TOYA TAKAHASHI

(907) · 538 · 1519 ◇ toyat@mit.edu ◇ linkedin/toya-takahashi ◇ github/toyat522 ◇ Cambridge, MA

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: Robotic Manipulation, Autonomous Navigation, Accelerated Computing, Deep Learning, Numerical Algorithms, Controls

EXPERIENCE

MIT Sensing, Perception, Autonomy, and Robot Kinetics (SPARK) Lab September 2024 - Present
Undergraduate Researcher *Cambridge, MA*

- Integrated learning-based keypoint extraction with SuperGlue and LightGlue into a visual loop-closure module for SLAM.
- Built a software platform for mobile robots supporting RTK positioning and LiDAR-inertial odometry to generate maps using 3D scene graphs.
- Evaluated camera-LiDAR calibration algorithms to reduce reprojection errors and improve 3D scene mapping accuracy.

MIT EECS Department February 2024 - Present
Teaching Assistant / Lab Assistant *Cambridge, MA*

- Guided students through labs on computer vision, state estimation, motion planning, and control using real robotic platforms.
- Assisted students with lab assignments on designing a pipelined RISC-V processor in the Minispec hardware description language.

NVIDIA Isaac ROS May 2025 - August 2025
Systems Software Robotics Solutions Intern *Santa Clara, CA*

- Developed a CUDA-accelerated suite of Robot Operating System (ROS 2) nodes for running a TensorRT-optimized Grounding DINO open-set object detection model, including a text tokenizer, text and image tensor encoders, and an output tensor decoder with visualization.
- Implemented benchmarking scripts to measure latency and throughput of the Grounding DINO detection graph across multiple GPUs.
- Integrated Segment Anything (SAM, SAM2) and Grounding DINO into a robotic manipulator workflow using behavior trees to segment and detect arbitrary objects for perception-driven pick-and-place tasks.
- Implemented a C++ ROS node to align Realsense depth images from the IR to RGB frame, enabling deep-learning-enhanced stereo disparity matching for accurate pose estimation.

MIT Arcturus Robotics September 2022 - March 2025
Autonomy Software Team Co-Lead *Cambridge, MA*

- Led a software team of approximately 20 students in developing an Autonomous Surface Vehicle (ASV) autonomy stack using C++ and Python with ROS 2 and Mission Oriented Operating Suite (MOOS-IvP) middlewares.
- Developed an algorithm to overlay clustered LiDAR point cloud onto the camera frame to match 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 Isaac ROS May 2024 - August 2024
Systems Software Robotics Solutions Intern *Santa Clara, CA*

- Enhanced an end-to-end robot manipulator object-following workflow by improving stability of object pose estimations from a deep neural network.
- Implemented ROS nodes for post-processing pose streams via averaging, stability analysis, outlier detection, and Kalman filtering.
- Developed and optimized a CUDA-accelerated alpha compositing ROS node, enabling efficient GPU-based image blending without redundant CPU-GPU memory transfers.

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.

TECHNICAL SKILLS

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