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

人工智能及其在无人系统中的应用

组织者

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2. 任秀秀，副教授，东北大学

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个人简介

邓超，南京邮电大学碳中和先进技术研究院教授/博士生导师。主要研究方向是分布式容错控制、信息物理系统安全控制以及智能微电网系统二次控制。主持国家自然科学基金青年项目 1 项、江苏省自然科学基金青年项目 1 项；国家优秀青年科学基金（海外）获得者，IEEE Senior Member，以第一作者和通讯作者发表 SCI 论文 40 余篇。目前担任《控制与决策》期刊副主编，并于 2022 年获得国际会议 ICCAR 最佳论文奖。

任秀秀，东北大学信息科学与工程学院副教授/博士生导师。主要研究方向为信息物理系统安全与控制理论、多智能体非合作博弈与安全一致性，具身智能与机器人技术。主持国家自然科学基金青年科学基金项目、辽宁省面上项目等国家级/省部级项目。以第一作者在领域国际顶级 IEEE 汇刊、Automatica 等期刊上发表十余篇论文。受邀担任《Symmetry》等知名学术期刊客座主编。

刘力宁，哈尔滨工程大学副教授/博士生导师。主要研究方向是分布式优化理论与集群导航应用。主持国家自然科学基金青年科学基金项目、海南省自然基金青年项目、黑龙江省博后面上资助、重点实验室开放课题等国家级/省部级项目。以第一作者在领域国际顶级 IEEE 汇刊、IEEE JAS 等期刊上发表十余篇论文。入选中国指挥与控制学会青年人才托举工程，获中国自动化学会研究生论文工程（博士学位论文）奖、2024 IEEE EI2 最佳学科交叉论文奖。担任

中国自动化学会学生工作委员会、中国造船工程学会青年工作委员会委员。

特邀专题简介

随着人工智能技术的迅猛发展，以神经网络、强化学习、模糊系统等为代表的智能方法不断取得突破，并在无人系统与机器人领域展现出强大的应用潜力。当今的无人系统与机器人正逐步从结构化环境走向复杂、多变的真实场景，具备自主感知、智能决策与自适应控制能力已成为关键发展方向。与此同时，受自然生物系统启发的智能机制与行为模式，也为提升系统的鲁棒性与灵活性提供了重要思路。

人工智能方法与无人系统的深度融合，正在推动传统机器人与自动化系统向更加智能化、自主化和协同化演进。通过引入数据驱动与模型驱动相结合的方式，无人系统能够在复杂环境中实现高效感知、精准决策以及动态优化控制，从而显著提升其在实际应用中的性能与可靠性。在此背景下，围绕人工智能理论、方法及其在无人系统中的应用开展系统性研究，对于拓展相关领域的研究边界与工程应用具有重要意义。

本特邀专题旨在汇集人工智能与无人系统领域的最新研究成果，鼓励具有创新思想、新方法、新模型以及新应用的原创性工作，推动相关理论与技术的发展与交叉融合。专题重点关注但不限于以下研究方向：

- 模糊系统与智能决策方法
- 智能感知与多模态信息融合
- 无人系统的环境感知、导航与路径规划
- 多智能体系统的协同控制、分布式优化与博弈
- 数据驱动的无人系统（含信息物理系统）安全分析与弹性控制
- 智能机器人与仿生系统
- 人工智能驱动的系统优化与应用

IEEE ICUS 2026
Invited Session Summary

Title of Session

Artificial Intelligence and Its Applications in Unmanned Systems

Organizers

1. Prof. Chao Deng
Nanjing University of Posts and Telecommunications, China
2. Prof. Xiuxiu Ren
Northeastern University, China
3. Prof. Lining Liu
Harbin Engineering University, China

Biosketches of Organizers

Chao Deng, Professor/Doctoral Supervisor, Nanjing University of Posts and Telecommunications. His main research directions are distributed fault-tolerant control, security control of cyber-physical systems, and secondary control of intelligent microgrid systems. He has led one project funded by the Young Scientists Fund of the National Natural Science Foundation of China and one project funded by the Young Scientists Fund of the Natural Science Foundation of Jiangsu Province. He is a recipient of the National Excellent Young Scientists Fund (Overseas) and an IEEE Senior Member. As the first author and corresponding author, he has published more than 40 SCI-indexed papers. He currently serves as an Associate Editor of the Journal of Control and Decision and received the Best Paper Award at ICCAR 2022.

