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
智能导航与先进信息融合技术

组织者
1.黄玉龙，教授，哈尔滨工程大学
2.高丽娜，助理研究员，哈尔滨工程大学
3.文伟松，助理教授，香港理工大学

个人简介

黄玉龙，教授，博士生导师，国家"万人计划"青年拔尖人才，IEEE Senior Member，现任哈尔滨工程大学智能科学与工程学院副院长，长期从事智能信息融合理论和导航应用研究，主持国家自然科学基金青年/面上项目、科技部重点研发课题、国防基础项目等国家级和省部级项目 10 余项，以第一作者或通信作者发表 SCI 论文 80 余篇，IEEE 顶级汇刊论文 40 余篇。入选中国科协青年人才托举工程、香江学者计划、黑龙江省向上向善好青年，获得中国自动化学会自然科学奖一等奖、吴文俊人工智能优秀青年奖、IEEE Barry Carlton 奖。中国自动化学会优秀博士学位论文奖。担任 IEEE TAC、IEEE TAES、IEEE TIM、IEEE SJ 等国际期刊副主编。

高丽娜，哈尔滨工程大学智能科学与工程学院，助理研究员，博士毕业于哈尔滨工业大学。主要从事计算机视觉、目标检测和跟踪算法等方向的研究工作。具体聚焦在注意力感知的视觉显著性计算、多模态图像的显著目标检测、智能计算等方面的研究工作，已累计发表期刊、会议论文 10 余篇，其中，以第一作者在著名国际期刊（Pattern Recognition，IEEE TGRS 等）上发表多篇论文，申请发明专利 4 项，授权发明专利 2 项。参与完成基金委、科技部、军科委等国家级和省部级横纵向课题 6 项。担任 IEEE TCYB、IEEE TGRS、KBS 和 NCAA 等著名国际期刊审稿人。

文伟松，博士，香港理工大学助理教授，香港理工大学智能定位与导航实验室副主任。致力于都市环境下无人驾驶导航定位与无人系统技术研究。2020 年博士毕业于香港理工大学机械工程系，同时为加州大学伯克利分校联合培养博士（2018 年）。累积在自动驾驶导航与定位领域发表 SCI 学术论文超过 30 篇，学术会议论文 40 篇，多次担任智能交通领域顶级会议 IEEE ITSC，美国导航协会年会 ION GNSS+担任分会/领域主席，同时担任多个期刊的特约客座编辑，副编辑等。

特邀专题简介

　　随着人类走向智能化时代，智能无人系统在军事和民用领域应用日益广泛，无人系统集群以群体智能的优势成为智能无人系统未来重要的发展方向，特别是微小型无人系统集群以其低成本、小体积、低功耗等受到广泛关注。近年来，随着导航传感器原理和制造工艺的不断发展，大量低成本、小体积、低功耗、智能的导航传感器被研制出来，为获取不同类型的导航数据提供了可能。在复杂的无人系统作业环境下，智能感知是实现智能行为和自主决策的关键。智能感知系统可以通过感知周围环境的信息来获取关键数据，进而实现决策和行动。这种感知不仅仅局限于传统的传感器数据收集，还包括对环境中各种动态和静态信息的理解和分析。除了单个无人系统的智能感知，群体智能的发展也十分重要，通过群体智能，无人系统集群可以实现协同工作、共同完成复杂任务。因此如何实现智能感知和群智信息融合为群体智能提供基础的信息保障，以实现对复杂环境的全面感知和理解是目前所面临的挑战。本专题会议将探讨智能导航、智能感知与先进信息融合技术的最新进展和重要突破，促进无人系统导航的交流与发展。本专题会议拟邀请多篇原创的、新颖的高水平学术论文，主要包括以下研究主题（不限于以下主题）：

- 惯性导航、卫星导航、声学导航、组合导航等传统导航技术；
- 全源导航、协同导航、视觉惯性导航、SLAM 等智能导航技术；
- 多传感器信息融合、分布式估计、状态估计等智能感知与先进信息融合技术；
- 变分学习、高斯过程学习、深度学习等导航领域机器学习技术。

