

JIANHAO JIAO

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EMPLOYMENT

University College London (UCL), United Kingdom

Senior Research Fellow Jan. 2024 - Present

The Hong Kong University of Science and Technology (HKUST), China

Research Associate (PostDoc) Jan. 2022 - Dec. 2023

EDUCATION

The Hong Kong University of Science and Technology (HKUST) Hong Kong SAR, CHINA

Ph.D. in Electronic & Computer Engineering Sep. 2017 - Jan. 2022

Advisor: Ming Liu

Committee: Xiaofang Zhou (Chair), Ming Liu, Michael Yu Wang, Qiong Luo, Zhiyong Fan, Hesheng Wang

Zhejiang University Hangzhou, CHINA

B.Eng. in Electronic Engineering Sep. 2013 - Jun. 2017

Advisor: Xiang Tian

AWARDS & HONORS

IEEE ROBIO'2019 Best Paper Finalist 2019

HKUST Postgraduate Student Scholarship 2017-2021

The 3rd Runner-up in DJI RoboMaster Summer Camp (Top 12.5%) 2017

Zhejiang Province Student Scholarship 2017

ZhongKong Robotics Competition Best Team Award, Zhejiang University 2016

RESEARCH GRANTS

- **UKRI Future Leaders Fellowship** Jan. 2024 - Present

RoboHike: Autonomous Quadrupedal Robot Navigation and Hiking in Challenging Rough Terrains

Main Member £1430K

- **HKUST-KAISA Joint Fund** Apr. 2020 - Mar. 2022

Development of Highly Integrated Multi-Sensor System

Main Member HK\$3766K

- **HKUST Bridge Gap Fund** Jul. 2020 - Jun. 2021

Development of Multi-Sensor Vehicle System for Autonomous Logistic Transportation

Main Member HK\$600K

- **Hong Kong Innovation and Technology Fund** Jan. 2017 - Dec. 2019

Deep Learning-Based Defect Inspection of Smartphone Glass

Main Member HK\$617.6K

SELECTED PUBLICATIONS (FIRST/CO-FIRST/CORRESPONDING AUTHOR)

*: Corresponding Author.

BOOK CHAPTER

- [1] **Jianhao Jiao**, Xiangcheng Hu, Xupeng Xie, Jin Wu, Hexiang Wei, Lu Fan, Ming Liu, Enabling Robust SLAM for Mobile Robots with Sensor Fusion, Autonomous Driving Perception: Fundamentals and Applications, 2023, **Springer**.

