

CV of Zuoya Liu

Personal details and date of CV

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Degrees

- Doctor of Geodesy and Survey Engineering, Wuhan University, China, 30.12.2021, "Research on Key Technologies of ToF-based Acoustic Indoor Positioning System".
Verification: Graduate School of Wuhan University.
<https://gs.whu.edu.cn/>, archive@whu.edu.cn.
- Master of Circuit and System, Central China Normal University, China, 30.06.2015, "Design and Implementation of Wideband Amplifier for Weak Laser Signal".
- Bachelor of Electronic Information Science and Technology, Central China Normal University, China, 30.06.2012, "Embedded System for Autonomous Driving Car".

Current employment

- **01.01.2026 – 31.12.2029, Senior Researcher Scientist**, Full-time, Finnish Geospatial Research Institute (FGI) in the National Land Survey of Finland. In this role, I will be focusing on the R&D of efficient, reliable and accurate measures for field references and forest survey.
- **01.05.2022 – 31.12.2025, Researcher Scientist**, Full-time, Finnish Geospatial Research Institute (FGI) in the National Land Survey of Finland. In this role, I'm focusing on the R&D of reliable and accurate positioning technologies for robotics (e.g. UAVs, ATVs, harvesters) and foresters, and novel solutions for measuring tree positions efficiently and precisely.
- **01.08.2022 - Current, HW & SW Engineer**, 20% Part-time with the permission of FGI, Field Finland Oy, Finland. In this role, I'm focusing on the development of HW & SW for an accurate UWB-based positioning prototype for measuring tree positions for forest plots, overcoming the difficulty in providing fast and accurate measures for trees under forest canopies.
Currently, the prototype has been finished and is been planning to the market in 2026.
- Research career stages: R2

Previous work experience

- 01.01.2022 - 30.04.2022, System engineer, Full-time, ZInavi Co., Ltd, Zhejiang, China.
- 01.09.2019 - 31.12.2021, R&D engineer, 40% Part-time, ZInavi Co., Ltd, Zhejiang, China.
- 01.09.2018 - 01.09.2019, Analog expert, 20% Part-time, Hi-Cloud Co., Ltd., Wuhan, China.
- 01.07.2015 - 30.06.2018, Laser engineer, Full-time, Hi-Cloud Co., Ltd., Wuhan, China.
- 01.01.2014 - 30.06.2015, Laser engineer, Internship, Hi-Cloud Co., Ltd., Wuhan, China.
- 01.01.2012 - 30.06.2013, Embedded engineer, Internship, LISMARS, Wuhan University, China.

Career breaks

- N/A

Research funding and grants

- 01.09.2025 – 31.08.2029, "Efficient Reference Data Capture with Accurate Tree Positions at Individual Tree Level for Forest Plots" (grant no. 368564), **Academy Research Fellowships 2025 (784, 251 €)**, including Research Council of Finland, **548, 976 €**, and Finnish Geospatial Research Institute, **235, 275 €, PI**.
- 01.01.2022- 31.12.2024, "Forest-Human-Machine Interplay - Building Resilience, Redefining Value Networks and Enabling Meaningful Experiences / Consortium: UNITE" (grant nos.

- 357908), Finnish Flagship Program call 2020 TUK, Research Council of Finland, **1, 220, 677 €**, *Researcher (PI, Prof. Juha Hyppä)*.
- 01.09.2020- 31.08.2024, “Feasibility of Inside-Canopy UAV Laser Scanning for Automated Tree Quality Surveying / Consortium: Quality4Trees” (grant no. 334002), Academy Project LT, Research Council of Finland, **498, 130 €**, *Researcher (PI, Prof. Juha Hyppä)*.
 - 01.09.2016- 31.12.2019, “High Availability, High Precision, Indoor Intelligent Hybrid Positioning and Indoor GIS Technology” (grant nos. 2016YFB0502200 and 2016YFB0502201), Nation Key Research and Development Program of China, Ministry of Science and Technology of China, **81, 700, 000 ¥**, *main applicant as a Doctoral Student, in collaboration with Prof. Ruizhi Chen (PI)*.

