

第七届普适定位、室内导航 与基于位置服务(UPINLBS 2022)国际会议 THE 7TH UBIQUITOUS POSITIONING, INDOOR NAVIGATION AND LOCATION-BASED SERVICES INTERNATIONAL CONFERENCE



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PREFACE

Dear colleagues,

On behalf of the State Key Laboratory of Information Engineering in Surveying Mapping and Remote Sensing (LIESMARS), Wuhan University, it is my great pleasure to welcome all of you to the Seventh ISPRS Ubiquitous Positioning, Indoor Navigation and Location-Based Services Conference (UPINBLS) in Wuhan, China.

Location has enabled a large amount of smart applications in various areas including indoor/outdoor navigation, intelligent transportation, smart city, auto-driving car, mobile health, precision marketing, virtual/augmented/mixed realities and so on. It will continue to play an important role in future beyond smartphone applications. It will be an enable technology for applications of artificial intelligence and super intelligence.

UPINLBS is an international conference series technically sponsored by the ISPRS addressing the topics of ubiquitous positioning, indoor navigation and location-based service. Indoor positioning is an important research topic because people spend 80% of their time indoors. However, it is still challenging because indoor environments are far more complicated than outdoor environments in terms of spatial geometry and signal propagation. Low-cost high-precision indoor positioning technology is still a major obstacle for us to achieve a high-precise ubiquitous positioning solution. In the topic of ubiquitous positioning, a lot of new research appeared in recent years, such as Beidou + 5G positioning, brain-inspired navigation, marine geodetic positioning and marine resilient PNT, deep space positioning and autonomous navigation, underground positioning, robot localization and positioning with wearable devices.

Today, we are gathering together in Wuhan to celebrate this event for the 7th time and discuss the recent developments in these areas. I hope you will take this opportunity to exchange ideas with other experts and take it home with a clear vision for your future research.

I would like to take this opportunity to thank our colleagues from Wuhan University for their tremendous work to make this event happen.

I hope you all have an exciting UPINLBS!

Prof. Ruizhi Chen

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Director of (LIESMARS), Wuhan University General Chair of UPINLBS 2022

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ORGANIZERS

Guiding Unit

Chinese Society for Geodesy Photogrammetry and Cartography

ORGANIZERS

Wuhan University State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS)

CO-ORGANIZERS

International Society for Photogrammetry and Remote Sensing (ISPRS), WG III/1 "Thematic Information Extraction", WG IV/5 "Indoor/Outdoor Seamless Modelling, LBS and Mobility"

TECHNICAL SPONSORS

Hubei Luojia Laboratory Collaborative Innovation Center of Geospatial Technology (INNOGST) Joint International Research Laboratory of GeoInformatics

SPONSORS

South Surveying & Mapping Technology Co., Ltd. CHINA SURVEYING AND MAPPING

GENERAL CHAIR Prof. Ruizhi Chen, Wuhan University, China

PROGRAM CHAIRS

Prof. Liang Chen, Wuhan University, China Prof. Yuan Zhuang, Wuhan University, China Prof. Xinlian Liang, Wuhan University, China



KEYNOTE SPEAKERS



Systems

Prof.Yuanxi Yang, a research fellow of the Xi' an Research Institute of Surveying, is an academician of the Chinese Academy of Sciences (CAS) and deputy chief designer of the BeiDou global navigation satellite system. He has been for a long time engaged in geodesy and navigation, presided over a series of national major projects and make remarkable achievements. In recent years, his research mainly focuses on satellite navigation, marine geodesy, undersea navigation and the comprehensive and resilient poisoning, navigation and time (PNT) system. He has been elected as the the IAG fellow in 2003, and ION fellow in 2018, and listed among the World's Top 2% Scientists.

Topic: Comprehensive, Resilient and Intelligent PNT Time: 9:00 - 9:40, Mar.18

Prof. Naser El-Sheimy is a Fellow of the Canadian Academy of Engineering and the US Institute of Navigation (ION). He holds a Tier-I Canada Research Chair (CRC) in Geomatics Multi-sensor Systems and has won more than 50 Canadian and international research awards, including a number of educational excellence awards and research achievement awards.

Topic: Technologies for Future Autonomous Navigation

Time: 10:10-10:50, Mar.18



Prof. Michael Milford is the Deputy Director of QUT's Centre for Robotics, Laureate Fellow of Australian Research Council, and Microsoft Research Faculty Fellow. He was Chief Scientist of Robotic Vision Australia and received the Batterham Medal of the Australian Academy of Technology and Engineering.

Topic: Neuroscience-inspired SLAM and Navigation: Where Are We Coming from and Where Could We Go?

Time: 10:50-11:30, Mar.18



People



Prof. Armin Grün was the former director of the Institute of Geodesy and Photogrammetry at the Eidgenössische Technische Hochschule Zürich (ETH) and the Chairman of the ISPRS White Elephant Club. His most important international awards include the ISPRS Otto von Gruber Gold Medal and the Brook Gold Medal.

Topic: Underwater Photogrammetry: A Powerful Tool for Coral Monitoring

Time: 16:40-17:20, Mar.18



Prof. Wshington Yotto Ochieng is a Fellow of the Royal Academy of Engineering (RAEng), the Head of the Department of Civil and Environmental Engineering, and Chair in Positioning and Navigation Systems, Imperial College London. He was the Head of the Centre for Transport Studies and Co-Director of the ISST at Imperial College. Currently, he is currently the Vice President of the Royal Institute of Navigation (RIN).

