

Tristan Yan-Klassen

Mechatronics Engineering Student, University of Waterloo
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TECHNICAL SKILLS

Applications: SolidWorks (CSWP), Fusion 360, AutoCAD, KiCAD, MATLAB, Simulink, Git
Manufacturing: 3D Printing, CNC, Mill, Lathe, Sheet Metal, DFMA, GD&T, PCB Assembly, Soldering
Hardware: Oscilloscope, Signal Generator, Multimeter, Arduino, ESP32
Languages: C/C++, Python, Java, VBA

EXPERIENCE

Engineering Intern

Jan. 2025 – Apr. 2025

Oxygen8 Solutions Inc.

- Designed and implemented Ventum H wire harness to cut material cost 30% and assembly time 75%.
- Created global electrical standard for unit wiring and standard templates for SolidWorks Electrical.
- Conducted DFMA analysis of Terra 2.0 to reduce part count by 56% and assembly time by 20%.
- Developed prototype electrical boxes for Terra V and Terra 2.0 unit lines.
- Designed custom wire tester PCB around ESP32 with screen for data tracking and feedback.

Aerodynamic Controls System Development

Sep. 2024 – Present

Waterloo Rocketry

- Built 6DoF rocket simulation in Simulink to test canard control algorithms for sounding rocket.
- Independently conducted aerodynamic analysis and FMEA to determine the viability of unlinked canards.
- Designed, modeled, and calibrated a robust mechanical linkage for the canard system.
- Performed HIL testing to validate full system integration and verify controller and actuator response.
- Independently researched and developed a model for fin flutter on active aerodynamic surfaces.

Team Lead

Sep. 2023 – Jun. 2024

Team Canada CanSat

- Represented Canada as national champion at the European Space Agency, placing 1st of 18 teams.
- Led team of 6 to build a prototype space lander to remotely core and test a soil sample.
- Designed, modeled, and manufactured drilling apparatus with drill, testing chamber, and landing legs.
- Integrated electronics, drilling apparatus, and recovery system into can sized lander.

Coach and Volunteer Coordinator

Jan. 2025 - Present

Canadian Physics Olympiad

- Lectured and created handouts for Team Canada in preparation for the International Physics Olympiad.
- Developed problems for and test-solved the 2025 CAP Prize Exam and Canadian Physics Olympiad.
- Independently organized and coordinated ten alumni volunteers to support the CPhO program.

PROJECTS

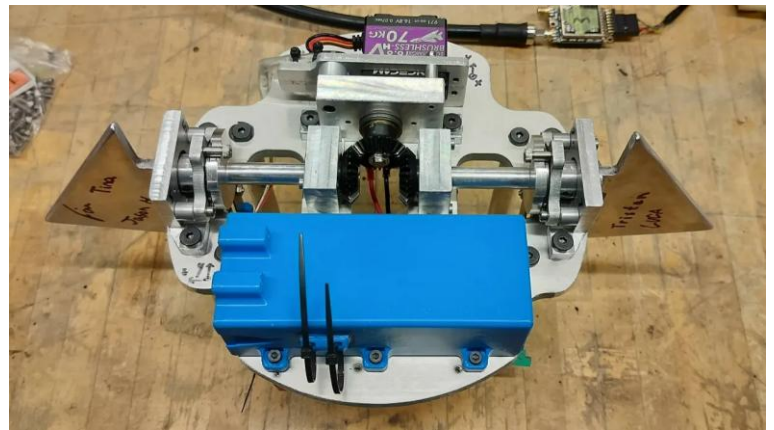
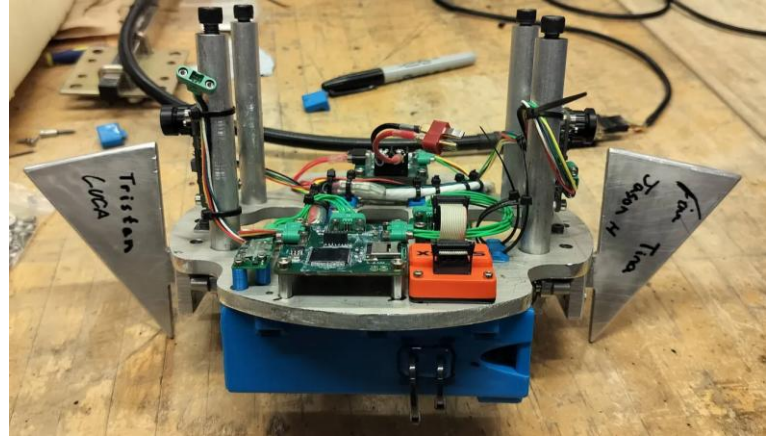
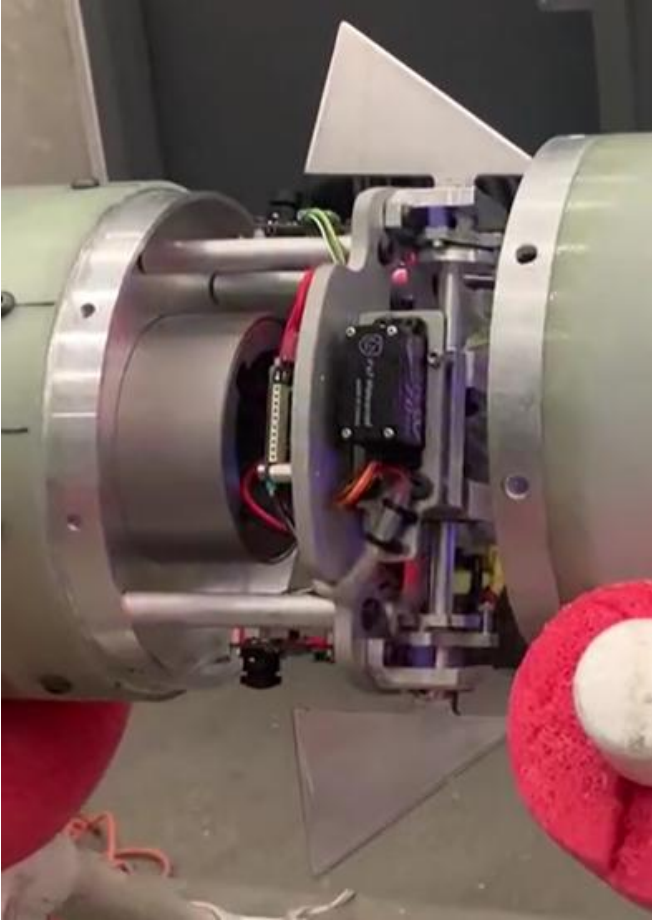
Smart Tool Rack

