

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	自主无人系统智能感知与决策
组织者	<ol style="list-style-type: none">1. 李修贤，教授，同济大学2. 高伟男，教授，东北大学3. 孟伟，教授，广东工业大学4. 赵世钰，特聘研究员，西湖大学5. 朱波，副教授，中山大学/南京大学
个人简介	<p> 李修贤，同济大学教授，博导，自主智能无人系统全国重点实验室，电子与信息工程学院，上海自主智能无人系统科学中心，国家级青年人才。主要研究兴趣是分布式控制和优化、博弈、无人系统应用。于香港大学获得机械工程博士学位，曾为新加坡南洋理工大学博士后与香港城市大学高级副研究员。发表 SCI 期刊论文 50 余篇，获国际会议 IEEE RCAR 2018 最佳论文提名奖、上海市人工智能学会青年优秀论文奖(2021)，中国自动化学会青年工作委员会委员，AAAI、CAA 和 CAAI 会员，CICC 和 IEEE 高级会员。</p> <p> 高伟男，东北大学教授、博士生导师、IEEE 高级会员、国家级青年人才、美国三菱电气研究实验室客座教授、斯坦福全球前 2% 顶尖科学家。曾任美国佛罗里达理工学院助理教授、博士生导师。长期从事人工智能、自适应动态规划、优化控制和输出调节等基础理论研究，并以智能网联汽车、无人驾驶、电力系统等为具体对象进行基础应用研究。围绕上述领域在 IEEE TAC、Automatica 等国际期刊发表论文 60 余篇。担任自动化学报（英文版）、IEEE TNLS、Control Engineering Practice 等控制与人工智能领域国际期刊编委。主持中国自然科学基金委、美国自然科学基金委、美国交通部联邦高速署等项目，多次担任美国自然科学基金委项目评审专家。获多个 IEEE</p>

学术会议最佳论文奖。



孟伟，本硕均毕业于东北大学，博士毕业于新加坡南洋理工大学。2012-2017 年曾任职于新加坡国立大学淡马锡实验室，担任研究科学家职位。目前任职于广东工业大学自动化学院，担任教授、博士生导师。研究兴趣包括无人系统、多机器人系统、数字孪生等。



赵世钰，本硕毕业于北京航空航天大学，博士毕业于新加坡国立大学。2019 年加入西湖大学，目前是工学院特聘研究员、智能无人系统实验室负责人。加入西湖大学前，他是英国谢菲尔德大学自动控制与系统工程系的讲师和博士生导师。他的实验室致力于研发有趣、有用、有挑战性的下一代机器人系统，包括大规模机器人集群系统、空中无人机协同追捕系统、空中作业机器人系统。代表性研究成果发表在 Nature Communications、IEEE Transactions on Robotics、International Journal of Robotics Research, IEEE Control Systems Magazine 等顶级期刊。他曾获得国家海外高层次人才引进计划青年项目。在追求高品质研究成果之外，他也致力于教授高影响力的课程。他撰写的英文教材《Mathematical Foundations of Reinforcement Learning》即将由清华大学出版社和 Springer 出版社联合出版。



朱波，分别于 2004 年和 2010 年在北京航空航天大学获得本科和博士学位（导航、制导与控制）。自 2010 年 8 月起，在电子科技大学航空航天学院历任讲师、副教授（副研究员）、硕士生导师和博士生导师。于 2013 年 8 月-2014 年 8 月，作为访问学者，在多伦多大学宇航技术研究院（UTIAS）飞行系统与amp;控制研究小组进行学术交流和amp;学习。自参加工作以来，已经在系统与amp;控制、航空航天等领域的主流期刊上，发表论文 40 余篇；出版英文著作 1 部；主持/主研国家级、省部级项目 10 余项，其中主持国家自然科学基金项目 3 项。目前，正在办理到南京大学苏州校区全职工作的相关流程，任长聘副教授、博士生导师。研究兴趣包括：ADA 控制技术、干扰抑制技术、及其无人集群系统

用。

特邀专题简介

随着新一轮信息技术的快速发展,自主智能无人系统的应用与需求越来越强烈。作为人工智能的重要应用之一,其发展可大大推动人工智能技术的创新与进步。自主智能无人系统依靠控制、大数据、人工智能以及其他学科的进步来创造具有集成感知、运动规划、决策和推理能力的无人系统,具有自主性、智能性和协作性等主要特征。典型自主无人系统包括无人机、无人车、自动驾驶汽车、智能制造机器人以及陪伴型机器人等。通过新一代人工智能技术与无人系统技术深度融合,可实现通过学习认知来增强物理系统的感知、计算分析与控制的能力。现阶段对于自主无人系统智能感知与决策研究仍有许多技术难点,包括群体智能感知、集群智能决策等。