JOURNAL

- [1] Peng Yin*, **Jianhao Jiao*** (Co-first Author), Shiqi Zhao, Lingyun Xu, Guoquan Huang, Howie Choset, Sebastian Scherer, Jianda Han, General Place Recognition Survey for Modern Robotic Systems: Towards the Real-World Autonomy Age, IEEE Transactions on Robotics (**TRO**), 2025.
- [2] Hexiang Wei, **Jianhao Jiao*** (Co-first and Corresponding Author), Xiangcheng Hu, Jingwen Yu, Xupeng Xie, Jin Wu, Yilong Zhu, Lujia Wang, Ming Liu, FusionPortableV2: Challenging Multi-Sensor Perception Dataset Beyond Campus, The International Journal of Robotics Research (**IJRR**), 2024.
- [3] **Jianhao Jiao*** (Corresponding Author), Ruoyu Geng, Yuanhang Li, Ren Xin, Bowen Yang, Jin Wu, Lujia Wang, Ming Liu, Rui Fan, Dimitrios Kanoulas, Real-Time Metric-Semantic Mapping for Autonomous Navigation in Outdoor Unstructured Environments, IEEE Transactions on Automation Science and Engineering (**TASE**), 2024.
- [4] **Jianhao Jiao**, Feiyi Chen, Hexiang Wei, Jin Wu, Ming Liu, LCE-Calib: Automatic LiDAR-Frame/Event Camera Extrinsic Calibration With a Globally Optimal Solution, IEEE/ASME Transactions on Mechatronics (**T-Mech**), 2023.
- [5] **Jianhao Jiao*** (Corresponding Author), Haoyang Ye, Yilong Zhu, Ming Liu, Robust Odometry and Mapping for Multi-LiDAR Systems with Online Extrinsic Calibration, IEEE Transactions on Robotics (**TRO**), 2021.
- [6] Shuyang Zhang, Jinhao He, Bowen Yang, Yilong Zhu, Jin Wu, **Jianhao Jiao*** (Corresponding Author), Jie Yuan, VirCap: Virtual Camera Exposure Control Based on Image Photometric Synthesis for Visual SLAM Application, IEEE/ASME Transactions on Mechatronics (**T-Mech**), 2024.
- [7] Bowen Yang, Jie Cheng, **Jianhao Jiao*** (Corresponding Author), Ming Liu, Efficient Global Navigational Planning in 3D Structures based on Point Cloud Tomography, IEEE/ASME Transactions on Mechatronics (**T-Mech**), 2024.
- [8] Xiangcheng Hu, Linwei Zheng, Ruoyu Geng, Jin Wu, Hexiang Wei, Yang Yu, Xiaoyu Tang, Lujia Wang, **Jianhao Jiao*** (Corresponding Author), Ming Liu, PA-SLAM: Robust Prior-Assisted Ground Truth Trajectory Generation for Benchmarking, IEEE/ASME Transactions on Mechatronics (**T-Mech**), 2023.
- [9] Yingbing Chen, Jie Cheng, Sheng Wang, Hongji Liu, Xiaodong Mei, Xiaoyang Yan, Mingkai Tang, Ge Sun, Ya Wen, Junwei Cai, Xupeng Xie, Lu Gan, Mandan Chao, Ren Xin, Lujia Wang, Ming Liu, and **Jianhao Jiao*** (Corresponding Author), Enhancing Campus Mobility: Achievements and Challenges of the Snow Lion Autonomous Shuttle, IEEE Robotics and Automation Magazine (**RAM**), 2024.

CONFERENCE

- [1] **Jianhao Jiao**, Jinhao He, Changkun Liu, Sebastian Aegidius, Xiangcheng Hu, Tristan Braud, Dimitrios Kanoulas, LiteVLoc: Map-Lite Visual Localization for Image Goal Navigation, International Conference on Robotics and Automation (**ICRA**), 2025.
- [2] **Jianhao Jiao**, Hexiang Wei, Tianshuai Hu, Xiangcheng Hu, Yilong Zhu, Zhijian He, Jin Wu, Jingwen Yu, Xupeng Xie, Lujia Wang, Ming Liu, FusionPortable: A Multi-Sensor Campus-Scene Dataset for Evaluation of Localization and Mapping Accuracy on Diverse Platforms, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2022.
- [3] **Jianhao Jiao**, Yilong Zhu, Haoyang Ye, etc, Ming Liu, Greedy-Based Feature Selection for Efficient LiDAR SLAM, IEEE International Conference on Robotics and Automation (**ICRA**), 2021.
- [4] **Jianhao Jiao**, Peng Yun, Lei Tai, Ming Liu, MLOD: Awareness of Extrinsic Perturbation in Multi-LiDAR 3D Object Detection for Autonomous Driving, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2020.
- [5] **Jianhao Jiao**, Yang Yu, Qinghai Liao, Haoyang Ye, Ming Liu, Automatic Calibration of Multiple 3D LiDARs in Urban Environments, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2019. **This work was cited and integrated into MATLAB¹.**
- [6] **Jianhao Jiao**, Qinghai Liao, Yilong Zhu, Tianyu Liu, Yang Yu, Rui Fan, Lujia Wang, Ming Liu, A Novel Dual-Lidar Calibration Algorithm Using Planar Surfaces, IEEE Intelligent Vehicles Symposium (**IV**), 2019.
- [7] **Jianhao Jiao**, Rui Fan, Han Ma, Ming Liu, Using DP Towards A Shortest Path Problem-Related Application, IEEE International Conference on Robotics and Automation (**ICRA**), 2019.
- [8] Yuzhou Cheng, **Jianhao Jiao*** (Corresponding Author), Yue Wang, Kanoulas Dimitrios LoGS: Visual Localization via Gaussian Splatting with Fewer Training Images, International Conference on Robotics and Automation (**ICRA**), 2025.
- [9] Aegidius Sebastian, Hadjivelichkov Dennis, **Jianhao Jiao*** (Corresponding Author), Embly-Riches Jonathan, Kanoulas Dimitrios Watch your STEPP: Semantic Traversability Estimation using Pose Projected Features, International Conference on Robotics and Automation (**ICRA**), 2025.
- [10] Jinhao He, Huaiyang Huang, Shuyang Zhang, **Jianhao Jiao*** (Corresponding Author), Ming Liu, APMP: Accurate Prior-centric Monocular Positioning with Offline LiDAR Fusion, IEEE International Conference on Robotics and Automation (**ICRA**), 2024.
- [11] Shuyang Zhang, Jinhao He, Bohuan Xue, Jin Wu, **Jianhao Jiao*** (Corresponding Author), Ming Liu, An Image Acquisition Scheme for Visual Odometry based on Image Bracketing and Online Attribute Control, IEEE International Conference on Robotics and Automation (**ICRA**), 2024.
- [12] Yilong Zhu, Dong Han, **Jianhao Jiao**, etc, Ming Liu, Rui Fan, Road Curb Detection Using A Novel Tensor Voting Algorithm, IEEE International Conference on Robotics and Biomimetics (**ROBIO**), 2019. **Best Paper Finalist (1.19%).**

