

Colton Acosta

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SUMMARY

Junior aerospace engineering student with leadership and collaborative project experience including work in computer-aided design and modeling, specification development, electronics, hardware-software interfacing, and programming. Interests include control theory, signal processing, and avionics. Open to relocation.

EDUCATION

B.S.E, Aerospace Engineering; Autonomous Vehicle Systems
Arizona State University, Tempe, AZ

Graduating May 2022
4.00 GPA

TECHNICAL SKILLS

Presentation and Organization: Microsoft Office, L^AT_EX
Design and Modeling: MATLAB, Simulink, SOLIDWORKS, LabVIEW
Programming: Python, C, C++, Linux (git, vim, gcc, gdb)

EXPERIENCE

Liquid Propulsion Avionics Lead, Sun Devil Rocketry

August 2019-Present

- Leading the design and development of an avionics system for a liquid rocket engine with over 20 hardware components including valves, transducers, thermocouples, load cells, controllers, and signal processing circuitry
- Defined avionics systems functional requirements with a system architecture diagram
- Conducting trade studies on electronic actuators and orifice flow meters to develop main propulsion system specifications using MATLAB for multivariate trade-off analyses and physical modeling
- Building a central telemetry system to integrate flow control and data acquisition systems using RS-485 electrical interfaces for long distance and noise insensitive serial communications
- Wrote a C++ program to generate Gaussian noise for hardware filter testing by writing an algorithm for computing values of an inverse Gaussian cumulative distribution function
- Programming AVR microcontrollers with C for prototype testing of the engine's embedded systems including data acquisition, actuation, flow control, and communications functionality
- Interfacing temperature, pressure, thrust, and flow measurements with a Python graphical user interface
- Built an instrumentation amplifier circuit using operational amplifiers to boost sensor outputs to measurable ranges resulting in hardware savings upwards of \$200
- Designed and built a second order, active low-pass filter and tested the filter's noise reduction and signal reproduction by adding noise to a measured signal with a voltage summing circuit
- Wrote a C program to encode the state of the engine's valves using bit operators for efficient serial data transmission
- Documented project progress in published AIAA Propulsion and Energy conference paper

PROJECTS

Flow Control Valve Actuator Control System

Fall 2020

- Designed and built a closed loop control system for a valve actuator for use in flow throttling applications
- Examined the relationship between Pulse Width Modulation duty cycle and steady state shaft speed to derive a controller output signal with a linear transfer function from controller output to shaft position
- Characterized the plant transfer function a series of step response experiments
- Designed and simulated a saturated PI controller with integrator clamping using Simulink with performance specifications of zero steady state error of step inputs and complete rejection of step disturbances.
- Built the actuator control system using a brushed DC motor, coupling shaft, Arduino controller, and quadrature rotary encoder for feedback.

Orbital Mechanics Trans-lunar Injection Simulation

Spring 2019

- Simulated a free-return, trans-lunar injection orbital trajectory in MATLAB with an animated solution
- Calculated the trajectory by solving the two-body problem using a numerical differential equation solver built from scratch with Apollo 11 low earth orbit initial conditions