehicles. He has published over 400 papers in leading international journals (including IEEE Transactions), domestic core journals, and international conferences, of which more than 200 are SCI-indexed and 25 have been selected as ESI Highly Cited Papers (top 1%). He has been continuously listed as a Global ESI Highly Cited Scientist from 2018 to 2023. He currently serves as Senior Associate Editor and Associate Editor of IEEE Transactions on Systems, Man, and Cybernetics: Systems, and as an editorial board member of Journal of Harbin Engineering University. He has led 1 NSFC Key Project, 4 NSFC General Programs, and 1 National 863 Program project. His awards include 1 First Prize of Liaoning Provincial Natural Science Award, 1 First Prize of Ocean Engineering Science and Technology Award, 1 Second Prize of Ministry of Education Natural Science Award, and 2 Second Prizes of Liaoning Provincial Natural Science Award.

Details of Session

The ocean is one of the most expansive, resource-rich, and strategically significant spaces on Earth. As China continues to advance its maritime power strategy, research and application of marine unmanned systems are entering an era of unprecedented opportunity. Marine unmanned systems encompass a diverse range of platforms, including unmanned surface vessels (USVs), autonomous underwater vehicles (AUVs), maritime unmanned aerial vehicles (UAVs), and their cooperative swarms, with broad application prospects in ocean resource exploration, marine environment monitoring, underwater target detection, and maritime security. However, the high complexity and uncertainty of the marine environment pose extremely demanding challenges to autonomous perception, intelligent decision-making, and precise control of unmanned systems.

In recent years, embodied intelligence, an important direction in next-generation artificial intelligence, has emphasized the deep integration of perception, cognition, and action through an agent's physical interaction with its environment, offering new theoretical paradigms and technical pathways to overcome the existing limitations of marine unmanned systems. Introducing the perception–decision–execution closed-loop mechanism of embodied intelligence into marine unmanned systems holds the promise of driving a leapfrog evolution in autonomous cognitive capabilities and significantly enhancing adaptive capacity and cooperative operational efficiency in complex marine missions.

This session focuses on cutting-edge research results in the fields of marine unmanned systems and embodied intelligence, building an interdisciplinary and cross-domain academic exchange platform to jointly advance the deep integration and innovative application of embodied intelligence technologies in marine unmanned systems, providing important theoretical foundations and technical support for ocean exploration, resource development, and national security.

High-quality original papers are solicited on topics including, but not limited to:

- Multimodal perception and target recognition for complex marine environments
- Autonomous decision-making and mission planning for marine unmanned systems
- Intelligent guidance and motion control of marine unmanned platforms
- Manned/unmanned cooperation and human-machine collaborative interaction at sea
- Cooperative control and swarm intelligence for multiple marine unmanned systems
- Embodied intelligence, large-scale models, and reinforcement learning methods for marine tasks