Timothy Cai

timothycai2004@gmail.com | +1 778-512-5896
portfolio | linkedin

Education

Bachelor of Engineering - Mechatronics **Sep 2022 - May 2027**

University of British Columbia | 3.6 GPA *Vancouver, BC*

Skills

Design Skills CAD | Electronics Design | Coding | Rapid Prototyping | FEA | Data Analysis | CFD

Technologies SOLIDWORKS | OnShape | FUSION360 | Arduino | KiCAD | Autodesk EAGLE | C++ | Python | MATLAB

Highlights

- Currently designing and testing a **regeneratively cooled**, 3.5kN ethanol/nitrous rocket engine with a **gas centered coaxial swirl** injector and **CFD-informed** geometry.
- Designed and flew a self-stabilized thrust vectoring rocket, with **guidance electronics** designed in EAGLE and control algorithms written in **C++ and Python**, achieving **±3.5 degrees of stability**.
- Created and analyzed a **supersonic rocket** in **SOLIDWORKS**, with the rocket reaching a top speed of **1280km/hr** and an altitude of **2.8km** and successfully recovering.
- Completed over **400 hours** of **lathe, mill, and waterjet** operation. Versed in **CAM** and **additive manufacturing**.

Experience

Atomic Semi **May 2025 - Aug 2025**

Mechanical Intern *San Francisco, CA*

- Designed and deployed a "**tractor beam**" by applying a **novel solid-state**, gripper design optimized with **modal analysis**, generating a negative squeeze-film to hold silicon wafers and patterned masks at a 40 micron distance and transport them at up to 3Gs of acceleration with **zero surface contact**.
- Engineered and automated an **in-house butterfly vacuum valve** using **OnShape** and **C++**; the hardware and electronics achieved better-than-industry **helium-tight** sealing at 10^{-10} torr-l/s while both reducing manufacturing **costs by 86%** (from $1,000 to $140 per unit) and **extending lifetime** by over 15x (to 15,000 cycles).
- Rapidly prototyped and installed an **automated vacuum chamber door** for atomic layer deposition (ALD) within a day; this design was productionized and deployed, drastically reducing equipment downtime and supporting **thousands** of operational cycles without failure.

ARTMS Inc **May 2024 - Dec 2024**

Mechanical/Mechatronics Intern *Burnaby, BC*

- Designed and implemented a solid target **leak check station** utilizing Festo and Swagelok pneumatic components, resulting in a **increase to 100%** target manufacturing success.
- Generated schematics and board layouts with constant current and voltage architecture for ARTMS's **automated radioisotope recycling** product using KiCAD, reducing space by 85%.
- Employed geometric tolerancing and dimensioning (**GD&T**) for part manufacturing, ensuring effective communication with machinists.

DI Self-Composites **Aug 2023 - Sept 2024**

Mechatronics Engineering Intern *Vancouver, BC*

- Utilized **SOLIDWORKS** to rapidly design and prototype a movement system capable of **printing metal** at 400mm/min in a highly volatile and **abrasive environment 20% under budget**.
- Operated **CNC mills, 3D printers, waterjets,** and other machines to manufacture the movement system in-house.
- Adapted existing Marlin code and **wrote custom firmware** to quickly produce a **full-featured** printing solution.

Teams and Projects (see portfolio)

UBC Rocket **May 2021 - Present**

Propulsion Lead *Vancouver, BC*

- Led a team in the design, construction and static fire preparation of a flight capable, 2.5kN kerosene/liquid oxygen rocket engine.

Team Zephyr Satellite Design Team **Sep 2021 - Jan 2023**

Team Captain *Bologna, IT*

- Led a team in the production of a CanSat, accomplishing first place at the Canadian CanSat Challenge and representing Canada at the European Space Agency (ESA) CanSat Competition.