CESAR BRIONES

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EDUCATION

Bachelor of Science in Mechanical Engineering Expected May 2026
University of South Florida GPA: 3.72/4.0

EXPERIENCE

Research Lab Assistant, USF Corrosion Research Laboratory – Void detection in tendons May 2024 – Present

- Used Python and FFT-based signal processing to estimate baseline from magnetic data for grout quality analysis
- Designed custom PCBs using EasyEDA and transitioned to third-party fabrication to improve project scalability
- Developed a Python-based data acquisition application to collect and analyze tendon impedance measurements
- Integrated Arduino-based sensing hardware with real-time data feedback to enhance troubleshooting

Research Lab Assistant, MNMC Laboratory – Polymer simulation May 2025 – July 2025

- Developed an ANSYS Fluent model to simulate shear stress in viscous polymers under varying rotational speeds
- Optimized meshing strategies and tested multiple boundary and initial conditions to improve simulation accuracy

Research Lab Assistant, RANCS Research Group – Autonomous Vehicles December 2023 – March 2024

- Designed and built an aluminum frame to elevate a $10,000 LIDAR sensor by 1 ft, resolving collision issues
- Determined the minimum mounting height required to prevent LIDAR interference with the car roof and validated the solution through on-road testing, achieving over 100 hours of successful on-road software evaluation

LEADERSHIP

IREC Chief Engineer, USF Rocketry Team (SOAR) May 2025 - Present

- Led the team in the design and development of a high-power rocket for the IREC 10K COTS category
- Supervised 7 subsystems, ensuring full system integration and compliance with competition requirements
- Conducted system design reviews to confirm readiness, coordinating with faculty mentors and competition judges
- Defined constraints and derived technical requirements for each subsystem to align with mission objectives

PROJECTS

Coaxial Swirl Injector, Independent June 2025 – Present

- Designed a bipropellant injector optimized for N2O and Ethanol in a 2400N thrust liquid engine
- Conducted preliminary flow simulations in ANSYS Fluent to assess injector behavior and spray characteristics
- Validated flow performance using a 3D-printed resin model, performing tests to verify spray angle and atomization
- Applied Parker O-Ring Handbook guidelines to design seal grooves and select compatible elastomers

Active Aerodynamic Control, USF Rocketry Team (SOAR) June 2024 – May 2025

- Designed a four-bar mechanism to disrupt the flow regime around the rocket, achieving the goal of a variable C_d
- Performed parametric CFD simulations using Ansys Fluent, calculating for the variance of drag over deployment
- Achieved a 26% mass reduction in CNC-machined aluminum parts by slotting non-critical areas, optimized with FEA
- Regressed CFD drag data into a multivariate polynomial equation using MATLAB, reducing computational time for drag calculations and enabling more operations per unit of time in the airbrakes system's PID control

SKILLS

Programing Languages: MATLAB, Python, C#
Software Proficiency: SolidWorks, Ansys Fluent and Mechanical, NX12, COMSOL Multiphysics, Fusion 360, EasyEDA
Certifications: SOLIDWORKS Associate - Mechanical Design (CSWA) & Additive Manufacturing
Fabrication: CNC Machining Programming and Operation, Soldering, 3D Printing, Power Tools, composites handling