

You can find more information about me and my projects at shihaocao.com

Summary

I'm a 12th-grade student at TJHSST interested in a future in Aerospace Engineering.

Experience

Intern at Exo Analytic Solutions

Jun 2018 - Aug 2018

- Over the summer I worked on a rapid prototyping project involving a cheap deployable defense solution for drones. Specifically, I developed a small unit to detect drones using cameras and analysis. I delivered a fully operational and demonstratable prototype within my time at Exo.

Student Project Lead for TJ REVERB (CubeSat)

Jan 2018 - Present

- Manage students to ensure that each team member is informed and tasked.
- Coordinate between subsystems
- Spearhead development of VHF radio communications software
- Spearhead development of Python-based CubeSat mission software
- Primary hardware and software integrator

President of UAV Club

Sept 2018 - Present

- Lecture students on programming, CAD, electronics, and aerodynamics
- Spearhead development of fixed-wing cargo UAV (3m wingspan) for AUVSI SUAS competition
- Host weekend build meetings for competitions and for fun
- Instruct students on how to fly RC Aircraft

Intern at Kashmir World Foundation

Oct 2016 - May 2018

- Researched computer vision for drone-based aerial image recognition.
- Primary test pilot for fixed wing and multi-copter prototypes
- Helped to develop a large (2.5-meter wingspan) fixed-wing drone for long endurance aerial imaging and counter poaching
- Constructed multiple APM flight computer based custom drones

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Education

Thomas Jefferson High School for Science and Technology

GPA: 4.502

Currently Enrolled: Multivariable Calculus, Electrodynamics, Computer Vision 1 & 2, Energy Systems Research, AP Literature, AP Government

Previous Courses: Artificial Intelligence 1 & 2, Prototyping 1 & 2, Robotics 1 & 2, AP Physics, AP Chemistry, AP BC Calculus, AP Computer Science, AP US History, AP Chinese

Activities and Societies: Nanosatellite Club, UAV Club, Go Club, Wrestling, FIRST Robotics

Honors and Awards: Hack TJ 2017 Fannie Mae Award

Skills

Fusion 360

- Timeline and parametric CAD
- CAM design for CNC machinery

AutoCAD

- 2D design and layout

Autodesk CFD (Computational Fluid Dynamics)

- Wind tunnel analysis
- Lift/Drag analysis

Mathematica:

- Mathematical analysis

Rapid Prototyping:

- 3D Printing
- Laser Cutting

Prototyping:

CNC Mill	Band Saw	Lathe	Metal Casting
CNC Router	Table Saw	Router	Welding
CNC Lathe	Drill Press	Dremel	Soldering Iron

Programming:

- **Python (3 years):** OOP, data visualization, data analysis, pathfinding, machine learning, neural networks, backpropagation.
- **Java (2 years):** AP CS, OOP, neural networks
- **C (1 year):** VHF radio programming through the serial interface for TJ REVERB
- **C++ (1 year):** OOP, graphics parallel processing
- **HTML & CSS (2 years):** see shihaocao.com & Website design lead for TJ REVERB.

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- **Arduino and Applied Robotics (3 years):** servo operation, XBee data transmission, live sensor feed, brushless motor operation, ESC programming
- **Raspberry Pi & Linux (2 years):** VM/Other OS installation, terminal usage, computer repair
- **Github (3 years):** Version control, software project management

Drone Technology:

- **Drone Construction (5 years):** Work on large fixed wing drones with 5+ pound payloads, work on quad/hexacopter platforms with onboard Raspberry Pi for data computation. Extensive experience with Arducopter/plane & APM based flight controllers.
- **Autonomous Drone Control & Stabilization (2 years):** MAV Proxy, Drone Kit, autonomous pre-planned flights and Mission Planner Ground Control Software.
- **Hobby Aircraft (5 years):** Foam/Balsa electric aircraft for “fun”, custom end to end airframe/power system design for Hobby grade flight platforms.
- **UAV Piloting / Ground Control (4 years):** RC fixed wing and multicopter pilot for hobby and commercial untested prototypes. Experienced in handling in-flight emergencies.

Personal Projects

Electric Longboard

June 2015

- I built an electric longboard powered by a brushless motor and Li-Po batteries. It's capable of accelerating up to 25 kph up a 20-degree incline and going up to 5km on one charge.

Thrust Vectoring EDF Rocket Lander

January 2018

- I designed and built a thrust vectoring system for an EDF (Electric Ducted Fan). I used a 90mm EDF with a 6S Li-Po and a 100A ESC. The system delivers about 4 pounds of thrust and has a 1.2 thrust to weight ratio capable of hovering.

Remote Control F-86

May 2018

- I designed, built and flew a 700mm wingspan RC F-86 powered by a 64mm EDF, 4S Li-PO and a 80A ESC. I used Fusion 360, AutoCAD, and Autodesk CFD to do most of the design work. I've outlined my project on my website. I'm currently working on a 900mm version with improved takeoff and landing performance (adding flaps and all-flying tail).