IEEE ICUS 2022 Invited Session Summary

Title of Session

Self-Organizing State Estimation and Control for Multi-Unmanned Systems

Name, Salutation and Affiliation Organizers

1. Assoc. Prof. Yuezu Lv

Beijing Institute of Technology, China

2. Dr. Peihu Duan

The University of Hong Kong, China

3. Assoc. Prof. Lei Chen

Beijing Institute of Technology, China

Biosketches of Organizers



Yuezu Lv received his B.S. and Ph.D. degrees from the College of Engineering, Peking University, Beijing, China, in 2013 and 2018, respectively. He is currently an Associate Researcher with Advanced Research Institute of Multidisciplinary Sciences, Beijing Institute of Technology, Beijing, China. From 2018 to 2021, he worked as a Lecturer in Department of Systems Science, School of Mathematics, Southeast University, Nanjing,

China. His research interests include cooperative control of multi-agent systems, adaptive control, robust control of uncertain systems, and distributed resilient control. Dr. Lv was a finalist for Zhang Si-Ying (CCDC) Outstanding Youth Paper Award in 2015. As a coauthor, he received Zadeh Best Paper Award at IEEE ICCSS 2020. He was selected for the fifth Young Elite Scientists Sponsorship Program by CAST, and received 2021 APNNS Young Researcher Award.



Peihu Duan received the B.Eng. degree in Mechanical Engineering from Huazhong University of Science and Technology, Wuhan, China, in 2015. He received the Ph.D. degree in Mechanical Systems and Control from Peking University, Beijing, China, in 2020. Currently, he works as a Postdoc at the Department of Electrical and Electronic Engineering in the University of Hong Kong, Hong Kong,

China. From May 2019 to August 2019, he was a Research Assistant with the City University of Hong Kong, Hong Kong, China. From October 2020 to August 2021,

he was a Postdoc at the Department of Electronic and Computer Engineering in the Hong Kong University of Science and Technology, Hong Kong, China. His research interests include cooperative control and state estimation of networked systems.



Lei Chen, as the associate researcher with Beijing Institute of technology, has long been engaged in the research of complex networks, model simplification, collaboration and decision-making. Now he is a member of the complex environment science detection center, mainly responsible for the research and development of unmanned system cluster and intelligent decision-making scientific research platform and related

scientific research. He was a visiting scholar at Okayama Prefecture University in Japan and Royal Melbourne University of technology in Australia, and served as the Secretary of the industrial Internet innovation and development project of the Ministry of industry and information technology.

Details of Session

Thanks to the rapid development of perception, communication and computing technologies, unmanned systems have increasingly strong autonomous capabilities and are becoming a strategic research direction in many fields. By leveraging information sharing and collaboration among individuals, multi-unmanned systems are expected to achieve high-level swarm intelligence, applicable to more complex application scenarios. However, the current collaboration mode for multi-unmanned systems usually requires overall planning and design in advance, where individual intelligence is not completely utilized and thus swarm intelligence cannot be further improved. With the popularization of multi-unmanned systems in various fields, the system self-organization capability has received more and more attention. Therefore, for the distributed state estimation and control issues of multi-unmanned systems, how to realize the self-organization design and implementation of individuals for estimation and control strategies is not only of theoretical significance, but also of practical values.

The invited session calls for original papers of innovative ideas and concepts, new discoveries and improvements, and novel applications relevant but not limited to the following selected topics of "Self-Organizing State Estimation and Control for Multi-Unmanned Systems".

· Self-organizing mode for multi-unmanned systems

- Distributed state estimation for multi-unmanned systems
- Distributed cooperative control for multi-unmanned systems
- Sensor placement for multi-unmanned systems
- Actuator placement for multi-unmanned systems
- Communication mechanism for multi-unmanned systems
- · Security mechanism for multi-unmanned systems
- Information fusion strategy for multi-unmanned systems
- Privacy-preserving strategy for multi-unmanned systems