Topic: Navigation A Wayfinding for Visually Impaired

Time: 16:00-16:40, Mar.19

Prof. Jiangzhou Wang is a Fellow of the Royal Academy of Engineering (RAEng), the Institute of Electrical and Electronics Engineers (IEEE), and the Institution of Engineering and Technology (IET). He was the former Head of the School of Engineering and Digital Arts at the University of Kent. He has made important contributions in the field of 2G-5G wireless communication and won many IEEE International Research Awards.

Topic: Intelligent Reflecting Surfaces for 6G Mobile Communications

Time: 16:40-17:20, Mar.19

TECHNICAL PROGRAM COMMITTEE

Prof. Deren Li, China (Academician of CAS and CAE) Prof. Jianya Gong, China (Academician of CAS) Prof. Ruizhi Chen, China (Academician of Finnish Academy of Science and Letters)

Prof. Liang Chen, China Prof. Zhixiang Fang, China Prof. Xiyun Hou, China Prof. Jie Jiang, China Prof. You Li, China Prof. Jingbin Liu, China Prof. Xiaoji Niu, China Prof. Hongxing Sun, China Prof. YunSheng Wang, Finland Prof. Tianhe Xu, China Prof. Jie Zhen, China Prof. Yuan Zhuang, China A/Prof. Lei Wang, China Dr. Jianfeng Cao, China Dr. Guangyi Guo, China Dr. Songjie Hu, China Dr. Xin Li, China Dr. Fei Yang, China Dr. Xuan Yang, China

Prof. Yuwei Chen, Finland Prof. Fuqiang Gu, China Prof. Yanqing Hou, China Prof. Zhizhong Kang, China Prof. Xinlian Liang, China Prof. Shanhong Liu, China Prof. Ling Pei, China Prof. Zhigang Tu, China Prof. Erhu Wei, China Prof. Jianguo Yan, China Prof. Baoding Zhou, China A/Prof. Ming Li, Switzerland A/Prof. Peng Zhang, China Dr. Haibo Ge, China Dr. Jianzhu Huai, China Dr. Nianchuan Jian, China Dr. Nan Shen, China Dr. Fangwen Yu, China

PRACTICAL INFORMATION

VENUE

State Key Laboratory of Information Engineering in Surveying Mapping and Remote Sensing (LIESMARS), Wuhan University Address: No. 129 Luoyu Road, Hongshan District, Wuhan, Hubei, China Tel: +86-27-68778229 Web: http://www.lmars.whu.edu.cn/

REGISTRATION DESK

Registration will be open on the afternoon of March 17. March 17, 14:30-19:00 The registration desk will be located in the lobby of Junyi Hotel (Accommodation staff) and Xing Hu Building (Non accommodation staff) Please do not hesitate to contact the conference registration desk for any questions you may have.

CONFERENCE AND MEETINGS

The Seventh Ubiquitous Positioning, Indoor Navigation and Location-Based Services (UPINLBS 2022), which will be held in Wuhan on March 18-19, 2022 (https://upinlbs.net/). For UPINLBS conference, please see the following detailed program.

COFFEE BREAKS

Coffee and tea during the scheduled coffee breaks will be served.

POSTERS

The poster session will take place on Saturday 19 March, Xing Hu Building (Third Floor). Please take note of the following points:

- Please submit your printed poster when you do the registration on March 18 and March 19

CONFERENCE LANGUAGES

The main conference language will be English.

UPINLBS2022 FINAL RESULTS SYMPOSIUM OVERVIEW

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Ice Breaking Reception: Date & Time: Mar.17 Thursday 5:00 p.m. Banquet: Date & Time: Mar.18 Friday 6:00 p.m.

EMERGENCY TELEPHONE NUMBERS

Fire Alarm: 119 Police: 110 Ambulance: 120 Transportation Accidents: 122 Telephone Number Inquiry: 114 Weather Forecast: 121

TRANSPORTATION

Subway: The nearest subway station is Jiedaokou Station located in Line 2.

TIME ZONE

The time zone in Wuhan is GMT + 8 hours.

WUHAN ONLINE MAP

For Wuhan City Map, please visit the following website: http://www.meet99.com/map-wuhan.html

CONTACT

upinlbs@yeah.net

	Time	Program
Mar 17 Thursday	2:30 p.m8:00 p.m.	Registration
Mai.17 Thursday	5:00 p.m8:00 p.m.	Ice Breaker Reception

	Time	Venue	Xing Hu Building-Third Floor					
	mie	Program	Academic Report Hall	309	308	306	305	301
	8:30a.m. – 9:00a.m.	Opening Session	Opening Session					
	9:00a.m. – 9:40a.m.	Keynote 1	Prof. Yang Yuanxi (Aca- demician of CAS): Topic: Comprehen- sive, Resilient and Intelligent PNT					
Mar.18 Friday	9:40a.m. – 10:10a.m.	Coffee Break & Photo						
	10:10a.m. – 10:50a.m.	Keynote 2	Prof. Naser El-Sheimy (Fellow of the Cana- dian Academy of Engineering): Topic: Technologies for Future Autono- mous Navigation Sys- tems					
	10:50a.m. – 11:30a.m.	Keynote 3	Prof. Michael Milford (Laureate Fellow of Australian Research Council and Micro- soft Research Faculty Fellow): Topic: Neurosci- ence-inspired SLAM and Navigation: Where Are We Coming From and Where Could We Go?					
	11:30a.m. – 12:00a.m.	Panel Discussion	Topic: Ubiquitous Navigation: Present & Future					
	12:00a.m. – 1:30p.m.	Lunch						

