

# Jaral Arroyo-Jefferson

(786) 812-1907 | [jaral.arroyo.jefferson@gmail.com](mailto:jaral.arroyo.jefferson@gmail.com) | [linkedin.com/in/jaral-arroyo-jefferson/](https://www.linkedin.com/in/jaral-arroyo-jefferson/) | [jaralarroyojefferson.me](http://jaralarroyojefferson.me)

## EDUCATION

### Case Western Reserve University

Cleveland, OH

*Bachelor of Science in Aerospace and Mechanical Engineering, Minor in Computer Science*

*May 2029*

## EXPERIENCE

### Undergraduate Robotics Research Assistant

October 2025 – Present

*Cybernetics and Physical Intelligence Laboratory — Human Fusions Institute*

*Cleveland, OH*

- Designed a Python control interface using Dynamixel SDK for a cable-driven robotic tentacle arm with 5 preset configurations, speeding up trial setup by 40%
- Built a real-time digital twin in MuJoCo that mirrors the physical arm's movement by fusing motor torque, cable length, and motion capture data through an Extended Kalman Filter
- Used the digital twin to test and validate a new method for tracking the arm's position and orientation, laying the groundwork for future control experiments in the lab

### Optical Tweezers Research Project Engineering Lead

August 2023 – May 2025

*Ransom Everglades School*

*Miami, FL*

- Led team of 6 to modify OpenFlexure 3D inverted microscope design, enabling laser integration for low-cost optical tweezing system
- Designed parts in Fusion 360 for 3D printing, assembled microscope, and integrated electronics using Arduino and Raspberry Pi
- Presented research on optical tweezers and microscopy at the 2025 APS Global Physics Summit

### NASA Aerial Robotics Research Intern

May 2024 – July 2024

*NASA STEM Enhancement in Earth Science Internship*

*Austin, TX*

- Fused IMU and LiDAR sensor data using a Kalman Filter, reducing IMU/GPS noise by 24% and LiDAR estimation error by 50%
- Assembled drone hardware and configured flight software and sensors, serving as flight test pilot for data collection
- Processed binary sensor data using Python and pyulog, presented findings at the 2024 American Geophysical Union Annual Meeting

## PROJECTS

### ML Star Classification | *Python, XGBoost, Tableau, Colab*

December 2025

- Built XGBoost model to predict star type from stellar attributes, including temperature, luminosity, and magnitude
- Created Tableau and Colab visualizations to identify defining characteristics across stellar evolutionary stages

### NASA Meteorite & Bolid: Data Analysis Report | *Python, Pandas, Matplotlib, Tableau*

January 2024

- Cleaned and merged two NASA Open Data Portal datasets in Python using Pandas, imputing missing values and standardizing coordinate formats
- Conducted exploratory data analysis using Matplotlib and Tableau, uncovering a strong linear relationship between radiated and impact energy

## LEADERSHIP

### SHPE Vice President of Communications

September 2025 – Present

*Society of Hispanic Professional Engineers (SHPE), CWRU Chapter*

*Cleveland, OH*

- Manage chapter communications and social media for a 5-member executive board
- Led outreach and promotion for Dia de Ciencias, engaging 25 local high school students

## TECHNICAL SKILLS

**Programming & Robotics:** Python, MATLAB, Git, GitHub, VS Code, Codex, Claude, HTML, CSS

**Controls & Estimation:** Kalman Filtering, Extended Kalman Filter, Sensor Fusion (IMU, LiDAR, Motion Capture), State Estimation, MuJoCo

**Engineering & Design:** SolidWorks, Fusion 360, 3D Printing, Laser Cutting, CNC Machining, Arduino, Raspberry Pi

**Data Science:** Machine Learning (XGBoost, Random Forest, Logistic Regression), Pandas, Matplotlib, Tableau

**Languages:** Bilingual Spanish