

IEEE ICUS 2022
Invited Session Summary

Title of Session

High Quality Distributed Control of Multi-Robot Systems

Name, Salutation and Affiliation of Organizers

1. Assoc. Prof. Qishao Wang

Beihang University, China

2. Prof. Qingyun Wang

Beihang University, China

3. Assoc. Prof. Yuezun Lv

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Biosketches of Organizers



Qishao Wang received the B.S. degree in Automation from Beihang University, Beijing, China, in 2014, and Ph. D. degree in engineering from Peking University, Beijing in 2019. He is currently an Associate Professor with Department of Dynamics and Control, Beihang University, Beijing, China. From 2019 to 2021, He worked as a post-doctor in Department of Dynamics and Control, Beihang University, Beijing, China. His research interests include cooperative control of multi-agent systems, adaptive control, and distributed optimization. He received Excellent Doctoral Dissertation Award of Chinese Institute of Command and Control. He was selected for the Postdoctoral Innovative Talent Support Program in 2019.



Qingyun Wang received the M.Sc. degree in mathematics from Inner Mongolia University, Hohhot, China in 2003 and the Ph.D. degree in general mechanics from Beihang University, Beijing, China in 2006. He is currently a full Professor with the Department of Dynamics and Control, Beihang University, Beijing, China. His research interests include neuronal dynamics modeling and analysis, dynamics and control of complex networks and the applications of nonlinear dynamics in mechanical and physical systems. He has been in charge of many scientific research items including the National Natural Science Foundation of China, the New-Century Training Program Foundation for the Talents by Ministry of Education of China,

Doctoral Fund of Ministry of Education of China, etc. Dr. Wang has published more than 100 scientific papers in the fields including control, synchronization and other complex dynamics. He has obtained China National Funds for Distinguished Young Scientists (2013). He has been honored by Cheung Kong Scholar Chair Professor of Department of Education (2016).



Yuezhu 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. He 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.

Details of Session

Multi-robot systems, the systems composed of several robots with motion, computing and communication capabilities, have been widely used to accomplish important tasks such as cooperative navigation and mapping, cooperative attack and defense, cooperative material transportation and so on. Compared with single-robot operation mode, multi-robot systems can achieve superior group effectiveness by complementing each other's advantages, which relies on high-quality cooperation among robots. Therefore, how to design control strategies to improve the performance of multi-robot systems in resource consumption, response rate, control accuracy and other aspects is of great theoretical and practical significance. In recent years, artificial intelligence technologies, such as machine learning, swarm intelligence, brain-inspired intelligence, have developed rapidly and have more powerful capabilities to improve the control quality of multi-robot systems.

This topic will focus on the high quality distributed control problem of multi-robot systems and invite researchers to display and discuss their new ideas, new methods and new applications in this field. Topics include but are not limited to:

- Distributed adaptive control of multi-robot systems

- Distributed receding horizon optimal control of multi-robot systems
- Task cooperation of multi robot system
- Multi-robot motion planning and control
- Differential game-based optimal control of multi robot system
- Distributed optimal control using artificial intelligence