

# Colton Acosta

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## SUMMARY

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Senior electrical engineering student with leadership and professional experience including work in embedded software, programming, PCB schematic and layout design, analog and digital electronics, and project management. Interests include avionics, embedded systems, control theory, and signal processing.

## EDUCATION

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

Graduating May 2023  
4.00 GPA

## TECHNICAL SKILLS

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**Software:** C, C++, Python, GCC Assembler, Linux, Git, Make, ARM Cortex-M, Vulkan

**Hardware:** Verilog, Microcontrollers, FPGA, Soldering (SMD), Multimeters, Oscilloscopes, Function Generators

**Design/Modeling:** LTspice, KiCAD, DipTrace, MATLAB/Simulink, Cadence

## PROFESSIONAL EXPERIENCE

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### Garmin Aviation: Embedded Graphics Software Engineering Intern

May 2022–August 2022

- Developed certification software for a new Vulkan graphics driver to be used in safety-critical avionics systems
- Wrote fuzz tests with randomized test vectors in C to test GPU driver source code with maximal coverage
- Debugged compiler errors of ARM and Windows builds using Visual Studio and MSBuild XML schemas

### Sun Devil Rocketry: President and Avionics Team Founder

August 2021–May 2022

- Oversaw all activities of a technical student organization with three rocket propulsion teams, two amateur rocketry teams, a K-12 outreach program, and over 50 members
- Facilitated all project development by holding meetings and design reviews, writing budget proposals, organizing launch logistics, mentoring, and maintaining industry/university relations
- Founded a new avionics team to design the club's first flight computer and promote the development of electrical and software engineering skills among students interested in the aerospace industry

### Pyramid Technologies, Inc, Mesa, AZ: Electrical Engineering Intern

May 2021–August 2021

- Evaluated bill validation errors of a bill acceptor's firmware using an in-circuit debugger and assembly source code
- Revised a switching power supply and serial opto-isolator PCB to be usable with multiple bill acceptors
- Qualified new optocouplers by measuring logic levels and slew rate for ambient temperatures ranging from 0 to 60°C
- Designed a new PCB to protect test fixture pins from overvoltage and overcurrent conditions using schottky diodes and a PTC resettable fuse
- Collected and analyzed phototransistor data on over 150 LEDs to find a viable bill validation LED that would work at scale production without firmware modifications
- Added serial indication LEDs, signal buffering, inrush current protection, and short circuit protection to a USB to MDB serial interface PCB
- 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

## PROJECTS

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### Sun Devil Rocketry: Flight Computer

January 2021–Present

- Developing a flight computer for high-powered rockets to implement recovery, control, and telemetry functionality

- Equipped the embedded computer with an ARM Cortex-M7 microcontroller, a 9-axis IMU, GPS, a LoRa wireless module, a micro SD card, external flash, and a USB interface
- Programmed the computer with C and assembly for low level control of the microcontroller's peripherals

### **Sun Devil Rocketry: Engine Controller**

August 2019–Present

- Developing a controller for a liquid rocket engine to manage engine hardware and automate ignition sequencing
- Designed the PCB using an ARM Cortex-M7 microcontroller, a switching power supply, external flash, an SD card, ignition terminals, sensor peripherals, a USB interface, and a wireless command and control interface
- Programmed the controller with C and assembly using for low level control of the microcontroller's peripherals
- Programmed a Python interface for real-time visualization of temperature, pressure, thrust, and flow measurements
- Amplified pressure transducer differential outputs to measurable ranges using a programmable amplifier circuit in order to save upwards of 10% of club funding in new sensor costs

### **Sun Devil Rocketry: Valve Controller**

Spring 2022

- Designed, built, and tested a controller to actuate rocket engine valves using an ARM Cortex-M7 microcontroller, solid state relays, a pulse interface, and motor sensors.
- Calibrated valve shaft initial positions using an optoelectronic photogate sensor with customized form factor
- Designed an optically-isolated voltage monitoring circuit to alert the controller when solenoid power is lost
- Programmed the controller in C to process valve actuation commands from the main engine controller

### **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
- Implemented a saturated PI controller with integrator clamping in C++, and simulated the performance using Simulink to meet 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