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

复杂气象环境下的自主无人系统协同感知

组织者

1.葛泉波，教授，南京信息工程大学

2.李宏，教授，中国飞行试验研究院

3.赵中原，讲师，南京信息工程大学

个人简介

葛泉波，男，南京信息工程大学教授，博士生导师，副院长(主持工作)，江苏省高校“青蓝工程中青年学术带头人”、省“万人计划”青年拔尖人才入选者，获中国自动化学会第四届青年科学家奖，省杰出青年科学基金获得者，美国明尼苏达大学电子与计算机工程系访问学者。发表和录用包括 IEEETAC、IEEETIE、IEEETNNLS、IEEE TC、自动化学报、控制理论与应用、航空学报等高质量学术论文近百篇，主持国家自然科学基金面上和重点项目、JWKJW 重大专项、航空科学基金和企业横向开发项目等三十余项科研项目。获中国自动化学会科学技术进步一等奖(2019)、二等奖(2021)中国指挥与控制学会科学技术二等奖(2022)以及上海市科技进步一等奖(2023)。IEEE TSMC: Systems Associate Editor,《自动化学报》、International Journal of Systems Science、《指挥与控制学报》和《控制工程》期刊编委。主要研究领域包括状态估计与信息融合、自主智能无人系统、飞行器测试数据分析和能源互联网技术等。

李宏，男，研究员，中国飞行试验研究院测试专业总师，航空工业集团首席技术专家，海军装备部技术专家和空军装备部试验鉴定技术专家。2019 年入选国家百千万人才工程，被授予国家“有突出贡献中青年专家”；2020 年被航空工业集团公司推荐享受国务院政府津贴专家。主要从事目标跟踪、光电信息处理、智能数据分析等研究

和应用，发表高水平学术论文 20 余篇，授权发明专利二十余项，获集团和省部级奖励十余项。

赵中原，男，南京信息工程大学讲师，2019 年 7 月于重庆大学自动化学院获得博士学位。研究领域包括多智能体系统协同控制理论、无人系统集群控制、分布式优化方法、机器学习等，发表论文二十余篇。中国自动化学会混合智能专业委员会委员，中国人工智能学会智能控制与智能管理专业委员会委员。获中国自动化学会科学技术进步二等奖(2023)、中国指挥与控制学会科学技术二等奖 (2023)、(2022)。主持军工纵向项目 1 项、江苏省自然科学基金青年基金 1 项、国防重点实验室开放基金 1 项以及企业委托项目 7 项。

特邀专题简介

自主智能无人系统作为新技术革命的重要突破口，以无人车、智能机器人、无人机等为载体，基于人工智能、大数据等前沿技术实现自主自治与协同，在军事和民用领域得到广泛应用。然而，在复杂气象等恶劣环境下，自主无人系统协同探测与感知技术面临着更大的挑战。针对复杂气象环境下的自主无人系统协同探测与感知问题，探讨如何利用先进的人工智能、大数据、数据融合等技术，实现自主无人系统恶劣的气象条件下高效的协同感知，以应对各种挑战和威胁，从而为推动自主智能无人系统在军事和民用领域的应用提供理论指导和技术支持，进一步促进该领域的进一步发展和应用。

本特邀专题邀请以下与“复杂气象环境下的自主无人系统协同感知”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。

- 复杂气象环境建模
- 数据融合与处理
- 自主无人系统感知
- 无人系统集群探测
- 气象探测机器人
- 协同感知技术

IEEE ICUS 2024
Invited Session Summary

Title of Session

Cooperative Perception of Autonomous Unmanned Systems in Complex Meteorological Environments

