Colton Acosta

404.430.1346 • cacost12@asu.edu • US Citizen • linkedin.com/in/colton-acosta/

SUMMARY

Junior electrical engineering student with leadership and professional experience including work in PCB design and fabrication, analog and digital electronics, embedded software, programming, and project management. Interests include avionics, control theory, signal processing, and embedded systems. Open to relocation.

EDUCATION

B.S.E, Electrical Engineering <div align="right">Graduating May 2023</div>
Arizona State University, Tempe, AZ <div align="right">4.00 GPA</div>

TECHNICAL SKILLS

Design and Modeling: MATLAB/Simulink, LTspice, KiCAD, Diptrace, SOLIDWORKS, Microsoft Office
Hardware: Microcontrollers, Soldering, Multimeters, Oscilloscopes, Function Generators, Electronic Loads
Programming: C, C++, Python, Linux, Git, ARM Embedded Toolchain, Assembly

EXPERIENCE

Pyramid Technologies, Inc, Mesa, AZ: Electrical Engineering Intern May 2021-August 2021

- Evaluated bill validation errors of a Pyramid bill acceptor in firmware using an in-circuit debugger with the calibration source code, written in coldfire assembly.
- Revised a switching power supply and serial opto-isolator PCB to be used in multiple Pyramid bill acceptors
- Conducted testing and qualification of replacement optocouplers including measurements of logic low voltage and slew rate for ambient temperatures ranging from 0 to 60°C
- Designed a test fixture IO protection PCB to protect test fixture pins from overvoltage and overcurrent conditions using schottky diodes and a PTC resettable fuse
- Conducted phototransistor data collection and analysis with over 150 LEDs to find a viable replacement bill validation LED that would work at scale production
- Designed a revised USB to MDB serial converter PCB by adding serial indication LEDs, signal buffering, inrush current protection, and short circuit protection to the original design
- Designed a revised bill acceptor software development board by adding an electronic fuse to alleviate faulty supply/loading conditions and provide power supply fault indication
- Performed DC load testing on a new 120V AC power supply to measure power trace voltage drops at full load
- Conducted electrical tests and wrote qualification documents for replacement PCB parts to resolve procurement issues
- Tracked project progress and managed feedback on PCB designs and layouts with git and bitbucket
- Resolved electrical issues with dysfunctional test fixtures and equipment used by engineers and production staff
- Wrote Python scripts to calculate external component design values from input specifications and datasheet guidelines

Sun Devil Rocketry: President August 2019-Present

- Managed a technical engineering student organization with over 100 members by overseeing engineering projects, organizing events and meetings, writing budgeting plans, mentoring, and maintaining industry/university relations

Sun Devil Rocketry: Avionics Team Founder January 2021-Present

- Founded an avionics team to teach members electrical and software engineering skills through hands-on projects
- Leading a multidisciplinary team of nine engineering students to design and develop a liquid bipropellant rocket engine
- Designing an avionics system for a liquid rocket engine to manage all engine hardware including including valves, transducers, thermocouples, load cells, motor drivers, wireless transceivers, 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
- Interfacing temperature, pressure, thrust, and flow measurements with a Python graphical user interface
- Designing an instrumentation amplifier PCB with digitally programmable gain to boost available sensor outputs to measurable ranges resulting in sensor savings upwards of 10% of club funding
- Designed an embedded engine controller PCB including a 32-bit ARM Cortex-M7 microcontroller, a switching power supply, an external flash and SD card data logger, and an ignition system

- 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
- Designing an actuation interface for the engine's AC powered flow control solenoids using solid state relays
- Programming microcontrollers with C for software control of the engine's data acquisition, actuation, flow control, and communications functionality
- 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
- 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

5280 Team Member, Sun Devil Rocketry Fall 2018-Spring 2019
- Collaborated with a group of 12 students to launch an amateur rocket to an altitude of 5280 feet
- Determined build specifications, apogee altitude, and static margin with OpenRocket software
- Constructed rocket with phenolic tubing wrapped with epoxied fiberglass fabric and laser-cut fins
- Adjusted final build to pragmatically mitigate static margin calculation error, allowing rocket to be launched on time
- Used a microcontroller breakout board with internal altimeter for parachute deployment

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 with a series of step response experiments
- Designed and simulated a saturated PI controller with integrator clamping using Simulink to meet 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.

Team Lead, Airfoil Statistics Project Spring 2020
- Lead a group of seven students to complete a semester long project by devising a project plan, delegating workloads, setting timelines, and scheduling team meetings
- Collected computational aerodynamic data with Ansys for airflow over a wing section with configurable design specifications created with SOLIDWORKS from a NACA 2412 airfoil parameterization
- Used R programming to analyze data with an Analysis of Variance test and to compute significance-based regression models for wing section lift and drag response to chord length, angle of attack, and sweep angle factors

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