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
无人系统复杂环境智能导航

组织者
1.朱祥维，教授，中山大学
2.庄学彬，副教授，中山大学
3.王磊，副教授，武汉大学
4.侯燕青，助理教授，中山大学

个人简介

朱祥维，教授、博士生导师、国家重点研发计划首席科学家，中山大学电子与通信工程学院院长助理。二十年专注于北斗系统和综合定位导航授时（PNT）体系研究工作，致力于解决北斗系统工程型号关键技术瓶颈背后的科学问题，主持和作为骨干参与国家重点型号工程项目 3 项、国家科技重大专项项目 10 项、国家重点研发计划 2 项、自然科学基金项目 3 项，发表论文 100 余篇，申请发明专利 60 余项。在北斗导航系统、综合 PNT 技术、智能可信导航等方面开展了交叉创新研究。曾获得军队科技进步一等奖，测绘科学技术奖一等奖，"军队优秀专业技术人才"、国防科技大学"青年拔尖人才"，荣立个人三等功。目前担任中科院百人计划评审专家、科技部国家重点研发计划评审专家、教育部学位中心评审专家、国家自然科学基金评审专家、战略支援部队专家库专家、军委科技委创新特区专家，以及天地一体化信息技术国家重点实验室特聘教授、南方海洋科学与技术广东省实验室特聘教授，担任中国指挥与控制学会青工委委员，航空学报、全球定位系统、导航定位学报编委，IEEE TIM、TAES、电子学报、通信学报等 20 余个期刊审稿专家

庄学彬，中山大学系统科学与工程学院副院长、副教授、博士生导师。2011 年 7 月博士毕业于清华大学。长期从事卫星导航技术和无人系统自主导航技术研究。作为项目负责人、技术负责人和主要参加人，先后承担二十余项国家级、省部级等二十余项科研项目，其中主持 10 余项。以第一作者或主要完成人，申请专利十余项，其中 7 项已授权。先后发表 SCI、EI 等近 20 篇学术论文。担任 2022 第五届 IEEE 国际无人系统大会组织委员会副主席、第十届中国卫星导航学术年会分会主席（S11 抗干扰与反欺骗技术分会）、中国卫星导航学术年会（CSNC）审稿专家（第七至十三届）、中国指挥与控制学会空天安全平行系统专业委员会委员等。

王磊，武汉大学副教授，硕士生导师，珞珈一号、珞珈二号卫星导航增强分系统副总师，IEEE 会员。2015 年毕业于澳大利亚昆士兰科技大学，获博士学位，研究方向为低轨卫星导航增强，GNSS 精密定位，低轨卫星精密定轨，室内定位等。目前已发表学术论文 70 余篇(其中 SCI/EI 论文 50 余篇)，出版专著 1 部，申请专利 15 项，软件著作权 4 项，主持和参与国家自然科学基金，国家重点研发计划等科研项目十余项，获卫星导航定位科技进步奖 1 项，测绘科技进步特等奖 1 项，担任《无线电工程》青年编委，GSIS 和 Atmosphere 期刊客座编辑，以及 Journal of Geodesy、IEEE JIOT、IEEE TVT、IEEE TAES 等三十余个期刊的审稿人。

侯燕青，助理教授、硕士生导师。中山大学系统科学与工程学院"百人计划"引进人才。2016 年博士毕业于国防科技大学，研究方向为多源融合导航，卫星导航高精度定位技术等。主持国防科技创新特区项目 1 项，作为骨干参与国家 863 计划项目、装备预研项目等 10 余项，以第一作者和联合作者发表 SCI 学术论文 10 余篇，担任 Survey Review、Mathematical Problems in Engineering 等期刊审稿人。

特邀专题简介

随着无人系统在各领域的广泛应用，如自动驾驶汽车、无人机、智能机器人等，对其在复杂环境下的智能导航技术提出了更高的要求。复杂环境中存在着各种挑战，如密集城市区域、室内环境、恶劣天气条件等。无人系统复杂环境智能导航旨在提高无人系统的导航精度、可靠性和实时性，推动自动驾驶、智能制造、救援和勘测等领域的发展。该领域的研究内容包括多传感器数据融合技术、感知与环境建模、智能导航、仿生导航等关键技术。

本特邀专题邀请以下与"无人系统复杂环境智能导航"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。

- 多源融合导航技术

- 可信导航技术

- 卫星导航在复杂环境中的应用与优化；

- 惯性导航技术在动态环境下的精确定位；

- 视觉导航算法及其在各类场景中的应用；

- 传感器融合与数据融合在智能导航中的作用；

- 机器学习与人工智能在导航系统中的应用；

- 无人系统智能路径规划与避障技术；

- 环境感知与建模在导航系统中的应用；

- 智能认知导航

- 感知与环境建模技术

- GNSS 抗欺骗与抗干扰技术

- 完好性监测与评估方法

- 增强定位系统与技术

- 地月空间无人系统导航技术

- 其他与无人系统智能导航相关的研究与应用。

Title of Session
Intelligent Navigation of Unmanned Systems in Complex Environments

Organizers
1. Prof. Xiangwei Zhu
Sun Yat-sen University, China
2. Assoc. Prof. Xuebin Zhuang
Sun Yat-sen University, China
3. Assoc. Prof. Lei Wang
Wuhan University, China
4. Asst. Prof. Yanqing Hou
Sun Yat-sen University, China

