

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

跨域异构无人集群自主协同与通感一体技术

组织者

1. 叶 磊，副研究员，国防科技大学试验训练基地
2. 张佳龙，工程师，国防科技大学试验训练基地
3. 段海滨，教授，北京航空航天大学
4. 张 普，讲师，西安理工大学
5. 丛一睿，副研究员，国防科技大学

个人简介



叶磊，副研究员，硕导，无人中心主任，美国加州大学伯克利分校访问学者，主要从事地面无平台环境感知与路径规划方面的研究工作。



张佳龙，工程师，国防科技大学实验训练基地，主要研究方向集群协同控制、集群空中联合作战闭环杀伤链。



段海滨，教授，博导，国家级领军人才，主要研究方向分别为无人机集群自主飞行控制，仿生视觉认知域智能控制以及仿生智能计算理论与应用。



张普，讲师，西安理工大学自动化与信息工程学院，主要从事多智能体协同容错与跟踪控制研究工作。



丛一睿，副研究员、硕导，澳大利亚国立大学博士，湖南省优秀青年基金获得者，国防科技大学青年拔尖人才。研究方向为无人集群控制导航通信一体化。

特邀专题简介

随着人工智能技术的迅猛发展及在军事领域的广泛运用，无人系统的智能化程度不断提升，自主能力持续增强，无人智能作战呈现出不同于以往的优势和效能，能够在高动态、强对抗的复杂环境中，更加有效地与其他作战力量联合遂行作战任务。尤其以跨域协同无人集群作战，将成为抢占军事竞争战略制高点的重要途径。然后，现阶段无人集群跨域协同与通感技术仍存在很多关键技术亟待攻克，主要包括无人集群技术层、指控层以及任务层的协同，智能感知以及组网通讯。这两大技术的突破，将实现无人集群在不同空间域具备互联互通互操作的能力，同时功能互补、能效倍增，有助于加快推进无人集群跨域作战进程，而且对战争规则和作战方式产生颠覆性的影响。

本特邀专题邀请以下与“跨域异构无人集群自主协同与通感一体技术”主题相关的包括创新思想、概念、改进以及新战法的原创论文。

- 无人机集群精细化建模新方法、新技术
- 无人集群协同控制新范式
- 跨域无人机协同感知新技术、新手段
- 无人集群系统动态通信组网互联互通新技术
- 跨域无人集群博弈对抗新方法
- 无人集群作战战法技术
- 与无人集群系统相关的技术和平台

IEEE ICUS 2024
Invited Session Summary

Title of Session

Cross-domain Heterogeneous Unmanned Cluster Autonomous Collaboration and Sensory Integration Technology

Organizers

1. Assoc. Prof. Lei Ye

National University of Defense Technology, China

2. Dr. Jialong Zhang

National University of Defense Technology, China

3. Prof. Haibing Duan

Beihang University, China

4. Dr. Pu Zhang

Xi'an University of Technology, China

5. Assoc. Prof. Yirui Cong

National University of Defense Technology, China

Biosketches of Organizers



Lei Ye is an associate researcher, master's tutor, director of the Unmanned Centre, and visiting scholar at the University of California, Berkeley, U.S.A. He is mainly engaged in research work on environment sensing and path planning for ground-based unmanned platforms.



Jialong Zhang is an engineer at the Test and Training Base, National University of Defense Technology, and his main research interests are cluster cooperative control and closed-loop kill chain for cluster air joint operations.



Haibin Duan is a professor, a doctoral director, and a national leading talent. His main research interests are autonomous flight control of UAV clusters, intelligent control of bionic visual cognitive domain, and bionic intelligent computation theory and application.



Pu Zhang is a lecturer at the School of Automation and Information Engineering, Xi'an University of Technology, focusing on multi-intelligence collaborative fault tolerance and tracking control.



Yirui Cong is an associate researcher and master's supervisor, PhD from Australian National University, recipient of Hunan Provincial Outstanding Youth Fund, and a young top-notch talent of National University of Defense Technology. His research interests include unmanned cluster control, navigation and communication integration.

Details of Session

With the rapid development of artificial intelligence technology and its extensive use in the military field, the degree of intelligence of unmanned systems is constantly improving, and their autonomous capability is continuously enhanced, unmanned intelligent combat presents different advantages and effectiveness, and is capable of more effectively attempting combat tasks jointly with other combat forces in a complex environment of high dynamics and strong confrontation. Especially with cross-domain coordinated unmanned cluster combat, it will become an important way to seize the strategic high ground of military competition. However, at this stage, there are still a lot of key technologies in unmanned cluster cross-domain coordination and sensing technology that need to be overcome, mainly including unmanned cluster technology layer, accusation layer and mission layer coordination, intelligent sensing and network communication. The breakthrough of these two major technologies will realise that unmanned clusters will have the ability to interconnect and interoperate in different space domains, and at the same time complement each other's functions and multiply energy efficiency, which will help to accelerate the process of unmanned cluster cross-domain combat, and will have a subversive impact on the rules of war and the way of combat.

The invited session invites original papers of innovative ideas, concepts, improvements, and new methods of warfare relevant to the following selected topics of “Cross-domain heterogeneous unmanned cluster autonomous collaboration and sensory integration technology”.

- New methods and techniques for refined modelling of drone clusters Bio-inspired manipulation
- New paradigm of unmanned cluster cooperative control
- New technologies and means of collaborative perception of drones across domains
- New technology of unmanned cluster system dynamic communication network interconnection and interoperability
- New method of cross-domain unmanned cluster game confrontation
- Unmanned Cluster Combat Battle Method Technology
- Technologies and platforms related to unmanned cluster systems