James A. Scott III

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EDUCATION

California Institute of Technology (Caltech) - 3.6 / 4.0 GPA June 2026

Bachelor of Science in Mechanical Engineering, Depth in Robotics — *Pasadena, CA*

- **QuestBridge Match Scholarship - Full-ride**

WORK EXPERIENCE

Microfluidics Deposition Automation Intern — Jun. 2025 – Present

GTRI Aerospace, Transportation and Advanced Systems (ATAS) Laboratory — *Atlanta, GA*

- Designed and implemented a closed-loop microfluidics deposition system from concept to deployment, achieving ±10-micron precision through Arduino (C++), custom Python state machine, and a synchronized PyQT5 GUI for real-time control, error correction, and automated calibration.
- Developed a modular computer vision pipeline using OpenCV, featuring CLAHE enhancement, edge detection, and shape matching to identify $200\mu m$ channels, providing a foundation fully autonomous operation.

Teaching Assistant - Thermal Sciences (ME 11C) — Mar. 2025 – Jun. 2025

Caltech, Professor Ruby Fu — *Pasadena, CA*

- Conducted weekly office hours to assist students with problem sets and core concepts in fluid mechanics, heat transfer, and thermodynamics.
- Evaluated and provided detailed feedback on homework assignments, ensuring consistent grading standards across all submissions.

Lunar Inflatable Structures Development and Project Management — Nov. 2023 – Nov. 2024

Autonomous Robotics and Control Lab, Caltech | NASA BIG Idea '24 Challenge Finalist — *Pasadena, CA*

- Co-authored winning $150,000 proposal for a lunar regolith shielding system and co-directed testing of inflatable structures, including tensile, vacuum, and hot-fire tests.
- Led a 6-member sub-team in developing deployment methods (autonomous inflation, rocket integration) and presented results at NASA BIG Idea Forum and LSIC Conference.
- Spearheaded structural analysis of inflatable lunar structure using LS-Dyna FEA, validating anchor points under rocket plume loads. Designed and implemented a load cell setup with temperature sensors to minimize data drift during high-temperature testing to validate the FEA model.

PROJECTS

Autonomous Pac-Man Robot — Mar. 2025 – Jun. 2025

- Implemented custom ROS2 nodes for motor control, odometry, and sensor fusion on a Raspberry Pi, achieving 5cm navigation accuracy via RRT path planning and lidar scan-matching ($>80\%$ drift reduction) and designed a state machine for dynamic task prioritization, processing real-time scan data and environmental inputs to optimize robot behavior.

Path Planners for Unknown Environments — Jan. 2025– Mar. 2025

- *Dynamic Obstructions* - Constructed an autonomous 2D agent with predictive motion modeling, implemented 2D/3D RRT and PRM + A* planners featuring a nonlinear FOV-penalizing cost function, and built a dual-visualization Tkinter/Pygame/Matplotlib GUI for real-time path visualization and planner evaluation.
- *Static Obstructions* - Created an incremental grid-based path planner using the D* Lite algorithm that quickly recalculates optimal routes on a configurable map as obstacles appear or disappear.

Robotic Guitar Playing System — Sep. 2024 – Dec. 2024

- Engineered a 45-DOF bimanual robotic system using the Shadow Robot Hand URDF in ROS, implemented damped least-squares inverse kinematics for task-prioritized motion planning, and wrote algorithms for chord progression and strumming patterns within ROS.

Computer Vision Eye & Tennis Ball Tracking Robot — Sep. 2022 – Dec. 2022

- Built a dual-mode vision system (PyTorch CNN eye detection + adaptive HSV object tracking) with $>85\%$ accuracy, implemented quartic spline motion smoothing, and designed an optimized 3D-printed pan/tilt platform.

TECHNICAL SKILLS

Programming: Python, C++ C#, MATLAB, JavaScript, Bash
Software: ROS2, SolidWorks, ANSYS, LaTeX, Unity, Microsoft Office, Git, Linux
Hardware: CNC Machining, GD&T, Rapid Prototyping, Sensor Integration, Mechatronics