

Bo Pang

Ph.D. Candidate in Control Science and Engineering, Zhejiang University

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Education

Zhejiang University, Hangzhou, China

Sep 2023 – Present

Ph.D. Candidate in Control Science and Engineering

Supervisors: Prof. Liang Li and Prof. Jiming Chen

Shandong University, Jinan, China

Sep 2019 – Jun 2023

B.Eng. in Automation

Undergraduate Advisors: Prof. Chaoqun Wang, Prof. Yan Li, and Prof. Bo Sun

GPA: 96.69 / 100

Research Interests

Robot Perception and Navigation; Spatial-Semantic Localization; Map-Light Autonomous Navigation; LiDAR-based Place Recognition; Sparse-Map Retrieval; 3D Scene Understanding; 3D Multi-Object Tracking.

Publications

Peer-Reviewed Publications

- **Bo Pang**, Yang Xu, Jiming Chen, and Liang Li. “PB-MOT: Pose-aware Association Boosted Online 3D Multi-Object Tracking.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025.

Manuscripts

- **Bo Pang**, Yang Xu, Jiming Chen, and Liang Li. “PB-MOT++: Extending Pose-aware Association to Trajectory-Centric Offline Optimization.” *Manuscript under review*.
- **Bo Pang**, et al. “Semantic-Aware Sparse-Map Retrieval for Robust Robot Localization.” *Manuscript in revision for journal submission*.

Research Experience

Spatial-Semantic Localization and Map-Light Navigation

2026 – Present

Zhejiang University

- Investigating compact spatial-semantic representations for autonomous robots operating with sparse, incomplete, or changing maps.
- Exploring how semantic landmarks, object-level cues, and sparse geometric structures can support robust localization, route reasoning, and map-light navigation.
- Extending previous research in LiDAR-based place recognition and loop closure detection toward robot perception and navigation in complex real-world environments.

Semantic Sparse-Map Retrieval and Loop Closure Detection

2025 – 2026

Zhejiang University

- Investigated LiDAR-based localization under sparse map conditions, treating sparse maps as compact and deployment-oriented representations for map-light navigation.
- Designed bird’s-eye-view representations that combine geometric occupancy and semantic cues for reliable retrieval under incomplete map observations.
- Explored rotation- and translation-tolerant global descriptors for large-displacement loop closure detection under sparse, partial, and cross-view observations.

- Conducted multi-dataset experiments to evaluate retrieval robustness, localization reliability, and generalization across different sensing and mapping conditions.

Online and Offline 3D Multi-Object Tracking

2023 – 2025

Zhejiang University

- Developed pose-aware association strategies for online 3D multi-object tracking, improving identity consistency through ego-motion-aware spatial reasoning.
- Built a highly efficient tracking pipeline for LiDAR-based autonomous driving perception, achieving real-time performance with low computational overhead.
- Achieved leading performance on the KITTI 3D Multi-Object Tracking benchmark in both online and offline settings, ranking first on the leaderboard at the time of evaluation.
- Extended online tracking into a trajectory-centric offline optimization framework for evidence recovery, topology repair, gap completion, and kinematic state refinement.

Robotic System Experience

- Built mobile robot perception platforms by integrating LiDAR sensors, onboard computing, power delivery, communication interfaces, and ROS/Linux software stacks.
- Worked with Jackal and Ranger Mini platforms equipped with Velodyne VLP-16 and Livox LiDAR for perception, mapping, data acquisition, and field validation.
- Designed and fabricated PCB-based interface and power-distribution modules for robotic hardware integration, including sensor interfacing, wiring, signal routing, and debugging.
- Configured embedded and edge computing platforms, including Intel N100, Raspberry Pi 4B, and laptop-based GPU systems, for real-platform perception experiments.

Awards and Honors

- **Second Prize**, 16th China Undergraduate Intelligent Vehicle Competition 2021
Basic Four-Wheel Category, National Finals
- **Second Prize**, 15th China Undergraduate Intelligent Vehicle Competition 2020
Dual-Car Relay Category, National Finals
- **Second Prize**, National Undergraduate Electronics Design Contest, Shandong Division 2020, 2021

Technical Skills

- **Programming:** Python, C++, MATLAB
- **Robotics and Perception:** ROS, OpenCV, OpenPCDet, SLAM, LiDAR perception, 3D object detection, multi-object tracking, place recognition, loop closure detection
- **Deep Learning and Experimentation:** PyTorch, point cloud processing, bird's-eye-view representations, semantic-enhanced perception, benchmark evaluation
- **Systems and Tools:** Linux, Git, Docker, LaTeX, PCB design, embedded electronics, sensor integration, power and signal debugging, robotic platform deployment

Academic Service

- Teaching Assistant, *Robotics II: Mobile Robotics*, Department of Control Science and Engineering, Zhejiang University Sep 2024 – Jan 2025
- Teaching Assistant, *Intelligent Mobile Systems*, Department of Control Science and Engineering, Zhejiang University Sep 2023 – Jan 2024
- Teaching Assistant, SDG-NAS Summer School on Networked Autonomous Systems, Zhejiang University Jul 2025
- Teaching Assistant, SDG-NAS Summer School on Networked Autonomous Systems, Zhejiang University Aug 2024
- Volunteer, National PhD Student Academic Forum in Control Science and Engineering, Zhejiang University Nov 2024