

2026 第九届 IEEE 国际无人系统大会 特邀专题简介表

特邀专题名称

人工智能赋能的工业无人系统自主决策与协同

组织者

1. 任晟，博士后研究员，香港理工大学
2. 杨依书，博士后研究员，香港理工大学
3. 李一辰，助理研究员，上海交通大学
4. 李明，助理教授，香港理工大学

个人简介



任晟，香港理工大学工业与系统工程系，博士后研究员。2024 年于上海交通大学取得工学博士学位，2018 年于西北工业大学取得工学学士学位。面向大飞机装配测试等智能制造场景，开展工业数字孪生、工业物联网与工业人工智能等技术研究，在 IEEE TII、IEEE TASE、IEEE/CAAJAS 等国际期刊于顶级会议发表论文 20 余篇，授权国家发明专利 4 项。相关成果获得国家自然科学基金委第二届“未来工业互联网”学术研讨会优秀论文。



杨依书，香港大学博士，香港理工大学工业与系统工程系，博士后研究员。致力于工业智能、供应链管理及复杂系统决策研究。研究领域跨越从预制建筑供应链优化到工业级 AI Agent 架构的深度应用，涵盖服装制造及航空维修等垂直领域。在 Advanced Engineering Informatics 等工业工程与管理科学领域国际期刊发表多篇高质量学术论文。目前核心参与包括香港创新科技署（ITC）资助、香港纺织及成衣研发中心（HKRITA）合作项目在内的多项重点科研任务，致力于推动大语言模型在垂直工业领域的深度落地与技术迁移。



李一辰，博士，上海交通大学助理研究员，入选中国科协青年人才托举工程与上海市“超级博士后”激励计划，获中国指挥与控制学会科技进步（技术发明类）一等奖、上海交通大学“十大科技进展”奖、中国指挥与控制学会优博论文、上海市自动化学会技术发明一等奖等。面向海洋智能无人系统的信息感知需求，开展涉海无人系统的协同定位跟踪、跨介质通信组网、多源数据融合等技术研究，在 IEEE JOE、IEEE/CAA JAS、IEEE TII 等国际期刊发表论文 23 篇，授权专利 7 项。



李明，博士，香港理工大学工业与系统工程系助理教授，兼任理大人工智能学院（PAAI）助理院长及理大大亚湾技术创新研究院人工智能研究中心副主任。曾任暨南大学讲师及香港大学物理互联网实验室博士后研究员。2018 年与 2013 年分别获香港大学工业与制造系统工程博士及硕士（优异）学位，2012 年毕业于华南理工大学，获计算机科学（主修）与金融学（辅修）双学士学位。长期从事生成式人工智能、区块链及面向智能制造与智慧物流的网络物理系统研究，主持或参与科研项目经费累计超过 2000 万港元。在 IEEE TII、IJPE、JMS、RCIM 等国际期刊及顶级会议发表论文 100 余篇，拥有专利及软件著作权 40 余项。入选 2019 年广东省特支计划创新创业领军团队核心成员，为 IEEE 与 CCF 高级会员，并担任 HKIE、ASME、IISE、IET 会员。同时为物流 SaaS 企业 CommaTech 及生成式人工智能初创公司 InfiX AI 的联合创始人。

特邀专题简介

随着人工智能技术的快速发展，工业无人系统正逐步从传统的规则驱动模式向数据驱动与智能决策模式转变。以自主机器人、无人机及网络物理系统为代表的无人系统，正在智能制造、智慧物流及大型工程系统等领域得到广泛应用。在复杂多变的工业环境中，这类系统需要具备自主感知、实时决策与协同控制能力，以应对任务动态变化、通信受限以及安全约束等挑战。

近年来，大语言模型、强化学习与数据驱动优化等技术的突破，为无人系统在不确定环境中的感知、推理与决策提供了新的技术路径。同时，数字孪生与工业物联网的发展，使得虚实融合与闭环优化成为可能，进一步推动工业无

人系统向高效、鲁棒与可扩展方向发展。在此背景下，研究人工智能赋能的工业无人系统自主性与决策方法，对于提升复杂工业系统的智能化水平具有重要意义。本特邀专题面向“人工智能赋能的工业无人系统自主性与决策方法”，邀请相关领域具有创新思想、理论方法及工程应用价值的原创论文。

- 面向无人系统决策的语言模型与基础模型
- 工业自主系统中的任务规划与调度方法
- 工业环境中的多智能体协同与协作机制
- 基于学习的机器人感知—决策—执行一体化方法
- 数字孪生驱动的智能决策与系统优化
- 面向自主系统的强化学习与数据驱动控制
- 通信受限环境下的协同决策与分布式控制
- 工业无人系统中的人机协同方法
- 智能制造环境中的仿真、学习与系统验证
- 工业场景下无人系统的实际应用与案例研究

IEEE ICUS 2026

Invited Session Summary

Title of Session

AI-Enabled Autonomy and Decision-Making for Industrial Unmanned Systems

Organizers

1. Dr. Cheng Ren

The Hong Kong Polytechnic University, China

2. Dr. Yishu Yang

The Hong Kong Polytechnic University, China

3. Dr. Yichen Li

Shanghai Jiao Tong University, China

4. Prof. Ming Li

The Hong Kong Polytechnic University, China

Biosketches of Organizers



Dr. Cheng Ren, Postdoctoral Research Fellow, Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University. He received his Ph.D. in Engineering from Shanghai Jiao Tong University in 2024 and his B.Eng. degree from Northwestern Polytechnical University in 2018. His research focuses on intelligent manufacturing scenarios such as large aircraft assembly and testing, with emphasis on industrial digital twins, industrial Internet of Things, and industrial artificial intelligence. He has published more than 20 papers in leading international journals and top conferences, including IEEE TII, IEEE TASE, and IEEE/CAA JAS, and holds four granted Chinese invention patents. His work received the Excellent Paper Award at the 2nd “Future Industrial Internet” Academic Symposium organized by the National Natural Science Foundation of China.