	Timo			Xing Hu Building-Third Floor					
	Inne	Program	Academic Report Hall	309	308	306	305	301	
	1:30p.m. – 2:50p.m.	Technical Session		S1(a): Beidou + 5G Positioning and Communication	S2(a): Brain-Inspired Naviga- tion Workshop	S3(a): Marine Geodetic Posi- tioning and Marine Resilient PNT	S4(a): Indoor Mobile Map- ping	S5: Underground Space Posi- tioning and Navigation	
	2:50p.m. – 3:10p.m.	Coffee Break							
Mar.18 Friday	3:10p.m. – 4:30p.m.	Technical Session		S1(b): Beidou + 5G Positioning and Communication	S2(b): Brain-Inspired Naviga- tion Workshop	S3(b): Marine Geodetic Posi- tioning and Marine Resilient PNT	S4(b): Indoor Mobile Map- ping	S6: Multi-Source Fusion Location	
	4:40p.m. – 5:20p.m.	Keynote 4	Prof. Armin Grün (Chairman of the ISPRS White Elephant Club) Topic: Underwater Photogrammetry: A Powerful Tool for Coral Monitoring						
	6:00p.m. – 9:30p.m.	Banquet							

	Time	Venue		Xing Hu Building-Third Floor				
	Inne	Program	Academic Report Hall	309	308	306	305	301
	9:00a.m. – 10:20a.m.	Technical Session		S11(a): Advanced Technologies of High Accuracy Indoor Positioning	S8: Location-based Knowl- edge Mining and Services	S9: Smart Wearable Position- ing	S10(a): Visual Perception and Visual Positioning	S7: Deep Space Positioning and Autonomous Navigation
	10:20a.m. – 10:40a.m.	Coffee Break						
	10:40a.m. – 12:00a.m.	Technical Session		S11(b): Advanced Technologies of High Accuracy Indoor Positioning	S12: Robot Localization and Perception	S13(a): Sino-Europe Ubiqui- tous Positioning	S10(b): Visual Perception and Visual Positioning	S14(a): LEO Navigation Aug- mentation
	12:00a.m. – 1:30p.m.	Lunch						
	1:30p.m. – 2:50p.m.	Technical Session		S15: Brain-Inspired Spatial Cogni- tion	S17: Information Perception, Localization and Semantic Mapping of Underwater Envi- ronment	S13(b): Sino-Europe Ubiqui- tous Positioning	S16: Human Body Interior Space Navigation and Posi- tioning	S14(b): LEO Navigation Aug- mentation
Mar 19	2:50p.m. – 3:05p.m.	Coffee Break						
Saturday	3:05p.m. – 3:50p.m.	Poster Session				Poster 3	Poster 2	Poster 1
	4:00p.m. – 4:40p.m.	Keynote 5	Prof. Washington Yotto Ochien (Fellow of the Royal Academy of Engi- neering) Topic: Navigation A Wayfinding for Visually Impaired People					
	4:40p.m. – 5:20p.m.	Keynote 6	Prof. Jiangzhou Wang (the Fellow of Royal Academy of Engineering) Topic: Intelligent Reflecting Surfaces for 6G Mobile Communications					
	5:20p.m. – 5:40p.m.	Closing & Awarding						
	5:40p.m. – 6:00p.m.	Technique Visiting & Discussion						

2022 THE SEVENTH UBIQUITOUS POSITIONING, INDOOR NAVIGATION AND LOCATION-BASED SERVICES (UPINLBS)



Thursday, 17 March, 2022

Registration:

March 17, 14:30-19:00

The registration desk will be located in the lobby of Junyi Hotel (Accommodation staff) and Xing Hu Building (Non accommodation staff)



Thursday, 18 March, 2022

Time	Events			
08:30 – 09:00	Opening Session			
08:30 - 08:37	Prof. Chaozhi Song Chairman of China Society of Surveying and I	Mapping		
08:37 – 08:44	Prof. Ruizhi Chen General Chair of UPINLBS 2022 Academician of the Finnish Academy of Sciences and Humanities Director of LIESMARS, Wuhan University			
08:44 - 08:51	Prof. Jie Jiang Fellow of ISPRS Chairman of ISPRS Technical Committee on Remote Sensing			
08:51 – 09:00	Prof. Deren Li Academician of CAS and CAE Internationally Renowned Photogrammetry and Remote Sensing Scientist			
00.00 00.40	Keynote 1			
09:00 - 09:40	Prof. Yuanxi Yang (Academician of CAS)	Comprehensive, Resilient and Intelligent PNT		
09:40 - 10:10	Coffee Break & Photo			
	Keynote 2			
10:10 – 10:50	Prof. Naser El-Sheimy (Fellow of The Canadian Academy of Engineering)	Technologies for Future Autonomous Naviga- tion Systems		
	Keynote 3			
10:50 - 11:30	Prof. Michael Milford (Laureate Fellow of Australian Research Council and Micro- soft Research Faculty Fellow)	Neuroscience-inspired SLAM and Navigation: Where Are We Coming from and Where Could We Go?		
11:30 - 12:00	Panel Discussion Ubiquitous Navigation: Present & Future			
12:00 - 13:30	Lunch			

