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

基于数据驱动的无人系统智能控制与决策优化

组织者

1. 金鑫，教授，复旦大学

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个人简介

金鑫，复旦大学智能复杂体系基础理论与关键技术实验室青年研究员，长期从事群智能无人系统的协同控制与优化决策以及相关的应用研究，围绕上述研究方向，截至目前已在 Automatica、IEEE 汇刊等重要国际期刊/顶级会议发表论文 30 余篇，入选 2022 年中国科协青年人才托举工程、上海启明星(扬帆专项)计划。主持国家自然科学基金青年项目、国家自然科学基金叶企孙联合基金项目子课题，作为技术负责人参与国家自然科学基金重点项目，中央军委科技委基金项目等，担任多本 IEEE 汇刊审稿人，包括控制领域顶级期刊 IEEE TAC, Automatica。与五院空间飞行器总体设计部、航天科技八院上海控制技术研究所、中国星网开展项目合作与学生联合培养。

毛帅，博士，南通大学电气与自动化学院副教授，长期从事分布式优化、分布式学习以及相关的应用研究，围绕上述研究方向，截至目前已在 Automatica、IEEE TAC、IEEE 汇刊等重要国际期刊/顶级会议发表论文 20 余篇。主持国家自然科学基金青年项目、江苏省基础研究计划自然科学青年基金项目、江苏省高校自然科学研究面上项目，担任多本 IEEE 汇刊审稿人。

秦冬冬，华东理工大学助理研究员，从事多智能体系统自主控制与协同优化研究，聚焦分布式决策、数据驱动预测控制、事件触发协同机制及系统性能分析。在国内外控制与自动化领域期刊及会议发表论文 19 篇，申请/授权专利 8 项，其中以第一作者在 *Automatica* 和 IEEE 汇刊发表论文 8 篇。主持国家自然科学基金青年科学基金项目、中国博士后科学基金面上资助项目及国家科技重大专项子课题等，参与国家自然科学基金集成项目和横向科研课题。荣获中国自动化学会自然科学二等奖，入选 2024 年上海市“超级博士后”计划并获国家资助博士后计划 B 档资助。

唐漾，博士，教授，博士生导师， IEEE Fellow，国家级高层次人才、国家级高层次青年人才、上海市优秀学术带头人和德国洪堡基金等计划入选者。主要研究智能无人系统，多体智能、工业智能、具身智能和生物信息学等。围绕上述领域，在 Nature 子刊，CVPR，ICCV，NeurIPS，SIAM，Automatica 和 IEEE 汇刊等发表论文 200 余篇。主持国家科技部重点研发计划项目和课题，多项国家自然科学基金重点类项目（重大项目课题、重点项目、联合重点）等。担任 IEEE TCASI 资深领域编辑，IEEE TNNLS，IEEE TCYB，IEEE TII，IEEE/ASME TMECH，IEEE TCASI，中国科学：信息科学、自动化学报等多个国际期刊的副主编/编委，获得 2019 年度上海市自然科学奖一等奖（第一完成人），担任中国自动化学会大数据专委会副主任委员、中国自动化学会网联智能专业委员会副主任委员。

特邀专题简介

当前无人系统正面临从结构化环境向复杂非结构化环境、从单一任务执行向多任务自主协同、从遥控操作向全自主智能的重大转型。然而，传统的基于精确数学模型的控制方法难以应对动态不确定环境、高维状态空间和复杂耦合系统带来的挑战。数据驱动方法，特别是深度学习、强化学习与控制理论的融合，为无人系统提供了突破模型依赖、实现自主智能的新范式。通过海量异构数据的采集、处理与知识提取，无人系统可实现环境精准感知、智能决策优化和自适应控制，显著提升在未知环境下的生存能力与任务执行效能。研究数据

驱动的无人系统智能控制与决策优化，对推动无人系统向更高层次的自主性、适应性和协同性发展具有重要的理论意义与应用价值。

本特邀专题聚焦数据驱动范式下无人系统智能控制与决策优化的前沿理论与关键技术，邀请相关领域专家学者探讨如何通过数据智能赋能无人系统。本特邀专题邀请以下与"基于数据驱动的无人系统智能控制与决策优化"主题相关的包含创新思想、新概念、新方法、技术突破及工程应用的原创论文：

- 基于数据驱动的无人系统状态估计
- 人机混合智能与人在回路决策优化
- 无人系统安全决策、可信 AI 与对抗鲁棒性
- 面向复杂任务意图理解与自主行为规划
- 基于数据驱动的多无人系统集群智能控制
- 模型-数据混合驱动的鲁棒自适应控制

IEEE ICUS 2026
Invited Session Summary

Title of Session

Data-Driven Intelligent Control and Decision Optimization for Unmanned Systems

Organizers

1. Prof. Xin Jin
Fudan University, China
2. Prof. Shuai Mao
Nantong University, China
3. Prof. Dongdong Qin
East China University of Science and Technology, China
4. Prof. Yang Tang
East China University of Science and Technology, China

