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	
	无人系统复杂环境认知技术与应用

组织者

1. 魏宪，研究员，华东师范大学
2. 李宏伟，教授，郑州大学
3. 衣鹏，教授，同济大学
4. 金博，副教授，同济大学

个人简介

魏宪，博士，华东师范大学研究员，博士生导师，博士毕业于德国慕尼黑工业大学计算机工程学专业。长期从事机器智能感知与决策相关理论与技术应用研究。在人工智能与机器人领域知名刊物（包括 IEEE T-PAMI，T-NNLS，T-IP，T-ITS 等期刊，以及 NeurIPS，AAI，CVPR，IJCAI，ECCV，ICRA 等会议）发表 100 余篇论文。书籍 1 部、译著 1 部，书籍章节 1 节。授权发明专利 22 项，PCT 专利 4 项，软件著作权 19 项。获得多项国家和省部级项目支持。近五年获得省部级奖项和国家级学会奖项 5 项。

李宏伟，博士，郑州大学教授，长期从事地理信息科学理论与方法教学科研工作，先后主持国家及省部级科研项目 30 余项，在地理空间信息语义计算、地理空间数据挖掘、地理信息服务等方面有较深入的研究。获得全国高校 GIS 创新人物荣誉，获得省部级科技进步一等奖、二等奖各 2 项，公开出版教材专著 8 部，发表论文 130 余篇。现兼任中国测绘学会地图学与地理信息系统专业委员会委员、中国地理信息产业协会地理信息科学理论与方法工作委员会委员、河南省地理学会副理事长、河南省城市科学研究会副理事长。

衣鹏，2011 年从中国科学技术大学获得自动化本科学位，2016 年从中国科学院数学与系统科学研究院获得运筹学与控制论博士学位。2016 年-2019 年分别于加拿大多伦多大学和美国圣路易斯华盛顿大学从事博士后研究。2019 年加入同济大学，现任"青年百人"教授。主要研究方向为多智能系统的分布式优化与博弈。入选国家海外青年人才计划，获得中国科协 "青年人才托举工程"与上海市科技英才"扬帆计划"支持，主持国家自然基金委青年和面上项目，科技部国家重点研发计划课题，参与上海市重大专项、先导专项等项目。

金博，博士，同济大学软件学院副教授，博导，上海市自主智能无人系统科学中心可信人工智能研究所所长助理，毕业于上海交通大学控制理论与控制工程专业。主要研究方向为可信机器学习、群体智能、强化学习理论及应用。主持与参与科技部科技人工智能 2030 专项、国家 863 项目、工信部产业技术基础公共服务平台项目、工信部人工智能产业创新任务揭榜挂帅、国家自然科学基金联合项目与青年项目、军委装发预研重点项目、上海市科委创新行动计划人工智能支撑项目与重点项目及企业合作十余项；已发表 IEEE TPAMI、IEEE TMI、IEEE TC、CVPR、ICLR、KDD、WWW、IJCAI、SIGIR、AAMAS、PR、Neurocomputing 中国科学等人工智能领域论文 80 余篇，发明专利 20 余项；获中国商飞"大飞机奋斗者"荣誉称号。

特邀专题简介

当前，随着人工智能、机器人以及认知科学技术的蓬勃发展，无人系统在结构化环境中的任务水平已经取得了显著提升。但是，在非结构、动态变化、开放的复杂环境中，无人系统的环境感知、建模、推理与决策等认知能力仍存在明显不足，限制了无人系统在不同行业领域的深化应用。针对上述挑战，本专题聚焦于无人系统复杂环境认知研究进展，围绕无人系统环境认知的"感知-建模-推理与决策"全过程，探讨深度学习等人工智能方法、认知科学理论成果、机器人平台技术在这一领域的创新发展与应用。

本特邀专题邀请以下与"无人系统复杂环境认知技术与应用"主题相关的

理论、方法、技术及应用的原创论文，以及能代表该研究领域前沿水平、未来发展趋势的综述性论文。

- 复杂环境感知

- 复杂环境建模

- 复杂环境推理决策

- 感知决策一体化

- 基于持续学习的复杂环境认知

- 类脑启发的复杂环境认知

- 复杂环境多模态数据处理

- 复杂环境下的无人系统平台

以及其他与无人系统复杂环境认知相关的研究与应用。

Title of Session
Cognitive Techniques and Applications of Unmanned Systems in Complex Environments

Organizers
1. Dr. Xian Wei
East China Normal University, China
2. Prof. Hongwei Li
Zhengzhou University, China
3. Prof. Peng Yi
Tongji University, China
4. Prof. Bo Jin
Tongji University, China

Biosketches

Xian Wei received the Ph.D. degree in Computer Engineering from the Technical University of Munich, Munich, Germany. Currently, he is a research professor in the Software Engineering Institute (SEI) at the East China Normal University, Shanghai, China. His research interests focus on deep learning, geometric optimization, and time series analysis. The applications include multi-sensor fusion for intelligent car, robotic vision, data sequence or images modeling, synthesis, recognition and semantics. He has authored over 100 publications in refereed journals and conference proceedings. He is a senior member of IEEE and CCF.