Organizers

1. Prof. Quanbo Ge

Nanjing University of Information Science and Technology, China

2. Prof. Hong Li

Chinese Flight Test Establishment, China

3. Dr. Zhongyuan Zhao

Nanjing University of Information Science and Technology, China

Biosketches of Organizers

Quanbo Ge, Male, Professor of Nanjing University of Information Science and Technology, Doctoral Advisor, Vice Dean (Presiding over the work), Director of the Collaborative Innovation Center for Atmospheric Environment and Equipment Technology in Jiangsu Province, Director of the Engineering Research Center for Intelligent Weather Detection Robot in Jiangsu Province, Young and Middle-Aged Academic Leaders of the "Blue Project" in Jiangsu Province's Universities, and Visiting Scholar of the Department of Electronic and Computer Engineering of the University of Minnesota in the United States. He has published and accepted nearly 100 academic papers in high-quality journals such as IEEE TAC, Acta Automatica Sinica, Control Theory and Applications, and Chinese Journal of Aeronautics. He has led more than 30 scientific research projects, including the General and Key Projects of the National Natural Science Foundation of China and the Aviation Science Foundation of China. He is the vice chairman of the Youth Working Committee of the Chinese Association of Automation, the vice chairman of the Intelligent Control and Management Committee of the China Association of Artificial Intelligence, etc. He is an editorial board member of IEEE TSMC: Systems, Acta Automatica Sinica, International Journal of Systems Science, and other journals. His main research areas include state estimation and information fusion, autonomous intelligent unmanned systems,

aircraft test data analysis, and energy internet technology.

Hong Li, male, Chief Engineer of Test Specialty of China Flight Test Establishment, Chief Technical Expert of Aviation Industry Group, Technical Expert of Naval Equipment Department and Technical Expert of Test Identification of Air Force Equipment Department. In 2019, he was selected into the National Talent Project and awarded the national "Young and middle-aged Experts with Outstanding Contributions". In 2020, he was recommended by Aviation Industry Group corporation to enjoy the government allowance of The State Council. He is mainly engaged in the research and application of target tracking, Optical-Electronic information processing, intelligent data analysis, etc. He has published more than 20 high-level academic papers, authorized more than 20 invention patents, and received more than 10 awards from the group and provincial and ministerial levels.

Zhongyuan Zhao. He is a lecturer at Nanjing University of Information Science and Technology. He obtained his Ph.D. degree from the School of Automation, Chongqing University in July 2019. His research interests include cooperative control theory of multi-agent systems, swarm control of unmanned systems, distributed optimization methods, machine learning, etc. He has published over twenty papers. He is a member of the Hybrid Intelligence Professional Committee of the Chinese Association of Automation and the Intelligent Control and Intelligent Management Professional Committee of the Chinese Association for Artificial Intelligence. He has received the Second Prize of Scientific and Technological Progress from the Chinese Association of Automation in 2023, the Second Prize of Science and Technology from the Chinese Society of Command and Control in 2023, and 2022. He has presided over one military industry longitudinal project, one Jiangsu Natural Science Foundation Youth Fund project, one open fund project of a national defense key laboratory, and seven commissioned projects from enterprises.

Details of Session

As a breakthrough in the new technological revolution, autonomous intelligent unmanned systems, including unmanned vehicles, smart robots, and drones, utilize

cutting-edge technologies such as artificial intelligence and big data to achieve autonomy and coordination, finding broad applications in both military and civilian domains. However, in harsh environments like complex meteorological conditions, the collaborative detection and perception technologies of autonomous unmanned systems face even greater challenges. Addressing the collaborative detection and perception issues of autonomous unmanned systems in complex meteorological environments, this special topic explores the utilization of advanced technologies such as artificial intelligence, big data, and data fusion to achieve efficient collaborative perception under adverse weather conditions, thereby addressing various challenges and threats. This initiative aims to provide theoretical guidance and technical support for promoting the application of autonomous intelligent unmanned systems in both military and civilian fields, further advancing the development and application in this domain.

The invited session invites original papers of innovative ideas and concepts, new discoveries and improvements, and novel applications relevant to the following selected topics of "Collaborative Perception of Autonomous Unmanned Systems in Complex Meteorological Environments".

- Complex meteorological environment modeling
- Data fusion and processing
- Autonomous unmanned system perception
- Unmanned system cluster detection
- Meteorological detection robot
- Collaborative perception technology