PATENTS

¹<https://uk.mathworks.com/help/lidar/ug/multi-lidar-calibration-workflow.html>

- [1] Chinese Patent (4228721): A Localization Method, System, and MediumJan. 2021
Jianhao Jiao, Peng Yun, Ming Liu
- [2] Chinese Patent: Transition Platform and Joint Data Collection Assembly Jun. 2023
 Xie Xupeng, Wei Hexiang, **Jianhao Jiao**, Hongji Liu, Ming Liu

TEACHING AND MENTORSHIP

Teaching Assistant

- UCL COMP0132: Msc Robotics and Computation Dissertation. Jan. 2024 - Sep. 2024
 Instructor: Prof.Dimitrios Kanoulas (UKRI Future Leader Fellowship)
- HKUST ELEC1030: The Rise of Autonomous Robots. Jan. 2018 - Dec. 2018
 Instructor: Prof.WANG, Michael Yu (IEEE/ASME Fellow)

PROFESSIONAL ACTIVITIES

Associate Editor

- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024-2025

Journal/Conference Reviewer

- **Journal:** IEEE TRO, IEEE RAM, IEEE RAL, AuRO, IEEE/ASME TMECH, IEEE TASE, IEEE TITS, IEEE TIM, etc.
- **Conference:** RSS, ICRA, IROS, IV, ITSC, CVPR-Workshop, ECCV-Workshop, etc.

INVITED TALKS

[1] Academic Talk

- **General Mobile Robot Navigation System for Unstructured Environments**2024
 Host: Prof.Baoding Zhou. Shenzhen University, China.
- **General Mobile Robot Navigation System for Unstructured Environments**2024
 Host: Prof.Shilei Li. Beijing Institute of Technology, China.
- **General Mobile Robot Navigation System for Unstructured Environments**2024
 Host: Prof.Jianlin Chen. Shanghai University, China.
- **General Mobile Robot Navigation System for Unstructured Environments**2024
 Host: Prof.Yi Zhou. Hunan University, China.
- **Autonomous Navigation System of Mobile Robots for Large-scale Unstructured Environments** 2023
 Host: Prof.Weisong Wang. IEEE International Conference on Intelligent Transportation Systems (ITSC) Workshop: Intelligent Vehicle Meets Urban: Safe And Certifiable Navigation And Control For Intelligent Vehicles In Complex Urban Scenarios.
- **Enabling Robust Perception System for Autonomous Navigation**2022
 Host: Prof.Lei Zhu. Robotics and Autonomous Systems Thrust, The Hong Kong University of Science and Technology (Guangzhou), China.

