

# 2024 第七届 IEEE 国际无人系统大会

## 特邀专题简介表

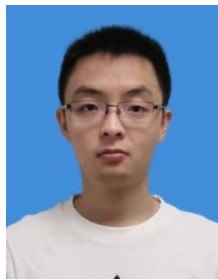
<b>特邀专题名称</b>	AI 驱动的水面自主无人系统及技术
<b>组织者</b>	<ol style="list-style-type: none"><li>1. 张新宇，教授，大连海事大学</li><li>2. 束亚清，副教授，武汉理工大学</li><li>3. 陈信强，副教授，上海海事大学</li><li>4. 高若滨，博士后研究员，南洋理工大学</li><li>5. 梁茂晗，博士后研究员，新加坡国立大学</li><li>6. 张明阳，研究员，芬兰阿尔托大学</li></ol>
<b>个人简介</b>	 <p><b>张新宇</b>，大连海事大学航海学院教授，博士生导师，海上智能交通研究团队负责人，中国航海学会会士、中国航运 50 人论坛受聘研究员、中国航海智库首批特约研究员、《中国舰船研究》期刊编委，入选辽宁省百千万人才工程、镇江市“金山英才”领军人才计划、辽宁省高校优秀人才支持计划等。吉林大学博士毕业，大连理工大学水利工程博士后，英国伦敦大学学院（UCL）访问学者。张新宇教授长期致力于解决航海科技领域的关键理论、技术难题和应用推广。在港口交通组织优化、自主船舶、海事大数据应用等方面具有开拓性成果，主持/参与国家科技部重点专项和国家自然科学基金等重大项目 20 余项、大连市“揭榜挂帅”、大连市科技创新基金等项目 10 余项，在国内外高水平期刊发表论文 100 余篇，获权国家发明专利 20 余项，获得中国航海学会科技进步一等奖等国家级、省部级优秀成果及科研奖励 10 余项，主持研发的全水域逐点乘潮系统、船舶避碰辅助决策系统、港口水域布置规划支持系统等实现工程化应用，累计成果转化达 1 亿余元。</p>



**东亚清**，武汉理工大学航运学院副教授、硕士生导师，湖北省“楚天学者计划”楚天学子，国家自然科学基金函评专家。近五年主持国家自然科学基金面上项目 1 项，主持/参与国家自然科学基金重点项目、横向项目等 30 余项；发表学术论文 60 余篇，其中 SCI 论文 50 余篇(第一/通讯作者 30 余篇)，ESI 高被引论文 2 篇，Google H-index 19(2024 年 3 月)，国家级一流本科课程线下一流课程主要成员，主编教材/专著 1 部，获中国航海学会科学技术奖一等奖 1 项，申请发明专利 10 余项、授权 1 项。担任 Ocean & Coastal Management (JCR Q1) 执行编辑、Sustainable Horizons 执行编辑、Ocean Engineering (JCR Q1) 编委及多个领域内期刊审稿人。主要研究领域为船舶智能航行、海事大数据挖掘、船舶防污染、水上交通风险等。



**陈信强**，上海海事大学副教授，博士生导师，IEEE 会员，博士毕业于上海海事大学，曾受国家留学基金委资助公派美国华盛顿大学博士联合培养。复旦大学博士后，师从国内海洋气象环境预测预报权威专家穆穆院士。担任 SCI 期刊 IET Intelligent Transportation Systems (SCI 3 区) 和 Measurement & Control (SCI 3 区) 期刊副主编，二区 SCI 期刊 Journal of Marine Science and Engineering 期刊编委，三区 SCI 期刊 Sustainability 期刊编委。主要研究方向为视频数据驱动的复杂交通/水上通航环境智能感知与理解、自动化码头 IGV 视觉导航、智能航海、交通大数据挖掘分析与知识图谱。作为项目组核心成员，主持和参与国家自然科学基金(青年、面上)、交通运输部基础研究项目、美国联邦公路局研究项目等纵向课题 10 余项。



**高若滨**，南洋理工大学博士后，SCI 期刊 Computers & Electrical Engineering 副主编、SCI 期刊 Information Fusion 客座编委、SCI 期刊 Engineering Applications of AI 客座编委、ICONIP 2023 分会主席。博士、硕士均毕业于南洋理工大学，本科毕业于吉林大学，现任南洋理工大学计算机与科学工程学院以及土木与环境工程学院联合博士后。高若滨博士长期致力于解决时间序列挖掘领域的技术难题。在随机化神经网络、时间序列挖掘、信号

