# KAILANI P. ALARCON

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## EDUCATION

**University of Nevada, Reno | Reno, NV** Expected May 2028
M.S. in Electrical Engineering | Graduate study in robotics, controls, and embedded systems
Spring 2027 registered coursework (upcoming): Digital Control Engineering, Computer Vision, Fundamentals of Deep Learning.

**University of Nevada, Reno | Reno, NV** August 2026
B.S. in Electrical Engineering; Minor in Mathematics; Honors Baccalaureate; Robotics, Autonomous/Aerial Vehicles, and Embedded Systems emphasis.

## PROFESSIONAL EXPERIENCE

**NASA Marshall Space Flight Center | Huntsville, AL** Aug 2026–Present
OSTEM Intern | Robotics, image analysis, systems design and test engineering

**Lunar Regolith Surface Contamination Image Analysis**

- Develop an automated Fiji/ImageJ macro pipeline using illumination correction, segmentation, and morphological filtering to quantify lunar-dust contamination from microscopy images, standardizing comparisons across test campaigns.
- Analyze percent area coverage, optical darkening, and particle morphometry; apply spatial sampling and 95% confidence intervals and generate CSV data, plots, and QC overlays to characterize deposition gradients.
- Extract Feret diameters, aspect ratio, circularity, and solidity measurements to characterize dust-grain morphology and support repeatable comparison of contaminated test surfaces.

**Project Plumero | High-Vacuum Robotic Arm**

- Evaluate robotic-arm workspace, joint loading, actuator compatibility, and vacuum requirements; translate six operating scenarios into 34 hierarchical requirements and calculate a preliminary 3.1 N·m shoulder self-load moment.
- Develop ROS 2/MoveIt 2 and Python simulation/control tools and a 12-document engineering specification package to support proposed six-axis arm design, vendor quotations, and verification planning.
- Size candidate motors, strain-wave gearboxes, encoders, and gripper hardware; evaluate conduction-based thermal paths and dust-ingress protection for proposed high-vacuum operation.

**Space Nuclear Propulsion | Wire Extraction Testing**

- Model wire-extraction forces using channel friction, curl stiffness, and capstan effects to support repeated-trial material and exit-geometry testing in a non-nuclear mockup.
- Build Python/PyQt6 tools for force-displacement visualization, CAN-bus motor control, test sequencing, SQLite storage, and physics simulation; identify load-cell resolution limitations affecting low-force measurement.
- Compare extraction-force trends across materials and exit-edge geometries to assess wire-breakage margin and recommend instrumentation improvements for design reviews.

**Instron Wire Pull Test Data Processor**

- Automate Instron CSV processing in Excel/VBA with delimiter detection, baseline correction, filtering, friction metrics, batch statistics, and structured reporting to standardize test data for engineering review.
- Implement validation, error logging, automatic backups, and versioned handoff documentation to improve reliability and repeatability across multiple test runs.

**LUX Dynamics | Reno, NV** Sep 2023–Aug 2026
Product Development Intern

- Evaluated electrical, thermal, and photometric performance of more than 12 LED products to support engineering and manufacturing-release decisions.
- Built a team-adopted Python/Arduino thermal-validation workflow with Pico TC-08 acquisition, temperature control, stability tracking, and automated reports; authored two industry white papers.

**University of Nevada, Reno | Reno, NV** Aug 2024–May 2026
Engineering Peer Tutor

- Tutored approximately 12–15 engineering students weekly in circuits, controls, signal processing, embedded C, microcontrollers, MATLAB, and Simulink.

## RESEARCH & ENGINEERING PROJECTS

**Three-Link Human-Leg Dynamics | Honors Research** Jan–May 2025
Faculty mentor: Dr. Sesh Commuri, University of Nevada, Reno

- Developed a MATLAB Level-2 S-function and Simulink model for three-link kinematics, Jacobian velocity mapping, and simplified torque analysis with inertia and gravity effects.

**Virtual Vector Network Analyzer | Honors Research** Jan–May 2025
Faculty mentor: Dr. Jihwan Yoon, University of Nevada, Reno

- Built a MATLAB virtual two-port VNA spanning 100 MHz to 6 GHz at 236 points with 12-term SOLT calibration, S-parameter visualization, and automated Touchstone exports.

**IVerify | Senior Capstone, Systems Integration Lead** Spring 2026

- Led integration of a four-person team's five-subsystem IV occlusion detector, coordinating sensing, analog electronics, firmware, and verification; assembled a bench prototype with two-LED output.

**UR3e Robot Kinematics | Robotics Team Project** Spring 2026

- Modeled manipulator motion with Denavit-Hartenberg transforms and MATLAB Jacobians; identified a rank-five Jacobian configuration in singularity analysis.

**DC Motor-Generator Control | Arduino, PI Control** Fall 2025

- Implemented PI speed control using Hall-effect encoder feedback and PWM; compared back-EMF, interrupts, and tachometer measurements to assess speed response under changing loads.

**FPGA Digital System Design | Cyclone V, VHDL** Fall 2025

- Designed a clocked four-bit ALU and finite-state machine with clock division, pattern detection, and seven-segment output; validated functionality through hardware debugging.

## TECHNICAL SKILLS

Programming and software: Python, C/C++, MATLAB/Simulink, PyQt6, Excel/VBA, SQLite, VHDL, Git, Linux.

Robotics and systems: ROS 2, MoveIt 2, MuJoCo, robot kinematics, Jacobian analysis, actuator sizing, Creo, requirements development, verification planning.

Instrumentation and analysis: Fiji/ImageJ, segmentation, particle morphometry, signal processing, CAN bus, STM32, Arduino, FPGA, oscilloscope, Pico TC-08, SOLT calibration.

## TECHNICAL WRITING & HONORS

Industry white papers: Thermal Validation of Commercial LED Luminaires; Understanding Optical Lens Performance in LED Luminaires (LUX Dynamics, 2026).

Awards: College of Engineering and Electrical Engineering Outstanding Service Awards (2026); TC Energy Scholarship (2026); Presidential Scholarship (2022).