

ZIHAN LIU

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Education

Carnegie Mellon University, School of Computer Science

August 2026 - August 2028

Master of Science in Robotics

New York University, College of Arts and Science

January 2023 - May 2026

BA in Computer Science, BA in Mathematics

GPA: 3.91/4.0 (Magna cum laude)

Publications

Diwei Sheng, Vijayrajsinh Gohil, Satyam Gaba, **Zihan Liu**, Giles Hamilton-Fletcher, JR Rizzo, Yongqing Liang, Chen Feng. *Scene Change Detection with Vision-Language Representation Learning*. In submission to **RA-L 2026**.

Haokun Zhu, Zongtai Li, **Zihan Liu**, Kevin Guo, Zhengzhi Lin, Yuxin Cai, Guofei Chen, Chen Lv, Wenshan Wang, Jean Oh, Ji Zhang. *SysNav: Multi-Level Systematic Cooperation Enables Real-World, Cross-Embodiment Object Navigation* **RA-L 2026**.

Research Experience

Vision Language Navigation

June 2025 – September 2025

Research Assistant, Supervised by Dr. Ji Zhang from Carnegie Mellon University

Pittsburgh, PA

- Contributed to the development of an innovative **object-navigation system** with a structured representation (three-stage representation with room node, viewpoint node and object node) and VLM verification. Paper accepted by **RA-L 2026**. Here is the [link for this work](#)
- Designed and integrated **semantic nodes** and a **ray tracing module** into the **TARE Planner** to resolve open-set object navigation ambiguities and efficient viewpoint selection.
- Co-developed a **VLM reasoning node** using **Gemini 2.5 Flash** to optimize reasoning for room-type recognition, navigation decisions, and early-stop reasoning through structured prompts and termination logic, enabling robots to interpret high-level instructions with reduced ambiguity.
- Conducted **indoor experimental tests** to validate system performance, ensuring robustness and real-time operation in realistic navigation environments.

NYU Self Drive

September 2024 – May 2025

Research Team Lead, Supervised by Dr. Chen Feng from New York University

New York, NY

- Designed benchmarks for **hybrid outdoor-indoor navigation** with seamless **GPS-to-vision transitions** to simulate realistic scenarios, and proposed a new competition format for the **EarthRover Challenge Indoor Track Proposal** (accepted for **IROS 2026**) to evaluate robustness through **multi-sensor fusion** and transition metrics, advancing beyond single-environment benchmarks.
- Integrated the **Model Based Re-Annotation** navigation pipeline into the **GPS Track** and proposed **Indoor Track** framework for the **EarthRover Challenge**, enabling robust navigation across outdoor and indoor environments. Achieved over **60% checkpoint completion** and earned **2nd place** in the competition, demonstrating strong performance under real-world navigation constraints.

VPR Scene Change Detection - AI4CE Lab

April 2025 – May 2026

Research Assistant, Supervised by Dr. Chen Feng from New York University

New York, NY

- Enhanced the state-of-the-art **Robust Scene Change Detection** pipeline (ICRA 2025) by integrating **feature warping** and **semantic information** into visual foundation models with cross-attention mechanisms, achieving around **20% improvement** in both F1 score and IoU. Paper is in submission to **RAL 2026**
- Benchmarked** the current solutions through systematic experiments, and conducted a rigorous comparative analysis against our proposed method, quantifying performance gains across key metrics to validate the architectural advancements.

MappingNYC - AI4CE Lab

December 2024 – April 2025

Research Assistant, Supervised by Dr. Chen Feng from New York University

New York, NY

- Implemented **HDL-SLAM** and **FastLIO** to develop an open-source, large-scale, and multi-traversal datasets of New York City's complex and busy urban environments, improving spatial accuracy by **15%** compared to existing solutions.

