IEEE ICUS 2022

Invited Session Summary

Title of Session
Group Cooperative Decision-making and Control for Autonomous Unmanned
Systems(AUS)
Name, Salutation and Affiliation of Organizers
1. Prof. Hongbo Gao
University of Science and Technology of China, China
2. Dr. Junjie Zhou
Chery Inc, China
3. Dr. Ruidong Yan
Beijing Jiaotong University, China
4. Prof. Yingfeng Cai
Jiangsu University, China
5. Prof. Manjiang Hu
Hunan University, China
Biosketches of Organizers



Dr. Hongbo Gao, Researcher, Doctoral Supervisor, School of Information Science and Technology, University of Science and Technology of China. He graduated with a PhD from Beihang University in November 2016 under the supervision of Academician Deyi Li, and worked at Tsinghua University. Chaired more than 10 projects including key projects of the

National Natural Science Foundation of China, integrated project topics, sub-topics of the Key R&D Program of the Ministry of Science and Technology of China, and special projects on artificial intelligence of the Ministry of Education, with total funding of more than 12 million RMB. He has published 22 JCR Zone 1 / Zone 2 SCI papers as first/corresponding author (16 papers in top JCR Zone 1 journals), with the highest single SCI citations of more than 171, one ESI highly cited paper, 1721 Google Scholar citations, H-factor of 22, more than 20 papers with SCI factor > 5.0, and 5 international journal conference paper awards. He has been awarded 22 invention patents, 1 US patent and 1 PCT patent. He has been awarded

the "Special Support Plan" Innovation Leader of Anhui Province, the First Prize of Science and Technology Progress Award of China Command and Control Society (rank 1), the Science and Technology Innovation Youth Award of China Communications Association, the Young Scientist Award of China Command and Control Society, and the Outstanding Award of Anhui Province Artificial Intelligence Technology Award (rank 3). He is currently the director of the China Command and Control Society and the deputy director of the Youth Working Committee, the chairman of the supervisory board and the chairman of the youth working committee of the Anhui Robotics Society, the executive director of the Anhui Association of Academicians and Experts and the Anhui Association of Scientists and Entrepreneurs, and the deputy chairman of the youth working committee of the China Command and Control Society. He serves as Associate Editor of IEEE Trans. on Neural Network and Learning System (IF=10.451), a leading SCI journal in artificial intelligence, and IEEE Trans. on Automation Science and Engineering (IF=4.938), a leading SCI journal in robotics. (IF=4.938), Associate Editor of the well-known SCI journal Int. J. Adv. Robot. Syst. (IF=1.482), Editorial Board member of EI journals for two times, Section Chair and Guest Editor-in-Chief for nine times. He has been invited to present at international and national conferences more than 5 times.



Dr. Junjie Zhou, now the technical director of automatic driving of Chery Lion Technology, the technical director of Chery Intelligent Vehicle Development, the intelligent vehicle expert of the Ministry of Science and Technology, and the Artificial Intelligence expert of Anhui Province. He once worked in Hyundai Mobis and Continental Germany

Group.He presided over and participated in 10 national and provincial major special projects and 4 internal major special projects of Chery group, and led the team to research and development of many driverless technologies, such as ACC, AEB, APA, and "remote call • intelligent parking". During the working period, more than

50 patents were applied for/authorized.



Dr. Ruidong Yan, Master's degree advisor, currently working at Beijing Jiaotong University. He received a doctoral degree from Beijing University of Aeronautics and Astronautics in 2017; After graduation, he engaged in postdoctoral research in the school of vehicles and transportation of Tsinghua University. He has been engaged in the research of autonomous driving

perception, decision-making and control, and has published more than 20 academic papers including IEEE Trans. series.



Dr. Yingfeng Cai, Professor, Doctoral supervisor. She is currently the executive vice president of the Graduate School of Jiangsu University, the director of the Jiangsu "Intelligent Vehicle and Operation" Engineering Research Center, and the leader of the transportation engineering discipline of Jiangsu University. She is an editorial board

member of Automotive Innovation. She holds the bachelor's, master's and doctorate degrees from Southeast University, and is a visiting scholar at Michigan State University and Hong Kong University. She has carried out scientific research and technical research on the major problems of intelligent vehicle complex environment perception, the theory of accident chain blocking based on vehicle-road coordination and the bottleneck problem of dynamic control quality improvement, and has successively undertaken more than 10 national and provincial key projects including the National Natural Science Foundation of China with total scientific research funds exceed 20 million yuan. She has won 3 provincial and ministerial first prizes and 2 second prizes, published more than 100 papers, and authorized more than 50 invention patents and 3 PCT patents. Selected as a young scholar in the "Changjiang Scholars Award Program" of the Ministry of Education, a young talent support project of the China Association for Science and

Technology, a leader of Jiangsu Province's "Six Talent Peaks" innovative talent team, outstanding youth in Jiangsu Province Funds and other talent projects. She also won the China Automobile Industry Outstanding Young Talent Award, "Jiangsu Youth May 4th Medal", "Jiangsu Top Ten Youth Science and Technology Stars" and other honors.



Dr. Manjiang Hu, Professor, Doctoral Supervisor, Yuelu Scholar with Hunan University, selected as Hunan Young Scientific and Technological Innovation Talents. He is currently the Deputy Director of the State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, the Executive Director of Hunan Manufacturing Innovation Center

(Intelligent Vehicle System), the Executive Director of Wuxi Intelligent Control Research Institute of Hunan University. He has presided more than 20 S&T projects including National Key Research and Development Project, National Natural Science Foundation of China, State Key Laboratory Independent Key Project, and Major University-Enterprise Cooperation Projects. Currently, he serves as a member of SAE International Intelligent and Connected Vehicle Technology Committee and Guest Editor of Automotive Innovation. He has published more than 40 high-level academic papers, more than 10 authorized invention patents; he is a recipient of four International Conference Best Paper Awards and National University Science and Technology Paper Awards. He is also a recipient of the Hunan Provincial Teaching Achievement Award of Higher Education, Teaching Achievement Award of Hunan University, and ChangFeng Excellence Teacher Award.

Details of Session

With the rapid development of artificial intelligence technology, autonomous unmanned systems(AUS) are also becoming more intelligent. Considering that AUS are highly intelligent, unmanned, and networked in the future, the current organizational model of a single agent can not meet the needs of complex tasks, and group collaboration technology will become a new research hotspot in intelligent systems. Given the complex application scenarios, group cooperative decision-making and control methods for autonomous unmanned systems are one of the key technologies and are becoming increasingly important. How to realize cooperative perception, cooperative positioning, cooperative planning, cooperative decision-making and cooperative control in multi- AUSes will be the core of the next generation of swarm intelligence in AUS, and will lay the foundation for the new revolution of intelligent technology of unmanned systems.

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 "Group Cooperative Decision-making and Control of Unmanned Autonomous Systems".

- · Unmanned aerial vehicle group cooperative decision-making
- Unmanned vehicle group cooperative decision-making
- · Unmanned ship group cooperative decision-making
- Unmanned aerial vehicle group cooperative control
- Unmanned vehicle group cooperative control
- Unmanned ship group cooperative control
- Autonomous unmanned system based on cooperation
- AUS cooperative interaction
- AUS cooperative perception
- AUS cooperative planning
- AUS cooperative positioning