XIONGWEI ZHAO

Ph.D. Candidate in 3D Perception, World Models, and Autonomous Systems

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Education

Harbin Institute of Technology **2021.03–Present**
Ph.D. in Robotics Shenzhen, China
SUPERVISORS: Prof. Dr. Xu Zhu and Prof. Dr. Yang Wang
THESIS: Towards Robust Robotic Localization and Perception in Complex Scenarios

University of Science and Technology Beijing **2018.09–2021.02**
M.Sc. in Mechanical Engineering Beijing, China
SUPERVISOR: Prof. Dr. Cunxiao Miao
THESIS: Multi-Sensor Fusion SLAM Using RGB-D Cameras

Xi'an University of Science and Technology **2014.09–2018.07**
B.Sc. in Vehicle Engineering Xi'an, China
SUPERVISOR: Prof. Dr. Shuangfeng Zhao
THESIS: Vision-Based Driver Fatigue Detection

Research Experience

Narwal Technologies Co., Ltd. **2020.10–2021.01**
Research Intern Shenzhen, China
- Built sensor fusion for 2D LiDAR and cameras.
- Developed SLAM for floor-cleaning robots; improved map consistency.

HUAWEI Technologies Co., Ltd. **2020.05–2021.08**
Research Intern Shenzhen, China
- Prototyped multi-sensor localization with wheel odom, camera, IMU.
- Integrated multi-modal features; reduced drift in challenging scenes.

The Hong Kong Polytechnic University **2020.01–2021.05**
Research Assistant Hongkong, China
- Researched visual/map-based positioning with multi-modal maps.
- Tuned Mobileye localization and HD map matching pipelines.

Publications

Primary-Author Publications:
(includes first, co-first, and corresponding; * co-first; # corresponding)

[1] **Xiongwei Zhao**, Congcong Wen, Xu Zhu, Yang Wang, Haojie Bai, Wenhao Dou, "TripleMixer: A 3D Point Cloud Denoising Model for Adverse Weather." IEEE Transactions on Image Processing **(TIP)**, 2025. [Code]

[2] **Xiongwei Zhao**, Congcong Wen, Sai Manoj Prakhya, Hongpei Yin, Rundong Zhou, Yijiao Sun, Jie Xu, Haojie Bai, Yang Wang, "Multimodal features and accurate place recognition with robust optimization for lidar–visual–inertial slam." IEEE Transactions on Instrumentation and Measurement **(TIM)**, 2024. [Code]

[3] Wenqing Kuang*, **Xiongwei Zhao***, Yehui Shen, Congcong Wen, Huimin Lu, Zongtan Zhou, Xieyuanli Chen, "ResLPR: A LiDAR Data Restoration Network and Benchmark for Robust Place Recognition Against Weather Corruptions." IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2025. [Code]

[4] Linqi Yang*, **Xiongwei Zhao***, Qihao Sun, Ke Wang, Ao Chen, Peng Kang, "SplatPose: Geometry-Aware 6-DoF Pose Estimation from Single RGB Image via 3D Gaussian Splatting." IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2025. [Code]

[5] **Xiongwei Zhao**, Cunxiao Miao, He Zhang, "Multi-Feature Nonlinear Optimization Motion Estimation Based on RGB-D and Inertial Fusion." Sensors **(Sensors)**, 2020. [Code]

[6] **Xiongwei Zhao**, Xieyuanli Chen, Xu Zhu, Xingxiang Xie, Haojie Bai, Congcong Wen, Rundong Zhou, Qihao Sun, "An Iterative Task-Driven Framework for Resilient LiDAR Place Recognition in Adverse Weather." IEEE Transactions on Vehicular Technology **(TVT)**, **(major revision)**, 2025. [Code]

[7] Caixiong Li*, **Xiongwei Zhao***, Jinhang Zhang, Xing Zhang, Qihao Sun, Zhou Wu, "MQADet: A Plug-and-Play Paradigm for Enhancing Open-Vocabulary Object Detection via Multimodal Question Answering." Scientific Reports **(SR)**, **(major revision)**, 2025.