Time	Events			
13:30 - 14:50	Sessions 1-5			
	S1(a): Beidou + 5G Positioning and Commu Session Chair: Weiping Jiang and Liang Ch Venue: Xing Hu 309	inication en		
13:30 - 13:50	Zhongliang Deng(Beijing University of Posts and Telecommunications)	The Development Opportunity of GNSS + 5G Integration		
13:50 - 14:10	Xing Li (China Satellite Navigation Engi- neering Center)	The Development of Beidou System and Its Integration with Communication Systems		
14:10 - 14:30	Honglei Qin (Beijing University of Aero- nautics and Astronautics)	Signal-of-Opportunity Positioning Technology for Low-Orbit Communication Satellites		
14:30 - 14:50	Xi Chen (Tsinghua University)	Integrated PNT in Broadband Satellite Sys- tems		
	S2(a): Brain-inspired Navigation Workshop Session Chair: Fuqiang Gu and Fangwen Yu Venue: Xing Hu 308			
13:30 - 13:50	Bailu Si (Beijing Normal University)	Cognitive Mapping Based on Geometry Representations		
13:50 - 14:10	Lei Deng (Tsinghua University)	Brain-inspired Computing Chip and Robots		
14:10 - 14:30	Chuang Yang (Nanjing University of Aero- nautics and Astronautics & National Uni- versity of Singapore)	Brain-inspired Navigation for UAV Swarm Working in GNSS-Denied Environment		
14:30 - 14:50	Miao Dong, Haiyang Qiu, Hui Wang, Peng- fei Zhi and Zihao Xu (Jiangsu University of Science and Technology)	Sonar Image Recognition Based on Machine Learning Framework		
	S3(a): Marine Geodetic Positioning and Marine Resilient PNT Session Chair: Tianhe Xu and Jie Zhen Venue: Xing Hu 306			
13:30 - 13:50	Shufang Zhang(Dalian Maritime University)	The Study of International Maritime Techni- cal Specifications of Communication and Navigation at Sea		
13:50 - 14:10	Shuqiang Xue (Chinese Academy of Sur- veying and mapping)	Seafloor Geodetic Station Network and Subsea PNT Service Key Technologies		
14:10 - 14:30	Fangjun Qin (Naval Engineering University)	Progress of Marine Atomic Gravimeter and Matching Navigation		
14:30 - 14:50	Jiangying Qin, Ke Yang, Ming Li, Jiageng Zhong and Hanqi Zhang (Wuhan University)	Real-Time Positioning and Tracking for Vision-Based Unmanned Underwater Vehi- cle		
	S4(a): Indoor Mobile Mapping Session Chair: Baoding Zhou and Shengjur Venue: Xing Hu 305	1 Tang		
13:30 - 13:50	Sisi Zlatanova(University of New South Wales)	3D Space-Based Seamless Indoor/Outdoor Navigation		
13:50 - 14:10	Kourosh Khoshelham (University of Mel- bourne)	Indoor Navigation Using 3D Models		

Time	Even	ts		
14:10 - 14:30	Yang Xiansheng and Zhuang Yuan(Wuhan University)	E-Lambert Model: An Extended Lambert Model to Address Interference from Ambi- ent Light on VLP System		
14:30 - 14:50	Ye Su, Liang Chen and Xiaoyan Liu(Wuhan University)	Crowdsourced Wifi Fingerprint-Based Localization in Urban Canyon		
	S5: Underground Space Positioning and Navigation Session Chair: Gongbo Zhou and Shaoyi Xu Venue: Xing Hu 301			
13:30 - 13:50	Baoguo Yu(The 54th Research Institute of China Electronics Technology Corpora- tion)	Reflections on The Future Development of Underground Space Navigation and Posi- tioning		
13:50 - 14:10	Leilei Li, Qihai Huang, Keyi Xu, Guangyi Guo and Ruizhi Chen (Wuhan University)	Vehicle Positioning in An Underground Space Using A Smart Phone		
14:10 - 14:30	Hai Yang (Southwest Petroleum Universi- ty)	Measurement While Drilling Method for Guided Drilling		
14:30 - 14:50	Shijia Wang (Yanshan University)	The Shearer Positioning Method in The Underground Coal Mine		
14:50 - 15:10	Coffee Break			
15:10 - 16:30	Sessions 1-6			
	S1(b): Beidou + 5G Positioning and Commu Session Chair: Liang Chen and Weiping Jian Venue: Xing Hu 309	nication ng		
15:10 - 15:30	Yidong Lou and Yusheng Wang(Wuhan University)	Beidou/5G Integrated Lidar SLAM in Com- plexed Environments		
15:30 - 15:50	Risheng Lv (China Academy of informa- tion and Communications Technology)	Application Demands and Industry Expan- sion of 5G Positioning		
15:50 - 16:10	Zhaoliang Liu, Xin Zhou, Yanlin Ruan and Liang Chen (Wuhan University)	A Precise Ranging with Subcarrier Diversity for 5G NR Indoor Positioning		
16:10 - 16:30	Gonzalo Seco Granados (Autonomous University of Barcelona)	Evolution of The Standards and The Simu- lation Models Towards 5G Positioning		
	S2(b): Brain-inspired Navigation Workshop Session Chair: Fangwen Yu and Fuqiang Gu Venue: Xing Hu 308			
15:10 - 15:30	Zhenshan Bing (Technical University of Munich, Germany)	Towards Cognitive Navigation: A Biological- ly inspired Calibration Mechanism for The Head Direction Cell Network		
15:30 - 15:50	Guangzhi Tang (Rutgers University, USA)	Biologically Inspired Spiking Neural Net- works for Energy-Efficient Robot Navigation and Control		

