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

极端环境无人系统智能作业技术与应用

组织者

1. 杨丽英，研究员，中国科学院沈阳自动化研究所
2. 周鹏，教授，沈阳建筑大学
3. 李大鹏，教授，辽宁工业大学
4. 褚玲玲，副教授，沈阳理工大学
5. 徐佳璨，副教授，沈阳建筑大学

个人简介

杨丽英，中国科学院沈阳自动化研究所，博士，研究员。2011 年毕业于中科院沈阳自动化研究所获工学博士学位。主要从事无人系统控制、规划以及系统应用研究工作。主导研发了云鹐 100 号无人直升机和云雀多旋翼无人系统，其中云雀系统是国内首款面向高海拔科考应用的无人系统系统。上述无人系统系统面向农业、电力、海洋观测、高原科考等多个行业开展了应用示范。作为项目负责人主持国家自然科学基金青年基金、973 专题、国家重点研发计划课题等多项项目。在国内外知名期刊及会议发表 EI/SCI 检索论文 20 余篇，EI/SCI 检索 30 余篇，作为主要编著者，参编专著 1 部，发表专著章节 3 篇，申请无人系统相关专利 20 余项。

周鹏，沈阳建筑大学，教授，博士，博士后，博士生导师，博士后合作导师，现任沈阳建筑大学工创学院院长、国家标准化委员会委员、省百千万人才工程人选、省“兴辽英才”、省高校创新团队负责人、省高校科技创新人才、市领军人才、市中青年科技人才，担任辽宁省智能建筑工程装备重点实验室主任、辽宁省职工创新工作室负责人、重大工程装备关键技术研发及工程化创新团队负责人，一直从事极端工况下无人值守装备智能化研究，主持国家自然科学基金、国家重点研发计划任务、省基础研究计划等课题、任务 30 余项，

发表论文 80 余篇、出版专著 4 部、授权发明专利 20 余项、编制国家行业标准 14 部、获辽宁省科技进步一等奖 1 项，荣获辽宁省优秀科技工作者称号。

李大鹏，辽宁工业大学，博士，教授，辽宁省优秀青年基金获得者，辽宁省“兴辽英才”计划青年拔尖人才，辽宁省“百千万人才工程”万人层次人选，锦州市“锦绣英才”青年拔尖人才。2024 年毕业于北京工业大学获工学博士学位。研究方向包括无人系统智能控制与决策、智能建模与优化控制。主持国家自然科学基金面向项目 1 项目、青年基金 1 项，联合重点项目课题 1 项。以第一作者或通讯作者发表和录用 Automatica 和 IEEE 汇刊论文 20 余篇，授权受理发明专利 10 余项，部分理论研究成果获得 2025 年度教育部自然科学奖二等奖、2025 年度自动化学会自然科学二等奖，2020 年钱学森论文奖。

褚玲玲，沈阳理工大学，博士，副教授。2025 年毕业于中国科学院沈阳自动化研究所，获工学博士学位。主要从事变形翼无人系统领域研究，聚焦气动设计理论、变形机理、飞行控制及多学科优化等关键技术，在柔性结构、智能材料、自适应变形、宽速域一体化设计等前沿方向开展了系统的理论研究与技术探索。现主持辽宁省科技厅应用基础研究项目 1 项，参与完成国家重点研发计划项目、装发部共用技术项目、省部级科技项目及横向课题等 10 余项。在国内外知名期刊及会议发表 SCI/EI 检索论文 10 余篇，其中 2 篇发表于新锐一区 TOP 期刊，1 篇入选 2025 年度 “领跑者 5000（F5000）— 中国精品科技期刊顶尖学术论文”，申请无人系统相关专利 8 项。

徐佳璨，沈阳建筑大学，副教授，博士，博士后，硕士研究生导师，现任辽宁省智能建筑工程装备重点实验室副主任。长期致力于极端环境下无人系统与重大工程装备智能化研究，面向复杂工况下装备自主运行与智能运维需求，系统开展数字孪生、智能感知、故障识别、寿命预测与自愈控制等方向科研工作，在模式识别与人工智能算法方面具有较深积累。近年来主持省部级项目 3 项，参与国家自然科学基金、重点研发任务等课题，已发表学术论

