Zhouhao Zhang

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Education

Beihang University Sep 2020 – Jun 2024
Bachelor of Engineering in Automation (GPA: 3.80 / 4.00) *Beijing*

Internship

Zhipu AI X-lab Jun 2024 – Present
Robotics Research Intern, Supervised by Dr. Tong Yang *Beijing*

- Developed the **Scene Iconicity Graph** for enhancing robotic operations, utilizing foundation models' zero-shot capabilities to improve scene understanding and reasoning
- Integrated and deployed a **3D LiDAR SLAM** system and **vision-language navigation** on the Unitree Go2 quadruped robot, utilizing **behavior trees** to manage navigation tasks
- Leading the design of a **mobile research robot** equipped with multiple sensors and AI computing resources for advanced **embodied-AI experimentation**

Skyforce Technology Jul 2023 – Dec 2023
R&D Engineer Intern *Shenzhen*

- Pending **National Invention Patent**: Automated keystone correction for projectors with structured light technology
- Calibrated structured light systems through **Gray code** and **local homography** for enhanced accuracy
- Developed an automatic keystone correction algorithm incorporating **TOF** and **IMU**
- Implemented obstacle avoidance for projectors using **LiDAR** and the **RANSAC algorithm**

Skills

Languages: Chinese (Native), English (TOEFL: 93)
Programming Languages: Python, C, C++
Robot Development Environments: Linux, ROS, ROS2, Gazebo, PyBullet, MATLAB, SolidWorks
Development Libraries: Pytorch, OpenCV, OpenAI Gym, PCL, Eigen
Robot Hardware: Differential/Omni-directional/Quadruped Chassis, Robotic Arms, LiDAR, Depth Camera, IMU, TOF
Embedded Systems: NVIDIA Jetson, Raspberry Pi, STM32, ESP32, Arduino

Honors

National Scholarship | *Top 3 out of 236, The Ministry of Education of the People's Republic of China* Dec 2022
First Prize, 23rd China University Robot Competition (ROBOCON) | *National Third Place* Jul 2024
Second Prize, 23rd China University Robot Competition (RoboMaster) Apr 2024
Second Prize, 22nd China University Robot Competition (ROBOCON) Jul 2023
First Prize, 2022 Five Provinces of North China University Robot Competition Nov 2022
First Prize, 2022 Beijing University Robot Competition Nov 2022
Second Prize, China Intelligent Robot Fighting and Gaming Competition Mar 2023
Third Prize, 38th National College Physics Competition Dec 2021
Outstanding Graduate Award | *Beihang University* Jun 2024
CATIC Scholarship | *Total 10 Places in Beihang University* Apr 2024
First Prize, Scholarship in Discipline Competition | *Beihang University* Apr 2024
Second Prize, Scholarship in Outstanding Social Work | *Beihang University* Apr 2024
Outstanding Student Leader | *Beihang University* Nov 2023
Top Prize, Learning Excellence Scholarship | *Top 3 out of 154, Beihang University* Dec 2022
Outstanding Student | *Top 2 out of 154, Beihang University* Sep 2022
Third Prize, 32nd FengRu Cup Competition & Yuyuan Robots Competition | *Beihang University* Jun 2022

Projects

MedAIR, Chinese University of Hong Kong Dec 2023 – Jun 2024

Graduation Project (Remote), Guided by Prof. Qi Dou

- Task planning of 7DOF **da Vinci Surgical Robot** via demonstration-guided **reinforcement learning** and **policy chain**
- Surgical robot visual manipulation policy learning using **world model-based reinforcement learning**
- High-level task planning of robot based on **large language models** and **behavior tree**

Biomechanics and Soft Robotics Lab, Beihang University Apr 2023 – Oct 2023

Research Member, Guided by Dr. Lei Li

- **Publication**: An Aerial–Aquatic Hitchhiking Robot with Remora-Inspired Tactile Sensors and Thrust Vectoring Units, in Advanced Intelligent Systems, DOI: 10.1002/aisy.202300381
- Debugged flight control programs and deployed SLAM algorithms for **aerial–aquatic UAV**

Pattern Recognition & Image Processing Course Project, Beihang University Dec 2023

Project Leader

- Segmentation of medical images (liver and fundus vessels) using **U-Net**
- Image stitching using **Scale-Invariant Feature Transform (SIFT)** for feature matching
- Grasp position detection for small electronic components based on **vision transformer**
- Hand written characters classification based on **convolutional neural network**
- Mixture Gaussian model of population constructed by **Expectation-Maximization algorithm**
- Point cloud classification and part segmentation using **PointNet, PointNet++**
- **EEG-net** based classification of motor imagery
- Solving the eight-digit problem with **graph search algorithms**

BR Robotics Team, Beihang University Aug 2022 – Jun 2024

Member & Coach

- **Visual auto-shoot algorithm** based on **YOLO** and localization prior for racing robot in ROBOCON 2023
- **Decision making** algorithm leveraged **minimax search** and **finite state machine** for racing robot in ROBOCON 2024
- Deployment of SLAM algorithms including **Vins-Mono**, **Vins-Fusion**, **RTABMAP**, **ORB-SLAM**, and **FAST-LIO2**
- **Camera pose estimation** using the **PNP algorithm** and **morphological operation**
- **Robot path planning** using the **A-star algorithm** and grid map
- **Technical guidance** for the RoboMaster, ROBOCON and RoboCup competitions
- Founded Beihang University's **first RoboMaster team**

Extracurricular Experience

Red Bird Challenge Camp Jun 2024

Hong Kong University of Science and Technology (Guangzhou) *Guangzhou*

- Designed and built a factory simulation environment in **Gazebo** to simulate intelligent mobile detection robots
- Implemented 2D **SLAM** for mobile robots using the **Cartographer** algorithm
- Developed autonomous navigation and dynamic obstacle avoidance systems using the **ROS Navigation** stack

Artificial Intelligence & Machine Learning Program Aug 2023

National University of Singapore *Singapore*

- Developed an innovative **Seq2Seq model** using **LSTM** for accurate population forecasting
- Achieved **winning team in the final presentation**, earning commendation from Prof. Mehul Motani

Summary

I am a self-motivated robotics enthusiast with a strong academic foundation and achievements in both competitions and research. I have a keen interest in various cutting-edge areas of robotics technology. Additionally, I value interdisciplinary teamwork and have demonstrated leadership in project settings. My goal is to continue advancing in robotics and mechatronics, with a future focus on embodied AI research to make robots smarter, more reliable, and easier to use in industry and our daily lives.