2025 第八届 IEEE 国际无人系统大会
特邀专题简介表

特邀专题名称

无人飞行器智能控制与协同

组织者

1.杨跃能，教授，国防科技大学

2.杨庆凯，教授，北京理工大学

3.张兴龙，副教授，国防科技大学

4.尹辉，副教授，湖南大学

个人简介

杨跃能，国防科技大学空天科学学院教授，军队青年科技英才、湖湘青年英才，主要从事飞行器总体设计与控制方面的研究工作，发表论文 70 余篇、授权发明专利 38 项、获省部级科技奖励 4 项。任中国指挥与控制学会无人系统专业委员会委员、中国宇航学会高级会员、国际仿生工程学会会员。任 Drones 客座主编，Journal of Bionic Engineering、《信息与控制》、《无人系统技术》青年编委。

杨庆凯，北京理工大学自动化学院教授，博士生导师，国家级青年人才。于 2018 年获得荷兰格罗宁根大学与北京理工大学双博士学位，主要从事多机器人协同运动控制、新概念机器人设计与具身智能控制等方面的研究工作。发表 IEEE TAC、Automatica 等领域内顶级 SCI 期刊论文 50 余篇，授权发明专利 20 余项，出版专著 1 部。曾获中国指挥与控制学会优秀博士学位论文，入选“青年人才托举工程”，获批国家重点研发计划“智能机器人”重点专项青年科学家项目，获得教育部自然科学一等奖、自动化学会自然科学一等奖。主持国家自然科学基金面上项目，国防预研项目等近 10 项国家级项目。现任中国自动化学会控制理论专业委员会（TCCT）委员，中国指挥控制学会无人系统专业委员会常务委员，TCCT 非线性系统与控制学组委员，担任期刊《仿生智能与机器人（英文）》（Biomimetic Intelligence and Robotics, BIRob）

青年编委，《信息与控制》青年编委，《Robot Learning》青年编委。

张兴龙，国防科技大学智能科学学院副教授，入选科协青托、湖湘科技英才。主要研究强化学习与预测控制及其在无人平台中的应用。在 IEEE TRO、Automatica、IEEE 汇刊以及 ICRA、IROS 等机器人和控制领域重要期刊和会议发表论文 60 余篇。授权发明专利 15 项。任中国自动化学会共融机器人专委会以及自适应动态规划与强化学习专委会委员、中国人工智能学会青年工作委员会委员。任 Frontiers in Robotics and AI、《兵工学报》等客座编委，Artificial Intelligence and Autonomous Systems 青年编委。

尹辉，湖南大学副教授、岳麓学者。研究方向为机械系统动力学与控制、飞行动力学与控制，主持科研项目 10 余项，包括国家自然科学基金、国家科技部高端外专引进项目在内的国家级项目 4 项；以第一/通讯作者身份在 IEEE 汇刊、ASME 汇刊、Mechanical Systems and Signal Processing 等领域内重要期刊上发表论文 40 余篇。

特邀专题简介

无人飞行器通常是指由飞行平台、动力系统、控制系统、通信系统与任务载荷组成的设备。随着人工智能、自主控制与通信技术的快速发展，无人飞行器在侦察监视、灾害救援、物流运输、摄影测绘等领域的应用日益广泛，正在重塑传统行业并拓展为新质产业。然而，复杂动态环境下无人飞行器的智能自主控制与多机协同仍面临诸多挑战，主要涉及环境复杂性、系统动态性、算法可靠性、实时性、安全与鲁棒性。如何提升无人飞行器的状态感知、自主决策、任务规划、智能控制与集群协同能力，成为当前研究的重点方向。

