Zihan Wang

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Education

The Chinese University of Hong Kong	*Aug. 2025 – Present*
M.S. in Robotics	
Beihang University	*Sep. 2021 – Jun. 2025*
B.E. in Automation	

- GPA: 88.1/100

Publications and Manuscripts

PUB: A Plasma-Propelled Ultra-Quiet Blimp with Two-DOF Vector Thrusting.
Yixing Zhang, **Zihan Wang**, Zhijun Li, Xuanlin Fan, Jiawei Zhang, Shaoping Wang
arXiv, 2025 [pdf]

Plasma-propelled ultra-quiet flying robot system and power combination control method.
China Invention Patent CN118220461A [pdf]

Research Experience

Tsinghua Laboratory of Brain and Intelligence, THU	*Mar. 2025 – Jul. 2025*
Undergraduate Research Assistant	Advisor: Jia Liu

- Topic: 2D&3D SLAM algorithms for Zhixing Autonomous Car II

Wang Lab, BUAA	*Sep. 2023 – Jun. 2024*
Undergraduate Research Assistant	Advisor: Shaoping Wang

- Topic: Electrical and Control System Design for Plasma-Propelled Ultra-Quiet Blimp

Advanced Robotics Centre, NUS	*Jul. 2023 – Dec. 2023*
Undergraduate Research Assistant (Remote)	Advisor: Wenshuo Wang

- Topic: 6-DOF grasp based on foundation models

Industry Experience

Beijing Kaiyun Technology Co., Beijing	*Jul. 2024 – Sep. 2024*
Summer Intern	Advisor: Bin Zhu

- Designed scripted test programs with LUA on the Semi-Physical Simulation Test Software ETEST.
- Accomplished semi-physical simulation on an embedded system lab box to design a smart clock with temperature and humidity sensing capabilities.

Projects

High-Fidelity 3D Building Reconstruction from Point Clouds(Bachelor Thesis) — *Dec. 2024 - Jun. 2025*

- Developed a comprehensive pipeline for high-precision 3D reconstruction of ground buildings from handheld laser scanner data, focusing on refined modeling through advanced segmentation and geometric completion.
- Data Preprocessing: Established a robust preprocessing pipeline for large-scale raw SLAM data. Utilized Statistical Outlier Removal to effectively filter a 74 million point cloud, reducing its size by 8.6% to eliminate noise and outliers while preserving key structural integrity.
- Semantic Segmentation: Implemented and trained a PointNet++ based deep learning model for semantic segmentation of architectural components (e.g., walls, windows, doors). Achieved 83. 6% overall accuracy (OA) and 54. 0% mIoU on custom-scanned building data, enhancing model robustness in complex scenes with occlusions or irregular structures.
- Refined Modeling via Component Regularization: Designed a novel workflow to address data incompleteness and geometric inconsistencies. Using K-Means clustering to automatically classify and standardize building compo-

nents based on their geometric properties (height, width).

- Component Reuse and Completion: Employed a two-stage registration process, combining manual point-pair matching for coarse alignment with the Iterative Closest Point (ICP) algorithm for fine-tuning, successfully completing missing or occluded architectural features with high precision.

Wheel-Legged Robot   *May. 2025 - Jul. 2025*

- Developed a wheeled-legged balancing robot, designing a custom STM32F103 microcontroller board and embedded software, with LQR and VMC-based control, capable of balancing, load-carrying and differential-drive locomotion.
- Implemented cascaded PID control loops to enhance MIT servo motor positioning accuracy to within $\pm0.5°$.
- Integrated the Mahony Filter for accurate state estimation from the Inertial Measurement Unit (IMU).

Zhi Xing Autonomous Car II   *Mar. 2025 - May. 2025*

- Developed a ROS2 autonomous mobile car based on NVIDIA Jetson, with sensor fusion implemented from the driver level to integrate LiDAR and depth cameras, enabling real-time perception and navigation.
- Modeling & Simulation: Designed the URDF vehicle model and validated motion dynamics through IsaacSim and Gazebo for robust system testing.
- High-Precision Mapping & Navigation: Deployed Cartographer SLAM integrated with Nav2 navigation stack, achieving over 95% map coverage and robust obstacle-aware path planning.
- 3D Mapping: Utilized Intel RealSense cameras with the NVBlox framework to generate real-time ESDF occupancy maps, enabling faster and more accurate navigation in dynamic environments.

Zhi Xing Autonomous Car I   *Sep. 2024 - Nov. 2024*

- Developed an autonomous mobile car using ROS, integrating mapping, navigation, and voice interaction modules for real-world deployment.
- SLAM Mapping: Implemented GMapping to generate 2D occupancy grid maps, achieving over 90% map coverage.
- Path Planning & Obstacle Avoidance: Deployed the ROS Navigation Package for real-time global and local planning, achieving dynamic obstacle avoidance with 97% avoidance accuracy.
- Voice Interface: Integrated the Baidu Speech Recognition SDK for hands-free voice-controlled navigation, with >80% recognition accuracy.

Plasma-Propelled Ultra-Quiet Blimp   *Sep. 2024 - Jun. 2025*

- Designed a helium-based blimp platform propelled by plasma ionic wind thrusters, achieving ultra-quiet flight and pitch and yaw control with a 2-DOF gimbal.
- Developed a four-ring asymmetric electrode thruster with a 27kV high-voltage circuit, achieving a thrust of 0.051 N and a thrust ratio of 2.6N/kg of thrust to weight.
- Modeled non-linear dynamics, derived linearized state-space models, and implemented state-feedback and sliding mode controllers for attitude stabilization.
- Validated closed-loop control system via Simulink and real-world flight tests, demonstrating stable hovering, climbing, and landing with ultralow noise.

Treasure-Hunting Car   *Feb. 2023 - May. 2023*

- Developed a mobile robot using Arduino as the main controller and ESP32 for signal processing, integrating map recognition, path planning, and motion control capabilities.
- Developed map-based image processing pipeline using OpenCV, performing perspective correction and obstacle coordinate extraction through edge detection and contour analysis.
- Integrated PID control with the A* searching algorithm to achieve high-precision path tracking and dynamic obstacle avoidance. Attained sub-centimeter positional accuracy (<0.5 cm) and rapid attitude control response with minimal overshoot (<1%).

Skills

Programing: C/C++, Python, Pytorch, MATLAB

Robotics Software: ROS/ROS2, OpenCV, PCL, IsaacSim/Lab, Gazebo, Mujoco

Robotics Hardware: Solidworks, Fusion360, 3D Printing; Multisim; STM32, ESP32, Arduino, NVIDIA Jetson

Language: TOEFL:101 (W:27), LaTeX

Awards

The Undergraduate Training Program for Innovation and Entrepreneurship Funding (National level)	2024
Academic Excellence Award	2024
Academic Excellence Award	2023