- **LiDAR Perception System for Autonomous Robots: from Calibration to Localization, Mapping, and Recognition** 2021
Host: Prof.Hong Zhang. Southern University of Science and Technology, China.
- **LiDAR Perception System for Autonomous Robots: from Calibration to Localization, Mapping, and Recognition** 2021
College of Control Science and Engineering. Zhejiang University, China.
- **Extending Multi-LiDAR Fusion to LiDAR-Inertial-Event Fusion** 2021
Host: Dr.Ming Liu. Robotics and Autonomous Systems Thrust, The Hong Kong University of Science and Technology (Guangzhou), China.

[2] Public Lecture:

- **Cognitive Robots for Good** 2024
65th London International Youth Science Forum, UK. Audience: 420 high-scholar students from 82 countries and territories.

APPENDIX: OTHER CO-AUTHOR PUBLICATIONS

- [1] Changkun Liu, **Jianhao Jiao**, Huaijian Huang, Zhengyang Ma, Dimitrios Kanoulas, Tristan Braud, AIR-HLoc: Adaptive Retrieved Images Selection for Efficient Visual Localisation, International Conference on Robotics and Automation (**ICRA**), 2025.
- [2] Jingwen YU, Hanjing Ye, **Jianhao Jiao**, Ping Tan, Hong Zhang, GV-Bench: Benchmarking Local Feature Matching for Geometric Verification of Long-term Loop Closure Detection, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2024.
- [3] Tianshuai HU, **Jianhao Jiao**, Yucheng Xu, Hongji Liu, Sheng Wang, Ming Liu, DHP-Mapping: A Dense Panoptic Mapping System with Hierarchical World Representation and Label Optimization Techniques, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2024.
- [4] Bonan Liu, Guoyang Zhao, **Jianhao Jiao**, Guang Cai, Chengyang Li, Handi Yin, Yuyang Wang, Ming Liu, Pan Hui, OmniColor: A Global Camera Pose Optimization Approach of LiDAR-360Camera Fusion for Colorizing Point Clouds, IEEE International Conference on Robotics and Automation (**ICRA**), 2024.
- [5] Jin Wu, Yu Zheng, Zhi Gao, Yi Jiang, Xiangcheng Hu, Yilong Zhu, **Jianhao Jiao**, Ming Liu, Quadratic Pose Estimation Problems: Globally Optimal Solutions, Solvability/Observability Analysis and Uncertainty Description, IEEE Transaction on Robotics (**TRO**), 2022.
- [6] Shuyang Zhang, Qingwen Zhang, Feiyi Chen, Jin Wu, **Jianhao Jiao**, Lujia Wang, A VT-HMM-based Framework for Countdown Timer Traffic Light State Estimation, IEEE Transactions on Intelligent Transportation Systems (**TITS**), 2023.
- [7] Yang Yu, Peng Yun, Bohuan Xue, **Jianhao Jiao**, Ming Liu, Accurate and Robust Visual Localization System in Large-scale Dynamic Environments, IEEE/ASME Transactions on Mechatronics (**T-Mech**), 2022.
- [8] Huaiyang Huang, Yuxiang Sun, Wu Jin, **Jianhao Jiao**, Xiangcheng Hu, Linwei Zheng, Lujia Wang, Ming Liu, On Bundle Adjustment for Multiview Point Cloud Registration, IEEE Robotics and Automation Letters (**RAL**), 2021.
- [9] Tianyu Liu, Qinghai Liao, etc, **Jianhao Jiao**, Ming Liu, Hercules: An Autonomous Logistic Vehicle for Contact-less Goods Transportation During the COVID-19 Outbreak, IEEE Robotics and Magazine (**RAM**), 2020.
- [10] Wu Jin, Soheil Sarabandi, **Jianhao Jiao**, Huaiyang Huang, Bohuan Xue, Ruoyu Geng, Lujia Wang, Ming Liu, Completely Rational $SO(n)$ Orthonormalization, IEEE International Conference on Robotics and Automation (**ICRA**), 2023.
- [11] Bowen Yang, **Jianhao Jiao**, Lujia Wang, Ming Liu, Game-Theoretic Local Planner for Interactive Crowd Navigation, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2022.
- [12] Feiyi Chen, Shuyang Zhang, Yutong Wang, Xupeng Xie, Qingwen Zhang, **Jianhao Jiao**, Ming Liu, Automatic Extrinsic Calibration for Multiple Cameras and LiDARs using a Checkerboard, IEEE Intelligent Transportation Systems Conference (**ITSC**), 2022.

