James A. Scott III

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EDUCATION

California Institute of Technology (Caltech) - GPA: 3.6 / 4.0   Sep. 2022 - Jun. 2026
Bachelor of Science in Mechanical Engineering   *Pasadena, CA*
- **QuestBridge Match Scholarship, Full-ride**

WORK EXPERIENCE

Rapid Prototyping and Control Systems Intern   Jun. 2025 – Sep. 2025
GTRI, Aerospace, Transportation and Advanced Systems Laboratory   *Atlanta, GA*
- Designed and implemented a closed-loop microfluidics deposition system from concept to deployment, achieving ± 10-micron precision through Arduino (C++), 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 for fully autonomous operation.

Teaching Assistant - Thermal Sciences   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 and thermal sciences while evaluating assignments and providing detailed feedback to ensure consistent grading standards

Lunar Inflatable Structures Development and Project Management   Nov. 2023 – Nov. 2024
Caltech - Autonomous Robotics and Control Laboratory   *Pasadena, CA*
- Co-authored successful $150,000 proposal for a lunar regolith shielding system, presenting results at LSIC.
- Led design and prototyping of automated deployment mechanisms, applying testing workflows such as sensor integration, data logging, and repeatability analysis.
- Performed LS-Dyna FEA of plume-loaded anchor points and validated results with a custom instrumented test rig using temperature-compensated load cell measurements.

PROJECTS

Wheeled Robot For Autonomous Navigation   Mar. 2025 – Jun. 2025
- Created modular ROS2 nodes for differential-drive control, LiDAR–IMU fusion, and real-time odometry, enabling <4% trajectory error in indoor navigation tests.
- Built a state machine for behavior selection, enabling dynamic task prioritization from real-time environment cues.

Path Planners for Unknown Environments   Jan. 2025– Mar. 2025
- **Dynamic Obstructions -** Constructed autonomous agent simulators implementing RRT, PRM, and A with predictive obstacle-motion modeling and FOV-penalizing cost functions for temporal planning.
- **Static Obstructions -** Implemented a D*Lite incremental planner on grid-based unkown maps, enabling real-time re-planning dynamic obstacle updates as the planner discovers objects.
- Generated a Python GUI for live visualization and benchmarking of planners.

Simulated Robotic Guitar Playing System   Sep. 2024 – Dec. 2024
- Pioneered a 45-DOF simulated robot in ROS2 using damped least-squares inverse kinematics with varying cost function weights and task-priority control for accurate multi-finger string manipulation.

Variable Mass Projectile Testing   Sep. 2022 – Mar. 2023
- Formulated MATLAB variable-mass dynamic models for simulating motion on the moon.
- Validated models using an Arduino-based data acquisition system with a variable-mass projectile and a compressed-gas launcher, capturing transient dynamics during tether-based mass ejection.

Computer Vision Tracking Camera System   Sep. 2022 – Dec. 2022
- Conceived a dual-mode real-time vision system combining PyTorch CNN eye detection with adaptive HSV tracking and spline-based motion smoothing to achieve <12% detection error.
- Fabricated a lightweight, high-stiffness 3D-printed pan/tilt platform for smooth servo actuation and low vibration.

TECHNICAL SKILLS

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