Research output

Publications:

- 30 peer-reviewed publications ([Scholar H-12](#)), and 10 most important publications:
- **Zuoya Liu**, Harri Kaartinen, Teemu Hakala, Heikki Hytti, Antero Kukko, Juha Hyppä, Ruizhi Chen. 2025. “Comparative Analysis of Ultra-Wideband and Mobile Laser Scanning Systems for Mapping Forest Trees under A Forest Canopy”, *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, X-G-2025, 551–557, <https://doi.org/10.5194/isprs-annals-X-G-2025-551-2025>.
- **Zuoya Liu**, Harri Kaartinen, Teemu Hakala, Heikki Hytti, Juha Hyppä, Antero Kukko, Ruizhi Chen, Mikko Vastaranta. 2025. “Ultra-Wideband-Based Method for Measuring Tree Positions with Decimeter-Level Accuracy Under a Forest Canopy”, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 18, 12961-12972, <http://doi.org/10.1109/JSTARS.2025.3569958>.
- **Zuoya Liu**, Harri Kaartinen, Teemu Hakala, Heikki Hytti, Juha Hyppä, Antero Kukko and Ruizhi Chen. 2025. “Performance Analysis of Ultra-Wideband Positioning for Measuring Tree Positions in Boreal Forest Plots”, *ISPRS Open Journal of Photogrammetry and Remote Sensing*, 100087, <https://doi.org/10.1016/j.Iophoto.2025.100087>.
- **Zuoya Liu**, Harri Kaartinen, Teemu Hakala, Juha Hyppä, Antero Kukko and Ruizhi Chen. 2025. “Tracking foresters and mapping tree stem locations with decimeter-level accuracy under forest canopies using UWB”, *Expert Systems With Applications*, 262, 125519, <https://doi.org/10.1016/j.eswa.2024.125519>.
- **Zuoya Liu**, Harri Kaartinen, Teemu Hakala, Juha Hyppä, Antero Kukko and Ruizhi Chen. 2024. “Performance analysis of standalone UWB positioning inside forest canopy”, *IEEE Transactions on Instrumentation and Measurements*, DOI: [10.1109/TIM.2024.3413139](https://doi.org/10.1109/TIM.2024.3413139).
- **Zuoya Liu**, Teemu Hakala, Juha Hyppä, Antero Kukko, Harri Kaartinen and Ruizhi Chen. 2024. “Data-driven antenna delay calibration for UWB devices for network positioning”, *IEEE Transactions on Instrumentation and Measurements*, 73, DOI: [10.1109/TIM.2023.3348891](https://doi.org/10.1109/TIM.2023.3348891).
- **Zuoya Liu**, Teemu Hakala, Juha Hyppä, Antero Kukko, Harri Kaartinen and Ruizhi Chen. 2024. “Performance comparison of UWB IEEE 802.15. 4z and IEEE 802.15. 4 in ranging, energy efficiency and positioning”, *IEEE Sensors Journal*, 24 (8), 12481-12489, DOI: [10.1109/JSEN.2024.3368113](https://doi.org/10.1109/JSEN.2024.3368113).
- **Zuoya Liu**, Ruizhi Chen, Feng Ye, Guangyi Guo and Lixiong Huang. 2020. “A low-delay and robust solution for rapid movement detection using UWB”, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 43, 377-382, <https://doi.org/10.5194/isprs-archives-XLIII-B1-2020-377-2020>.
- **Zuoya Liu**, Ruizhi Chen, Changhui Jiang, Feng Ye, Guangyi Guo, Liang Chen and Xinchuang Lin. 2024. “Submeter-level ToF-based acoustic positioning of moving objects with chirp-based doppler shift compensation”, *IEEE Internet of Things Journal*, 11 (12), 21916-21929, DOI: [10.1109/JIOT.2024.3377435](https://doi.org/10.1109/JIOT.2024.3377435)

- **Zuoya Liu**, Ruizhi Chen, Feng Ye, Lixiong Huang, Guangyi Guo, Shihao Xu and Danni Chen. 2022. "Precise, low-cost, and large-scale indoor positioning system based on audio dual-chirp signals", *IEEE Transactions on Vehicular Technology*, 71 (1), 1159-1168, DOI: [10.1109/TVT.2022.3205960](https://doi.org/10.1109/TVT.2022.3205960).

