

IEEE ICUS 2022
Invited Session Summary

Title of Session

Intelligent Navigation for Unmanned Systems

Name, Salutation and Affiliation of Organizers

1. Prof. Xiangwei Zhu

Sun Yat-sen University, China

2. Assoc. Prof. Xuebin Zhuang

Sun Yat-sen University, China

3. Assoc. Prof. Lei Wang

Wuhan University, China

4. Asst. Prof. Yanqing Hou

Sun Yat-sen University, China

Biosketches of Organizers



Xiangwei Zhu, Professor, Doctoral Supervisor, Chief Scientist of National Key R&D Program, Assistant Dean of School of Electronics and Communication Engineering, Sun Yat-Sen University. For 20 years, he has been focusing on the research of Beidou system and integrated positioning, navigation and timing (PNT) system, and is committed to solving the scientific problems behind the key technical bottlenecks of Beidou system engineering projects. He has directed/attended 10 special projects, 2 national key research and development plans, 3 natural science fund projects, published more than 100 papers, and applied for more than 60 invention patents. Cross-innovation research has been carried out in Beidou navigation system, integrated PNT technology, intelligent and trusted navigation, etc. He has won the first prize of the Army Science and Technology Progress Award, the first prize of the Surveying and Mapping Science and Technology Award, "Outstanding Professional and Technical Talents of the Army", "Young Top Talents" of the National University of Defense Technology, and won the third-class personal merit. Currently, he serves as an evaluation expert for the Hundred Talents Program of the Chinese Academy of Sciences, an evaluation expert for the National Key R&D Program of the Ministry of Science and Technology, an evaluation expert for the Academic Degree Center of the Ministry of Education, an evaluation expert for the National Natural Science

Foundation of China, an expert for the Strategic Support Forces Expert Bank, an expert for the Innovation Special Zone of the Military Commission Science and Technology Commission, and an expert in the integration of space and earth. Distinguished professor of the State Key Laboratory of Technology, Distinguished Professor of the Guangdong Laboratory of Southern Marine Science and Technology, serving as Member of the Youth Working Committee of the Chinese Institute of Command and Control, editorial board member of Journal of Aeronautics and Astronautics, Global Positioning System, Journal of Navigation and Positioning, and reviewer of more than 20 journals such as IEEE TIM, TAES, Journal of Electronics, Journal of Communications, etc. Manuscript expert.



Xuebin Zhuang, Deputy Dean, Associate Professor and Doctoral Supervisor of the School of Systems Science and Engineering, Sun Yat-Sen University. In July 2011, he received his Ph.D. from Tsinghua University. He has long been engaged in research on satellite navigation technology and autonomous navigation technology for unmanned systems. As the project leader, technical leader and main participant, he has successively undertaken more than 20 scientific research projects at the national, provincial and ministerial levels, among which more than 10 were presided over. As the first author or the main author, he has applied for more than ten patents, of which 7 have been authorized. He has published nearly 20 academic papers in SCI and EI. Served as Vice Chairman of the Organizing Committee of the 5th IEEE International Unmanned Systems Conference in 2022, Chairman of the 10th China Satellite Navigation Academic Annual Conference Branch (S11 Anti-jamming and Anti-Spoofing Technology Branch), and China Satellite Navigation Academic Annual Conference (CSNC) Reviewer Manuscript expert (seventh to thirteenth), member of the Air and Space Safety Parallel System Professional Committee of the Chinese Society of Command and Control, etc.



Lei Wang, Fixed-term Associate Professor of Wuhan University, Master Supervisor, Deputy Chief Engineer of LuoJia-1A and LuoJia-2A Satellite Navigation Augmentation Subsystem, IEEE member. He received a Ph.D. degree from Queensland University of Technology, Australia in 2015. His research interests include LEO satellite navigation augmentation, GNSS precision positioning, LEO satellite precise orbit determination, indoor positioning, etc. He has published more than 70 research papers (including more than 50 SCI/EI papers), published 1 monograph, applied for 15 patents, and 4 software copyrights. He has hosted and participated in ten scientific research projects such as the National Natural Science Foundation of China and the National Key R&D Program. He has won 1 satellite navigation and positioning science and technology progress award and 1 special prize for surveying and mapping science and technology progress. He serves as the young editorial board member of Radio Engineering, guest editor of GSIS and Atmosphere journals, and reviewer for more than 30 journals, including Journal of Geodesy, IEEE JIOT, IEEE TVT, IEEE TAES.



Yanqing Hou, Assistant Professor and Master Supervisor. The "Hundred Talents Program" of the School of Systems Science and Engineering of Sun Yat-Sen University introduces talents. In 2016, he graduated from National University of Defense Technology with a Ph.D., and his research interests include multi-source fusion navigation and high-precision positioning technology for satellite navigation. Presided over 1 national defense science and technology innovation special zone project, participated in more than 10 national 863 plan projects and equipment pre-research projects as the backbone, published more than 10 SCI academic papers as the first author and co-author, and served as Survey Review, Mathematical Problems in Engineering, etc. Journal Reviewer.

Details of Session

Under the needs of social development, unmanned systems such as drones and unmanned vehicles are developing in a blowout manner, and unmanned systems play an important role in both civil and military fields. With the continuous expansion of the application field of unmanned systems, they will face more complex environments. Besides, the mission coverage and mission execution capability of

individual UAVs and unmanned vehicles are limited, which cannot meet the increasingly diverse and complex mission requirements. Therefore, the future unmanned system is bound to develop in the direction of intelligence and scale. As the kernel of unmanned systems, navigation system runs through the development of unmanned system technology. Required by intelligent and large-scale unmanned systems, it is becoming increasingly important to develop intelligent navigation technology that is suitable for complex environments and group collaboration.

This session invites the following original papers related to the topic "Intelligent Navigation for Unmanned Systems" containing innovative ideas, concepts, new discoveries, improvements, and new applications.

- High-precision positioning theory and methods
- Multi-source fused navigation and positioning technology
- Unmanned swarm intelligent navigation technology
- Intelligent and trusted navigation technology
- Intelligent navigation countermeasure technology
- AI-enabled navigation technology
- Vision/Laser SLAM
- Indoor positioning technology
- UAV/Unmanned Vehicle Navigation Technology
- Indoor mapping and route planning
- Other emerging intelligent navigation technologies