

Senior at TJHSST with experience in engineering design and programming, interested in electrical engineering and aerospace

Skills:**Mechanical**

- Experience with Fusion 360 and Solidworks
- Design for 3D printing, laser cutting, and aluminum extrusion
- Light experience with CAM for CNC machinery
- Mechanical design, incl. cam and roller, bearing unloading, and detent mechanisms
- Materials selection and design for spacecraft

Electrical

- Schematic design and board layout with KiCAD
- SMD assembly and reflow
- Board troubleshooting, modification, and revision
- Lab equipment including power supplies, DC loads, and oscilloscopes
- Analog amplifiers, DC power electronics, microcontrollers, low EMI design, and radiation tolerance
- Design for Cubesat PC104 standard

Programming

- OOP, machine learning using Python
- Microcontroller programming, AVR and ARM register manipulation, and time optimization using C
- PID control loops, simple signal filtering, bitwise math, and hardware interfacing (I²C, SPI, UART, bit-banging, fast port manipulation)
- OOP and data structures using Java
- OS installation, terminal usage, package management in Raspberry Pi and Linux

Communications

- Familiarity with Iridium Short Burst Data
- Protocol design for maximizing data density and splitting and tracking packets

Activities and Projects:

Project Manager, TJ-BUS (TJ Space Program, formerly Nanosatellite), April 2022 - Present

- TJ-BUS is a 3U Cubesat designed to be standardized and easy to build, to carry student designed research projects
- Designed mission concept and stackup
- Selected components with consideration for power production and attitude control
- Contacted manufacturers for quotes
- Led efforts to prepare for TJREVERB deployment and operations

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

- Working on the Avalon project, an autonomous aircraft with rover payload, camera, and radio mission uplink and data downlink, which competed in the 2022 SUAS competition and will compete in the 2023 SUAS competition
- Designed, assembled, and iterated on the aircraft's electronics bay, including a Pixhawk flight computer, Raspberry Pi Zero image processor, Ubiquiti Bullet WiFi antenna, RC Receiver, and RFD900X telemetry radio.
- Assisted in mechanical design and assembly of the plane, including a flaps mechanism, payload release mechanism, and horizontal and vertical stabilizer mount.
- Spearheaded design of a 2 axis self stabilizing camera gimbal for the Sony A5000 camera, tuned camera settings, and researched camera options for gphoto2 compatibility.
- Ensured battery safety and longevity with good charging and discharging practices
- Formatted purchase orders for finance
- Organized meeting task lists
- Attended most test flights and assisted in setup, cleanup, and maintenance
- Assembled and tested electronics at competition

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.
- Handled 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, scheduled to launch on SpaceX CRS-26 in November 2022
- Wrote and tested low level hardware drivers for power system, radio, and IMU
- Brought flight computer PCB design from unfinished to flight ready, and added a real time clock and IMU
- Developed all aspects of the Iridium 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
- Reorganized the lab area and designed a flatsat PCB to make flatsat prototyping easier for future missions
- Performed much of the 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, worked with CAD team to ensure fit
- Discussed the mission concept of operations

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, attended three launches
- Qualified for nationals, was not able to go due to FCPS field trip policy

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

Most of my personal projects, including a flight simulator throttle, a 2 axis self-stabilizing camera gimbal, a PCB reflow hotplate design, and an ongoing cubesat EPS and Battery design are available on github:

<https://github.com/Alan-JH?tab=repositories>