Colton Acosta

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SUMMARY

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

EDUCATION

B.S.E, Aerospace Engineering; Autonomous Vehicle Systems — Graduating May 2022
Arizona State University, Tempe, AZ — 4.00 GPA

TECHNICAL SKILLS

Design and Modeling: MATLAB/Simulink, SOLIDWORKS, Microsoft Office, LabVIEW
Programming: Python, C, C++, Linux (git, vim, gcc, gdb)
Hardware: Soldering, Digital Multimeters, Oscilloscope, Microcontrollers, Operational Amplifiers

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
- 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
- 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 gcc, g++, gdb, and vim
- 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
- Documented project progress in published AIAA Propulsion and Energy conference paper
- Wrote a development plan for the 2020-2021 academic year consisting of 42 deliverables to document project milestones, cultivate a results-oriented work environment, and delegate workloads among new talent

PROJECTS

Electronic Valve Actuator Flow Control System — Fall 2020

- Designed, built, and programmed 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 programmed from scratch with Apollo 11 low earth orbit initial conditions