Olivia Ma

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Education

University of Michigan, *College of Engineering* *Aug 2021 - May 2026* | **Ann Arbor, MI**
Master of Science in Engineering (Robotics) *August 2025 - May 2026* | *GPA: 3.92/4.00*
Bachelor of Science in Engineering (Robotics) *Aug 2021 - May 2025* | *GPA: 3.81/4.00*

Relevant Coursework: Data Structures & Algorithms, Discrete Math, Dynamics & Vibrations, Full-Stack Robotics, Linear Systems, Controls Analysis, SLAM/Navigation, Multi-Robot Systems, Legged Robot Control, Real-Time Systems, Circuit Design, Statistics

Professional Experience

Guidance, Navigation, and Control Intern, *Reliable Robotics* *May 2025 – Aug 2025* | **Mountain View, CA**

- Designed and implemented C++ trajectory generation algorithms for autonomous fixed-wing aircraft, enabling safe entry and exit maneuvers for FAA-compliant holding patterns under strict safety constraints
- Translated high-level autonomy requirements into real-time, safety-critical production code and comprehensive unit and integration tests, ensuring numerical stability and predictable behavior within a large codebase
- Developed high-fidelity dynamic models of actuators, mechanical linkages, and control surfaces from first principles, capturing inertial effects, viscous friction, and gear compliance to improve simulation accuracy and closed-loop control performance

Hardware Engineering Co-op, *Amazon Robotics* *Jan 2024 - Jun 2024* | **Westborough, MA**

- Identified solution to in-field conveyor belt subassembly failures by performing root cause analysis and conducting testing to numerically characterize lifetime performance under various belt tension, wear, and loading conditions
- Redesigned LiDAR sensor brackets and calibration jigs, reducing calibration time and variability by over 80%, by working with manufacturing teams to improve user experience & vibration resistance
- Upgraded sheet metal shelf design with integrated monitor mount to reduce cost, part count, and enable item detection

Motor Controls Engineering Intern, *Stellantis* *May 2023 - Aug 2023* | **Auburn Hills, MI (Remote)**

- Developed Simulink models for a complex vector PI control loop, streamlining Model-in-the-Loop (MIL) testing and automatic code generation for 3-phase AC motor controllers
- Applied root locus analysis and loop shaping techniques to tune controller gains, enhancing stability and torque response to meet industry AUTOSAR standards

Research Experience

Research Assistant, *University of Michigan - A2Sys Laboratory* *Jun 2022 - May 2025* | **Ann Arbor, MI**

- M. Nail, N. Jänne, O. Ma, G. Arellano, E. Atkins and R. B. Gillespie, "Simplifying Aerial Manipulation Using Intentional Collisions," 2023 IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, 2023, pp. 5359-5365, doi: 10.1109/ICRA48891.2023.10161462.
- Implemented switching controller in C to autonomously manage hexacopter flight and bouncing dynamics
- Led flight tests to tune PID controller gains to minimize system lag, increasing trajectory fidelity by 25%

Projects

Michigan Experimental Rocketry Organization | *Guidance, Navigation, Control Subteam* **Sept 2025 - Present**

- Derived 6DOF nonlinear dynamics model of rocket from first principles and implemented a Python simulation using RK4 integration and SO(3) rotation matrices to propagate state forward in discrete time
- Developed linearized Model Predictive Controller (MPC) using CasADi to track optimal trajectories with a 1.5s time horizon, solving optimization steps in $\sim$60ms for real-time applicability
- Modeled convexified actuation limits to ensure control outputs remained within physical hardware safety bounds

Michigan Autonomous Aerial Vehicles | *Structures Lead (April 2023 - May 2025)* **Jan 2022 - May 2025**

- Designed fully autonomous quadplane to fly a 3 mi course, deliver 5 payloads to corresponding targets in 30 minutes
- Lead full-stack requirements flowdown for drone frame and payload delivery mechanism selection. Chose hybrid quadplane design to maximize straight-line efficiency, eliminating need to land for battery swap
- Optimized design for modularity, allowing entire plane to fit in carry-on luggage and be assembled in 5 min.

Skills

Languages/Technologies: C++, C, Python, MATLAB, Simulink, Java
Tools & Hardware: ROS2, CasADi, MuJoCo, Git, Linux/Bash, Docker, Solidworks, ANSYS, Arduino, Raspberry Pi