

IEEE ICUS 2022
Invited Session Summary

Title of Session

Coordinated Control and Distributed Intelligent Decision-Making of Multiple
Unmanned Surface Vessels (USVs)

Name, Salutation and Affiliation of Organizers

1. Assoc. Prof. Jialing Zhou

Nanjing University of Science and Technology, China

2. Prof. Guanghui Wen

Southeast University, China

3. Prof. Zhisheng Duan

Peking University, China

Biosketches of Organizers



Assoc. Prof. Jialing Zhou received the B.S. degree in automation from Beijing Jiaotong University, Beijing, China in 2012, and the Ph.D. degree in mechanical systems and control from Peking University, Beijing, China, in 2017. She is currently an Associate Professor with the School of Automation, Nanjing University of Science and Technology, Nanjing, China, and the deputy director of the Laboratory of Security Operation and Control for Intelligent Autonomous Systems, Southeast University, Nanjing, China. As a coauthor, she received "Zadeh Best Paper Award" at IEEE ICCSS 2020. She was selected for the Young Elite Scientist Sponsorship Program of the China Association for Science and Technology. Her research interests include distributed control and optimization, guidance and control of flight vehicles, reinforcement learning, and networked games.



Prof. Guanghui Wen received the Ph.D. degree in mechanical systems and control from Peking University, China, in 2012. Currently, he is a Full Professor with the Department of Systems Science, Southeast University, Nanjing, China. His current research interests include cooperative control of multi-agent systems, analysis and synthesis of complex networks, cyber-physical systems, and resilient control. Dr. Wen was the recipient of the Best Student Paper Award in the 6th Chinese Conference on Complex Networks in 2010. He was named a Highly Cited

Researcher by Clarivate Analytics since 2018. Dr. Wen was awarded a National Natural Science Fund for Excellent Young Scholars in 2017. Moreover, he was a recipient of the Australian Research Council Discovery Early Career Researcher Award in 2018. He currently serves as an Associate Editor of IEEE Journal of Emerging and Selected Topics in Industrial Electronics, IEEE Trans. Systems, Man and Cybernetics: System, and Asian J. Control. He is an IET Fellow.



Zhisheng Duan is currently a full Professor with the Department of Mechanics and Engineering Science, College of Engineering, Peking University. His research interests include robust control, stability of interconnected systems, flight control, and analysis and control of complex dynamical networks. He obtained the outstanding National Natural Science Foundation in China and he is currently a Cheung Kong Scholar in Peking University.

Details of Session

In recent years, fast-growing technologies of perception, communication and embedded systems have provided technical supports for the development of coordinated control and decision-making of unmanned swarm systems. Multi-USV system, as an important type of unmanned swarm systems, has attracted much attention due to its wide applications in both civilian and military fields. With the increasing autonomous capability of single USV, multiple USVs as a coordinated system formed based on information exchange has become more and more powerful and played an important role in tasks on water surface including ocean-going escort, water environment monitoring, joint search and rescue, and cooperative attack against adversaries.

This session will focus on coordinated control and distributed intelligent decision-making of multiple USVs. We aim to provide an effective communication platform for researchers in this field to display, summarize and discuss recent developments. Topics include but are not limited to:

- Distributed formation control of multi-USV systems
- Distributed secure control and obstacle avoidance of multi-USV systems
- Distributed intelligent decision-making of multi-USV systems
- Path planning of multi-USV systems
- Distributed coverage control of multi-USV systems
- Task-oriented distributed optimization of multi-USV systems
- Game and confrontation of multi-USV systems

