Zhenyu Wu

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EDUCATION

University of California San Diego, San Diego, CA 09/2024 – 06/2026
Master of Science** in **Computer Science
- Overall GPA: 3.87 / 4.0
- Major GPA: 3.87 / 4.0

Lehigh University, Bethlehem, PA 08/2019 – 05/2024
Bachelor of Science** in **Computer Science
- Overall GPA: 3.82 / 4.0
- Major GPA: 3.9 / 4.0

PUBLICATIONS

[1] Wu, Z.*, Huang, A.*, Atar, S., Zhi, Y., Yip, M.
SteadyTray: Learning Object Balancing in Humanoid Tray Transport via Residual Reinforcement Learning.
Submitted to International Conference on Intelligent Robots and Systems (IROS) 2026.
Project Website.

[2] Wu, Z., Su, X., Rasch, M. J., Li, N.
Methods for Setting Device Specifications for Analog In-Memory Computing Inference.
Advanced Intelligent Systems, 2026.

RESEARCH EXPERIENCES

ARC LAB, University of California San Diego 09/2024 – Present
Research Assistant, Advised by Dr. Michael Yip, Dept. of ECE
- Research focus on applying reinforcement learning to humanoid locomanipulation tasks, specifically training control polices for stable humanoid bimanual tray-carrying and payload transportation.
- Built the complete training pipeline in Isaac Lab, developing and maintaining all training scripts, simulation environments, and experimental pipelines.
- Jointly trained a decoupled policy architecture with PPO: upper-body policy for tray manipulation and lower-body policy for locomotion, each controlling separate degrees of freedom.
- Trained a residual whole-body control policy with a transformer teacher encoder which applied privileged object observation to output corrective actions on top of the decoupled polices to achieve payload and object stablization during locomotion.
- Distilled the teacher encoder into a student encoder using DAgger, enabling the policy to rely solely on object position and orientation acquired through AprilTag pose estimation on the real robot.
- Implemented Sim-to-Sim to Mujoco and Sim-to-Real deployment scripts and deployed control polices on unitree G1 humanoid.
- Leveraged knowledge in **Python, Pytorch, Numpy, SciPy, Isaac Sim, Isaac Lab, Mujoco**

Seed LAB, Lehigh University 09/2023 – 02/2025
Research Assistant, Advised by Dr. Ning Li, Dept. of ECE
- Research focus on hardware-aware training for analog in-memory computing: fine-tuning floating-point neural networks for robust deployment on IMC chips, then conducting large-scale inference experiments across device parameter spaces to identify optimal configurations for different neural network architectures.
- Developed and managed the full simulation pipeline for large-scale inference experiments on HPC clusters.
- Applied hardware-aware training using PyTorch and IBM AIHWKit to train LSTM and ResNet32 models robust to analog non-idealities, maintaining 99% of floating-point accuracy on in-memory computing hardware.
- Evaluated the impact of PCM device non-idealities (conductance range, drift, programming and read noise) on in-memory inference by mapping LSTM and ResNet32 models to a PCM simulation device and conducting systematic experiments, analyzing trade-offs between device specifications and DNN performance over time.
- Leveraged knowledge in **Python, Pytorch, Numpy, SciPy, MATLAB**

Swarm LAB, Lehigh University 09/2023 - 05/2024
Research Assistant, Advised by Dr. David Saldaña, Dept. of CSE
- Participated in the design and construction of aerial robot swarms formed by lighter-than-air bicopter Blimps, for the "Defend the Republic" robotic research competition at Lehigh University.

- Implemented PID controller for aerial robots and ground differential drive robots closed-looped by IMU and camera observation.
- Applied ROS2 and the ROS2 AprilTag package to develop ground robots using a subsumption architecture with position-based visual servoing based on camera observations.
- Applied ROS2 to implement Kalman filter-based SLAM for ground robots using camera observations.
- Implemented A*, RRT, PRM algorithms for path planning in configuration space, along with visibility graph and Voronoi diagram-based planning.
- Applied Fusion 360 to design 3D printed robot's frame and assembled aerial robots based on Xiao ESP32-S3, ultrasonic sensor, IMU and Arduino Nicla Vision smart camera.
- Implemented internal communication between aerial robot, sensor and ground station in both manual mode and autonomous mode to facilitate the implementation of controllers.
- Implemented blob tracking algorithm for aerial robots to achieve target detection.
- Leveraged knowledge in **C/C++, Python, Arduino, OpenMV, opencv, Fusion 360, ROS2, Rviz**

Dash LAB, Lehigh University 06/2023 – 09/2023

Research Assistant, Advised by Dr. Yu Yang, Dept. of CSE

- Developed a fault-tolerant app using flutter & dart to measure air quality in areas without air quality monitoring stations through connecting with mobile air quality sensors, facilitating future air quality prediction with machine learning techniques.
- Applied Google map and Geolocator plugins to retrieve real time spatial data and to perform location tracking.
- Applied flutter_blue_serial plugin to connect with sensors and collect data.
- Applied syncfusion_flutter_charts plugin and Google map markers to dynamically perform data visualization in both graph representations and map animations during data collection.
- Built database on MongoDB Atlas and applied mongo_dart plugin to perform cloud storage.
- Leveraged knowledge in **Flutter, Dart, Android Studio, MongoDB**

Capstone: Using ML and Data Scrapping for equitable resilient energy systems 02/2023 – 12/2023

Research Assistant, Advised by Dr. Alberto J. Lamadrid, Dept. of Economics & Dr. Stephen Lee-Urban, Dept. of CSE

- Developed PUC Scraper through tabula and beautiful soup libraries to scrape PA electric utility companies' annual rate schedule and implemented PUC Rate Classifier to classify each rate into fixed or variable cost.
- Developed PA/NYS Scraper based on WattBuy's scraper through request libraries to scrape electric suppliers' rate for different electric utility companies in PA and NY from PA Power Switch and provided it to WattBuy as a solution.
- Developed GPT OCA Scraper through openai library and fine-tuned gpt-assistant to detect and extract crucial data from the unstructured PA electric utility companies' monthly rate schedules from OCA.
- Developed EJ Matcher to locate Energy Justice regions in each utility companies' service territory in PA from DEP's Energy Justice Map and use CensusAPI to retrieve detailed data for each matched EJ area.
- Built an AWS RDS database and integrated it with scrapers to store data with MySQL workbench and pymysql.
- Leveraged knowledge in **Python, Openai, SQL, MySQL, Docker**

SKILLS

- **General Programming Languages:** Python, C/C++, Java, JavaScript, C#, Dart, TypeScript, Rust
- **Robotics Tools**: Nvidia Isaac Sim, Isaac Lab, ROS2, Rviz, Mujoco
- **Machine Learning Tools**: Pytorch, scikit-learn
- **Embedded Systems and Hardware:** Raspberry Pi, Arduino ESP32, Arduino Nicla Vision
- **Web Frontend Tools:** HTML, CSS, React
- **Database Management Tools:** SQL, MySQL, PostgreSQL, MongoDB, SQL Developer, JDBC
- **Mobile App Development Tools:** Flutter, Android Studio
- **Backend Development Tools:** Spark, Spring-boot, Node.js
- **Operating Systems:** MacOS, Microsoft Windows, Linux
- **Programming IDEs:** Android Studio, Visual Studio Code, Jupyter Notebook, PyCharm
- **Other Tools:** Git, Docker, Maven, Postman, VirtualBox, Anaconda, MATLAB