- [13] Sukai Wang, **Jianhao Jiao**, Peide Cai, Ming Liu, R-PCC: A Baseline for Range Image-based Point Cloud Compression, IEEE International Conference on Robotics and Automation (**ICRA**), 2022.
- [14] M Usman Maqbool Bhutta, Shoaib Aslam, Peng Yun, **Jianhao Jiao**, Ming Liu, Smart-Inspect: Micro Scale Localization and Classification of Smart Phone Glass defects for Industrial Automation, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2020.
- [15] Bohuan Xue, **Jianhao Jiao**, Yilong Zhu, etc, Ming Liu, Automatic Calibration of Dual-LiDARs Using Two Poles Stickered with Retro-Reflective Tape, IEEE International Conference on Imaging Systems and Techniques (**IST**), 2019.
- [16] Rui Fan, Mohammud Bocus, **Jianhao Jiao**, Ming Liu, et al, Road Crack Detection Using Deep Convolutional Neural Network and Adaptive Thresholding, *IEEE Intelligent Vehicles Symposium (IV)*, 2019.
- [17] Han Ma, Yixin Ma, **Jianhao Jiao**, Rui Fan, Ming Liu, et al, Multiple lane detection algorithm based on optimised dense disparity map estimation, IEEE International Conference on Imaging Systems and Techniques (**IST**), 2019.
- [18] **Jianhao Jiao**, Peng Yun, and Ming Liu, A Cloud-Based Visual SLAM Framework for Low-Cost Agents, International Conference on Computer Vision Systems (**ICVS**), 2017.
- [19] Yun, Peng, **Jianhao Jiao**, and Ming Liu, Towards a Cloud Robotics Platform for Distributed Visual SLAM, International Conference on Computer Vision Systems (**ICVS**), 2017.
- [20] **Jianhao Jiao**, Ruoyu Geng, Yuanhang Li, Bowen Yang, Ming Liu, Online Metric-Semantic Mapping for Autonomous Robot Navigation, Robotics: Science and Systems Workshoptop (**RSSW**), 2023.
- [21] **Jianhao Jiao**, Huaiyang Huang, Liang Li, Zhijian He, Yilong Zhu, Ming Liu, Comparing Representations in Tracking for Event Camera-based SLAM, IEEE/CVF Conference on Computer Vision and Pattern Recognition, Event-based Vision Workshop (**CVPRW**), 2021.
- [22] Xiangcheng Hu, Jin Wu, **Jianhao Jiao**, Ruoyu Geng, Ming Liu, PA-SLAM: Robust Prior-assisted Ground Truth Trajectory Generation for Benchmarking, IEEE International Conference on Robotics and Automation Workshop (**ICRAW**), 2023.
- [23] Rui Fan, **Jianhao Jiao**, Jie Pan, Huaiyang Huang, Shaojie Shen, Ming Liu, Real-Time Dense Stereo Embedded in An UAV for Road Inspection, IEEE/CVF Conference on Computer Vision and Pattern Recognition, UAV Vision Workshop (**CVPRW**), 2019.