2024 第七届 IEEE 国际无人系统大会
特邀专题简介表

特邀专题名称	
	复杂环境下无人集群系统智能决策规划

组织者

1. 化永朝，副教授，北京航空航天大学

2. 梁子璇，教授，北京理工大学

3. 李晓多，助理教授，北京航空航天大学

4. 崔世晟，教授，北京理工大学

个人简介

化永朝，北京航空航天大学人工智能学院副教授，入选中国科协青年人才托举工程、小米青年学者。主要从事集群智能与协同控制研究，主持国家自然科学基金、北京市自然科学基金、国防重点项目课题等 10 余项，在 IEEE TAC、Automatica 等学术期刊上发表 SCI 论文 20 余篇，出版 Taylor & Francis 英文专著 1 部；曾荣获吴文俊人工智能优秀青年奖、中国指挥与控制学会科技进步奖一等奖、中国发明协会发明创新奖一等奖、空军"无人争锋"比赛冠军等；担任中国指挥与控制学会青工委副总干事、集群智能与协同控制专委会委员等。

梁子璇，北京理工大学宇航学院教授、博士生导师，国家级青年人才，中国科协"青年人才托举工程"入选者、中国宇航学会首届"卓越托举人才"。主要从事飞行器轨迹优化与制导控制等方面研究。承担国家重点研发计划、国家自然科学基金、中国博士后科学基金等项目。担任中国宇航学会青年科学家俱乐部副主席，中国指挥与控制学会集群智能与协同控制专业委员会委员，《Chinese Journal of Aeronautics》《航空学报》《深空探测学报（中英文）》等期刊青年编委。

李晓多，北京航空航天大学助理教授。2014年毕业于北京航空航天大学数学与应用数学专业，获理学学士学位。2020年毕业于北京航空航天大学导航制导与控制专业，获工学博士学位。主要研究方向包括无人集群智能决策与控制、多飞行器智能博弈与优化等，发表学术论文20余篇，申请并受理国家发明专利5项。现主持和参与多项国家和省部级项目。担任中国指挥与控制学会集群智能与协同控制专委会委员。

崔世晟，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。2019年毕业于宾夕法尼亚州立大学，获博士学位。2011年毕业于斯坦福大学计算机系，获硕士学位。2009年毕业于清华大学自动化系，获学士学位。主要从事多智能体博弈及控制、人工智能中的复杂系统优化、大规模星座系统优化及决策等方面研究。获得国际运筹学及管理科学协会（INFORMS）Koopman Prize、美国能源部电网优化大赛一等奖、国际数学优化协会(MOS) ICCOPT Young Researcher Prize 提名、IEEE Roberto Tempo Best CDC Paper Award 提名等国际学术奖励。承担 National Science Foundation（NSF）、Department of Energy（DOE）、Office of Naval Research（ONR）及国家自然科学基金等项目，成果以第一作者发表于 Mathematical Programming、IEEE Transactions on Automatic Control 等期刊。兼任《宇航学报》青年编委。

特邀专题简介

无人集群系统在军事和民用领域均有广阔的应用前景，例如，微纳卫星集群协同探测、无人机集群协同干扰、无人车集群协同搬运等，智能协同决策规划技术是集群智能领域的研究热点和难点，在无人集群系统协同执行任务中有重要应用价值。如何设计分布式自主智能协同方法实现自主决策、任务分配、路径规划、轨迹优化、分布式博弈等层面的有机协作,加速无人集群系统的OODA循环，是当前学术界和产业界共同关注的焦点。

本专题围绕复杂环境下无人集群系统智能决策规划技术，聚焦最新研究成果，欢迎与无人集群自主决策规划、任务分配、路径规划、轨迹优化、多智能体强化学习、分布式优化、集群博弈、效能评估等协同相关的论文。

IEEE ICUS 2024
Invited Session Summary

Title of Session

Intelligent Decision-Making and Planning Technologies for Unmanned Swarm Systems Under Complex Environment

Organizers

1. Dr. Yongzhao Hua

Beihang University, China

2. Prof. Zixuan Liang

Beijing Institute of Technology, China

3. Dr. Xiaoduo Li

Beihang University, China

4. Prof. Shisheng Cui

Beijing Institute of Technology, China

Biosketches of Organizers

Yongzhao Hua received the B.E. and Ph.D. degrees in navigation, guidance, and control from Beihang University, Beijing, China, in 2014 and 2019, respectively. From 2019 to 2020, he was a Postdoctoral Research Associate with the Department of Aerospace Engineering, University of Bristol, Bristol, U.K. He is currently an Associate Professor with the Institute of Artificial Intelligence, Beihang University. His current research interests include distributed control, optimization, and game for multiagent systems.

Zixuan Liang received the B.E. degree in automation and the Ph.D. degree in guidance navigation and control from Beihang University, Beijing, China, in 2011 and 2016, respectively. He is currently a Professor with the School of Aerospace Engineering, Beijing Institute of Technology. He was selected for the National Youth Talent Plan of China, the Young Elite Scientists Sponsorship Program by China Association for Science and Technology, and the Outstanding Elite Scientists Program of Chinese Society of Astronautics. His research interests include trajectory optimization, guidance, and control for flight vehicles.

Xiaoduo Li received the B.S. degree in 2014 and the Ph.D. degree in 2020, both from Beihang University, Beijing, China. He is currently an assistant professor with the Institute of Artificial Intelligence, Beihang University, Beijing, China. His research interests include intelligent decision-making and control for unmanned swarm systems, intelligent game and optimization for multi-aircraft systems. He has published more than 20 papers and is an active reviewer for many research journals and conferences.

Shisheng Cui is currently a professor in the School of Automation at the Beijing Institute of Technology (BIT). His research honors include winners of the Grid Optimization Competition managed by the Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) in 2021 and the Koopman Prize for Military Operations Research from INFORMS in 2016. Additionally, he was a finalist for the Young Researcher Prize in continuous optimization by the mathematical programming society (MPS) in 2022, and was nominated for the Roberto Tempo Best CDC Paper Award by IEEE Control Systems Society in 2022. He holds a Ph.D. from the IME Department at the Pennsylvania State University (2019), with a concentration in operations research. He also holds masters and undergraduate degrees from the Stanford University (in Computer Science) and the Tsinghua University (in Automation), respectively. His interests lie in stochastic optimization, variational inequality problems, and hierarchical optimization and games complicated by non-smoothness and uncertainty with application interests in machine learning and power systems.

Details of Session

Unmanned swarm systems have broad application prospects in both military and civil fields, such as micro satellite swarm cooperative detection, UAV swarm cooperative interference, UGV swarm cooperative transportation, and so on. Intelligent decision-making and planning technology is a hot and difficult research topic in the field of swarm intelligence and has important application value in swarm system cooperative task execution. How to design distributed cooperative approaches to realize autonomous decision-making, task allocation, path planning, trajectory optimization, and distributed game is a hot topic of the current academia and industry.

This invited session focuses on the latest research results for the intelligent decision-making and planning technologies for unmanned swarm systems. In particular, papers related to swarm intelligent decision-making, task allocation, path planning, trajectory optimization, multi-agent reinforcement learning, distributed optimization and game, evaluation and verification are welcome.