Time	Ever	nts
15:50 - 16:10	Junyi Feng (Wuhan University)	Design of Low-Power Convolutional Neural Network for Navigation Pattern Recognition of Smart Wearable Devices
16:10 - 16:30	Feifan Zhang, Wei Ke and Hongxin Ouyang (Nanjing Normal University)	Indoor Visible Light Localization Method Based on Embedded Artificial intelligence
	S3(b): Marine Geodetic Positioning and Ma Session Chair: Jie Zhen and Tianhe Xu Venue: Xing Hu 306	rine Resilient PNT
15:10 - 15:30	Jiaheng Li, Feng Tong and Weihua Jiang (Xiamen University)and Sumit Roy (Uni- versity of Washington)	Underwater Acoustic Modem with High Pre- cision Ranging Capability Based on Sec- ond-Level Cesium Atomic Clock
15:30 - 15:50	Jiageng Zhong, Ming Li, Jiangying Qin, Yuxin Cui, Ke Yang and Hanqi Zhang (Wuhan University)	Real-Time Marine Animal Detection Using YOLO-Based Deep Learning Network in the Coral Reef Ecosystem
15:50 - 16:10	Peng Zhou (Xiangtan University)	Research Status and Development of Inte- grated Navigation System Under 5G Com- munication: Analysis Summary
16:10 - 16:30	Shen Ying (Wuhan University)	Mobile Indoor Navigation without Location Signal Support
	S4(b): Indoor Mobile Mapping Session Chair: Shengjun Tang and Baoding Venue: Xing Hu 305	g Zhou
15:10 - 15:30	Shuhan Shen (Institute of Automation , CAS)	Image-Based Large-Scale Indoor Scene 3D Modeling
15:30 - 15:50	Tingting Lei and You Li(Wuhan University)	Pedestrian Inertial Navigation Algorithm Based on Scene Recognition
15:50 - 16:10	Zhiyuan Yang, Jing Li and Chenhui Shi (National Engineering Research Center for Geoinformatics, CAS)	Real-Time Dense 3D Mapping R Using Por- table Lidar and Camera
16:10 - 16:30	Qipeng Li, Yuan Zhuang, Yiwen Chen and Jianzhu Huai (Wuhan University)	A Novel 3D Point Clouds Moving Object Seg- mentation Network for Lidar SLAM
	S6: Multi-Source Fusion Location Session Chair: Gongmin Yan and Hongxing Sun Venue: Xing Hu 301	
15:10 - 15:30	Jizhou Lai(Nanjing University of Aero- nautics and Astronautics)	Autonomous Positioning Technology of Unmanned System independent of Satellite
15:30 - 15:50	Xiaoxu Wang (Northwest University of Technology)	Self Calibration Technology of Hemispheri- cal Resonator Gyro.

Time	Events				
15:50 - 16:10	Lixiong Huang, Ruizhi Chen, Feng Ye, Zuoya Liu, Zheng Li, Shihao Xu, Guangyi Guo and Long Qian (Wuhan University)	An Indoor Positioning System Based on Combined Audio Chirp/MEMS/Floor Map: Performance Analysis of Kepler A100			
16:10 - 16:30	Sheng Yang, Jingbin Liu and Xiaodong Gong(Wuhan University)	An Enhanced Smartphone Hybrid Indoor Positioning Solution Incorporating Hetero- geneous Sensors			
	Keynote 4				
16:40 – 17:20	Prof. Armin GrÜN (Chairman of the ISPRS White Elephant Club)	Underwater Photogrammetry: A Powerful Tool for Coral Monitoring			
18:00 - 21:30	Banquet				

Saturday, 19 March, 2022

Time	Events	
09:00 - 10:20	Sessions 7-11	
	S7: Deep Space Positioning and Autonomous Navigation Session Chair: Jianguo Yan and Fei Li Venue: Xing Hu 301	
09:00 – 09:20	Jean-Pierre Barriot (University of French Polynesia)	A Full Relativistic Framework for Deep Space Precise Orbitography
09:20 - 09:40	Yong Huang (Shanghai Astronomical Observatory, CAS)	Progress and Prospect of Precise Orbit Determination for Chinese Lunar and Deep Space Exploration
09:40 - 10:00	Xiangyu Huang (Beijing Control Engineer- ing Research institute)	Key Technologies of Autonomous Naviga- tion for Deep Space Exploration Spacecraft
10:00 - 10:20	Wutong Gao and Jianguo Yan (Wuhan University)	A 3-Degree Gravitational Model for 67P/Churyumov-Gerasimenko Using an Updated Comet Ephemeris
	S8: Location-based Knowledge Mining and Services Session Chair: Zhizhong Kang and Xinlian Liang Venue: Xing Hu 308	
09:00 – 09:20	Shihong Du (Peking University)	Measurement and Analysis of Urban Vitality Based on Multi-Source Spatial Data
09:20 - 09:40	Zhizhong Kang (China University of Geosciences)	Generation of Topology-Based Map for Indoor Navigation from 3D Point Clouds
09:40 - 10:00	Chenglu Wen (Xiamen University)	Human Localization and Motion Capture in Reconstructed 3D Scene