Xiuxiu Ren, Associate Professor and Ph.D. Supervisor at the College of Information Science and Engineering, Northeastern University. Her primary research interests focus on the security and control theory of Cyber-Physical Systems (CPS), non-cooperative games and secure consensus in multi-agent systems, as well as embodied intelligence and robotics. She serves as the Principal Investigator (PI) for several national and provincial-level research projects, including the Youth Science Fund Project of the National Natural Science Foundation of China (NSFC) and the General Program of the Natural Science Foundation of Liaoning Province. She has published more than ten papers as the first author in top-tier international journals in her field, such as various IEEE Transactions and Automatica. Furthermore, she has been invited to serve as a Guest Editor for renowned academic

journals, including Symmetry.

Lining Liu, Associate Professor/Doctoral Supervisor, Harbin Engineering University. His main research directions are distributed optimization theory and cluster navigation applications. He has presided over national/provincial-level projects such as the National Natural Science Foundation of China Youth Science Fund Project, Hainan Provincial Natural Science Foundation Youth Project, Heilongjiang Provincial Postdoctoral General Funding, and Key Laboratory Open Project. He has published more than ten papers as the first author in top international journals in the field, such as IEEE Transactions and IEEE JAS. He was selected into the Young Talent Support Program of the Chinese Society of Command and Control, and won the Engineering Award for Graduate Theses (Doctoral Dissertation) of the Chinese Association of Automation and the 2024 IEEE EI2 Best Interdisciplinary Paper Award. He serves as a member of the Student Work Committee of the Chinese Association of Automation and the Youth Work Committee of the Chinese Society of Naval Architecture and Marine Engineering.

Details of Session

With the rapid development of artificial intelligence (AI) technologies, intelligent methods represented by neural networks, reinforcement learning, and fuzzy systems have continuously achieved breakthroughs, demonstrating tremendous application potential in the fields of unmanned systems and robotics. Today's unmanned systems and robots are gradually moving from structured environments into complex and dynamic real-world scenarios. Possessing capabilities for autonomous perception, intelligent decision-making, and adaptive control has become a critical direction for development. Meanwhile, intelligent mechanisms and behavioral patterns inspired by natural biological systems also provide important insights for enhancing system robustness and flexibility.

The deep integration of AI methods and unmanned systems is driving traditional robots and automation systems to evolve towards greater intelligence, autonomy, and collaboration. By introducing approaches that combine data-driven and model-driven methods, unmanned systems can achieve efficient perception, accurate decision-making, and dynamic optimal control in complex environments, thereby significantly improving their performance and reliability in practical applications. Against this backdrop, conducting systematic research centered on AI theories, methods, and their applications in unmanned systems is of great significance for expanding the research boundaries and engineering applications of related fields.

This invited special issue aims to gather the latest research achievements in the fields of artificial intelligence and unmanned systems, encouraging original works

with innovative ideas, new methods, novel models, and new applications, to promote the development and cross-disciplinary integration of related theories and technologies. The special issue focuses on, but is not limited to, the following research topics:

- Fuzzy systems and intelligent decision-making methods
- Intelligent perception and multi-modal information fusion
- Environmental perception, navigation, and path planning of unmanned systems
- Cooperative control, distributed optimization, and games in multi-agent systems
- Data-driven security analysis and resilient control of unmanned systems (including cyber-physical systems)
- Intelligent robots and biomimetic systems
- AI-driven system optimization and applications