

# Jason Chen

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## SUMMARY

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I'm a senior at Thomas Jefferson High School for Science and Technology interested in liquid rocket propulsion.

## EXPERIENCE

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### **Project Lead & Chief Engineer, Project Caelus** (*Nov. 2018 - Present*)

- Founded Project Caelus, a fully student-run 501(c)(3) organization aiming to design, build, and fly the world's first high-school-built suborbital liquid rocket. 09/13/20: Completed a cold flow test of our pressure blowdown 1.5kN ethanol/nitrous system to test plumbing/injector characteristics, telemetry, and control
- Main author of research presented at national AIAA conferences, full system research paper is [linked here](#)
- Responsible for full engine design. Delegated subsystem R&D, set timelines, integrated hardware/software
- Optimized nozzle geometry via a minimum-length MOC diverging section to neutralize PM expansion fans
- Designed injector for manufacturing ease (O-ring config/part count) and to prevent combustion instability
- Performed transient fluid flow calculations to iterate P&ID configurations and minimize pressure drops
- Ran pressure vessel testing routines to isolate and resolve failure nodes; significantly upped safety factor

### **Intern, U.S. Naval Research Laboratory** (*Jun - Aug 2019*) for Dr. Olson, Optical Sciences Division

- Used kPCA and manifold/unsupervised learning to detect anomalies in satellite hyperspectral imagery
- Developed RL-based control systems to reduce warship power consumption, extending naval capabilities

### **Intern, U.S. Naval Research Laboratory** (*Jun 2020 - Present*) for Corbin Wilhelmi, LASR

- Designed a semi-autonomous VTOL tiltwing rotor aircraft with level-flight capabilities for disaster relief
- Iterated airframe and rotor configurations to maximize control authority and smoothen takeoff transients

### **Systems & Mechanical Engineer, TJ UAV** ([AUVSI SUAS](#)) (*Sept. 2018 - Present*)

- Airframe characterization; finding ideal taper ratio and static margin (XLFR & Matlab) for maneuverability
- Applied wind tunnel testing; optimized fuselage structure and selected airfoil type to minimize dry weight
- Used Ardupilot/Mission Planner for autonomous flight, TCP sockets/telemetry radios for comm systems

## EDUCATION

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### **THOMAS JEFFERSON HIGH SCHOOL FOR SCIENCE AND TECHNOLOGY, ALEXANDRIA, VA 22312**

**Weighted GPA (June 2020):** 4.268/4.0

**Relevant Courses:** Quantum Mechanics & Electrodynamics, Multivariable Calculus, Linear Algebra, AP Physics C M&EM, AP Chemistry, AP Calculus BC, Artificial Intelligence, Automation & Robotics, AP Computer Science A+

## RELEVANT SKILLS

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### **ENGINEERING/MANUFACTURING:**

- **Fusion 360 CAD (4 years):** Advanced. Assembly and parametric CAD design with CNC & 3D printing
- **ANSYS CFD (3 years):** Basic thermal and combustion, supersonic compressible flows (rocket exhausts)
- **Applied Electronics (2 years):** Iridium radio, device communication and interfacing (i2c, serial, SPI), soldering, PCB design via Eagle, microcontrollers (Arduino & Teensy, Raspberry Pi), motors & ESCs
- **Machining (2 years):** Basic CNC milling, manual & CNC lathe, bandsaw, drill press, laser cutter, sander

### **PROGRAMMING:**

- **Python (4 years):** Fluent. [TJREVERB](#) & Project Caelus flight software, GUIs, OpenCV, TensorFlow for unsupervised anomaly detection, chaotic systems modeling, reinforcement learning (e.g. PPO, A3C, DQ)
- **Matlab (3 years):** Moderate. Global optimization for wing design, MOC for nozzle design, rocket thrust vectoring PID design & tuning, reinforcement learning. Simulink for rocket plumbing and its controls
- **C++ (2 years):** Moderate. Sensor integration for Caelus FS, basic drivers & control tasks for MCL

## HONORS

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- ISEF Science Fair International Finalist (2020) for design of a novel supersonic nozzle contour using ML.
- International Finalist for the Breakthrough Junior Challenge (2018), International Finalist at the New York Academy of Sciences (2017), Regional & State Science Fair: Patent & Trademark Award in Mechanical Engineering (2019), First Place Project in Engineering (2020), AIAA 1<sup>st</sup> Choice Engineering Project (2019), ASME Excellence in Engineering (2020), NASA Goddard Space Flight Center ELO (2019, 2020).