处理、智能化海洋计算等方面具有开拓性成果，参与新加坡人工智能计划，在国内外高水平期刊、会议发表论文 40 余篇，包括 Neural Networks、Information Fusion、Applied energy、IEEE TNLS 等期刊。



**梁茂晗**，现任新加坡国立大学(NUS)博士后研究员。武汉理工大学博士毕业，博士期间获国家公派研究生项目资助赴南洋理工大学 (NTU) 联合培养。梁茂晗博士针对海事智能交通系统的需求，围绕海事多源信息感知与计算等应用基础研究问题，重点开展海事数据挖掘，船舶智能感知，船舶辅助驾驶等理论与技术研究。在 IEEE Transactions on Intelligent Transportation Systems、IEEE Transactions on Industrial Informatics、Ocean Engineering、Reliability Engineering and System Safety 等重要学术期刊与会议总计发表论文 30 余篇，其中 ESI 热点论文 1 篇，高被引论文 2 篇，总计被引 600 余次，谷歌 h 指数 13。授权发明专利 3 项，转化 1 项。在知名期刊 Computers and Electrical Engineering, Information 担任客座编辑。担任知名期刊 Frontiers in Future Transportation 编委。获得中国航海学会科技进步奖二等奖，博士研究生国家奖学金，武汉理工大学优秀博士毕业论文，IEEE CPSCOM 最佳会议论文奖等优秀成果及科研奖励。



**张明阳**，博士，芬兰阿尔托大学研究员，美国机械工程协会会员，IEEE 会员，玛丽居里校友会会员。2022 年取得芬兰阿尔托大学科学博士学位。主要是从事大数据、机器学习&深度学习在船舶技术领域的应用研究。近 5 年，发表论文 60 余篇，其中，7 篇入选全球 1%ESI 高被引论文，3 篇全球 0.1%ESI 热点论文；荣获阿尔托大学全额奖学金，国家优秀自费生奖学金，芬兰海事基金博士奖学金等；主持参与欧盟水平线项目 2 项及芬兰海事基金项目 1 项；受邀担任 8 个国际 SCI 期刊特约编辑、编委；担任 40 余个国内外期刊审稿人；受邀参加国际学术会议并作报告 10 余次；曾担任 IMECE 2022 交通安全与可靠性分会场主席；IWSH 2023 国际论坛委员等。目前从事 RETROFIT 55，与来自工业界、学术界和海运业政策制定者的利益相关者合作。

## 特邀专题简介

水面自主无人系统是指在海洋环境下，通过人工智能、机器学习等先进技术驱动的无人系统。随着人工智能等前沿技术的不断进步，水面自主无人系统迎来了新的发展机遇。然而，环境的复杂多变性及不确定性为水面自主无人系统的实际应用提出了巨大挑战。在这一背景下，本特邀专题旨在聚焦水面自主无人系统的感知、规划、决策与自主控制等关键问题，探讨 AI 技术在解决这些挑战中的作用与应用。我们诚挚邀请相关领域的专家学者提交包含创新思想、概念、新发现、改进以及新应用的原创论文，共同探讨如何利用人工智能驱动的技术推动水面自主无人系统的安全、可靠与弹性的发展，为相关理论与方法在实践中的应用奠定坚实基础。

本特邀专题邀请以下与“AI 驱动的水面自主无人系统及技术”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。

- 环境感知技术
- 多源信息融合理解技术
- 轨迹数据挖掘
- 任务规划与路径规划技术
- 决策与智能控制技术
- 人机交互技术
- 水面自主无人系统的安全性、可靠性及弹性设计
- 测试与应用案例分析
- 多水面自主无人系统及编队控制

