2025 第八届 IEEE 国际无人系统大会
特邀专题简介表

特邀专题名称
智慧港航视觉感知与控制

组织者

1. 陈信强，副教授，上海海事大学

2. 吴兵，研究员，武汉理工大学

3. 王宁，教授，大连海事大学

4. 何伟，教授，闽江学院

5. 张瀚，博士生，上海海事大学

个人简介

陈信强现任上海海事大学副教授及博士生导师，其主要研究方向包括船舶智能导航的视觉感知、自动化码头无人车辆的视觉定位与导航、交通大数据挖掘以及智能交通视频理解等。他受邀在多种高水平期刊担任职务，如 IET Intelligent Transportation Systems (SCI, JCR Q3)、Measurement & Control (SCI, JCR Q3)、International Journal of Advanced Robotic Systems (SCI) 和 Discover Applied Sciences (EI, ESCI) 等。此外，他还担任 Journal of Marine Science and Engineering (SCI) 和 Sustainability (SCI) 的编委。他作为项目负责人主持了超过 10 项由国家自然科学基金等资助的项目，并已在高水平期刊上发表了超过 100 篇论文，其中 15 篇为 ESI 高被引论文或热点论文。

吴兵教授现任武汉理工大学智能交通系统研究中心副主任及水路交通控制全国重点实验室主任助理，入选国家高层次人才（青年）计划。他长期专注于水路交通安全、智能船舶航行安全及海事安全监管与仿真等研究，主持国家重点研发计划及多项国家自然科学基金项目，曾赴国际知名高校深造交流，取得丰硕科研成果，多次获得科技奖项。

王宁教授，现任大连海事大学教授及博士生导师，曾获国家海洋领域优秀科技青年等多项荣誉。他主要从事智能海洋机器人、无人驾驶船舶与智能自主系统的研究，主持和参与国家自然科学基金及重点研发项目，已在 SCI 期刊上发表 70 余篇论文，并担任多家国际期刊编委，学术影响深远。

何伟教授现任闽江学院物理与电子信息工程学院院长及船舶智能航行安全控制工程研究中心常务副主任，是福建省百千万人才工程省级入选者及高层次人才。其研究主要涉及智能系统与信息融合、船海装备及新能源领域，在国内外发表论文 50 余篇，主持多项国家及省市科研项目，并荣获多项教学和科研成果奖项。
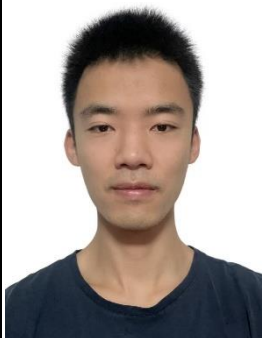
张瀚，博士生，就读于上海海事大学，专注于智慧港口视觉感知研究。他致力于将先进的图像处理、深度学习与机器人控制算法应用于港航无人系统，探索高精度定位、导航及安全监控技术。在导师指导下，张瀚参与多项国家及省部级科研项目，并在国际期刊上发表论文，为推动海事智能化进程积累了丰富的实践经验。

特邀专题简介

随着信息技术、人工智能与大数据的迅速发展，传统港口与航运管理正迎来前所未有的变革机遇。先进的传感器、图像处理和数据分析技术不断涌现，为港航领域提供了全新的智能化解决方案，使得实时监控、精准调度和安全管理成为可能。视觉感知作为智慧港航系统的核心技术，能够实现对港口、船舶及相关设施运行状态的实时监测，并为智能决策与控制提供关键数据支持，从而大幅提升港航管理的效率与安全性。

本专题旨在搭建国际交流平台，汇聚全球在智慧港航视觉感知与控制领域的最新研究成果和技术创新。专题重点涵盖以下内容：

- 先进视觉传感与图像处理技术

- 目标检测与识别在港航环境中的应用
- 无人船及自动化码头的视觉定位与导航
- 数据融合、风险评估与智能决策支持
- 智能控制算法及系统集成应用
- 港航管理的信息化与数字化转型

