

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

跨介质协同感知与智能控制

组织者

1. 李一辰，助理研究员，上海交通大学
2. 于文彬，副研究员，上海交通大学
3. 宋磊，副研究员，上海交通大学
4. 王琳，教授，上海交通大学

个人简介



李一辰，博士，上海交通大学助理研究员，入选上海市“超级博士后”激励计划，获中国指挥与控制学会优博论文奖、上海交通大学优博论文提名奖等。面向海洋智能无人系统的信息感知需求，开展水下定位跟踪、跨介质协同组网、多源数据融合等技术研究，在 IEEE JOE、IEEE/CAA JAS、IEEE TII 等国际期刊/会议发表论文 15 篇，申请专利 10 项。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，《海洋工程装备与技术》青年编委等。目前主持国家自然科学基金青年项目，参与完成国家自然科学基金重点等项目。



于文彬，博士，上海交通大学自动化系副研究员。主持国家自然科学基金面上、青年、上海市自然科学基金、国家重点研发计划子课题等，授权发明专利 8 项，发表 SCI 论文 20 余篇。获得上海市技术发明一等奖 1 项。面向智能无人系统感知需求，研究空天海潜目标与环境信息感知、传输与控制，针对各域高速小目标，通过复合系统进行跟踪与测量，设计目标探测“感-传-控”一体化架构，构建数据自适应采样、稳定传输以及传感设备最优化调度。



宋磊，工学博士、博士生导师，上海交通大学电子信息与电气工程学院副研究员、汉江国家实验室双聘副研究员。主要研究方向为海空智能集群、跨域协同控制与自主无人系统，作为项目负责人主持基础加强技术领域基金重点、装备预研联合基金、重点实验室基金、上海交大“深蓝计划”基金及企业横向项目 20 余项；在 IEEE TNLS、IEEE JOE、IEEE RAL、AST、OE、ACC、《航空学报》、《指挥与控制学报》等人工智能与空天海洋等国内外顶级期刊与会议上发表学术论文 30 余篇，授权国家、国防发明专利 10 余项，兼任中国指挥与控制学会高级会员、集群智能与协同控制专委会委员、青年工作委员会委员等职务。



王琳，上海交通大学教授、博导，上海市曙光学者，围绕网络系统的分析与控制开展研究，发表 SCI 期刊论文 60 余篇，获 2022 年中国自动化学会自然科学奖一等奖，2022 年上海市科学技术奖自然科学二等奖，2020 年中国电子学会电子信息领域优秀科技论文奖，第 13 届智能控制与自动化世界大会最佳理论论文奖。担任 IFAC 大规模复杂系统专委会副主席、中国工业与应用数学学会复杂网络与复杂系统专委会秘书长，IEEE Trans. Network Science & Engineering 和 Systems & Control Letters 副编委，J. Systems Science & Complexity 青年编委，《系统科学与数学》编委。

特邀专题简介

随着人工智能、机器人、信息系统等技术的快速发展，自主无人平台已成为当今空天、陆地、海洋等重要领域发展中不可替代的组成部分，而基于海量异构无人平台的任务执行模式，也逐渐演化出明显的跨介质、协同、智能等特征趋势。同时，在跨介质的网络化系统中，感知与控制技术为无人平台提供了基本的信息输入与任务执行手段，是复杂环境中无人集群实现高质量认知决策和高效率任务执行的关键保障。面向典型的陆、海、空、天、潜跨介质协同网络架构，剖析不同介质对感知与控制的本质性限制，融合各域各介质中异构无人平台的性能优势，构建多域跨介质的分布式协作机制与框架，突破协同感知与智能控制技术在传统单一介质场景中的性能提升瓶颈，为当今跨介质网络协同技术发展奠定基础。

本特邀专题邀请以下与“跨介质协同感知与智能控制”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。

- 异构无人平台的跨介质协同机理/机制
- 复杂态势去伪存真的智能认知技术
- 高精敏捷跨介质协同控制技术
- 跨介质组网通信技术
- 海量多源数据融合技术
- 非合作目标持续定位与稳健跟踪技术
- 异构平台弹性规划与协同部署技术
- 海上公务任务智能筹划技术

