Alan Hsu

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(858)-442-2909

Senior at Thomas Jefferson High School for Science and Technology with experience in engineering design and programming, interested in electrical engineering, power electronics, and aerospace

Skills

Electrical

- Schematic design and board layout with KiCAD
- SMD assembly and reflow
- Board assembly, troubleshooting, modification, and revision
- Lab equipment including power supplies, DC loads, and oscilloscopes
- DC power electronics, microcontrollers, low EMI design, and radiation tolerance
- Design for CubeSat PC104 standard
- Remote Control (RC) electronics, Pixhawk, and LiPo safety

Programming

- OOP, automation, and machine learning using Python
- Microcontroller programming, AVR and ARM register manipulation, and optimization using C
- PID control loops, simple signal filtering, bitwise math, and hardware interfacing (I^2C, SPI, UART, bit-banging, fast port manipulation)
- OOP and data structures using Java
- OS installation, terminal usage, package management in Raspberry Pi and Linux

Mechanical

- Experience with Fusion 360 and Solidworks
- Design for 3D printing, laser cutting, and aluminum extrusion
- Mechanical design
- Materials selection for spacecraft

Academics and Awards

- 4.417 GPA
- 2022 National Merit Scholarship Semifinalist
- 2022 AIAA YPSE Mid-Atlantic Section Best High School Presentation
- 2021 TARC Nationals Qualification

Activities

Electronics Team Lead, TJ UAV Club, September 2021 - Present

- Spearheaded technical design (specializing in electronics) Avalon, an autonomous aircraft with rover payload, camera, and radio mission uplink and data downlink, which competed in the 2022 SUAS competition as Mk 3.5 and will compete in the 2023 SUAS competition as Mk X
- Iterated on the aircraft's electronics bay, which achieves autonomous flight with a Pixhawk 2.4.8 and image processing with a Raspberry Pi 4
- Performed layout and fabrication of laser cut wing ribs and trusses for the second and third wing iterations on Mk X

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- Designed, fabricated, and iterated upon a two-axis self stabilizing camera gimbal for the Sony a5100 camera, tuned camera settings, and developed code for automated image retrieval using gphoto2
- Organized purchase orders and some club finance for hardware acquisition
- Handled electronics in the pits and on the flight line at the 2022 AUVSI-SUAS competition
- Organized tasks and oversaw flight line operations at test flights for Mk X

Senior Advisor, TJ Space Program, formerly Nanosatellite, August 2022 - Present

- Attended the 2022 Small Satellite Conference and presented technical details about TJREVERB
- Designed mission concept and stackup for TJ-BUS, a 3U CubeSat designed to be standardized and easy to build, carrying student research projects into Low Earth Orbit
- Led efforts to prepare for TJREVERB deployment and mission operations
- Designing a Raspberry Pi and Iridium based CubeSat bus using experience from TJREVERB to provide a low cost and easy to use platform for future missions

Intern at Starpath Robotics, June to August 2022

- Starpath is a San Francisco startup designing and building rovers to drill for ice on the Moon and Mars, and submitting its design to the NASA Break the Ice Challenge
- Responsible for all electronics design and assembly for third and fourth Rover iterations, including transitioning from servos to stepper motors and brushed drive motors to brushless, mechanical electronics bay design in Solidworks, cable harness assemblies, and PCB designs for power management

Technical Lead, TJREVERB (Nanosatellite Club), August 2021 to July 2022

- TJREVERB is a 2U CubeSat project started in 2016, designed to measure Iridium signal strength at various points along the ISS orbit, which launched to the ISS on CRS-26 and is scheduled to deploy on December 29, 2022
- Wrote and tested low level hardware drivers for the electrical power system, radios, and IMU
- Brought flight computer PCB design from unfinished to flight ready, and added a real time clock
- Developed all aspects of the Iridium SBD communications system, including a hardware driver for the 9602 modem, protocol design, concept of operations code, and ground station backend
- Designed a radio data encoding system, including custom 3 byte float encoding, to save significant amounts of data per packet on Iridium over string encoding
- Contacted ISISpace and ClydeSpace for testing data on the antenna deployer, solar panels, and battery, and provided all updates on safety data and bill of materials to our launch provider, Nanoracks
- Documented issues and proposed solutions in a best practices document to benefit future missions
- Performed final assembly, oversaw final testing and delivery to NASA in July

Electronics Team, TJ Nanosatellite Club's Balloon Project, September 2020 to June 2021

- Balloon project was a tethered weather balloon to measure 5G signal strength at various altitudes
- Designed the interface PCB, and worked with CAD team to ensure fit
- Led discussions on the mission's concept of operations

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TJ Rocketry TARC Team, September 2020 to June 2021

- The American Rocketry Challenge (TARC) is a rocketry event where teams build rockets that must carry an egg safely to a target altitude and back to the ground
- Assisted in rocket assembly and launch preparation, and attended three launches
- Qualified for Nationals

CodeRaven Volunteer Project, July to November 2020

- Designed and taught lessons for middle school students in basic programming to grow interest in computer science.

TJ Computer Team September 2019 to June 2020 (and USACO from 2019-2021)

- Completed Bronze level at the end of the 2019-2020 season

Personal Projects

More information about my personal projects and many of my contributions to school teams is available at https://www.alanjhsu.com/projects