[8] Xinye Yang, **Xiongwei Zhao**#, Jinhang Zhang, Senkang Hu, Zhenjun Zhao, Xiangcheng Hu, Yehui Shen and Xieyuanli Chen, "OMDA: Omni Mask Domain Adaptation for Semantic Segmentation." arXiv, 2025.

Selected Collaborative Publications:

[1] Yehui Shen, Lei Zhang, Qingqiu Li, **Xiongwei Zhao**, Yue Wang, Huimin Lu, Xieyuanli Chen, "UGNA-VPR: A Novel Training Paradigm for Visual Place Recognition Based on Uncertainty-Guided NeRF Augmentation." IEEE Robotics and Automation Letters **(RAL)**, 2025. [Code]

[2] Haojie Bai, Jiping Luo, Huafu Li, **Xiongwei Zhao**, Yang Wang, "A Robust Cooperative Vehicle Coordination Framework for Intersection Crossing." IEEE Transactions on Vehicular Technology **(TVT)**, 2025.

[3] Haojie Bai, Hai Zhu, **Xiongwei Zhao**, Huafu Li, Yang Wang, "Robust Motion Coordination with Covariance Steering Model Predictive Control in Bandwidth Limited Scenarios." IEEE International Conference on Robotics and Biomimetics **(ROBIO)**, 2024.

[4] Rundong Zhou, Yulong Gao, Peng Wu, **Xiongwei Zhao**, Wenhao Dou, Chenyang Sun, Yu Zhong, Yang Wang, "Collision-free waterway segmentation for inland unmanned surface vehicles." IEEE Transactions on Instrumentation and Measurement **(TIM)**, 2022.

[5] Jie Xu, Ruifeng Li, Song Huang, **Xiongwei Zhao**, Shuxin Qiu, Zhijun Chen, Lijun Zhao, "R2DIO: A Robust and Real-Time Depth-Inertial Odometry Leveraging Multimodal Constraints for Challenging Environments." IEEE Transactions on Instrumentation and Measurement **(TIM)**, 2023. [Code]

[6] Rundong Zhou, Yulong Gao, Yang Wang, Xingxiang Xie, **Xiongwei Zhao**, "A real-time scene parsing network for autonomous maritime transportation." IEEE Transactions on Instrumentation and Measurement **(TIM)**, 2022.

[7] Rundong Zhou, Yang Wang, Yulong Gao, **Xiongwei Zhao**, Xiang Xu, "Visual place recognition for coastal scenes with semantic and sequential constraints." Measurement, 2025.

[8] Xingxiang Xie, **Xiongwei Zhao**, Zhumei Song, Kening Li, "Posterior Cramér–Rao lower bounds for extended target tracking with PMBM conjugate recursion." Electronics Letters **(EL)**, 2024.

Awards

- First Prize Scholarship. **2021–2026** — Harbin Institute of Technology
- China Scholarship Council (CSC) Scholarship. **2023.** — China Scholarship Council
- Excellent Graduate Student. **2021.** — University of Science and Technology Beijing
- First Prize Scholarship. **2018–2021** — University of Science and Technology Beijing
- Third Prize, National University UAV Innovation Competition. **2018.** — Ministry of Education, China
- National Encouragement Scholarship. **2017.** — Ministry of Education, China
- 3st place, Honda Energy Saving Competition. **2017.** — Honda
- Second Prize Scholarship. **2014–2018** — Xi'an University of Science and Technology

Academic Services

Invited Talks:

- **3D Robust Perception: Improving Autonomous Driving Perception in Adverse Weather** 2025.10.16
  Host: Xiaoliu Cheng. CVLife, Shenzhen, China. Link

Journal Reviewer:

- IEEE Transactions on Automation Science and Engineering (TASE)
- IEEE Transactions on Instrumentation and Measurement (TIM)
- IEEE Robotics and Automation Letters (RAL)
- IEEE Transactions on Vehicular Technology (TVT)

Conference Reviewer:

- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Conference on Robotics and Biomimetics (ROBIO)
- IEEE International Conference on Communications in China Workshops (ICCC)