Colton Acosta

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

EDUCATION

B.S.E, Electrical Engineering May 2023
Arizona State University, Tempe, AZ 4.00 GPA

TECHNICAL SKILLS

Software: C, C++, Python, Assembly, Linux, Git, Make, ARM, Visual Studio
Hardware: Verilog, Microcontrollers, FPGA, Soldering (SMD), Multimeters, Oscilloscopes, Function Generators
Design/Modeling: LTspice, KiCAD, DipTrace, MATLAB/Simulink, Cadence, SolidWorks

EXPERIENCE

Undergraduate Research Assistant: Advanced CMOS January 2022–April 2023

- Assisted in the data collection of a 90nm CMOS process in adverse environments for use in satellite imaging systems
- Designed over ten PCBs for mounting test devices and interfacing with a semiconductor parameter analyser
- Constructed a CMOS measurement setup rated for cryogenic temperatures to emulate temperature conditions in space
- Designed and simulated a transimpedance amplifier to amplify CMOS drain currents and filter high frequency noise

Garmin Aviation: Embedded 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 unit tests with randomized test vectors in C to test the GPU driver source code with maximal coverage
- Debugged compiler errors of ARM and Windows builds using Visual Studio and MSBuild XML schemas
- Resolved runtime errors caused by randomized test vectors by analyzing the source code functions and manually setting up data structures, pointers, arrays, and buffers

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

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 for low level control of the microcontroller's UART, I2C, SPI, and GPIO peripherals
- Developed APIs for accessing IMU and barometric pressure sensor data from application code
- Wrote a data-logger application to collect real flight data for testing, and successfully recovered flight data from a Sun Devil Rocketry high power launch

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
- Developed ignition and data-logging APIs in C to abstract low-level hardware control functionality
- 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
- Developed a solenoid control API in C to implement basic solenoid actuation functions to simplify the application code

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 using a brushed DC motor, coupling shaft, Arduino, and quadrature rotary encoder for feedback