

# 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

AI 使能的无人机通信

## 组织者

1. 杜智勇，副教授，国防科技大学
2. 汪西明，讲师，国防科技大学
3. 徐逸凡，讲师，陆军工程大学
4. 陈嘉琦，讲师，国防科技大学
5. 吴杜成，讲师，国防科技大学

## 个人简介



**杜智勇**，国防科技大学副教授，研究方向为无线通信中的智能决策、在线学习与优化、无人机通信等，主持国家自然科学基金、国防重点实验室基金、综合研究计划等 3 项国家和省部级项目，参研 2 项国家自然科学基金和 1 项科技委项目。授权发明专利 2 项，出版学术专著 1 本，在 IEEE TWC/TVT/COM 等通信领域国际权威期刊和多个国际知名学术会议发表论文 30 余篇，是多个期刊的审稿人和 IEEE ICC/VTC 等知名国际学术会议的程序委员会成员，2020 年入选玛丽居里学者计划。



**汪西明**，国防科技大学讲师，研究方向为智能抗干扰通信、认知无线电、多智能体决策理论等。在 IEEE CM/WCM/WCL 等通信领域国际权威期刊和多个国际知名学术会议发表论文 20 余篇，是多个期刊和学术会议的审稿人，授权国家发明专利 4 项。主持国家自然科学基金青年科学基金、国家自然科学基金地区科学基金子课题、基础加强计划基金子课题等项目 3 项。



**徐逸凡**，陆军工程大学讲师。研究方向为认知无线电、无人集群通信和智能抗干扰通信。主持基础加强计划基金、江苏省青年基金、国家自然科学基金联合基金重点支持项目子课题等项目 4 项，在 IEEE TIFS/TVT/IoTJ/TGCN 等高水平期刊和 IEEE ICC/WCNC 等国际知名学术会议发表论文 40 余篇，出版学术专著 1 部，授权国家和国防发明专利 10 项，获 2022 年军事科学技术进步二等奖 1 项，2023 年入选中国科协青年人才托举工程。



**陈嘉琦**，国防科技大学讲师，研究方向为移动通信网络覆盖、无线信道建模和预测、无人机通信等。在 IEEE TWC/WCM/ICC 等通信领域国际权威期刊和多个国际知名学术会议发表论文 10 余篇，是多个期刊和学术会议的审稿人。参与国家重点研发计划项目 1 项，军队级项目 2 项。



**吴杜成**，国防科技大学讲师，研究方向为无线网络资源分配、认知无线电、无人机通信等，主持国家自然科学基金青年科学基金项目 1 项，授权发明专利 2 项，在 IEEE TVT/CL 等通信领域国际期刊和多个国际学术会议发表论文 20 余篇，是多个期刊和学术会议的审稿人。

### 特邀专题简介

由于无人机的高速移动和无线信道的开放性，无人机通信系统的资源优化将面临高动态、任务驱动和易受干扰等挑战。随着无人机通信与人工智能 (AI) 的快速发展，AI 使能的无人机通信技术可以为无人机通信系统面临的困难与挑战提供具有前景的解决方法，从而显著提升无人机通信系统的资源利用率、任务完成度和通信可靠性。通过对无线环境和执行任务的认知，AI 使能的通信技术能够让无人机系统自主地优化飞行轨迹、通信参数、用频策略，实现对无线环境、任务和恶意干扰的自适应与通信网络的自组织。此外，由于无人机高动态、分布式等特点，传统 AI 的“离线训练，在线应用”使用模式将难以在无人机通信系统中发挥最大效能，研究分布式在线学习 AI 在无人机通信中的应用也是一个有趣且实际的课题。

本特邀专题围绕“AI 使能的无人机通信”主题征求原创稿件，并借此机会为研究人员交流新思想和新方法、探讨相关问题和挑战提供平台。

- 机器学习在无人机通信中的应用
- 强化学习在无人机通信中的应用
- 深度学习在无人机通信中的应用
- 分布式在线学习在无人机通信中的应用
- AI 使能的无人机通信组网技术
- AI 使能的无人机通信抗干扰技术
- 无人机通信系统中 AI、任务、组网的联合优化

