

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, 6.4132 Principles of Autonomy and Decision Making, 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 students with lab assignments focused on designing a RISC-V pipelined processor using the Bluespec hardware description language.

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 Tools

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