TOYA TAKAHASHI

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EDUCATION

Massachusetts Institute of Technology (M.I.T.) *Expected in May 2026*

B.S. in Electrical Engineering and Computer Science — GPA: 5.0/5.0

Relevant Coursework: 6.4200 Robotics: Science and Systems, 6.1210 Introduction to Algorithms, 2.14 Analysis and Design of Feedback Control Systems, 6.1910 Computation Structures, 6.2000 Circuits and Electronics

EXPERIENCE

MIT Arcturus Robotics September 2022 - Present

Autonomy Software Team Co-Lead *Cambridge, MA*

- Leading a software team of approximately 20 students in developing an Autonomous Surface Vehicle (ASV) autonomy stack using C++ and Python with Robot Operating System (ROS 2) middleware.
- Developed an algorithm to overlay clustered LiDAR point cloud on the camera frame for matching obstacles with detected objects.
- Implemented an Extended Kalman Filter to fuse GPS and IMU data for global robot localization with centimeter-level accuracy.
- Created a visual navigation algorithm for buoy traversal, integrating the YOLOv5 object detection model with a PID controller.

NVIDIA May 2024 - August 2024

Systems Software Engineering Intern *Santa Clara, CA*

- Enhanced the performance of an end-to-end robot manipulator object-following workflow by tripling throughput and improving the stability of object pose estimations detected by a deep neural network.
- Implemented and wrote unit tests for a suite of ROS nodes for post-processing a stream of poses through averaging, stability analysis, outlier detection, and Kalman filtering.
- Developed and optimized a CUDA-accelerated alpha compositing ROS node, enabling efficient image blending directly on the GPU without redundant CPU-GPU memory transfers.
- Calibrated camera intrinsics using ArUco and ChArUco boards to minimize reprojection error for improved 3D scene mapping accuracy.

MIT EECS Department February 2024 - May 2024

Lab Assistant, "Computation Structures" *Cambridge, MA*

- Assisted undergraduate students with lab assignments for an introductory computer architecture and operating systems course.

MIT Sea Grant College January 2023 - May 2024

Undergraduate Researcher *Cambridge, MA*

- Modeled an oyster farm simulation environment in the Gazebo robotics simulator to test and validate an ASV autonomy stack.
- Created Unified Robot Description Format (URDF) and Simulation Description Format (SDF) files for ships, oyster baskets, and ocean waves to generate realistic simulation models.
- Designed and built a cross-hull electrical wiring system for integrating microcontrollers, stepper motors, and sensors.

MIT Media Lab: Signal Kinetics June 2023 - December 2023

Undergraduate Researcher *Cambridge, MA*

- Operated the UR5e robot arm to collect millimeter-wave radar, OptiTrack motion capture, and camera data, contributing to the development of a robot designed to search for and retrieve hidden items.
- Wrote C++ and Python scripts using data analysis packages such as NumPy and Matplotlib to construct a machine learning dataset of simulated and robot-collected radar images.

MIT Code for Good October 2023 - February 2023

Team Leader *Cambridge, MA*

- Led a team of 6 to develop a secure web application to collect and visualize client data on behalf of Thrive and Support Advocacy, a nonprofit organization supporting youth and adults with developmental disabilities.
- Engineered user-friendly web interfaces with ReactJS for uploading survey results to the server and visualizing collected data.
- Integrated front-end UI with back-end authentication and data handling systems using MongoDB, ExpressJS, and NodeJS.

TECHNICAL SKILLS

Computer Languages	Python, C/C++, NumPy, CUDA, JavaScript, MATLAB, RISC-V Assembly
Tools	Git, Docker, Linux, Robot Operating System (ROS), Computer-Aided Design (CAD), Simulink