**IEEE ICUS 2024**  
**Invited Session Summary**

**Title of Session**

AI-driven Autonomous Unmanned Surface Systems and Technologies

**Organizers**

**1. Prof. Xinyu Zhang**

Dalian Maritime University, China

**2. Assoc. Prof. Yaqing Shu**

Wuhan University of Technology, China

**3. Assoc. Prof. Xinqiang Chen**

Shanghai Maritime University, China

**4. Dr. Ruobin Gao**

Nanyang Technological University, Singapore

**5. Dr. Maohan Liang**

National University of Singapore, Singapore

**6. Dr. Mingyang Zhang**

Aalto University, Finland

**Biosketches of Organizers**



**Xinyu Zhang** is a professor and doctoral supervisor at the Navigation College of Dalian Maritime University. He is also the leader of the Maritime Intelligent Traffic Research Team. Professor Zhang holds positions as a Fellow of China Institute of Navigation, a researcher in the China Shipping 50-Person Forum, a special research fellow in the China Maritime Think Tank, and an editorial board member of the “Chinese Journal of Ship Research”. He has been selected for various talent programs, including the Talent Program of One Hundred, Thousand, and Ten Thousand in Liaoning Province, the “Golden Mountain Talent” Leading Talents Program in Zhenjiang City, and the Outstanding Talent Support Program in Liaoning Province’s universities. Professor Zhang obtained his Ph.D. from Jilin University and completed his postdoctoral research in Water Resources Engineering at the Dalian University of Technology. He has also served as a visiting scholar at University College London (UCL) in the United Kingdom. Professor Zhang has dedicated himself to solving key theoretical, technical challenges, and

promoting applications in the field of maritime technology. He has made pioneering achievements in areas such as port traffic organization optimization, autonomous vessels, and maritime big data applications. He has led or participated in over 20 major projects funded by the Ministry of Science and Technology and the National Natural Science Foundation of China. He has also been involved in more than 10 projects, including the “Revealing Talents and Taking the Lead” project in Dalian and the Dalian Science and Technology Innovation Fund. He has published over 100 papers in high-level domestic and international journals, obtained more than 20 national invention patents, and received over 10 national and provincial awards for outstanding achievements in scientific research, including First Prize of Science and Technology Progress Award of China Institute of Navigation. He has led the development of engineering applications such as the Vessel Accurate Riding Tidal System, Ship Collision Avoidance Decision Support System, and Port Water Area Layout Planning Support System. The cumulative achievement transformation has reached over 100 million yuan.



**Yaqing Shu**, associate professor and master supervisor at the School of Navigation of Wuhan University of Technology, is a recipient of the "Chu Tian Scholar Program" in Hubei Province and serves as an expert reviewer for the National Natural Science Foundation of China. Over the past five years, he has led one National Natural Science Foundation general project, and has been involved in over 30 projects including key projects and horizontal projects funded by the National Natural Science Foundation. He has published more than 60 academic papers, among which over 50 are SCI papers (with more than 30 as first/corresponding author), including 2 highly cited papers in ESI. As of March 2024, his Google H-index is 19. He is a key member of national-level top undergraduate courses and has edited one textbook/monograph. Shu Yaqing has won one first prize of the Science and Technology Award of the China Institute of Navigation, and has applied for more than 10 invention patents with one authorized. He serves as an executive editor for *Ocean & Coastal Management* (JCR Q1), *Sustainable Horizons*, and a editorial board member for *Ocean Engineering* (JCR Q1), as well as a reviewer for several journals in the field. His main research areas include intelligent ship navigation, maritime big data mining, ship anti-pollution, and risk assessment of waterborne transportation.





**Xinqiang Chen** serve as Associate Professor and Ph.D. supervisor at Institute of logistics Science and Engineering, Shanghai Maritime University. He studied at University of Wahington (Seattle) as a joint-cultivated Ph.D. sponsored by China Scholarship Council. He was a research associate at Fudan University, and his cooperator supervisor in Fudan is Chinese Science Academician Mumu. Prof. Chen serve as associate editor for IET Intelligent Transportation Systems (JCR, Q3) and Measurement & Control (JCR, Q3), editorial board member for Journal of Marine Science and Engineering (JCR, Q2) and Sustainability (JCR, Q3). His research field focuses on video data supported maritime traffic situation awareness, intelligent guided vehicle routing and scheduling, visual navigation, intelligent shipping, large-scale traffic data analysis and knowledge discovery. Prof. Chen served as PI or Co-PI for more 10 projects.