Time	Eve	nts
10:00 - 10:20	Xinwei Chai, Xian Guo, Jihua Xiao and Jie Jiang (Beijing Unistrong Science & Tech- nology Co., Ltd)	Effect Assessment of Large-Scale Events Via Spatiotemporal Approach
	S9: Smart Wearable Positioning Session Chair: You Li and Yulong Huang Venue: Xing Hu 306	
09:00 - 09:20	Bisheng Yang (Wuhan University)	Design, Implementation, and Application of an Intelligent Helmet for Precise Capture of Complex Scene
09:20 - 09:40	Dongyan Wei (Aerospace Information Research Institute, CAS)	Pedestrian Location Technology Based on Environmental Perception
09:40 - 10:00	Haiyong Luo (Institute of Computing Technology, CAS)	Exploration of Deep Learning in Adaptive Navigation Technology
10:00 - 10:20	Zhenqi Zheng, Zongbo Liao, Yizhou Xue and You Li (Wuhan University)	Rapid Establishment and Use of Indoor Wi-Fi Positioning Database in Shopping Malls Based on Wearable Navigation Device (Weartrack)
	S10(a): Visual Perception and Visual Positic Session Chair: Yang Cong and Zhigang Tu Venue: Xing Hu 305	oning
09:00 - 09:20	Chen Wang (Carnegie Mellon University)	Dynamic Objects in Autonomous Exploration
09:20 - 09:40	Zheng Wang (Wuhan University)	Person Retrieval and Behavior Prediction for Social Safety
09:40 - 10:00	Haifeng Zhang, Zhitian Li, Shuaikang Zheng, Yunfei Liu and Xudong Zou (Aero- space Information Research Institute, CAS)	Leader-Follower Cooperative Localization Based on VIO / UWB Loose Coupling for AGV Group
10:00 - 10:20	Fei Yin, Jingbin Liu and Sheng Yang (Wuhan University)	Long-Term Indoor Visual Localization Method Using Panoptic Segmentation
	S11(a): Advanced Technologies of High Acc Session Chair: Xiaoji Niu and Jian Kuang Venue: Xing Hu 309	uracy Indoor Positioning
09:00 – 09:20	Guang Tan (Sun Yat-Sen University)	A High-Accuracy Indoor Positioning System Based on Light Coding and Its Applications
09:20 - 09:40	Jian Kuang (Wuhan University)	Consumer-Grade Imus-Enhanced Indoor Magnetic Field Matching Positioning Scheme
09:40 – 10:00	Yaxin Li, Xuexue Nie and Wu Chen (The Hong Kong Polytechnic University)	Precise Indoor and Outdoor Altitude Esti- mation Based on Smartphone
10:00 - 10:20	Zhaohan Zhang, Liang Wu, Zaichen Zhang, Jian Dang, Bingcheng Zhu and Lei Wang (Southeast University)	Multiple RSS Fingerprint Based Indoor Localization in RIS-Assisted 5G Wireless Communication System

Time	Events	
10:20 - 10:40	Coffee Break	
10:40 - 12:40	Sessions 10-14	
	S10(b): Visual Perception and Visual Positioning Session Chair: Zhigang Tu and Yang Cong Venue: Xing Hu 305	
10:40 - 11:00	Yang Cong (Shenyang Institute of Automation, CAS)	Robot Online Visual Perception
11:00 - 11:20	Zhigang Tu (Wuhan University)	Accurate Cross-View Geo-Localization
11:20 - 11:40	Maodong Zhu(President of Southern Pre- cision Survey Institute)	3D Indoor Positioning Applications Based on Multi-sensors Integrated with AI & SLAM Technologies
11:40 - 12:00	Yuchen Deng, Shengjun Tang, Weixi Wang, Xiaoming Li and Renzhong Guo (Research Institute for Smart Cities, Shen- zhen University)	A High Precision Visual Localization Method Optimized By Multi-Features
	S11(b): Advanced Technologies of High Accuracy Indoor Positioning Session Chair: Jian Kuang and Xiaoji Niu Venue: Xing Hu 309	
10:40 - 11:00	Liang Wu (Southeast University)	Angle of Arrival Based High Precision Posi- tioning Technologies in Mobile Communi- cation Systems
11:00 - 11:20	Shuai Cao(University of Science and Technology of China)	High-Precision and High-Reliability Acous- tic Indoor Positioning System
11:20 - 11:40	Jinzhan Du and Jian Wang (Beijing Uni- versity of Civil Engineering and Architec- ture)	Analysis of Positioning Accuracy of Indoor UWB Emergency Networking
11:40 - 12:00	Xinyang Xu(Southern surveying and map- ping group)	The Industry Application Situation and Development Expectation of Indoor Posi- tioning Technology
	S12: Robot Localization and Perception Session Chair: Yuan Zhuang and Jianzhu Huai Venue: Xing Hu 308	
10:40 - 11:00	Jianru Xue (Xi'An Jiaotong University)	Vision-Led, Multi-Sensor Collaborative Posi- tioning and Navigation
11:00 - 11:20	Weicheng Xiong(CTO of Zhihua Technolo- gy Co., Ltd.)	Fast and Robust 2D Laser-inertial SLAM System for Large Scenes