# IEEE ICUS 2024

## Invited Session Summary

### Title of Session

AI-enabled UAV Communications

### Organizers

**1. Assoc. Prof. Zhiyong Du**

National University of Defense Technology, China

**2. Dr. Ximing Wang**

National University of Defense Technology, China

**3. Dr. Yifan Xu**

Army Engineering University, China

**4. Dr. Jiaqi Chen**

National University of Defense Technology, China

**5. Dr. Ducheng Wu**

National University of Defense Technology, China

### Biosketches of Organizers



**Zhiyong Du**, Associate Professor at National University of Defense Technology, his research focuses on intelligent decision-making, online learning and optimization, and UAV communications. He has hosted three national and provincial projects, including the National Natural Science Foundation, the Defense Key Laboratory Fund, and the Comprehensive Research

Plan. He has participated in two national and military projects. He has been granted two invention patents, published one academic monograph, and has over 30 publications in international journals and conferences in the field of communications such as IEEE TWC/TVT/COM. He is the reviewer for multiple journals and the program committee member for international conferences such as IEEE ICC/VTC. In 2020, he was selected for the Marie Curie Fellowship program.



**Ximing Wang** is a lecturer in National University of Defense Technology, his research interests include intelligent anti-jamming communication, cognitive radio, multi-agent decision theory, etc. He has published more than 20 papers in IEEE CM/WCM/WCL and other international journals and

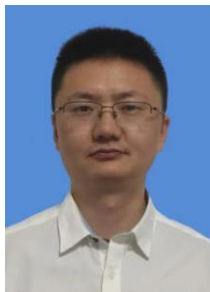
conferences. He is the reviewer of many journals and academic conferences, and has authorized 4 national invention patents. He has hosted 3 national and military projects.



**Yifan Xu** is a lecturer in Army Engineering University. His research interests include cognitive radio, UAV swarm communications and intelligent anti-jamming communications. He presided over four key projects supported by the Military Commission of Science and Technology, the Youth Fund of Natural Science Foundation of Jiangsu Province, and the National Natural Science Foundation, and published more than 40 papers in high-level journals such as IEEE TIFS/TVT/IoTJ/TGCN and internationally renowned academic conferences such as IEEE ICC/WCNC. He published 1 academic monograph, authorized 10 national and national defense invention patents, won the second prize of Military Science and Technology Progress Award in 2022, and was selected into Young Elite Scientists Sponsorship Program by CAST in 2023.



**Jiaqi Chen**, Lecturer in National University of Defense Technology, her research interests include mobile communication network coverage performance, channel modeling, channel prediction, and UAV communications. She has published more than 10 papers in IEEE TWC/WCM/ICC and other international journals or academic conferences, and is the reviewer of many journals and academic conferences. She has participated in one project of National Key Research and Development Program and two military projects.



**Ducheng Wu** is currently a Lecturer with National University of Defense Technology. His research interests include wireless network resource allocation, cognitive radio, UAV communication, etc. He has hosted one Young Science Fund of National Natural Science Foundation, been authorized two invention patents, and published more than 20 papers in IEEE TVT/CL and other international journals and several international conferences in the field of communication.

### **Details of Session**

Due to the high-speed movement of UAVs and the openness of wireless channels, the resource optimization of UAV communication systems will face challenges such as high dynamic, task-driven and susceptible to jamming. With the rapid development of UAV communications and artificial intelligence (AI), AI-enabled UAV communication technologies can provide promising solutions to the difficulties and challenges faced by UAV communication systems, thus significantly improving the resource utilization, task completion and communication reliability of UAV communication systems. Through the cognition of wireless environment and task, AI-enabled communication technologies enable UAV systems to autonomously optimize flight trajectories, communication parameters and spectrum-use strategies, and realize adaptive and self-organization of communication networks towards wireless environment, tasks and malicious jamming. In addition, due to the high dynamic and distributed characteristics of UAVs, the traditional “offline training and online application” AI mode will be difficult to play maximum efficiency in UAV communication systems. The study of distributed and online learning AI in UAV communications is also an interesting and practical topic.

The invited session calls for original papers relevant to the following selected topics of “AI-enabled UAV communications”, and takes this opportunity to provide a platform for researchers to exchange new ideas and new methods, and discuss related problems and challenges.

- Machine learning for UAV communications
- Reinforcement learning for UAV communications
- Deep learning for UAV communications
- Distributed and online learning for UAV communications
- AI-enabled networking techniques for UAV communications
- AI-enabled anti-jamming techniques for UAV communications
- Joint optimization of AI, task and networking in UAV communication systems