本特邀专题邀请如下方向稿件,但不局限于这些方向,旨在推动自主无人系统的协同智能感知、优化、博弈、控制等相关方向的发展。

- 智能环境感知
- 智能协同控制
- 分布式优化与博弈
- 数据驱动控制与决策
- 基于学习的控制
- 感知与决策的安全性
- 自主无人系统应用

IEEE ICUS 2024

Invited Session Summary

Title of Session

Intelligent Perception and Decision Making for Autonomous Unmanned Systems

Organizers

1. Prof. Xiuxian Li

Tongji University, China

2. Prof. Weinan Gao

Northeastern University, China

3. Prof. Wei Meng

Guangdong University of Technology, China

4. Prof. Shiyu Zhao

Westlake University, China

5. Assoc. Prof. Bo Zhu

Sun Yat-sen University / Nanjing University, China

Biosketches of Organizers



Xiuxian Li is a professor with National Key Laboratory of Intelligent Autonomous Systems, College of Electronic and Information Engineering, and Shanghai Research Institute for Intelligent Autonomous Systems, Tongji University, Shanghai, China. He received the Ph.D. degree in mechanical engineering from HKU, Hong Kong, in 2016. From 2016 to 2020, he has been a research fellow at NTU, Singapore, and he has also been a senior research associate at CityU, Hong Kong, in 2018. He held a visiting position at King Abdullah University of Science and Technology, Saudi Arabia, in Sept. 2019. He is in the finalist of IEEE RCAR 2018. His research interests include distributed control and optimization, game theory, as well as applications to UAVs and autonomous vehicles. He has published more than 50 SCI journal papers, and is a member of AAAI, CAA, CAAI, and a senior member of CICC and IEEE.



Weinan Gao is a Professor with the State Key Laboratory of Synthetical Automation for Process Industries at Northeastern University, Shenyang, China. Previously, he was an Assistant Professor of Mechanical and Civil Engineering at Florida Institute of Technology, Melbourne, FL, USA and a Visiting Professor of Mitsubishi Electric Research Laboratory (MERL), Cambridge, MA, USA. His research interests include reinforcement learning, adaptive dynamic programming (ADP), optimal control, cooperative adaptive cruise control (CACC), intelligent transportation systems, sampled-data control systems, and output regulation theory. Prof. Gao is the recipient of the best paper award in multiple IEEE conferences. He is an Associate Editor of IEEE Transactions on Neural Networks and Learning Systems, IEEE/CAA Journal of Automatica Sinica, Control Engineering Practice, Neurocomputing and IEEE Transactions on Circuits and Systems II: Express Briefs.



Wei Meng received the B.E. and M.E. degrees from Northeastern University, Shenyang, China, in 2006 and 2008, respectively, and the Ph.D. degree in control and instrumentation from the Nanyang Technological University, Singapore, in 2013. From 2012 to 2017, he was a Research Scientist in UAV Research Group, Temasek Laboratories, National University of Singapore. He is now with School of Automation, Guangdong University of Technology as a Professor. His current research interests include unmanned systems, multi-robot systems, digital twins.



Shiyu Zhao received the BE and ME degrees from Beijing University of Aeronautics and Astronautics, and obtained the PhD degree in Electrical Engineering from National University of Singapore. In 2019, he joined Westlake University, where he is currently an Associate Professor and the Director of the Intelligent Unmanned Systems Laboratory. Before he joined Westlake University, he was a Lecturer in the Department of Automatic Control and Systems Engineering at the University of Sheffield, UK. His laboratory is dedicated to the research on interesting, useful, and challenging next-generation robotic systems, including large-scale robotic swarm systems, cooperative aerial pursuit systems, and aerial manipulation systems. Representative research results have been

published in top journals such as Nature Communications, IEEE Transactions on Robotics, and IEEE Control Systems Magazine. In addition to pursuing high-quality research results, he is also committed to teaching high-impact courses. He has won the Best Teaching Award from the School of Engineering at Westlake University. The English textbook "Mathematical Foundations of Reinforcement Learning" written by him will soon be jointly published by Tsinghua University Press and Springer Nature Press.



Bo Zhu received the B.E. and Ph.D. degrees from Beihang University, Beijing, China, in 2004 and 2010, respectively. He was a lecturer and then promoted to an associate professor in July 2013 at University of Electronic Science and Technology of China (UESTC), Chengdu, China. He visited the FSC Lab, University of Toronto Institute for Aerospace Studies (UTIAS), Toronto, ON, Canada, from 2013 to 2014. He is now moving to Nanjing University (Suzhou Campus) as a tenured associate professor. His research interests include disturbance rejection techniques, ADA (Autonomous, Dependable and Affordable) control of swarm systems, and related applications.

Details of Session

Along with the rapid development of the new wave of information technology, there is an increasingly strong demand for application scenarios and the autonomous capabilities of unmanned systems. As one of the important applications of artificial intelligence, its development can greatly promote the innovation of artificial intelligence technology. Intelligent autonomous systems are an emerging interdisciplinary field that relies on advances in big data, artificial intelligence, and other science and technology to create unmanned systems with integrated task, motion planning, decision-making, and reasoning capabilities, featuring autonomy, intelligence, and collaboration. Typical intelligent autonomous systems include UAVs, UGVs, self-driving cars, intelligent manufacturing robots, and companion robots. Through the deep integration of new-generation artificial intelligence technology and unmanned system technology, the perception, computational analysis, and control capabilities of physical systems are enhanced through learning cognition. Currently, there are still many technical difficulties in the research of intelligent perception and decision-making for autonomous unmanned systems, including group intelligent perception, swarming intelligent decision-making, etc.

This special session invites papers from the following directions, but not limited to them, with the aim of promoting the development of collaborative intelligent perception, optimization, game theory, control, and other related directions in autonomous unmanned systems.

- Intelligent Environment Perception
- Intelligent Cooperative Control
- Distributed Optimization and Game Theory
- Data-Driven Control and Decision Making
- Learning-based Control
- Safety in Perception and Decision Making
- Applications in Intelligent Autonomous Systems