文 30 余篇，授权发明专利 10 余项，担任多个 SCI 期刊审稿人。

特邀专题简介

随着无人系统应用领域和环境的不断拓展，其在极端环境，如高原、南极、海上、地下空间等应用需求日益增长。极端环境中的高海拔、低气温、复杂气流干扰以及 GPS 拒止等特点，给无人系统的系统构型、环境适应性、环境感知、导航与定位、无人系统智能控制与决策等技术与应用提出了新的挑战。面向极端环境和典型作业任务，无人系统需要更智能、更灵活、更稳定和更强的环境适应性与作业能力。

本特邀专题邀请以下与“极端环境无人系统智能作业技术与应用”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。

- 无人系统新构型设计
- 无人系统高精度定位与导航
- 无人系统多传感器环境感知与探测
- 无人系统智能控制与决策
- 无人系统主动作业技术
- 面向典型任务的无人系统主动作业技术
- 无人系统/多无人系统极端环境应用与技术挑战

IEEE ICUS 2026
Invited Session Summary

Title of Session

Intelligent Operation Technology and Applications for Unmanned Systems in Extreme Environments

Organizers

1. Prof. Liying Yang
Shenyang Institute of Automation (SIA), Chinese Academy of Sciences

2. Prof. Peng Zhou
Shenyang Jianzhu University, China

3. Prof. Dapeng Li
Liaoning University of Technology, China

4. Assoc. Prof. Lingling Chu
Shenyang Ligong University, China

5. Assoc. Prof. Jiacan Xu
Shenyang Jianzhu University, China

Biosketches of Organizers

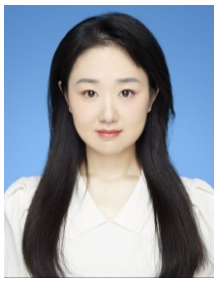
Liying Yang is currently a Research fellow at the State Key Laboratory of Robotics (SKLR) in Shenyang Institute of Automation (SIA), Chinese Academy of Sciences. She received her Ph.D. degree in pattern recognition and intelligent system from SIA in 2011. She has been engaged in the research of autonomous control, planning and the related applications of Unmanned Aerial Vehicles (Unmanned Systems). She led the research and development of Yunxiao-100 unmanned helicopter system and Yunque multiple rotor UAV, which is applied firstly in the survey of Qinghai-Tiber Plateau. Both of the two Unmanned Systems have carried out the application demonstration in the fields of precision agriculture, power industry, oceanic observation and Qinghai-Tiber Plateau survey. She has hosted numbers of projects such as National Natural Science Foundation of China, sub-task of National Defense 973 Project, Sub-task of National Key R & D Programs, etc. She has published more than 30 SCI/EI indexed academic papers and applied more than 20 patents in the related fields.

Peng Zhou is currently a Professor at Shenyang Jianzhu University. He received his Ph.D. degree and completed his postdoctoral research, and now serves as a doctoral supervisor and postdoctoral co-supervisor. He is currently the Dean of the School of Intelligent Engineering and Innovation at Shenyang Jianzhu University. He is also a member of the National Standardization Committee, a selected candidate of the Liaoning Province BaiQianWan Talent Project, a recipient of Xingliao Talent Program, the leader of a provincial university innovation team, a recipient of the provincial university science and technology innovation talent program, a municipal leading talent, and a municipal young and middle-aged science and technology talent. He also serves as the Director of the Liaoning Provincial Key Laboratory of Intelligent Construction Engineering Equipment, the head of the Liaoning Provincial Staff Innovation Studio, and the leader of the Innovation Team for Key Technology Research and Engineering Application of Major Engineering Equipment. He has long been engaged in the research of intelligent unattended equipment under extreme operating conditions. He has hosted more than 30 projects and tasks, including the National Natural Science Foundation of China, tasks of the National Key Research and Development Program of China, and the Provincial Basic Research Program. He has published more than 80 academic papers, authored 4 monographs, been granted more than 20 invention patents, contributed to the formulation of 14 national and industry standards, won 1 first prize of Liaoning Provincial Science and Technology Progress Award, and was honored with the title of Outstanding Science and Technology Worker of Liaoning Province.