Biosketches of Organizers

Xin Jin is a young researcher of Research Institute of Intelligent Complex Systems at the Fudan University. His research focuses on cooperative control and optimal decision-making of swarm unmanned systems and their applications. He has published over 30 papers in important international journals and top conferences, including Automatica and IEEE Transactions. He was selected in the China Association for Science and Technology Young Elite Scientist Sponsorship Program by Cast (2022) and the Shanghai Starting Star (Sailing Special) program. He has led several research projects, including the Young Scientists Fund of the National Natural Science Foundation of China (NSFC) and a sub-project under the NSFC-Ye Qisun Joint Fund, and participated in key national research projects. He serves as a reviewer for top journals including IEEE Transactions on Automatic Control and Automatica, and collaborates with major aerospace institutes in China on research and talent cultivation.

Shuai Mao is an Associate Professor at the School of Electrical and Automation Engineering, Nantong University. His research focuses on distributed optimization, distributed learning, and related applications. He has published over 20 papers in important international journals and top conferences, including Automatica, IEEE Transactions on Automatic Control, and other IEEE Transactions. He has led several research projects, including the Young Scientists Fund of the National Natural Science Foundation of China (NSFC), the Natural Science Young Scientists Fund of

Jiangsu Province Basic Research Program, and the General Program of Natural Science Research for Universities in Jiangsu Province. He serves as a reviewer for multiple IEEE Transactions.

Dongdong Qin is an Assistant Researcher at East China University of Science and Technology. His research focuses on autonomous control and cooperative optimization of multi-agent systems, with emphasis on distributed decision-making, data-driven predictive control, event-triggered coordination mechanisms, and system performance analysis. He has published 19 papers in domestic and international journals and conferences in control and automation, and has applied for or been granted 8 patents, including 8 papers published as the first author in Automatica and IEEE Transactions. He has led several research projects, including the Young Scientists Fund of the National Natural Science Foundation of China (NSFC), the General Program of the China Postdoctoral Science Foundation, and sub-projects of national major science and technology programs, and has participated in integrated projects of the NSFC and industry-funded research projects. He received the Second Prize of Natural Science from the Chinese Association of Automation, and was selected for the Shanghai "Super Postdoctoral" Program in 2024, with support from the National Postdoctoral Program (Grade B).

Dr. Yang Tang is a Professor and Ph.D. Supervisor, IEEE Fellow. He was selected for national high-level talent programs, national young high-level talent programs, the Shanghai Distinguished Academic Leader program, and the Humboldt Foundation. His research focuses on intelligent unmanned systems, multi-agent intelligence, industrial intelligence, embodied intelligence, and bioinformatics. He has published over 200 papers in important international journals and top conferences, including Nature series journals, CVPR, ICCV, NeurIPS, SIAM, Automatica, and IEEE Transactions. He has led several research projects, including key projects and topics under the National Key R&D Program of China and multiple key projects of the National Natural Science Foundation of China (NSFC), including major projects, key projects, and joint key projects. He serves as a Senior Area Editor of IEEE TCASI and as an Associate Editor or Editorial Board Member for multiple journals, including IEEE TNNLS, IEEE TCYB, IEEE TII, IEEE/ASME TMECH, IEEE TCASI, Science China: Information Sciences, and Acta Automatica Sinica. He received the First Prize of the Shanghai Natural Science Award in 2019 (first contributor), and serves as Vice Chair of the Big Data Committee and the Networked Intelligent Systems Committee of the Chinese Association of

Automation.

Details of Session

Unmanned systems are undergoing a significant transformation from structured to complex unstructured environments, from single-task execution to multi-task autonomous collaboration, and from remote control to fully autonomous intelligence. However, traditional control approaches based on precise mathematical models face great challenges in dealing with dynamic uncertainties, high-dimensional state spaces, and complex coupled systems. Data-driven methods, particularly the integration of deep learning, reinforcement learning, and control theory, provide a new paradigm for breaking model dependence and enabling autonomous intelligence in unmanned systems. Through large-scale heterogeneous data acquisition, processing, and knowledge extraction, unmanned systems can achieve accurate environmental perception, intelligent decision-making, and adaptive control, significantly improving their survivability and task performance in unknown environments. Research on data-driven intelligent control and decision optimization for unmanned systems is of great theoretical importance and practical value for advancing autonomy, adaptability, and cooperation in next-generation unmanned systems.

This invited session focuses on frontier theories and key technologies of intelligent control and decision optimization for unmanned systems under a data-driven paradigm. It aims to bring together researchers to explore how data intelligence can empower unmanned systems. Original contributions related to, but not limited to, the following topics are welcome:

- Data-driven state estimation for unmanned systems
- Human–machine hybrid intelligence and human-in-the-loop decision optimization
- Safety-critical decision-making, trustworthy AI, and adversarial robustness
- Intent understanding and autonomous behavior planning for complex tasks
- Data-driven swarm intelligence and cooperative control of multi-unmanned systems
- Model–data hybrid driven robust adaptive control