

Colton Acosta

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SUMMARY

Junior electrical engineering student with leadership and collaborative project experience including work in computer-aided design and modeling, electronics, hardware-software interfacing, and programming. Interests include control systems, signal processing, communication systems, and embedded software. Open to relocation.

EDUCATION

B.S.E, Electrical Engineering
Arizona State University, Tempe, AZ

Graduating December 2022
4.00 GPA

TECHNICAL SKILLS

Design and Modeling: MATLAB/Simulink, SOLIDWORKS, Microsoft Office, LabVIEW

Hardware: Microcontrollers, Operational Amplifiers, Soldering, Digital Multimeters, Oscilloscopes

Programming: C, C++, Python, 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
- 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
- Building a central telemetry system using RS-485 electrical interfaces for long distance and noise insensitive serial communications between data acquisition, valve control, and main controllers
- 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
- Programming AVR microcontrollers with C for prototype testing of the engine's embedded systems including data acquisition, actuation, flow control, and communications functionality
- 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
- 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
- Wrote a C program to encode the state of the engine's valves using bit operators for efficient serial data transmission
- Wrote, compiled, and debugged all C and C++ code using Linux command line tools such as makefiles, gcc, g++, gdb, avrdude, and vim
- 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