- Designed and executed a **data collection** pipeline using **Metacam**, integrating LiDAR, IMU, and GPS sensors to capture high-fidelity urban scene data, ensuring accurate mapping results.
- Refined raw data with Interactive **SLAM** techniques, reducing mapping errors such as missing loop-closure and z-drift by **25%** and ensuring high-quality outputs suitable for research and real-world applications.

Assistive Technology and Visual Attention Research - Rizzo Lab

January 2024 – January 2025

Research Assistant, Supervised by Dr. John Ross Rizzo from New York University

New York, NY

- Applied advanced computer vision models, including **Segment Anything** and **GroundingDINO**, to analyze fixation patterns and dwell time of visually impaired individuals, identifying key visual attention trends that informed assistive technology development.
- Utilized **NanoOwl** and **NanoSAM** for walkable space segmentation to assist in developing a wearable haptic device for visually impaired individual, achieving an **over 95%** obstacle recognition rate during real-world trail testings.
- Developed custom **Arduino** scripts and PCB designs to optimize battery efficiency and motor response, extending operational runtime by **1 hour** and reducing latency in haptic feedback by **30%**.
- Secured **third place** in the Sixth Sense Project at the 2024 Georgia Tech VIP Competition, recognized for innovation in assistive technology solutions.

Industry Experience

Horizon Robotics

May 2026 – August 2026

Embodied AI Intern

Shanghai, China

- Developed and evaluated **Vision-Language-Action (VLA)** and **World Action Models** for robotic manipulation, working with **LDA-1B**, **StarVLA**, and **OpenPI** across simulation benchmarks including **RoboTwin**, **RoboCasa**, **LIBERO**, and **Bridge**.
- Built and optimized large-scale robot learning pipelines for **multi-task policy training and evaluation**, including action/state representation alignment, trajectory preprocessing, normalization, and distributed experiments on **multi-GPU H20 clusters**.
- Investigated policy deployment and generalization across diverse manipulation tasks, analyzing the effects of **action horizons**, **diffusion inference steps**, and **robot state representations** on execution stability and task success.

Shanghai ShanCe Technologies Co., Ltd.

December 2024 – January 2025

Data Processing and Prediction Intern

Shanghai, China

- Processed and extracted main contract stock data using Python libraries (**Pandas**, **Numpy**), improving data quality and reducing preprocessing time by **20%**.
- Developed time-series prediction models (**LSTM** and **RNN**) to forecast 10-minute stock price ratios, outperforming traditional linear regression models by over **10%** in accuracy.
- Engineered advanced features from K-line data, including statistical metrics and technical indicators, optimizing model inputs and enhancing prediction performance.

Sub 360, Inc

May 2024 – August 2024

Software Development Engineer in Test Intern

Remote, United States

- Designed and implemented robust automated test scripts using **TypeScript** to validate core functionalities and ensure software reliability across multiple modules.
- Collaborated with developers to integrate comprehensive test suites into CI/CD pipelines, enabling seamless and proactive defect identification.
- Developed regression test suites and conducted performance testing to uphold the scalability, responsiveness, and stability of critical software releases.

Shanghai Stratosphere Information Technology Co., Ltd.

July 2022 – September 2022

Software Engineering Intern

Shanghai, China

- Utilized **ROS2** to optimize robotic vacuum's navigation, capturing images of everyday objects for **YOLO** training, boosting object recognition and efficiency.
- Applied the Zhang-Zhengyou chessboard calibration method to adjust camera parameters, resulting in a remarkable **20% improvement** in the accuracy of object recognition.

Technical Skills

Coding Languages: Python, Java, C++, JavaScript, Julia, LaTeX

Clouds & Databases: PostgreSQL, MongoDB

Developer Tools: VS Code, GitHub

Microsoft Office Suite: Word, Excel, PowerPoint

Operating Systems: Windows, MacOS, Linux

Packages: ROS, Scikit-learn, Scipy, Numpy, Matplotlib, Pandas, PyTorch, OpenCV, Tensorflow