Biosketches of Organizers

Xiangwei Zhu, Professor, Doctoral Supervisor, Chief Scientist of National Key R&D Program, Assistant Dean of School of Electronics and Communication Engineering, Sun Yat-Sen University. For 20 years, he has been focusing on the research of Beidou system and integrated positioning, navigation and timing (PNT) system, and is committed to solving the scientific problems behind the key technical bottlenecks of Beidou system engineering projects. He has directed/attended 10 special projects, 2 national key research and development plans, 3 natural science fund projects, published more than 100 papers, and applied for more than 60 invention patents. Cross-innovation research has been carried out in Beidou navigation system, integrated PNT technology, intelligent and trusted navigation, etc. He has won the first prize of the Army Science and Technology Progress Award, the first prize of the Surveying and Mapping Science and Technology Award, "Outstanding Professional and Technical Talents of the Army", "Young Top Talents" of the National University of Defense Technology, and won the third-class personal merit. Currently, he serves as an evaluation expert for the Hundred Talents Program of the Chinese Academy of Sciences, an evaluation expert for the National Key R&D Program of the Ministry of Science and Technology, an evaluation expert for the Academic Degree Center of the Ministry of Education, an evaluation expert for the

National Natural Science Foundation of China, an expert for the Strategic Support Forces Expert Bank, an expert for the Innovation Special Zone of the Military Commission Science and Technology Commission, and an expert in the integration of space and earth. Distinguished professor of the State Key Laboratory of Technology, Distinguished Professor of the Guangdong Laboratory of Southern Marine Science and Technology, serving as Member of the Youth Working Committee of the Chinese Institute of Command and Control, editorial board member of Journal of Aeronautics and Astronautics, Global Positioning System, Journal of Navigation and Positioning, and reviewer of more than 20 journals such as IEEE TIM, TAES, Journal of Electronics, Journal of Communications, etc. Manuscript expert.

Xuebin Zhuang, Deputy Dean, Associate Professor and Doctoral Supervisor of the School of Systems Science and Engineering, Sun Yat-Sen University. In July 2011, he received his Ph.D. from Tsinghua University. He has long been engaged in research on satellite navigation technology and autonomous navigation technology for unmanned systems. As the project leader, technical leader and main participant, he has successively undertaken more than 20 scientific research projects at the national, provincial and ministerial levels, among which more than 10 were presided over. As the first author or the main author, he has applied for more than ten patents, of which 7 have been authorized. He has published nearly 20 academic papers in SCI and EI. Served as Vice Chairman of the Organizing Committee of the 5th IEEE International Unmanned Systems Conference in 2022, Chairman of the 10th China Satellite Navigation Academic Annual Conference Branch (S11 Anti-jamming and Anti-Spoofing Technology Branch), and China Satellite Navigation Academic Annual Conference (CSNC) Reviewer Manuscript expert (seventh to thirteenth), member of the Air and Space Safety Parallel System Professional Committee of the Chinese Society of Command and Control, etc.

Lei Wang, Fixed-term Associate Professor of Wuhan University, Master Supervisor, Deputy Chief Engineer of Luojia-1A and Luojia-2A Satellite Navigation Augmentation Subsystem, IEEE member. He received a Ph.D. degree from Queensland University of Technology, Australia in 2015. His research interests include LEO satellite navigation augmentation, GNSS precision positioning, LEO satellite precise orbit determination, indoor positioning, etc. He has published more than 70 research papers (including more than 50 SCI/EI papers), published 1 monograph, applied for 15 patents, and 4 software copyrights. He has hosted and participated in ten scientific research projects such as the National Natural Science Foundation of China and the National Key R&D Program. He has won 1 satellite navigation and positioning science and technology progress award and 1 special prize for surveying and mapping science and technology progress. He serves as the young editorial board member of Radio Engineering, guest editor of GSIS and Atmosphere journals, and reviewer for more than 30 journals, including Journal of Geodesy, IEEE JIOT, IEEE TVT, IEEE TAES.

Yanqing Hou, Assistant Professor and Master Supervisor. The "Hundred Talents Program" of the School of Systems Science and Engineering of Sun Yat-Sen University introduces talents. In 2016, he graduated from National University of Defense Technology with a Ph.D., and his research interests include multi-source fusion navigation and high-precision positioning technology for satellite navigation. Presided over 1 national defense science and technology innovation special zone project, participated in more than 10 national 863 plan projects and equipment pre-research projects as the backbone, published more than 10 SCI academic papers as the first author and co-author, and served as Survey Review, Mathematical Problems in Engineering, etc. Journal Reviewer.

Details of Session

As unmanned systems are widely applied in various fields such as autonomous driving vehicles, drones, intelligent robots, higher demands are posed on their intelligent navigation technology in complex environments. Various challenges exist in complex environments, such as dense urban areas, indoor environments, adverse weather conditions, etc. Intelligent navigation in complex environments for

unmanned systems aims to enhance navigation accuracy, reliability, and real-time performance, thereby promoting the development of fields like autonomous driving, intelligent manufacturing, rescue operations, and surveying. Research in this field includes key technologies such as multisensory data fusion, perception and environmental modeling, intelligent navigation, bio-inspired navigation, etc.

This special invitation topic invites original papers related to the theme of "Intelligent Navigation of Unmanned Systems in Complex Environments," including innovative ideas, concepts, new discoveries, improvements, and new applications, as follows:

- Multi-source fusion navigation technology
- Trusted navigation technology
- Application and optimization of satellite navigation in complex environments
- Inertial navigation technology in dynamic environments
- Visual navigation algorithms and their applications in various scenarios
- The role of sensor fusion and data fusion in intelligent navigation
- Applications of machine learning and artificial intelligence in navigation systems
- Intelligent path planning and obstacle avoidance technology for unmanned systems
- Application of environmental perception and modeling in navigation systems
- Intelligent cognitive navigation
- Perception and environmental modeling technology
- GNSS anti-spoofing and anti-jamming technology
- Integrity monitoring and evaluation methods
- Enhanced positioning systems and technologies
- Navigation technology for lunar and space unmanned systems
- Other research and applications related to intelligent navigation of unmanned systems.