IEEE ICUS 2024

Invited Session Summary

Title of Session

Cross-Media Cooperative Sensing and Intelligent Control

Organizers

1. Dr. Yichen Li

Shanghai Jiao Tong University, China

2. Dr. Wenbin Yu

Shanghai Jiao Tong University, China

3. Dr. Lei Song

Shanghai Jiao Tong University, China

4. Prof. Lin Wang

Shanghai Jiao Tong University, China

Biosketches



Dr. Yichen Li, assistant researcher of Shanghai Jiao Tong University, was selected by Shanghai "Super Postdoctoral" incentive program, and was awarded with the Excellent Doctoral Dissertation of Chinese Institute of Command and Control and was Nominated for Excellent Doctoral Dissertation of Shanghai Jiao Tong University. Focusing on the information sensing of marine intelligent unmanned systems, he has carried out researches on underwater localization and tracking, cross-media cooperative networking, and multi-source data fusion. Until now, he has published 15 international journal and conference papers, including IEEE JOE, IEEE/CAA JAS, IEEE TII, etc., and applied for 10 patents.



Dr. Wenbin Yu is an associate professor in the Department of Automation at Shanghai Jiao Tong University. He has been involved in various research projects, including the National Natural Science Foundation's General and Youth Programs, Shanghai Natural Science Foundation, and sub-projects of the National Key Research and Development Program. He has been granted 8 invention patents and has published over 20 SCI papers. He has also received the first prize in the Shanghai Technical Invention Award. Dr. Yu's research focuses on the perception, transmission, and control of targets and environmental

information in intelligent unmanned systems. He specifically studies the tracking and measurement of high-speed small targets in different domains using composite systems. He designs an integrated architecture for target detection, transmission, and control, and develops data-adaptive sampling, stable transmission, and optimal scheduling of sensing devices.



Dr. Lei Song received the Ph.D. degree in control theory and control engineering from Shanghai Jiao Tong University, Shanghai, China. From 2007 to 2009, he was a Research Assistant with the Department of Computer Science and Technology, Tsinghua University, Beijing, China. He is currently an Associate Professor with the Department of Automation, Shanghai Jiao Tong University. His research interests include intelligent command and control, autonomous unmanned system and cross-domain synergy.



Lin Wang, a professor and doctoral supervisor at Shanghai Jiao Tong University, and a scholar from Shanghai Shuguang, has conducted research on the analysis and control of networked systems. She has published over 60 SCI journal papers and won the first prize of the Natural Science Award of the Chinese Society of Automation in 2022, the second prize of the Natural Science Award of the Shanghai Science and Technology Award in 2022, and the Excellent Science and Technology Paper Award in the Electronic Information Field of the Chinese Society of Electronics in 2020, Best Theoretical Paper Award at the 13th World Conference on Intelligent Control and Automation. She served as Vice Chairman of the IFAC Technical Committee on Large scale Complex Systems, Secretary General of the Complex Networks and Complex Systems Committee of the Chinese Society of Industry and Applied Mathematics. She also served as Associate Editor of IEEE Trans on Network Science & Engineering and Systems & Control Letters, Young Editor of J. Systems Science & Complexity.

Details of Session

With the rapid development of artificial intelligence, robotics, information systems and other technologies, autonomous unmanned platforms have become an irreplaceable component in various important areas. The cooperative systems based on massive heterogeneous unmanned platforms have gradually evolved to have

obvious characteristics such as cross-media, cooperative, and intelligent. Meanwhile, in the multi-domain networked systems, the sensing and control technologies provide the unmanned platform with the basic information input and mission execution means, which is the key guarantee for the unmanned clusters to realize high-quality cognition and decision-making as well as high-efficiency task execution in the complex environment. Facing the typical land, sea, air, space and underwater cross-media cooperative network architecture, it is important to analyze the intrinsic limitations of different media on sensing and control, integrate the advantages of heterogeneous unmanned platforms, construct a multi-domain and cross-media distributed cooperative framework, breakthrough the performance bottleneck of cooperative sensing and intelligent control in traditional single-medium scenarios, and lay the basic technical foundation for today's multi-media networked cooperative.

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 “Cross-Media Cooperative Sensing and Intelligent Control”.

- Cross-media cooperative mechanism for heterogeneous unmanned platforms
- Intelligent cognitive technology in complex environments
- High-precision and agile cross-media cooperative control
- Cross-media network and communication technologies
- Massive multi-source data fusion technology
- Continuous localization and robust tracking of noncooperative targets
- Flexible planning and cooperative deployment for heterogeneous platforms
- Intelligent planning technology for maritime missions