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

无人机智能技术与特种应用

组织者

1. 何玉庆，研究员，中国科学院沈阳自动化研究所

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3. 于丰华，教授，沈阳农业大学

4. 李树，副教授，辽宁工业大学

5. 雍可南，副教授，南京航空航天大学

个人简介

何玉庆，中科院沈阳自动化所研究员，工学博士，博士生导师。2002 毕业于东北大学秦皇岛分校获工学学士学位，2008 年毕业于中科院沈阳自动化研究所获工学博士学位，2012 年赴德国德累斯顿工业大学学术访问。目前担任辽宁省无人机智能控制专业技术创新中心主任、中国指挥与控制学会常务理事、中国自动化学会机器人专业委员会秘书长。长期从事无人系统自主行为技术的相关研究工作，在高性能控制、实时感知、行为决策、多平台协作等领域取得了一系列重要创新性成果，提出并完善了机器人化无人系统自主行为共性技术体系，研制了系列化空中、地面、水面等实用化无人系统，在灾难救援、公安反恐、极区科考等领域获得应用；提出并构建了陆海空无人系统跨域协同技术体系，实现了空地联合公安反恐、空地联合青藏科考、空海联合探测等创新应用。承担多项国家自然科学基金重点项目、重点研发计划项目等；出版专著两部，发表 SCI/EI 收录 200 余篇，申请/授权国家发明专利 20 余项。

杨丽英，中国科学院沈阳自动化研究所，博士，副研究员。2011 年毕业于中科院沈阳自动化研究所获工学博士学位。主要从事无人机控制、规划以及系统应用研究工作。主导研发了云鸮 100 号无人直升机和云雀多旋翼无人机，其中云雀系统是国内首款面向高海拔科考应用的无人机系统。上述无人机系统面向农业、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、国家重点研发计划子课题等多项项目。在国内外知名期刊及会议发表论文 20 余篇篇，EI/SCI 检索 20 余篇，作为主要编著者，参编专著 1 部，发表专著章节 3 篇，申请无人机相关专利 10 余项。

于丰华，男，汉族，1989 年 7 月生，中共预备党员、民盟盟员，博士，教授，硕士生导师，电子信息工程系主任。致力于研究农业无人机遥感与应用。入选辽宁省“兴辽英才计划”青年拔尖人才，沈阳市沈河区青年联合会委员。近 5 年主持国家自然科学基金青年基金、辽宁省自然科学基金面上项目、辽宁省教育厅面上项目等省级、国家级项目 6 项，发表 SCI、EI 论文 20 余篇，授权国家发明专利 3 项。兼任国家数字农业区域创新分中心（东北）副主任、国家航空植保科技创新联盟辽宁分会秘书长、《中国农业信息》青年编委、中国农业工程学会会员、中国农学会农业信息分会常务委员、中国作物学会智慧农业专业委员会委员、CCF 数字农业分会执行委员、国家农业大数据与信息服务联盟理事。

李树，博士，讲师，硕士生导师，辽宁省“兴辽英才计划”青年拔尖人才。研究方向：无人系统智能控制、智能控制理论及应用。主持国家自然科学基金青年基金 1 项、辽宁省“揭榜挂帅”科技计划（重点）项目揭榜课题 1 项、辽宁省教育厅面上项目 1 项，作为骨干成员参与国家自然科学基金 6 项，科技部重点研发计划课题 1 项。近年来，已在国内外控制及机器人领域权威期刊《IEEE Transactions on Cybernetics》、《IEEE Transactions on Robotics》和《Science Robotics》等重要期刊和

国际会议上发表论文 24 篇，3 篇入选 ESI 工程领域前 1%高被引论文。授权发明专利 3 项。现担任中国自动化学会平行控制与管理专业委员会委员和 IET Cyber-Systems and Robotics、Sensors 特刊 Guest Editor，Frontiers in Robotics and AI 期刊 Review Editor。

雍可南，副研究员，2020 于南京航空航天大学获博士学位后留校任教，长期从事无人机飞行控制技术的研究，发表学术论文 20 余篇，涵盖 Automatica、IEEE TAC 等国际顶尖期刊，先后主持国家级/省部级项目 7 项，包括国自然青年、江苏省自然青年、国家重点研发专题、航空基金等；获江苏省优秀博士学位论文奖、中国自动化学会自然科学一等奖（排名第二）、江苏省自动化学会青年科技奖，入选中国博士后科学基金“国际交流计划”派出项目。

特邀专题简介

随着无人机及相关技术的快速发展，无人机已经在各行各业开展了广泛的应用。面向精准农业、反恐围捕、地下探测等日益复杂的应用场景，传统无人机应用方式已经无法满足现实需求，因此，现实应用对无人机的系统构型、导航与定位、环境感知和无人机智能控制与决策等技术都提出了新的挑战。面向典型应用的无人机智能技术与系统需要更智能、更灵活、更稳定和更强的环境适应性。