**Ruobin Gao**, is a research fellow at Nanyang Technological University, serves as an associate editor for the SCI journal Computers & Electrical Engineering, a guest editor for the SCI journal Information Fusion, a guest editor for the SCI journal Engineering Applications of AI. He was the special session chair for ICONIP 2023. He completed both his Ph.D. and Master's degrees at Nanyang Technological University and his undergraduate studies at Jilin University. Currently, he holds a joint postdoctoral position at the School of Computer Science and Engineering and the School of Civil and Environmental Engineering at Nanyang Technological University, Singapore. Dr. Gao Ruobin has long been dedicated to addressing technical challenges in the field of time series data mining. He has made pioneering contributions in areas such as randomized neural networks, time series mining, signal processing, and intelligent maritime computation, participating in Artificial Intelligence Singapore programs. He has published over 40 papers in high-level international journals and conferences, including Neural Networks, Information Fusion, Applied Energy, and IEEE TNNLS.



**Maohan Liang**, is a Research Fellow at the National University of Singapore (NUS). He obtained his Ph.D. from Wuhan University of Technology (WUT). He was a visiting Ph.D. student at Nanyang Technological University (NTU) funded by China Scholarship Council (CSC). Dr. Liang's research focuses on maritime intelligent transportation systems, especially in the areas of maritime multisource information perception and computation. His work includes maritime data mining, intelligent ship awareness, and navigational assistance. He has published over 30 papers in prestigious journals and conferences, such as IEEE Transactions on Intelligent Transportation Systems and Ocean Engineering. His publications include 1 ESI hot paper and 2 highly cited papers, accumulating over 600 citations. He has obtained 3 national invention patents, with 1 transferred. He also serves as a guest editor for notable journals like Computers and Electrical Engineering and Information, as well as an editorial board member for Frontiers in Future Transportation. Dr. Liang has received several awards, including the Second Prize of Science and Technology Progress Award of China Institute of Navigation, the National Scholarship for Ph.D. students, the WUT Outstanding Ph.D. Thesis Award, and the IEEE CPSCom Best Conference Paper Award.



**Mingyang Zhang**, Ph.D., is a researcher at Aalto University and a member of esteemed organizations such as SNAME, IEEE, and MCAA. He obtained his Ph.D. degree in science from Aalto University, Finland, with a specialization in maritime big data analytics and the application of machine learning and deep learning in the maritime field. Dr. Zhang has published over 60 journal & conference papers. Notably, seven of his papers have been recognized as top 1% highly cited papers, while three papers have achieved the distinction of being among the top 0.1% highly cited papers. He has received several awards and distinctions, including full scholarships from Aalto University, Chinese National Scholarships for Outstanding Self-financed Students, Finnish National Maritime Foundation Doctoral Scholarships, and Aalto University Research Incentive Scholarships. Additionally, he has actively participated in significant projects funded by the European Union and the Finnish Maritime Fund. Dr. Zhang's expertise has been recognized in the academic community, leading to invitations to serve as a special editor and editorial board member for eight esteemed international journals.



He has also acted as a reviewer for more than 40 international journals. Dr. Zhang has presented his research findings at over 10 international conferences. He has served as the Chairman of the Traffic Safety and Reliability Branch at the International Mechanical Engineering Congress & Exposition and has been a member of the local organizing committee for the 12th International Workshop on Ship and Marine Hydrodynamics. Currently, he is engaged in the RETROFIT55 project, collaborating with stakeholders from the maritime industry, academia, and policymakers.

### **Details of Session**

Autonomous unmanned surface system refers to unmanned systems driven by advanced technologies such as artificial intelligence (AI) and machine learning (ML) in the navigation environment. With the continuous advancement of frontier technologies such as AI, autonomous unmanned surface systems have encountered new development opportunities. However, the complexity and variability of the environment pose significant challenges to the practical application of autonomous unmanned surface systems. Against this backdrop, this special topic aims to focus on key issues such as perception, planning, decision-making, and autonomous control of autonomous unmanned surface systems, exploring the role and application of AI technology in addressing these challenges. We sincerely invite experts and scholars in related fields to submit original papers containing innovative ideas, concepts, new discoveries, improvements, and new applications to collectively explore how to utilize AI-driven technologies to promote the safe, reliable, and resilient development of autonomous unmanned surface systems, laying a solid foundation for the application of relevant theories and methods in practice.

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 “AI-driven autonomous unmanned surface systems and technologies”.

- Environmental perception technology
- Multi-source information fusion and understanding technology
- Trajectory data mining
- Task planning and path planning technology
- Decision-making and intelligent control technology
- Human-machine interaction technology

- Safety, reliability, and resilience design of autonomous unmanned surface systems
- Testing and application case analysis
- Multi-autonomous unmanned surface systems and formation control