Dr. Yishu Yang, Postdoctoral Research Fellow at The Hong Kong Polytechnic University. Dr. Yang is committed to research in industrial intelligence, supply chain management, and complex system decision-making. Her expertise spans from the optimization of prefabricated construction supply chains to the deep application of industrial-grade AI Agent architectures, covering vertical sectors such as garment manufacturing and Aviation Maintenance, Repair, and Overhaul (MRO). She has published numerous high-quality academic papers in prestigious international journals in the fields of industrial engineering and

management science, such as Advanced Engineering Informatics. Currently, she plays a core role in several key research initiatives, including projects funded by the Innovation and Technology Commission (ITC) and collaborations with the Hong Kong Research Institute of Textiles and Apparel (HKRITA). Her work focuses on driving the implementation and technology transfer of Large Language Models (LLMs) within specialized industrial domains.



Dr. Yichen Li is a Research Assistant in the School of Automation and Intelligent Sensing at Shanghai Jiao Tong University. He has been selected for the Young Elite Scientists Sponsorship Program by the China Association for Science and Technology (CAST) and the Shanghai "Super Postdoctoral" Incentive Program. He has received awards including the First Prize for Scientific and Technological Progress from the Chinese Institute of Command and Control (CICC), the "Top Ten Scientific and Technological Advances" award from Shanghai Jiao Tong University, the Outstanding Doctoral Dissertation Award from the CICC, and the First Prize for Technological Invention from the Shanghai Association of Automation. Focusing on the information sensing of marine intelligent unmanned systems, he has carried out research on underwater localization and tracking, cross-media cooperative networking, and multi-source data fusion. Until now, he has published 23 international journal papers, including IEEE JOE, IEEE/CAA JAS, IEEE TII, etc., and applied for 16 patents.



Dr. Ming Li is currently an Assistant Professor at Department of Industrial and Systems Engineering (ISE), the Assistant Director of PolyU Academy for Artificial Intelligence (PAAI) and the Associate Director of Research Institute for Generative AI (RIGAI), The Hong Kong Polytechnic University. He is also the Associate Director of Artificial Intelligence Research Centre @PolyU-Daya Bay Technology and Innovation Research Institute. Prior to joining ISE, Dr. Li was a Lecturer at School of Intelligent Systems Science and Engineering, Jinan University and Post-Doctoral Fellow at the HKU-ZIRI Laboratory for Physical Internet (pi-Lab), The University of Hong Kong. He received his PhD degree and master's degree (Distinction) from Department of Industrial and Manufacturing Systems Engineering, The University of Hong Kong, in 2018 and 2013 respectively. He also obtained dual Bachelor degrees in Computer Science (major) and Finance (minor) at South China University of Technology in 2012. He has conducted research projects in the field of Generative AI, Blockchain and Cyber-Physical System for Smart Manufacturing and Logistics with substantial government and industrial grants over

85 million HK dollars. He has published more than 100 papers on leading international journals and top conferences, including IEEE T-II, IJPE, JMS, RCIM, and etc. He has also obtained more than 50 patents and copyrights. He is the Core Member of the 2019 Guangdong Special Support Talent Program – Innovation and Entrepreneurship Leading Team. Now he is senior member of IEEE and CCF, a member of HKIE, ASME, IISE and IET, as well as the co-founder of CommaTech and Infix.ai.

Details of Session

With the rapid advancement of large language models (LLMs) and foundation models, artificial intelligence is playing an increasingly important role in enabling autonomy and decision-making in industrial unmanned systems. Meanwhile, the evolution of intelligent manufacturing and the widespread deployment of autonomous robots, drones, and cyber-physical systems are making industrial environments more dynamic, data-intensive, and tightly interconnected. In such settings, unmanned systems must operate under evolving tasks, communication constraints, safety requirements, and strong coupling with physical processes.

Recent progress in LLMs, reinforcement learning, and data-driven optimization is transforming how unmanned systems perceive, reason, and make decisions under uncertainty. In particular, LLM-based approaches offer new capabilities for high-level reasoning, task planning, and knowledge integration, enabling more adaptive and scalable autonomy in complex industrial environments.

This special session aims to bring together researchers and practitioners working at the intersection of AI, robotics, and industrial systems, with a focus on system-level autonomy and intelligent decision-making. We particularly welcome contributions that integrate learning-based and model-based approaches, address real-world operational constraints, and demonstrate robust and scalable solutions in applications such as smart manufacturing, logistics, and large-scale engineering systems.

High-quality original papers are solicited on topics including, but not limited to:

- Large language and foundation models for decision-making in unmanned systems
- AI-driven task planning and scheduling in industrial autonomous systems
- Multi-agent coordination and collaborative autonomy in industrial environments
- Learning-based perception–decision–action integration for robotics
- Digital twin-enabled intelligent decision-making and system optimization
- Reinforcement learning and data-driven control for autonomous systems
- Communication-aware coordination and distributed decision-making

- Human–AI collaboration in industrial unmanned systems
- Simulation, learning, and validation in smart manufacturing environments
- Real-world applications of AI-enabled unmanned systems in industry