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

无人系统的安全控制与协同决策

组织者

1.余兰林，副研究员，合肥工业大学

2.王莉莉，副教授，南方科技大学

3.都海波，教授，合肥工业大学

个人简介

余兰林，副研究员，博导/硕导，现任自动化系党支部书记。博士毕业于中国科学技术大学，曾在西湖大学（浙江西湖高等研究院）从事博士后研究工作，长期致力于复杂网络系统建模与协同控制理论及应用研究。相关研究成果发表国际高水平 SCI 及会议论文近 30 余篇，出版合肥工业大学本科生教材 1 部，授权发明专利 7 项，连续主持该领域相关课题 7 项，其中国家基金 2 项，安徽省基金 1 项。获 2025 年安徽省自动化优秀青年人才奖励，2024 年国际无人系统大会（ICUS）最佳会议论文奖。担任中国指挥与控制学会具身智能专业委员，安徽省系统科学学会理事等。

王莉莉，IEEE Senior Member，于 2024 年 5 月加入南科大，任副教授一职，独立 PI，博士生导师；其先后于 2011 年和 2014 年在浙江大学分别获得工科学士学位和硕士学位，于 2020 年 12 月在美国耶鲁大学获得工程与应用科学博士学位。曾任职于普渡大学，持有 Lillian Gilbreth 博后奖学金。曾获得 2023CPS Rising Star，耶鲁大学 Henry Prentiss Becton 研究生奖，中国控制与决策会议（CCDC）张嗣瀛优秀论文奖等奖项。多项研究成果已在控制领域顶级期刊以及顶级会议，如 TAC、Automatica、IEEE TCYB、SCL 等期刊；CDC，ACC 等会议。

都海波，合肥工业大学电气与自动化工程学院特聘教授，博导，国家级青年人才，现为二级学科点负责人。一直从事机器人装备与智能控制相关研究，先后主持国防某工程项目 2 项，国家自然科学基金项目 4 项，省部级重点项目 2 项，企业委托类项目 10 项。发表 SCI 论文 100 余篇，其中自动控制领域顶刊 Automatica、SICON 和 IEEE 汇刊论文 50 余篇，SCI 他引超过 5000 次，连续入选 2020 年-2025 年爱思唯尔中国高被引学者，研究成果先后获日内瓦国际发明展金奖 2 次，教育部自然科学一等奖和二等奖、安徽省自然科学二等奖各 1 次。授权国家发明专利 12 项，专利成果转化近 100 万。先后访问美国德州大学圣安东尼奥分校、澳大利亚皇家墨尔本理工大学、香港大学等进行学术交流和合作。担任控制领域著名 SCI 刊物 International Journal of Robust and Nonlinear Control 等编委。现为 IEEE Senior Member,安徽省系统工程学会副理事长、中国指挥与控制学会青年工作委员会常务委员等。

特邀专题简介

随着自主无人系统（如无人机、无人车、无人船等）在复杂、高动态与非结构化环境中的部署，确保其运行安全与多机协同效率已成为决定任务成败的核心挑战。无论是在广域巡航、灾害救援，还是在物流运输与深空探测领域，无人系统的有效运作都依赖于多智能体之间的安全导航、交互与深度协作。

当前，数据驱动的人工智能（AI）与多智能体强化学习（MARL）在处理高维复杂的协同决策任务中展现出卓越的潜能。然而，其“黑盒”特性导致算法在面向实际物理系统部署时，难以提供满足工程需求的安全与闭环稳定性保证。另一方面，传统控制理论（如基于李雅普诺夫理论或控制屏障函数的解析方法）虽具备严密的物理安全边界证明，但在应对大规模集群智能涌现与启发式战术推理时，往往受制于泛化能力弱及“维数灾难”等局限。本特邀专题重点研讨如何将底层硬安全约束嵌入高层学习与决策架构中，从而构建兼具可证安全性、强鲁棒性与高效协同能力的自主无人系统。