本特邀专题邀请以下与“无人机智能技术与特种应用”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。

- 无人机新构型设计
- 无人机室内外定位与导航
- 无人机多传感器环境感知与探测
- 无人机智能控制与决策
- 无人机/多无人机特种应用与技术挑战

IEEE ICUS 2024
Invited Session Summary

Title of Session

Intelligent Technology and Special Applications of UAV

Organizers

1. Prof. Yuqing He

Shenyang Institute of Automation (SIA), Chinese Academy of Sciences, China

2. Dr. Liying Yang

Shenyang Institute of Automation (SIA), Chinese Academy of Sciences, China

3. Prof. Fenghua Yu

Shenyang Agricultural University, China

4. Dr. Shu Li

Liaoning University of Technology, China

5. Dr. Kenan Yong

Nanjing University of Aeronautics and Astronautics, China

Biosketches of Organizers

Yuqing He is currently a full professor at the State Key Laboratory of Robotics (SKLR) in Shenyang Institute of Automation (SIA), Chinese Academy of Sciences. He received his B.S. degree in automation from North-eastern University at Qinhuangdao in 2002 and Ph.D. degree in pattern recognition and intelligent system from SIA in 2008. In 2012, he was a visiting researcher at Institute for automatic control theory in Technique University of Dresden (Germany). He is now the director of innovation center of UAV intelligent control of Liaoning Province. He is also the executive member of the Chinese Institute of Command and Control and the secretary-general of robot professional committee, Chinese Chemical Society. He has been engaged in the researches of autonomy of unmanned systems and got series of achievements in the fields of high performance control, real-time sensing, behavior decision and cooperation/coordination of multiple-robot systems. Based on those, he proposed and perfected the autonomous behavior generic technology architecture of the robotized unmanned system. He has developed series and practical unmanned systems including air, ground and surface unmanned systems having been applied in

disaster rescue, public security anti-terrorism and polar scientific research. He also proposed and constructed the cross-domain collaborative technology architecture of UAV/UGV/USV/UUV system, and the related technologies are realized in joint air-ground public security anti-terrorism, joint air-ground Qinghai-Tibet plateau scientific exploration and joint air-sea exploration. These achievements are funded by several key projects of the national natural science foundation of China and national key research and development program projects. He has published more than 200 SCI/EI indexed academic papers and applied more than 20 patents in the related fields.

Liying Yang is currently an Associate 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 (UAVs). 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 UAVs 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 10 patents in the related fields.

Fenghua Yu, Ph.D., Professor, Master Supervisor, Director of the Department of Electronic Information Engineering, Shenyang Agricultural University. His research interests is agricultural UAV remote sensing and application. Young Talents of Liaoning Province Revitalization Talents Program. He has presided over a Young Scientists Fund of the National Natural Science Foundation of China, a General Program of Liaoning Provincial Natural Science Foundation, a General Program of Liaoning Provincial Educational Committee and 6 national projects. He has published 20 papers indexed by SCI and EI, and been authorized 3 invention patents. He is also the Deputy

Director of the National Digital Agriculture Regional Innovation Branch Center (Northeast), Secretary-General of the Liaoning Branch of the National Aviation Plant Protection Science and Technology Innovation Alliance, Secretary-general of Liaoning branch of National Aviation Plant Protection Science and Technology Innovation Alliance,Youth Editorial Board of " China Agricultural Information", Member of the Chinese Agricultural Engineering Society, Standing Committee of the Agricultural Information Branch of the Chinese Agricultural Society, Member of the Smart Agriculture Committee of the Chinese Crop Society, Executive Committee of the CCF Digital Agriculture Branch, and Director of the National Agricultural Big Data and Information Service Alliance.

Shu Li, Ph.D., Associate Professor, Master Supervisor, Young Talents of Liaoning Province Revitalization Talents Program. His research interests include Intelligent Control of Unmanned Systems and Intelligent Control Theory and Applications. He has presided over a Young Scientists Fund of the National Natural Science Foundation of China, "JieBangGuaShuai" project of the Liaoning Province Science and Technology Program, and a General Program of Liaoning Provincial Educational Committee, and participated in six programs of the National Natural Science Foundation of China and a Key Research and Development Program of the National Science and Technology Council as a key member. In recent years, he has published 24 papers in important journals and international conferences such as IEEE Transactions on Cybernetics, IEEE Transactions on Robotics, and Science Robotics, which are authoritative journals in the field of control and robotics at home and abroad. Three of them were selected as the top 1% of highly cited papers in the field of engineering by ESI. He has been authorized 3 invention patents. He is currently a member of the Parallel Control and Management Committee of the Chinese Society of Automation, the Guest Editor of the special issues of IET Cyber-Systems and Robotics and Sensors, and the Review Editor of Frontiers in Robotics and AI journal.

Kenan Yong received the Ph.D. degrees from the Nanjing University of Aeronautics and Astronautics (NUAA) in 2020. He is currently working as an associate researcher with the College of Automation Engineering, NUAA. His current research fucuses on the flight control technology of the unmanned aerial vehicles. He published over 20 works including the top journals of Automatica and IEEE TAC. He leaded the Youth Foundations of NSFC and Natural Science Foundation of Jiangsu Province, National Key R&D Program of China for Special Project, and AVIC Science Foundation of China. He was a recipient of Outstanding Doctorial Dissertation Award of Jiangsu in 2022, First Prize in Natural Science of Chinese Association of Automation (Rank 2) in 2023, Youth Science and Technology Award of Jiangsu Association of Automation in 2023, and International Postdoctoral Exchange Fellowship Program of China Postdoctoral Council in 2022.

Details of Session

The evolution of UAVs has enabled today's UAVs to be widely used in various industries. Facing increasingly complex application scenarios, such as precision agriculture, anti-terror roundup and underground exploration, traditional UAVs application methods are no longer able to meet existing needs, and UAVs urgently need to shift from observation to operation. Therefore, realistic applications pose new challenges to the system configuration, navigation and positioning, environmental perception, and intelligent control and decision-making of UAVs. Intelligent technologies and systems of UAVs for typical application need to be smarter, more flexible, more stable and more adaptable.

The invited session invites original papers of innovative ideas and concepts, new discoveries and improvements, and novel applications relevant to the following selected topics of "Intelligent Technology and Special Applications of UAV".

- New configuration design of UAV
- Indoor and outdoor UAV positioning and navigation
- Multi-sensor environment perception and detection of UAV
- Intelligent control and decision-making of UAV
- UAV intelligent decision-making
- UAV/multi-uav special applications and technical challenges