James Muren

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Education

California Institute of Technology — Pasadena, CA
B.S Mechanical Engineering | Robotics Track — *Class of 2026*

Technical Skills

Project Management, Solidworks CAD/CAM, Onshape, Python, Java, ROS, MATLAB, Machining/Prototyping, Thermodynamic / Mechanical / Statistical / Data Analysis, Motion Planning, Inverse Kinematics, Arduino, RVIZ, Ubuntu, VirtualBox, Raspberry Pi, RC

Work Experience

Summer Undergradute Research Fellowship (SURF) — June 2025 – Sep 2025
Undergraduate Researcher — *Pasadena, CA*
- Researched further advancements to M4 drone under Pr. Mory Gharib's group in CAST
- Designed, tested, and deployed adapter mechanism to integrate technologies from CAST lab, AMBER lab and TII in a joint technical demo.
- Spearheaded research effort to investigate a novel method of transformation for a package delivery M4 platform
- Include links to a video or final report

Undergraduate Teaching Assistant | *Mechanical Prototyping* — Sep 2024 – June 2025
Operation and Safety Instructor — *Pasadena, CA*
- 3D Printers, laser cutters, waterjets, lathes, and NC machining

Caltech Center for Autonomous Systems and Technologies (CAST) — May 2024 – Sep 2024
Mechanical Engineering Intern — *Pasadena, CA*
- Managed a redesign of Caltech's Multi-Modal Mobility Morphobot robot (M4)
- Communicated with TII research institute overseas to define performance parameters
- Involved managing **CAD assemblies, supply chain logistics,** and **rigorous testing** of critical components

UCSD Cyber-Archaeology Lab — July 2023 – Sep 2023
Undergraduate Research Assistant — *San Diego, CA*
- Developed drone technology to capture real-world environments for input into augmented reality
- Analysis of drone vision using photogrammetry to map images onto a 3D model
- Project created a way to model hard-to-reach environments at better than **1cm/px**

Miso Robotics — June 2022 – Sep 2022
Hardware Engineering Intern — *Pasadena, CA*
- Designed **multiple iterations** of a robotic arm attachment in **Onshape** that increased robot efficiency from 8 to 12 units per cook cycle **(150% throughput increase)**
- Spearheaded the development of a Hardware V&V test case suite alongside a mentor
- Improved the reliability of the robotic fry cook "Flippy2" by **36%**

Projects

ME 72 Capstone Design Challenge | *Project Management, Solidworks, GD&T* — Sep 2024 – Dec 2024
- Spearheaded design efforts of a high-torque, durable robotic drivetrain for use in a robot hockey competition
- Designed **custom 20:1 gearbox and transmission** system in **SolidWorks**
- Defined performance parameters through extensive research and calculated desired motor specifications
- Created **GD&T for low-tolerance** manufacturing conditions on **waterjet, CNC, and manual milling**
- Planned team meetings, organized building tasks, and established effective communication between sub teams

ME/CS/EE 133a Robotic Arm Simulation Project | *Python, ROS, RVIZ, VirtualBox* — Sep 2024 – Dec 2024
- Developed a project in **RVIZ** using a **7 DOF robotic arm** modeling the real-life ISS Canadarm
- Involved writing and interfacing **URDF files**, defining custom forward and inverse kinematic algorithms, and creating **secondary tasks** to avoid self-collisions
- Used advanced mathematical concepts such as **SVD, Moore-Penrose Pseudoinverse, Weighted Jacobians, and Newton-Rhapson Method** to calculate arm motion, handle singularities, and approximate error