Time	Events	
11:20 - 11:40	Feng Zhu and Xiaohong Zhang (Wuhan University)	State Estimation in Multi-Sensors Fusion Positioning: Filtering Or Optimization ?
11:40 - 12:00	Xuan Wang, Yuan Zhuang, Zhenghua Zhang and Xiaoxiang Cao (Wuhan University)	Tightly-Coupled Integration of BLE and PDR Combined With Map and Graph Optimiza- tion for Indoor Pedestrian Navigation
	S13(a): Sino-Europe Ubiquitous Positioning Session Chair: Yuwei Chen and Ling Pei Venue: Xing Hu 306	g
10:40 - 11:00	Weisong Wen and Li-Ta Hsu (Hong Kong Polytechnic University)	Factor Graph Optimization and Its Use in GNSS Collaborative Positioning and Sensor Integration
11:00 - 11:20	Rui Sun(Nanjing University of Aeronautics and Astronautics)	GNSS Positioning Techniques for Urban Canyons
11:20 - 11:40	Ling Yang, Nan Sun, Yunzhong Shen and Bofeng Li(Tongji University)	ARAIM Stochastic Model Refinements for Ground-Based GNSS Positioning
11:40 - 12:00	Chen Chen, Yuwei Chen, Changhui Jiang, Jianxin Jia and Haibin Sun(Nanjing Uni- versity of Science and Technology)	The Performance Analysis of BDS Position- ing in Nordic Areas Based on The Smart- phone
	S14(a): LEO Navigation Augmentation Session Chair: Cailun Wu and Lei Wang Venue: Xing Hu 301	
10:40 - 11:00	Cailun Wu (State Key Laboratory of Satel- lite Navigation System and Equipment Technology)	Current Status and Future of The LEO Navi- gation Augmentation Systems
11:00 - 11:20	Ertao Liang(Fire Eye Position Technology Co., Ltd.)	Progress of Tianshu LEO Navigation Aug- mentation System
11:20 - 11:40	Lei Wang, Wenju Fu, Tao Li, Haitao Zhou and Yi Han(Wuhan University)	An Error Budget Analysis for LEO Navigation Augmentation Systems
11:40 - 12:00	Yuzhao Li, Haowen Yan, Weifang Yang, Shijie Wang and Xiaoning Su(Lanzhou Jiaotong University)	Optimal Linear Combinations Selection Based on Fuzzy Clustering Analysis for Multi-Frequency GNSS
12:00 - 13:30	Lunch	
13:30 - 14:50	Sessions 13-17	
	S13(b): Sino-Europe Ubiquitous Positioning Session Chair: Ling Pei and Yuwei Chen Venue: Xing Hu 306	g

Time	Events	
13:30 - 13:50	Guoying Zhao (University of Oulu, Finland)	Emotional Face Analysis
13:50 - 14:10	Xianglin Liu (Fugro Group)	Fugro Spacestar Towards in-Orbit Demon- stration of Precise Point Positioning on-Board Norsat-TD
14:10 - 14:30	Xingxing Zuo (Technische Universitaet MÜNchen)	Towards The Era of Robust Pose Estima- tion for Robots
14:30 - 14:50	Changhui Jiang, Yuwei Chen, Jianxin Jia, Haibin Sun, Tinghuai Wang and Juha Hyyppa (Finnish Geospatial Research Insti- tute)	Convolutional Neural Networks Based GNSS Signal Classification using Correla- tor-Level Measurements
	S14(b): LEO Navigation Augmentation Session Chair: Lei Wang and Cailun Wu Venue: Xing Hu 301	
13:30 - 13:50	Xin Li and Xingxing Li (Wuhan University)	PPP-RTK based Real-time Precise Positioning Service and LEO Navigation Augmentation
13:50 - 14:10	Shengfeng Gu, Xiaopeng Gong, Feiyu Mao, Chengpeng He and Chengkun Gan (Wuhan University)	Progress of Wide Area Satellite Based PPP-RTK Technique
14:10 - 14:30	Haibo Ge, Tianhao Wu and Bofeng Li (Tongji University)	Real-time (Predicted) LEO Orbit and Clock Determination for LEO Enhanced GNSS (LeGNSS)
14:30 – 14:50	Wenju Fu, Jin Wang, Lei Wang, Ruizhi Chen and Wei Xie (Wuhan University)	Real-time Ambiguity-fixing GPS Satellite Clock Estimation with an Online Fractional Cycle Bias Filter Method
	S15: Brain-inspired Spatial Cognition Session Chair: Weihua Dong and Zhixiang Fa Venue: Xing Hu 309	ng
13:30 - 13:50	Weihua Dong (Beijing Normal University)	Pattern Recognition and Prediction of Human Spatial Navigation Behavior Based on Eye Movement Data
13:50 - 14:10	Zhen Sun (Shanghai Jiaotong University)	Bio-inspired Multiple Scales Place Recogni- tion for Electric Substations
14:10 - 14:30	Lubin Wang and Zhixiang Fang(Wuhan University)	Building EEG-Based Brain Connectivity Net- works for Detecting Pedestrian's Intended Direction During Navigation
14:30 - 14:50	Zhiyong Zhou(University of Zurich) and Haosheng Huang (Ghent University, Belgium)	Towards Hierarchical Indoor Navigation Guidance: A Data Modelling Perspective

