

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

无人系统与人工智能驱动的地灾预警、防灾空间规划与韧性城市治理

组织者

1. 周俊，正高级工程师，重庆邮电大学
2. 游钰和，高级工程师，厦门市规划数字技术研究中心
3. 唐雪峰，高级工程师，自然资源部丘陵山地地质灾害防治重点实验室
4. 代劲，教授，重庆邮电大学
5. 洪文兴，教授，厦门大学

个人简介



周俊，重庆邮电大学计算机科学与技术学院正高级工程师，硕士生导师。在军队、军工研究所长期曾从事信息化、智能化建设工作，主要研究方向为深度学习、图像处理。中国指会与控制学会高级会员，重庆科技局项目评审专家，重庆商务委员会专项资金评审专家，重庆市事业单位招聘面试考官、《重庆理工大学学报（自然科学版）》审稿专家、The Journal of Supercomputing (SCI 期刊) 审稿专家。公开发表论文 50 余篇，主持军队、省部级项目、军工企事业委托项目多项，出版学术专著 3 部，获得重庆市教学成果三等奖及中国通信工业协会第三届教育教学成果二等奖，授权发明专利、实用专利 2 项，授权软件著作权 6 项。



游钰和，高级工程师，现就职于厦门市规划数字技术研究中心。长期深耕自然资源信息化与应急管理数字化领域，担任厦门市地质灾害防治信息化、智慧化建设牵头人。具备丰富的工程项目管理经验，擅长以业务流程再造驱动公共治理数字化转型。近年来，主导构建了厦门市地质灾害“隐患点+风险区”双控智慧平台，创新性地将“空地一体”感知网络与 AI 视觉前沿技术深度融合融入防灾减灾实战。



唐雪峰，就职于福建省地质工程勘查中心，自然资源部丘陵山地地质灾害防治重点实验室，高级工程师，注册土木工程师（岩土），深耕岩土工程与地质灾害防治领域十余载，擅长岩土工程勘察设计、矿山生态修复以及地质灾害调查评价、监测预警、工程治理等。牵头或核心参与完成上百个项横纵向项目，成果广泛应用于东南沿海丘陵山地地质灾害防控与管理，具备丰富的理论知识和扎实的实践经验，迄今发表论文 15 篇，获得发明专利 10 项。



洪文兴，厦门大学航空航天学院教授、自动化系主任、博士生导师。现任全国高校计算机教育研究会副理事长、福建省系统工程学会理事长，是厦门高层次人才。主要研究方向是数据智能、无人系统及其在海洋或城市的应用、低空经济系统工程等。负责厦门大学智能无人系统研究中心，从事低空经济研究，牵头编制厦门市低空经济总体规划、城市空中交通方案、制定“数字素养与技能”团体标准等，在全国范围推行数字力认证，促进数字人才培养体系完善，服务企业数字化转型。曾主持国家、省自然科学基金各 1 项，骨干参与 4 项国家自然科学基金，主持重大企事业横向课题 6 项，获省、市科技奖 2 项，主编、出版数据科学系列教材 4 部。



代劲，重庆邮电大学计算机科学与技术学院教授，博导，重庆市高校优秀人才支持计划人选，重庆人工智能学会理事，主要研究方向为多粒度认知计算、大数据与知识工程、工业智能软件服务等。承担国家自然科学基金重点项目、科技部重点研发计划项目、中国高校产学研创新基金、重庆市重点产业重大主题专项、重庆市基础与前沿项目等二十余项，实现科研成果转化十余项，获重庆市科技进步奖二等奖、中国教育技术协会一等奖。

特邀专题简介

随着无人系统技术与空天遥感技术的深度融合，以无人机（UAV）、无人车（UGV）为代表的智能装备在应对极端、非结构化及高动态环境方面展现出显著效能。在自然资源监测、公共安全保障及现代化城市治理领域，无人系