本特邀专题邀请以下与“无人飞行器智能控制与协同”主题相关的包含新理论、新方法、新技术以及新应用的原创论文。

- 无人飞行器建模与仿真
- 无人飞行器状态感知
- 无人飞行器自主决策

- 无人飞行器智能控制
- 无人飞行器在线任务规划
- 多无人飞行器协同控制

IEEE ICUS 2025
Invited Session Summary

Title of Session

Intelligent Control and Collaboration of Unmanned Aircraft

Organizers

1. Prof. Yueneng Yang

National University of Defense Technology, China

2. Prof. Qingkai Yang

Beijing Institute of Technology, China

3. Assoc. Prof. Xinglong Zhang

National University of Defense Technology, China

4. Assoc. Prof. Hui Yin

Hunan University, China

Biosketches of Organizers

Yueneng Yang is a professor at the College of Aerospace Science and Engineering, National University of Defense Technology. He has been selected as a "Youth Science and Technology Talent of the Military" and a "Huxiang Youth Talent". His research focuses on aircraft design and control. He has published over 70 academic papers, obtained 38 invention patents, and received four provincial scientific and technological awards. He serves as a committee member of the Unmanned Systems Professional Committee of the Chinese Institute of Command and Control, a senior member of the Chinese Society of Astronautics, and a member of the International Society of Bionic Engineering. Additionally, he is a guest editor for Drones, as well as a youth editorial board member for the Journal of Bionic Engineering, Information and Control, and Unmanned Systems Technology.

Qingkai Yang is a Professor and PhD Supervisor at the School of Automation, Beijing Institute of Technology, and a recipient of China's National Young Talent award. He earned dual PhD degrees from the University of Groningen (Netherlands) and Beijing Institute of Technology in 2018. His research focuses on multi-robot cooperative motion control, novel robotic system design, and embodied intelligent control. With over 50 SCI papers published in top-tier journals (including IEEE TAC and Automatica), 20+ authorized patents, and one monograph, he has

established himself as a leading researcher in his field. His work has been recognized with prestigious honors such as the Outstanding Doctoral Dissertation Award from the Chinese Association of Command and Control, selection for the "Young Talent Support Program," and first prizes in natural science from both the Ministry of Education and the Chinese Association of Automation. As Principal Investigator, he has led nearly 10 national-level research projects, including grants from the NSFC and National Defense Pre-Research programs. Prof. Yang actively contributes to the academic community through his roles on multiple professional committees, including the Technical Committee on Control Theory (Chinese Association of Automation) and the Unmanned Systems Committee (Chinese Institute of Command and Control). He also serves as a Youth Editorial Board Member for several journals, including Biomimetic Intelligence and Robotics (BIRob) and Information and Control.

Xinglong Zhang is an Associate Professor with the National University of Defense Technology. He was selected for the China Association for Science and Technology's Youth Talent Support Program. His research interests include reinforcement learning and model predictive control and their applications in unmanned systems. He has published over 60 papers in international journals and conferences and 15 authorized patents. He serves as a committee member of the Tri-Co Robots Technical Committee and the Adaptive Dynamic Programming and Reinforcement Learning Technical Committee of the Chinese Association of Automation, and etc. He has served as a Guest Editor for serval journals including Frontiers in Robotics and AI, Acta Armamentarii, and a Youth Editorial Board Member for Artificial Intelligence and Autonomous Systems.

Dr. Hui Yin is an associate professor and a Yuelu Scholar at Hunan University. His research focuses on the dynamics and control of mechanical systems as well as flight dynamics and control. He has led more than 10 scientific research projects in these areas, including four national-level projects such as those funded by the National Natural Science Foundation of China and the High-end Foreign Expert Introduction Project by the Ministry of Science and Technology. He has published more than 40 papers in important journals in the field, such as the IEEE Transactions, the ASME Transactions, and Mechanical Systems and Signal

Processing, as the first or corresponding author.

Details of Session

Unmanned aircraft refers to the equipment composed of a flight platform, power system, control system, communication system, and mission payload. With the rapid development of artificial intelligence, autonomous control, and communication technologies, unmanned aircraft are widely used for reconnaissance and surveillance, disaster rescue, logistics transportation, and aerial photography and mapping, which reshapes traditional industries and expands into emerging sectors. However, intelligent autonomous control and multi- aircraft collaboration in complex and dynamic environments still face numerous challenges, primarily involving environmental complexity, system dynamics, algorithm reliability, real-time performance, safety, and robustness. Enhancing unmanned aircraft capabilities in state perception, autonomous decision-making, mission planning, intelligent control, and swarm coordination has become a key focus of current research.

This invited session invites original papers related to the topic of "**Intelligent Control and Collaboration of Unmanned Aircraft**" covering novel theories, methods, technologies, and applications, including but not limited to:

- Modelling and Simulation
- State Perception
- Autonomous Decision-Making
- Intelligent Control
- Online Mission Planning
- Collaborative Control of Multi-aircraft