Hongwei Li, a professor at Zhengzhou University, has long been engaged in teaching and research in the theory and methods of geographic information science. He has presided over more than 30 national and provincial-level research projects and has conducted in-depth research in areas such as semantic computation of geographic spatial information, geographic spatial data mining, and geographic information services. He has been honored as a national university GIS innovation figure and has received two first prizes and two second prizes for

scientific and technological progress at the provincial and ministerial levels. He has published eight textbooks and monographs and has authored over 130 papers. He currently serves as a member of the Professional Committee of Cartography and Geographic Information Systems of the Chinese Society for Geodesy Photogrammetry and Cartography, a member of the Committee on Theory and Methods of Geographic Information Science of the China Association for Geospatial Industry and Sciences, Vice Chairman of the Henan Geographic Society, and Vice Chairman of HN Society for Urban Studies.

Peng Yi completed his bachelor's degree in automation from University of Science and Technology of China in 2011 and his PhD in operational research and cybernetics from the Institute of Mathematics and Systems Science, Chinese Academy of Sciences in 2016. He held postdoctoral positions at the University of Toronto in Canada and Washington University in St. Louis, USA from 2016 to 2019. He then joined Tongji University in 2019 and currently serves as a "Hundred Youth Talents" professor. Yi's research mainly focuses on distributed optimization and game theory for multi-agent systems. He is selected for the National Overseas Youth Talent Program, and is supported by the "Youth Talent Support Project" of China Association for Science and Technology, and the "Sailing Plan" for Science and Technology Talents of Shanghai . He leads the Youth and General Program of National Natural Science Foundation of China and the Special Program for National Science and Technology Key Research of China. Moreover, he participates in the Key and Development Program of Shanghai, etc.

Bo Jin is an associate professor and doctoral supervisor at the School of Software Engineering, Tongji University. He is also the assistant director of Trusted Artificial Intelligence Institute, in Shanghai Research Institute for Intelligent Autonomous Systems. He graduated from Shanghai Jiao Tong University with a major in Control Theory and Control Engineering. His main research interests include trustworthy machine learning, swarm intelligence, reinforcement learning theory and its applications. He has led or participated in more than ten projects, including the National Key Research and Development Program of China, the Joint and Youth Funds of the National Natural Science Foundation of China, the Military Commission's Key Pre-Research Project, National 863 Program, the Public

Service Platform Project of the Ministry of Industry and Information Technology, the AI Innovation Task of the Ministry of Industry and Information Technology, the AI Support Project and Key Project of the Shanghai Committee of Science and Technology, and corporate collaboration projects. He has published more than 80 papers about artificial intelligence, such as IEEE TPAMI, IEEE TMI, IEEE TC, CVPR, ICLR, KDD, WWW, IJCAI, SIGIR, AAMAS, PR, Neurocomputing, and Chinese Science, and has more than 20 patents.

Details of Session

With the vigorous development of artificial intelligence, robotics, and cognitive science technologies, the task proficiency of unmanned systems in structured environments has significantly improved. However, in unstructured, dynamically changing, and open complex environments, unmanned systems still exhibit notable deficiencies in environmental perception, modeling, reasoning, and decision-making capabilities, which constrain their deepened applications across various industries. Addressing these challenges, this special issue focuses on the research progress of cognitive techniques in complex environments for unmanned systems. It revolves around the entire process of environmental cognition in unmanned systems, encompassing perception, modeling, reasoning, and decision-making, and explores innovative developments and applications of deep learning methods, cognitive science theories, and robotics platform technologies in this field.

This special issue invites original research papers on theories, methods, technologies, and applications related to " Cognitive Techniques and Applications of Unmanned Systems in Complex Environments," as well as comprehensive review papers that represent the cutting-edge research and future trends in this field.

- Perception of complex environments
- Modeling of complex environments
- Reasoning and decision-making of complex environments
- Integration of perception and decision-making
- Continual learning-based cognitive techniques for complex environments
- Brain-inspired cognitive techniques for complex environments
- Multi-modal data processing in complex environments
- Unmanned systems platforms for complex environments

And other research and applications related to cognitive aspects in unmanned systems in complex environments.