本特邀专题邀请以下与“无人系统的安全控制与协同决策”主题相关的包含创新思想、概念、新发现、改进以及新应用的原创论文。

- 安全学习机制

- 受限协同控制
- 动态博弈
- 分层控制
- 实机验证与部署

IEEE ICUS 2026
Invited Session Summary

Title of Session

Safe Control and Cooperative Decision-Making for Autonomous Unmanned Systems

Organizers

1. Prof. Lanlin Yu
Hefei University of Technology, China

2. Prof. Lili Wang
Southern University of Science and Technology, China

3. Prof. Haibo Du
Hefei University of Technology, China

Biosketches of Organizers

LanlinYu is currently an Associate Professor in the School of Electrical Engineering and Automation, Hefei University of Technology. She received her B.Sc.degree from the Southwest University, Chongqing, China in 2013, respectively, and the Ph.D. degree from the University of Science and Technology of China, Hefei, China in 2019. From 2018 to 2019, she has been a visiting researcher with the Faculty of Science and Engineering, University of Groningen, The Netherlands. Then, she was appointed as a postdoctoral researcher with the School of Engineering, Westlake University, Hangzhou, China, from 2019 to 2021. During this period, she visited the Technical University of Munich, Germany, as a visiting researcher. Her research interests include model reduction, cooperative optimization control for the complex networks, and path planning for mobile robots.

Dr. Lili Wang, IEEE Senior Member, joined Southern University of Science and Technology in May 2024 as an Associate Professor, an independent Principal Investigator, and a Ph.D. advisor. She earned her Bachelor's and Master's degrees in Engineering from Zhejiang University in 2011 and 2014, respectively, and her Ph.D. in Engineering and Applied Science from Yale University in December 2020. She previously worked at Purdue University, where she was awarded the Lilian Gilbreth Postdoctoral Fellowship. Throughout her career, Dr. Wang has received several honors, including the 2023 CPS Rising Star Award, the Henry Prentiss Becton Graduate Award from Yale University, and the Zhang Siying Outstanding Paper

Award from the Chinese Control and Decision Conference (CCDC). Her research has been published in top journals and conferences in the field of control, including the IEEE Transactions on Automatic Control (TAC), Automatica, IEEE Transactions on Cybernetics (IEEE TCYB), Systems & Control Letters (SCL), as well as the Conference on Decision and Control (CDC) and the American Control Conference (ACC).

Haibo Du received the Ph.D. degree in automatic control from Southeast University, Nanjing, China, in 2012. He is currently a Professor with the School of Electrical Engineering and Automation, Hefei University of Technology, Hefei, China. He held several visiting positions in USA, Australia, and Hong Kong. His research interests include nonlinear control theory with applications to multiagent systems, spacecraft, and power electronics. Prof. Du was a recipient of the Natural Science Award (Second Class) of the Ministry of Education of China in 2014 and the Natural Science Award (Second Class) of Anhui Province in 2020. He is one of the Elsevier Scopus Most Cited Chinese Researchers (Control and Systems Engineering) all over the world in 2020. He currently serves as a Guest Editor for the Asian Journal of Control and International Journal of Advanced Robotic Systems and other editorial board member.

Details of Session

As autonomous unmanned systems are increasingly deployed in complex, highly dynamic, and unstructured environments, ensuring their operational safety and cooperative efficiency has become a critical imperative. From wide-area surveillance and search-and-rescue to logistics and planetary exploration, the success of these missions heavily relies on the ability of multiple agents to safely navigate, interact, and collaborate.

Currently, data-driven Artificial Intelligence (AI) and Multi-Agent Reinforcement Learning (MARL) have demonstrated exceptional capabilities in solving complex, high-dimensional decision-making tasks. However, their inherent "black-box" nature often lacks the formal safety and stability guarantees required for real-world physical deployment. Conversely, traditional control theory provides rigorous, provable safety boundaries (e.g., via Lyapunov stability and Control Barrier Functions), but frequently encounters scalability and flexibility bottlenecks when applied to large-scale swarm intelligence and heuristic tactical reasoning.

This special session aims to bridge the critical gap between rigorous control theory and advanced learning algorithms. We seek to explore novel model-driven and data-driven paradigms that integrate hard safety constraints into learning

architectures, enabling provably safe, resilient, and cooperative decision-making among networked unmanned systems. We invite researchers to submit original theoretical breakthroughs and real-world implementations that push the boundaries of this interdisciplinary field.

Topics of interest include, but are not limited to:

- Safe Learning Architectures
- Cooperative Control under Constraints
- Game-Theoretic Strategies
- Hierarchical Control Frameworks
- Sim-to-Real and Practical Deployment