Dapeng Li is currently a professor at the Liaoning University of Technology. He also won the Excellent Young Fund of Department of Science and Technology of Liaoning province, and Excellent Young Talents of Liaoning Revitalization Talents Program. He received her Ph.D. degree in Control Science and Engineering from Beijing University of Technology in 2024. He has been engaged in the research of the intelligent control and decision for unmanned systems, intelligent modeling and optimization control. He has won the General Program and the Young Scientists Fund of National Natural Science Foundation of China, and undertaken the subproject of the Joint Key Program of the National Natural Science Foundation of China. As the first author or corresponding author, he has published over 20 papers in Automatica and IEEE Trans. series journals. And he has won a second prize of Ministry of Education Award for Natural Science, a second prize of Ministry of Education Award for Chinese Association of Automation, and a Hsue-shen Tsien

Paper Award.

Lingling Chu is currently an Associate Professor at Shenyang Ligong University. She received her Ph.D. degree in pattern recognition and intelligent system from Shenyang Institute of Automation (SIA), Chinese Academy of Sciences in 2025. She has been engaged in the research of morphing-wing Unmanned Aerial Vehicles (Unmanned Systems), focusing on key technologies such as aerodynamic design theory, morphing mechanisms, flight control, and multidisciplinary optimization. She has conducted systematic theoretical research and technological exploration in cutting-edge fields including flexible structures, smart materials, adaptive morphing, and integrated design over a wide flight envelope. She has hosted Applied Basic Research Project of the Department of Science and Technology of Liaoning Province, and participated in numbers of projects such as National Key R&D of China project, National Equipment Pre-research Common Technology project, etc. She has published more than 10 SCI/EI-indexed academic papers and applied more than 8 patents in the related fields, including two in Emerging First-Tier TOP journals and one paper selected as a 2025 Top Academic Paper of China's Premium Science and Technology Journals (F5000).



Jiacan Xu is an Associate Professor at Shenyang Jianzhu University, holding a Ph.D. degree and postdoctoral experience, and serving as a master's supervisor. She is currently the Deputy Director of the Liaoning Provincial Key Laboratory of Intelligent Construction Engineering Equipment. She has long been engaged in the intelligentization of unmanned systems and major engineering equipment under extreme environments. Oriented toward the autonomous operation and intelligent maintenance of equipment under complex working conditions, she has systematically carried out research on digital twins, intelligent perception, fault diagnosis, life prediction, and self-healing control, with substantial expertise in pattern recognition and artificial intelligence algorithms. In recent years, she has served as principal investigator for three provincial- and ministerial-level projects and participated in research programs including the National Natural Science Foundation of China and national key research and development tasks. She has published more than 30 academic papers, been granted more than 10 invention patents, and serves as a reviewer for multiple SCI journals.

Details of Session

As the application domains and environments of unmanned systems continue to expand, their operational demands in extreme environments such as high-altitude

plateaus, the Antarctic, maritime areas, and underground spaces are growing significantly. The characteristics of extreme environments—including high altitude, low temperatures, complex airflow interference, and GPS-denial—pose new challenges to the technologies and applications of unmanned systems, including system configuration, environmental adaptability, environmental perception, navigation and positioning, as well as intelligent control and decision-making. To meet the requirements of extreme environments and typical operational tasks, unmanned systems need to become more intelligent, flexible, stable, and possess stronger environmental adaptability and operational capabilities. This special issue invites original papers related to the theme of *' Intelligent Operation Technology and Applications for Unmanned Systems in Extreme Environments,'* including innovative ideas, concepts, new discoveries, improvements, and novel applications.

- Novel configuration design for unmanned systems
- High-precision positioning and navigation for unmanned systems
- Multi-sensor environmental perception and detection for unmanned systems
- Intelligent control and decision-making for unmanned systems
- Active operation technology of unmanned systems
- Active operation technology of unmanned systems for typical scientific expedition tasks
- Polar scientific expedition applications and technical challenges of unmanned systems/multi-UAV systems