统正逐渐成为提升区域安全韧性的关键技术手段。研究复杂地形环境下的地质灾害预警与防灾空间规划，一个核心路径是构建基于人工智能的“感知-预警-治理”一体化体系。利用多模态传感器融合与深度学习算法，能够实现对灾害隐患的精准识别与动态监测，改革传统的风险评估与空间治理范式。相关技术依托空天地一体化监测网络，可实现从宏观国土空间到微观城市社区的全周期覆盖。面对突发性灾害与复杂多变的城市运行需求，提升无人系统的智能化感知水平与跨部门协同能力变得愈发紧迫。现阶段，人工智能驱动的泛在监测正引领防灾手段向全周期数字化转型，旨在构建具备高可靠性、强适应性的智慧治理平台。这不仅能显著提升地灾预警的时效性，更为构建安全韧性空间、优化国土空间规划以及提升城市运行效率提供了科学的决策支撑。

本特邀专题旨在汇聚无人系统、人工智能、地质工程及城市治理等领域的最新研究成果。

本专题涵盖但不限于以下研究方向：

- 复杂高风险地形下的无人系统协同导航与路径规划
- 基于深度学习的多源数据融合与地灾隐患早期识别
- 无人系统集群在突发灾害中的应急通信保障与智能调度
- 面向韧性城市治理的数字孪生底座构建与实时仿真技术
- 基于人工智能的灾害风险动态评估与城市空间安全管理
- 空天地一体化监测下的防灾空间规划与国土治理策略
- 极端环境下无人系统传感器网络的长时效监测与智能维护
- 面向智慧社区治理的微型无人系统精细化巡检与识别
- 无人系统在地质灾害后评价与城市更新规划中的应用研究
- 跨行业数据融合下的防灾减灾治理体系与决策支持平台

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Invited Session Summary

Title of Session

Unmanned Systems and AI-Driven Geological Hazard Early Warning, Disaster Prevention Spatial Planning, and Resilient Urban Governance

Organizers

1. Prof. Jun Zhou

Chongqing University of Posts and Telecommunications, China

2. Prof. Yuhe You

Xiamen Planning Digital Technology Research Center, China

3. Prof. Xuefeng Tang

Key Laboratory of Hill and Mountain Geological Hazards Prevention, Ministry of Natural Resources, China

4. Prof. Jin Dai

Chongqing University of Posts and Telecommunications, China

5. Prof. Wenxing Hong

Xiamen University, China

Biosketches of Organizers



Jun Zhou is a Senior Engineer (Professor Grade) and Master's Supervisor at the School of Computer Science and Technology, Chongqing University of Posts and Telecommunications. He has extensive experience in informatization and intelligent system construction within military and defense research institutes. His research primarily focuses on deep learning and image processing. He is a Senior Member of the Chinese Institute of Command and Control and serves as a project review expert for the Chongqing Municipal Science and Technology Bureau and the Chongqing Municipal Commission of Commerce. Additionally, he is a reviewer for *The Journal of Supercomputing* (SCI) and the *Journal of Chongqing University of Technology*. Mr. Zhou has published over 50 papers, authored 3 monographs, and led numerous provincial and ministerial-level projects. He holds 2 patents and 6 software copyrights, and has received multiple teaching achievement awards.



Yuhe You is a Senior Engineer currently based at the Xiamen Planning Digital Technology Research Center. He has long been dedicated to the informatization of natural resources and the digitalization of emergency management, serving as the lead for Xiamen's geological disaster prevention intelligent construction projects. With extensive experience in engineering project management, he specializes in driving the digital transformation of public governance through business process re-engineering. In recent years, he spearheaded the development of Xiamen's "Hidden Danger Points + Risk Areas" dual-control intelligent platform, innovatively integrating "Air-Ground Integrated" sensing networks with cutting-edge AI vision technology into disaster prevention and mitigation operations.



Xuefeng Tang is a Senior Engineer and Registered Civil Engineer (Geotechnical) at the Fujian Geological Engineering Investigation Center and the Key Laboratory of Hill and Mountain Geological Hazards Prevention, Ministry of Natural Resources. With over a decade of expertise in geotechnical engineering and geological hazard prevention, he specializes in geotechnical investigation and design, mine ecological restoration, and hazard monitoring and early warning. He has led or played a core role in over 100 vertical and horizontal research projects, with results widely applied to disaster control in the hilly areas of the Southeast coast. Mr. Tang has published 15 papers and holds 10 invention patents.