Title of Session

Intelligent Navigation and Advanced Information Fusion Technology

Organizers

1. Prof. Yulong Huang

Harbin Engineering University, China

2. Dr. Lina Gao

Harbin Engineering University, China

3. Dr. Weisong Wen

Hong Kong Polytechnic University, China

Biosketches of Organizers

Yulong Huang (Senior Member, IEEE), Professor, PhD Supervisor, National Youth Talents, Vice Dean of College of Intelligent Science and Engineering, Harbin Engineering University, Deputy Director of Heilongjiang Provincial Engineering Laboratory of Navigation Instruments. He has long been devoted to intelligent information fusion theory and navigation application research. He hosted more than 10 national and provincial level projects, including the National Natural Science Foundation Youth/General Program and the Key R&D Project of the Ministry of Science and Technology. He has published more than 80 SCI papers, including more than 40 IEEE Transactions papers as first author or corresponding author. He was selected into the Youth Talents Support Project by China Association for Science and Technology, the Hong Kong Scholars Program, and the Outstanding and Virtuous Youth of Heilongjiang Province. He won the First Prize of the Natural Science Award of the Chinese Association of Automation, the Wu Wenjun Artificial Intelligence Excellent Youth Award, the IEEE Barry Carlton Award, the Honorable Mention of the IEEE Barry Carlton Award, and the excellent doctoral dissertation from the Chinese Association of Automation. He served as the Associate Editor for the IEEE TAC, IEEE TAES, the IEEE TIM and the IEEE Sensors Journal.

Lina Gao, Assistant Researcher at the School of Intelligent Science and Engineering, Harbin Engineering University. She obtained Ph.D. from Harbin Institute of Technology. Her research focuses on computer vision, object detection and object tracking algorithms. Specifically, she specializes in visual saliency computation with attention perception, salient object detection in multimodal images, and intelligent computing. She has published more than 10 papers in international journals and conferences, with several as the first author in renowned international journals such as Pattern Recognition and IEEE TGRS. She has filed 4 invention patents and obtained 2 invention patents. She has participated in 6 national and provincial level projects funded by organizations such as the National Natural Science Foundation of China, the Ministry of Science and Technology, and the National Defense Science and Technology Commission. She serves as a reviewer for prestigious international journals including IEEE TCYB, IEEE TGRS, KBS, and NCAA.

Weisong Wen (Member, IEEE) received a BEng degree in Mechanical Engineering from Beijing Information Science and Technology University (BISTU), Beijing, China, in 2015, and an MEng degree in Mechanical Engineering from the China Agricultural University, in 2017. After that, he received a PhD degree in Mechanical Engineering from The Hong Kong Polytechnic University (PolyU), in 2020. He was also a visiting PhD student with the Faculty of Engineering, University of California, Berkeley (UC Berkeley) in 2018. Before joining PolyU as an Assistant Professor in 2023, he was a Research Assistant Professor at AAE of PolyU since 2021. He has published 30 SCI papers and 40 conference papers in the field of GNSS (ION GNSS+) and navigation for Robotic systems (IEEE ICRA, IEEE ITSC), such as autonomous driving vehicles. He won the innovation award from TechConnect 2021, the Best Presentation Award from the Institute of Navigation (ION) in 2020, and the First Prize in Hong Kong Section in Qianhai-Guangdong-Macao Youth Innovation and Entrepreneurship Competition in 2019 based on his research achievements in 3D LiDAR aided GNSS positioning for robotics navigation in urban canyons. The developed 3D LiDAR-aided GNSS positioning method has been reported by top magazines such as Inside GNSS and has attracted industry recognition with remarkable knowledge transfer.

Details of Session

As humanity transitions into the era of intelligence, the application of intelligent unmanned systems in both military and civilian domains is becoming increasingly widespread. Swarm intelligence exhibited by clusters of unmanned systems has emerged as a pivotal direction for the future development of intelligent unmanned systems, especially with the extensive attention garnered by miniature unmanned system clusters due to their advantages of low cost, small size, and low power consumption. In recent years, with the continuous development of principles and manufacturing processes of navigation sensors, a plethora of low-cost, small-sized, low-power, and intelligent navigation sensors have been developed, enabling the acquisition of various types of navigation data. In complex operational environments of unmanned systems, intelligent perception is key to achieving intelligent behavior and autonomous decision-making. Intelligent perception systems can acquire crucial data by perceiving information from the surrounding environment, thereby facilitating decision-making and action. This perception extends beyond traditional sensor data collection to encompass the understanding and analysis of various dynamic and static information within the environment. In addition to intelligent perception of individual unmanned systems, the development of collective intelligence is also crucial. Through collective intelligence, clusters of unmanned systems can achieve collaborative work and collectively accomplish complex tasks. Therefore, addressing the challenge of integrating intelligent perception and collective intelligence to provide a foundation for comprehensive perception and understanding of complex environments is imperative. This special session will discuss the latest progress and important breakthrough of intelligent navigation, intelligent perception and advanced information fusion technology, and promote the communication and development of unmanned system navigation. It is planned to invite many original and novel high-level academic papers, mainly including the following research topics (but not limited to the following topics):

- Traditional navigation technologies such as inertial navigation, satellite navigation, acoustic navigation, and integrated navigation;
- Intelligent navigation technologies including multi source navigation, cooperative navigation, visual-inertial navigation, simultaneous localization and mapping (SLAM), etc.

- Intelligent perception and advanced information fusion technologies such as multi-sensor information fusion, distributed estimation, and state estimation;
- Machine learning technologies in the navigation field including variational learning, Gaussian process learning, deep learning, etc.