Time	Events	
	S16: Human Body Interior Space Navigation Session Chair: Bin Luo and Peng Zhang Venue: Xing Hu 305	and Positioning
13:30 - 13:50	Weiguo Dong (Wuhan University)	Research on Navigation and Positioning Technology in The Diagnosis and Treat- ment of Human Digestive Tract Diseases
13:50 - 14:10	Bin Luo(Wuhan University)	Capsule Robot in Vivo Positioning
14:10 - 14:30	Peng Zhang (Wuhan University)	Research on Capsule Robot Positioning Based on Wearable Devices
14:30 - 14:50	Yuan Xu, Dong Wan, Jidong Feng, Tao Shen and Bin Sun (University of Jinan)	XGB Assisted Self-Learning Kalman Filter for UWB Robot Localization
	S17: Information Perception, Localization and Semantic Mapping of Underwater Environment Session Chair: Zhaohui Li and Ming Li Venue: Xing Hu 308	
13:30 - 13:50	Zhaohui Li (Sun Yat-Sen University)	Research Progress of Underwater Informa- tion Perception and Fusion Technology
13:50 - 14:10	Ming Li (Wuhan University)	Research Frontiers of Deep Learning and Photogrammetric Computer Vision in Underwater Autonomous Robotics and Semantic Mapping
14:10 - 14:30	Zhou Yu (Hangzhou Aohai Ocean Engi- neering Technology Co., Ltd.)	Research and Application Status of Under- water Robots
14:30 - 14:50	Mingda Ouyang (Xi'an Research Institute of Surveying and Mapping)	Particle Swarm Optimization for Underwa- ter Gravity-Matching: Applications in Navi- gation and Simulation
14:50 - 15:05	Coffee Break	
15:05 - 15:50	Poster Sessions 1-3	
	Poster Sessions 1 Session Chair: Lei Wang Venue: Xing Hu 301	
15:05 - 15:14	Zhuang Yonggai and Wang Lei(Wuhan University)	Analysis of the Gravity Models Impact on LEO Satellite Orbit Prediction
15:14 - 15:23	Junzhan Chen and Jianguo Yan(Wuhan University)	Refinement of Space Debris Astronomical Localization Model Based on Large Field-of-View Monitoring Images
15:23 - 15:32	Xiao Sun, Yuan Zhuang and Shaohua Chen(Wuhan University)	Tightly Coupled RTK/INS Integrated Naviga- tion Using a Low-Cost GNSS Receiver and a MEMS IMU
15:32 - 15:41	Jingsong Liang and Liang Chen(Wuhan University)	An Indoor Positioning Method Based on Sound Source Angle of Departure

Time	Even	its
15:41 - 15:50	Yida Wei and You Li(Wuhan University)	Impact of Sensor Data Sampling Rate in GNSS/INS Integrated Navigation with Vari- ous Sensor Grades
	Poster Sessions 2 Session Chair: Bin Luo Venue: Xing Hu 305	
15:05 - 15:14	Guangrui Liu and Lei Wang(Wuhan Uni- versity)	Joint Track GPS and LEO Signals with Adap- tive Vector Tracking Loop in Challenging Environments
15:14 - 15:23	Xiaoxiang Cao, Guoliang Chen, Yuan Zhuang, Xuan Wang and Xiansheng Yang (Wuhan University)	Novel Method for Constructing a Wi-Fi Posi- tioning System Via Implicit Crowdsourcing
15:23 - 15:32	Yizhou Xue, Xueli Guo, Zhenqi Zheng and You Li(Wuhan University)	A Vision-Aided Calibration Method for Low-End Inertial Measurement Units
15:32 - 15:41	Qiaoting Gong and Zexian Li(Xiangtan University)	Bluetooth Localization Based on Fully Con- volutional Neural Network
15:41 - 15:50	Liao Zongbo and Li You(Wuhan University)	Implementation and Improvement Of Indoor Wearable UWB/INS Combined Posi- tioning Method
	Poster Sessions 3 Session Chair: You Li Venue: Xing Hu 306	
15:05 - 15:14	Yangyang Li and Lei Wang (Wuhan Univer- sity)	Accuracy Evaluation of Quad-System GNSS Doppler Velocity Estimation Using Android
15:14 - 15:23	Wen Zhichao, Guo Xueli, Zhang Xuanxuan and Li You(Wuhan University)	Tightly-coupled GNSS/INS Integrated Navi- gation and Smoothing Software for Land Vehicles
15:23 - 15:32	Shangbiao Sun, Wutong Gao, Bo Wang, Jianguo Yan and Jean-Pierre Barriot(Wuhan University)	A Simulated Gravity Field Estimation for the Main Belt Comet 133P/Elst-Pizarro Based on Satellite-To-Satellite Tracking Mode
15:32 - 15:41	Rui Yu and Yu Zhang(Guangzhou Urban Planning&Design Survey Research Insti- tute)	Research and Application Base on CGCS2000 of Coordinate System Parameter Inversion Algorithm
15:41 - 15:50	Hanqi Zhang, Ming Li, Xiaotian Pan, Xinlin Zhang, Jiageng Zhong and Jiangying Qin (Wuhan University)	Novel Approaches to Enhance Coral Reefs Monitoring with Underwater Image Seg- mentation

Time	Events	
16:00 - 16:40	Keynote 5	
	Prof. Washington Yotto Ochieng (Fellow of Royal Academy of Engineering)	Navigation a Wayfinding for Visually Impaired People
16:40 - 17:20	Keynote 6	
	Prof. Jiangzhou Wang (Fellow of Royal Academy of Engineering)	Intelligent Reflecting Surfaces for 6G Mobile Communications
17:20 – 17:40	Closing & Awarding	
17:40 - 18:00	Technical Visit & Discussion	