Other research outputs:

- **Zuoya Liu**, December 2021. Research on Key Technologies of ToF-based Acoustic Indoor Positioning System, in Chinese. Ph.D. thesis, Wuhan University.
- Patent, "Echo signal receiver in laser ranging" (No. CN106125068A), Xiaoming Lu, **Zuoya Liu**, Xiaoyu Chen, Qingzhou Mao, Qingwu Hu, Jianwei Yu, Shoujun Liu, Guokuang Weng and Hanlu Gong, Wuhan Hi-Cloud Technology Co., Ltd, 2016, CN, <https://patents.google.com/patent/CN106125068A/en>.

Research supervision and leadership experience

- Instructing Doctoral student in the publication: Xinchuang Lin, Ruizhi Chen, Lixiong Huang, **Zuoya Liu**, Xiaoguang Niu, Guangyi Guo, Zheng Li and Long Qian. 2023. "ChirpTracker: A precise-location-aware system for acoustic tag using single smartphone", *IEEE Internet of Things Journal*, 11 (1) , 848-862, DOI: [10.1109/JIOT.2023.3287593](https://doi.org/10.1109/JIOT.2023.3287593).
- Instructing Master student in the publication: Instructing Master student in the publication: Zexing Wang, Ruizhi Chen, Shihao Xu, Zuoya Liu, Guangyi Guo and Liang Chen. 2021. "A novel method locating pedestrian with smartphone indoors using acoustic fingerprints", *IEEE Sensors Journal*, 21 (24), 27887-27896, DOI: [10.1109/JSEN.2021.3126863](https://doi.org/10.1109/JSEN.2021.3126863).

Teaching merits

- Instructing Master students in terms of the R&D of HW, SW and positioning algorithms for moving targets during the Ph.D. study at Wuhan University.

Awards and honours

- "Zhilu Navigation Co., Ltd - Leader of audio positioning chips," **Gold**, 2021, 7th China International "Internet +" College Student Innovation and Entrepreneurship Competition, <https://pitchbook.com/profiles/company/489593-26#overview>. In this project, I developed the positioning module and a robust ToA ranging method for reverberant environments.
- "Core technology and application of audio positioning chip," **Grand Prize**, 2022, Chinese Society for Geodesy Photogrammetry and Cartography, <https://www.csgpc.org/detail/19180.html>. In this project, I finished the integration of the developed ToA ranging method into the RISC-V-based audio positioning chip.
- The 5th Taxonomy Club Innovation Award was awarded to **Field Finland Oy** by the Finnish Forest Centre for their pioneering work in bringing UWB positioning to the forest sector in Finland, <https://metsatiede.org/taksaattoriklubin-innovaatiopalkinto/>.

Other key academic merits, such as

- IEEE Member (2022-2024)
- Referee for scientific publications: *IEEE Internet of Things Journal*, *IEEE Communication Letters*, *Remote Sensing* and *ISPRS Journal of Geo-Information*, etc.
- Editor of Special Issue "Advances of Underwater Remote Sensing of Methane: Spatiotemporal Distributions" in *Remote Sensing*.
- Editor of Special Issue "Sustainable artificial intelligence in mobile environment sensing and localization" in *Sustainability*.

Scientific and societal impact

- The patent “Echo signal receiver in laser ranging” has successfully been used in mass produced laser rangefinders and scanners of Hi-Cloud Technology Co., Ltd. in 2017.
- The achievements of acoustic signal processing have successfully been integrated into the products of Zhilu Navigation Co., Ltd in 2021.
- The developed positioning solution with UWB technology has successfully been used by Field Finland Oy and by Masser Oy in their business in 2022 and 2025, respectively.

Other

- Acting as expert evaluator in hardware engineer recruitment when I was full-time with Hi-Cloud Technology Co., Ltd., Wuhan, China.