Wenxing Hong is a Professor, Doctoral Supervisor, and Head of the Department of Automation at the School of Aerospace Engineering, Xiamen University. He serves as the Vice Chairman of the National Association of Computer Education in Colleges and Universities and Chairman of the Fujian Systems Engineering Society. His research interests include data intelligence, unmanned systems, and low-altitude economy systems engineering. As the head of the Intelligent Unmanned Systems Research Center at Xiamen University, he led the compilation of Xiamen's master plan for the low-altitude economy and urban air mobility. Professor Hong has presided over various National and Provincial Natural Science Foundation projects, published 4 textbooks on data science, and received multiple provincial and municipal science and technology awards.



Jin Dai is a Professor and Doctoral Supervisor at the School of Computer Science and Technology, Chongqing University of Posts and Telecommunications. Selected for the Chongqing Excellent University Talent Support Program, he also serves as a Director of the Chongqing Artificial Intelligence Society. His research focuses on multi-granular cognitive computing, big data and knowledge engineering, and industrial intelligent software services. Professor Dai has undertaken over 20 high-level projects, including key programs from the National Natural Science Foundation of China and the Ministry of Science and Technology's Key R&D Initiatives. He has successfully commercialized over ten scientific achievements and won the Second Prize of the Chongqing Science and Technology Progress Award.

Details of Session

With the synergistic integration of unmanned systems and aerospace remote sensing technology, intelligent equipment—exemplified by Unmanned Aerial Vehicles (UAVs) and Unmanned Ground Vehicles (UGVs)—has demonstrated remarkable efficacy in navigating extreme, unstructured, and highly dynamic environments. Within the domains of natural resource monitoring, public safety, and modern urban governance, unmanned systems are increasingly serving as a pivotal technological instrument for enhancing regional safety resilience. A fundamental approach to investigating geological hazard early warning and disaster prevention spatial planning in complex terrains lies in the construction of an AI-driven, integrated "Perception-Warning-Mitigation" framework. By leveraging multimodal sensor fusion and deep learning algorithms, this system enables the precise identification and dynamic monitoring of latent disaster risks, thereby revolutionizing conventional paradigms of risk assessment and spatial governance. Empowered by space-air-ground integrated observation networks, these technologies achieve full-lifecycle coverage spanning macro-scale territorial spaces to micro-scale urban communities. In response to catastrophic events and the intricate demands of urban operations, enhancing the intelligent perceptual capabilities and cross-departmental synergistic efficiency of unmanned systems has become a matter of increasing urgency. Currently, AI-driven ubiquitous monitoring is spearheading the transition of disaster prevention methodologies toward full-lifecycle digitization, aiming to establish highly reliable and adaptive intelligent governance platforms. This evolution not only significantly bolsters the timeliness of geological hazard warnings but also provides a rigorous scientific foundation for decision-making in constructing resilient spaces, optimizing territorial spatial planning, and improving urban operational efficiency.

This invited session aims to convene the latest research achievements at the intersection of unmanned systems, artificial intelligence, geological engineering, and urban governance.

The topics of interest include, but are not limited to:

- Collaborative navigation and path planning for unmanned systems in complex and high-risk terrains.
- Deep learning-based multi-source data fusion and the early identification of latent geological hazards.
- Emergency communication assurance and intelligent scheduling of unmanned system swarms in sudden-onset disasters.
- Digital twin infrastructure construction and real-time simulation technologies for resilient urban governance.
- AI-driven dynamic disaster risk assessment and urban spatial safety management.
- Disaster prevention spatial planning and territorial governance strategies under space-air-ground integrated monitoring.
- Long-term monitoring and intelligent maintenance of unmanned sensor networks in extreme environments.
- High-precision inspection and recognition using micro-unmanned systems for smart community governance.
- Applied research of unmanned systems in post-disaster evaluation and urban renewal planning.
- Disaster prevention and mitigation governance frameworks and decision-support platforms based on cross-industry data fusion.