

Frank Hao

Email: Frankie.hao@mail.utoronto.ca

Linkedin: www.linkedin.com/in/frank-hao1

Phone: (647) 987-4449

Portfolio: lowinertia.com/portfolio/frankhao

EDUCATION

Bachelor of Applied Science in Mechanical Engineering + PEY Co-op

University of Toronto, Toronto, ON

Sept 2024 – April 2029

- **Intended Minor:** Artificial intelligence and Engineering Business
- **Deans Honour Roll Award (3x)**
- **Relevant Coursework:**
 - Mechanical Engineering Design | Engineering Analysis | Electric Fundamentals | Manufacturing Engineering
 - Material Science | Solid Mechanics | Physical Chemistry | Earth System Science
 - Fundamentals of computer programming | Fundamentals of Accounting and Finance
 - Numerical Analysis and Computational Methods

SKILLS

- **Programming Languages:** Python | MATLAB
- **Engineering Software:** SolidWorks (CSWA) | ANSYS (FEA) | RETScreen
- **Manufacturing & Fabrication:**
 - Additive Manufacturing & prototyping | Composite Manufacturing (Carbon Fibre) | Machining (Manual, C&C)
- **Technical Skills:**
 - Design for Manufacturing | Design for Reliability | Design for Modularity | Design for Sustainability
 - Mechanical System Design | Structural & Airframe Design | Kinematics & Mechanism Design
 - Gear & Transmission Design | Tolerance & Fastener Design | Energy Systems Modeling
 - Data Analysis & Market Segmentation
- **Professional Skills:**
 - Project Management | Engineering Documentation | Client Presentations | Excel | PowerPoint

PROJECT EXPERIENCE

Motion Control Camera Rig - Course Design Project Lead

September 2025 - January 2026

Mechanical Engineering Design, MIE234, University of Toronto

- Designed a 6-DoF camera motion-control robot in **SolidWorks**, producing a fully constrained mechanical assembly capable of precise positioning and unrestricted orientation.
- Generated **manufacturing-ready drawings** with tolerances and fastener design, and kinematic constraints to ensure assembly feasibility.
- Performed structural, dynamic, and load-path simulations using **ANSYS FEA** to validate stiffness, minimize vibration, and optimize actuator torque.
- Optimized housing and linkages design through material selection, cost analysis, and **design-for-manufacturability** to balance performance, weight, and production cost.
- Validated fabrication readiness by leading integrated design reviews, finalizing team decisions, and conducting rigorous **engineering documentation**.

Marketing Strategy Consultant - P&G Engineering Case Competition (2nd Place)

September 2025

- Designed a market research study using **data analysis and market segmentation**, combining survey analysis, demographic segmentation, and behavioral frameworks to identify product awareness gaps among Canadian consumers.
- Developed a multi-variable ROI model using **Python (Pandas) and Excel**, integrating demographic data and price-elasticity analysis to forecast advertising campaign performance in the Canadian market.
- Proposed an integrated advertising campaign that projected a 12% increase in household penetration.
- Delivered a 10-minute executive presentation to industry judges, demonstrating **persuasive communication** and **data visualization** skills under time-constrained conditions.

Engineering Consultant - University of Toronto Sustainability Office

January 2025 - April 2025

- Developed and modeled in **SolidWorks**, a solar-powered microgrid proposal for the University of Toronto Medical Sciences Building, defining a Phase-1 deployment of 114 photovoltaic modules to offset 42.6 MWh annually ($\approx 5\%$ of building demand) and reduce 7.9 metric tons of CO₂ emissions.
- Modeled seasonal energy output and conversion efficiency using **Python and MATLAB**, applying thermodynamic and materials principles to forecast system performance under variable irradiance conditions.
- Evaluated multiple microgrid configurations through **mechanical system design** trade-off analysis, integrating solar resource data, structural roof constraints, mechanical loading limits and seasonal demand profiles.
- Conducted lifecycle cost, payback, and financial feasibility analyses using **RETScreen and Excel**, integrating economic and sustainability metrics to support long-term investment justification.
- Led the development of a comprehensive engineering report through **project management** and **engineering documentation**, coordinating stakeholder analysis, objective prioritization, weighted decision criteria, and preliminary mechanical prototyping of the PV tilting mechanism.
- Presented technical findings to faculty and sustainability clients through client presentations, winning **3rd place** in the course, and praised by client for strong analytical rigor, cross-disciplinary system integration, and professional presentation quality

EXTRACURRICULAR EXPERIENCE

Mechanical Designer - University of Toronto Aerospace Team (Mechanical Subteam)

September 2025 - Present

- Designed the complete mechanical architecture of the *Cyclone* heavy-lift hexacopter drone using **SolidWorks**, including airframe, landing gear, and fastener interfaces, supporting up to 5 kg payload.
- Led end-to-end mechanical development from concept, through detailed CAD models, and fabrication using **composites and FDM printing**, producing flight-ready components using resin molds and carbon-fiber layups.
- Engineered a rigid quick-release payload mounting interface using **structural design** and **load path analysis**, to safely transmit full payload while enabling rapid attachment under mission constraints.
- Designed the landing gear using **structural and airframe design**, optimized for variable real-world surfaces, prioritizing rigidity, stability, and impact tolerance.
- Performed **ANSYS FEA** validation on airframe members, landing gear, and fastener interfaces, to ensure durability under worst-case loading and sudden impacts.
- Executed ~ 12 design iterations using **design for additive manufacturing (DfAM)**, resolving layer delamination, warping, and anisotropic strength limitations through geometry refinement and material selection.

Certifications and Training

- Certified Solidworks Associate (CSWA)
- Machine Shop Certification – UofT Machine Shop & George Brown College
- Machine Shop Safety & Equipment Training (Lathe, Mill, Drill Press)
- MATLAB Fundamentals
- WHMIS