Colton Acosta

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EDUCATION

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

TECHNICAL SKILLS

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

EXPERIENCE

Raytheon Missiles and Defense: Software Engineer I   July 2023–Present

- Implemented new features for a .NET based WebUI used for automating software (SIL), computer (CIL), and hardware (HIL) in the loop missile tests using C# and Javascript
- Wrote a C# method to automatically locate library dll files to eliminate the need for manually setting the path
- Added a new page to the WebUI for monitoring background test status by querying the API using HTTP requests
- Added Javascript keyboard event listeners to results pages to implement quit and save keyboard shortcuts

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

- Developed a flight computer to log flight data and implement parachute recovery in amateur and high power rockets
- Equipped the computer with an ARM Cortex-M4 microcontroller, a barometric pressure sensor, external flash, and a USB interface
- Created three PCB layouts to separately optimize for cost, size, and test by using different design rules (DRC)
- Wrote APIs in C for low level control of external hardware using UART, I2C, SPI, and GPIO
- Wrote a data-logger application to collect flight data, and successfully recovered flight data from several launches
- Implemented the recovery software using a state machine architecture to transition between programming, idle, in-flight, and post-flight states
- Implemented apogee detection, main parachute altitude detection, and landing detection algorithms using a FIFO buffer, Z-transforms, and tuned thresholds
- Tested the recovery software using a vacuum chamber to simulate the pressure loss that occurs during ascent

Sun Devil Rocketry: Liquid Rocket Engine Controller   August 2019–May 2023

- Architected an avionics system which successfully supported ASU's first static hotfire attempt of a liquid rocket engine
- Designed and built an engine controller for to manage engine hardware and communicate with the ground station
- 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 an RS485 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 engine state and sensor 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
- Wrote sequencing code in C to open/close engine values in a timed order to automate a static hotfire test
- Wrote an interrupt driven command processor to communicate with the remote ground station over ethernet

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 valve control API in C to implement basic valve actuation functions for solenoids and servo valves

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