Zhenjun Zhao

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Education

2019.8 – 2023.10 **The Chinese University of Hong Kong** **Hong Kong SAR**

PhD at Department of Mechanical and Automation Engineering

- Research interests include robust pose estimation, feature detection/description/matching and visual localization in challenging environments for drones and vehicles.

2012.9 – 2015.4 **Nanjing University of Aeronautics and Astronautics** **Nanjing, China**

Master at College of Automation Engineering

- Master of Science: Navigation, Guidance and Control granted in April 2015.
- GPA: 3.76/4.00; Rank: 2/38.

2008.9 – 2012.6 **Nanjing University of Aeronautics and Astronautics** **Nanjing, China**

- Bachelor of Engineering: Automation Engineering granted in June 2012.
- GPA: 3.70/4.00; Rank: 6/155.

Internship Experience

2020.6 – 2020.11 **Orbbec Co., Ltd.** **Shenzhen, China**

SLAM Algorithm Intern, Research Institute

- Research on visual-inertial odometry initialization.
- Develop light-weight visual-inertial odometry initialization and optimization in mobile devices.

2021.3 – 2022.12 **Peng Cheng Laboratory** **Shenzhen, China**

Research Intern, Mathematics and Theory Department

- Research on pose estimation and visual localization in underwater environments.
- Research on local feature extraction in underwater environments.

Professional Experience

2018.11 – 2019.7 **The Chinese University of Hong Kong** **Hong Kong SAR**

Research Assistant, Department of Mechanical and Automation Engineering

- Research on visual-inertial odometry for unmanned aerial vehicle.
- Integrate PX4 and MSF to build a loosely-coupled visual-inertial odometry for unmanned aerial vehicle.

2017.5 – 2018.9 **Feixun Technologies Co., Ltd** **Hangzhou, China**

Co-Founder & Algorithm Director

- Leading the control and navigation algorithm team (5 members).
- In charge of the application of unmanned aerial vehicle in agriculture.
- Designing the multi-sensor platform for the unmanned aerial vehicle.

2016.7 – 2017.5 **Dongfeng Technologies Co., Ltd** **Hangzhou, China**

Algorithm Engineer, Research and Development Division

- Research on multi-sensor fusion, localization and navigation for autonomous driving.
- Implement outdoor localization and navigation algorithm using GPS, IMU and camera.
- Implement indoor localization algorithm using LiDAR.

2015.4 – 2016.6 **Huawei Technologies Co., Ltd.** **Hangzhou, China**

Software Engineer, the Security Gateway Development Division

- Develop and maintain virtual system, intelligent routing, mail filtering and north direction in Huawei's first visualized software firewall (VFW).
- Develop and maintain virtual machine migration and policy optimization in Huawei's visualized network security product (NGFW).
- Lead the project of Huawei's first firewall simulation tool targeting at corporate users, trainees and examinees.

Selected Projects

Local Feature in Challenging Environment **USR Group, CUHK & CVGL, Westlake University**

- Local feature detection algorithm is investigated to enhance visual localization in low-lighting environment which exists motion blur effect.
- Proposed BALF achieves superior detection performance over prior works on motion blurred images, while keeping comparable performance for sharp images.
- Local feature extraction and matching are investigated to implement the front-end in underwater environment.
- Proposed UAD2Net achieves the state-of-the-art matching performance in underwater environment.
- Integrate UAD2Net to build sparse and dense underwater reconstruction.

Visual Localization – Pose Graph Registration **USR Group, CUHK**

- Propose a new paradigm for outdoor visual localization task leveraging multiple pose graph.
- Proposed algorithm achieves the state-of-the-art robustness performance in the outdoor visual localization task.

Visual-Inertial Odometry/SLAM Evaluation System **USR Group, CUHK**

- Build the full verification and validation system for visual-inertial odometry/SLAM from scratch.
- Proposed system contains full testing procedure, diverse challenging data, specified metrics.
- The overall protocol is open-sourced for the community.

Multi-Sensor Fusion for Indoor Localization Using Camera, IMU, and UWB **USR Group, CUHK**

- Build an advanced indoor localization system leveraging multiple sensors, including cameras, Inertial Measurement Units (IMUs), and Ultra-Wideband (UWB).
- Proposed multi-sensor fusion approach enables precise tracking and localization to enhance indoor navigation, tracking, and augmented reality applications.

Honors & Awards

Postgraduate Scholarship, CUHK
Huawei Annual Research Director Award (top 2 at Hangzhou Branch), Huawei
First-class Postgraduate Scholarship, NUAA
Undergraduate Scholarship, NUAA

Teaching

Co-supervisor, Undergraduate Final Year Project, 2019-2020
Co-supervisor, MSc Project, 2019-2020
Teaching Assistant, Multivariable Calculus for Engineers, Spring 2021
Teaching Assistant, Complex Variables for Engineers, Fall 2020
Teaching Assistant, Probability and Statistics for Engineers, Spring 2020
Teaching Assistant (Lead), Introduction to Control Systems, Fall 2019

Academic Services

Conference Reviewer: ICRA, 3DV, GMP, CVPRW
Journal Reviewer: Neurocomputing

Publications

Zhenjun Zhao and Ben M. Chen, Benchmark for Initialization of VIO, *Chinese Control Conference (CCC)*, 2023.

Zhenjun Zhao, BALF: Simple and Efficient Blur Aware Local Feature Detector, *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2024.

Zhenjun Zhao, Pose Graph Registration for Visual Localization, (Under review).

Zhenjun Zhao, Bangyan Liao, Lu Chen, Haoang Li, Daniel Cremers, Peidong Liu, Certifiable Optimal Vanishing Point Estimation in Manhattan World, (Under review).

Zhenjun Zhao, Bangyan Liao, Lu Chen, Haoang Li, Daniel Cremers, Peidong Liu, GlobalPointer: Large Scale Plane Adjustment with Bi-Convex Relaxation, (Under review).

Junjie Wen, Jinqiang Cui, **Zhenjun Zhao**, Ruixin Yan, Zhi Gao, Lihua Dou, Ben M. Chen, SyreaNet: A Physically Guided Underwater Image Enhancement Framework Integrating Synthetic and Real Images, *International Conference on Robotics and Automation (ICRA)*, 2023.

Haoang Li, Ji Zhao, Jean-Charles Bazin, Pyojin Kim, Kyungdon Joo, **Zhenjun Zhao**, Yun-Hui, Liu, Hong Kong World: Leveraging Structural Regularity for Line-based SLAM, *Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2023.

Johan Edstedt, Georg Bökman, **Zhenjun Zhao**, DeDoDe v2: Analyzing and Improving the DeDoDe Keypoint Detector, *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, 2024.