Jason Chen

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Summary

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

Experience

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 shock energy losses
- ➔ 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

Flight Software Sub-Lead & Avionics Integrator, TJ Nanosatellite (TJREVERB) (*Sept. 2018 - Present*)

- ➔ Developed flight software that: determined satellite attitude (converting coordinate systems and actuating magnetorquers), propagated orbital decay, interfaced electronic power system with spacecraft systems

Education

Thomas Jefferson High School for Science and Technology, Alexandria, VA 22312
Weighted GPA (June 2020): 4.268/4.0
Relevant Courses: Quantum Mechanics/Electrodynamics, AMT, Multivariable Calculus, Linear Algebra, AP Physics C M&EM, AP Chemistry, AP Calculus BC, Artificial Intelligence, Automation/Robotics, AP Computer Science A+

Relevant Skills

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

- 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 1st Choice Engineering Project (2019), ASME Excellence in Engineering (2020), NASA Goddard Space Flight Center ELO (2019, 2020).

Last updated: 06 November, 2020