通过本专题的交流与探讨，旨在推动港航领域的信息化升级与智能化发展，为提升运营效率、保障航运安全和实现绿色高效管理提供坚实的理论与实践支持。

IEEE ICUS 2025
Invited Session Summary

Title of Session
Smart Port and Navigation Visual Perception and Control

Organizers

1. **Prof. Xinqiang Chen**

   Shanghai Maritime University, China

2. **Prof. Bing Wu**

   Wuhan University of Technology, China

3. **Prof. Ning Wang**

   Dalian Maritime University, China

4. **Prof. Wei He**

   Minjiang University, China

5. **Dr. Han Zhang**

   Shanghai Maritime University, China

Biosketches of Organizers

Xinqiang Chen serves as associate professor and doctoral supervisor at Shanghai Maritime University, Shanghai, China. His primary research interests include visual perception of ship intelligent navigation, visual positioning and navigation of unmanned vehicles at automated docks, traffic big data mining, intelligent traffic video understanding, etc. He is invited to serve as several high-quality journals, such as IET Intelligent Transportation Systems (SCI, JCR Q3), Measurement & Control (SCI, JCR Q3), International Journal of Advanced Robotic Systems (SCI), Discover Applied Sciences (EI, ESCI). He also serves as editorial board member of Journal of Marine Science and Engineering (SCI) and Sustainability (SCI). He serves as PI over 10 projects funded by National Natural Science Foundation, etc. He has published over 100 high-quality journal papers, while 15 papers are ESI/hot papers.

Prof. Bing Wu is currently the Deputy Director of the Intelligent Transportation Systems Research Center at Wuhan University of Technology and the Assistant Director of the National Key Laboratory of Waterway Traffic Control. As an awardee of the National High-level Talent (Youth) Program, he has long been dedicated to research on waterway traffic safety, intelligent ship navigation, and maritime safety supervision and simulation. Professor Wu has led major national R&D projects and several National Natural Science Foundation projects, and has pursued advanced studies at internationally renowned universities, achieving significant research outcomes and earning multiple technology awards.

Ning Wang is a professor and doctoral supervisor at Dalian Maritime University. Recognized as an outstanding young scientist in the maritime field, his research focuses on intelligent marine robotics, unmanned ships, and intelligent autonomous systems. Professor Wang has led and participated in several projects funded by the National Natural Science Foundation and other key R&D initiatives, and has published over 70 papers in SCI journals. He also serves on the editorial boards of several international journals, making a profound academic impact.

Prof. Wei He is currently the Dean of the School of Physical and Electronic Information Engineering and the Executive Deputy Director of the Ship Intelligent Navigation Safety Control Engineering Research Center at Minjiang University, and has been recognized as a provincial-level talent under Fujian's "Hundred, Thousand, and Ten Thousand Talents" Program. His research primarily focuses on intelligent systems and information fusion, maritime equipment, and new energy. Professor He has published over 50 papers in both domestic and international journals, led several national and regional research projects, and received multiple awards for his contributions to teaching and research.

Han Zhang is a doctoral student at Shanghai Maritime University, specializing in smart port visual perception research. He is dedicated to applying advanced image processing, deep learning, and robotic control algorithms to unmanned systems in port and maritime environments, exploring high-precision positioning, navigation, and safety monitoring technologies. Under the guidance of his mentors, Zhang Han has participated in several national and provincial-level research projects and has published papers in international journals, accumulating rich practical experience in advancing maritime intelligence.

Details of Session

With the rapid development of information technology, artificial intelligence, and big data, traditional port and maritime management is facing unprecedented opportunities for transformation. Advanced sensors, image processing, and data analytics are continuously emerging, providing innovative intelligent solutions for the port and maritime sectors. These innovations enable real-time monitoring, precise scheduling, and enhanced safety management. Visual perception, as a core technology of smart port and navigation systems, allows for the real-time monitoring of ports, ships, and related facilities, offering critical data for intelligent decision-making and control. This leads to significantly improved operational efficiency and safety.

This invited session aims to establish an international platform that gathers the latest research findings and technological innovations in the field of smart port and navigation visual perception and control from around the world. The session will focus on the following topics:

- Advanced visual sensing and image processing technologies
- Object detection and recognition applications in port and maritime environments
- Visual positioning and navigation for unmanned ships and automated docks
- Data fusion, risk assessment, and intelligent decision support
- Intelligent control algorithms and system integration applications
- Digital transformation in port and maritime management

Through in-depth discussions and exchanges, this session seeks to promote the digital and intelligent transformation of the port and maritime sectors. It aims to provide robust theoretical and practical support for improving operational efficiency,

ensuring maritime safety, and achieving sustainable and efficient management.