- Built a smart tool rack to follow a user around the workshop to always have tools close at hand.
- Programmed onboard embedded system using C, incorporating multi-threading to handle concurrent tasks.
- Included distance tracking, object detection, and collision avoidance capabilities.
- Fully custom aluminum frame and laser-cut rotating tool rack designed to safely support 200 lbs.

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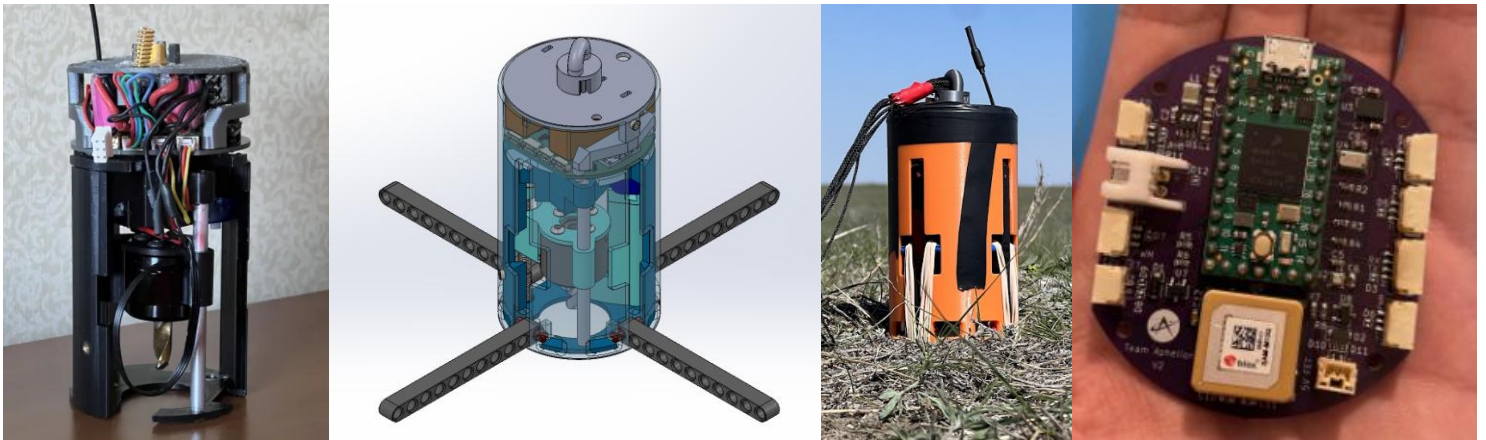
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Sounding Rocket Canards



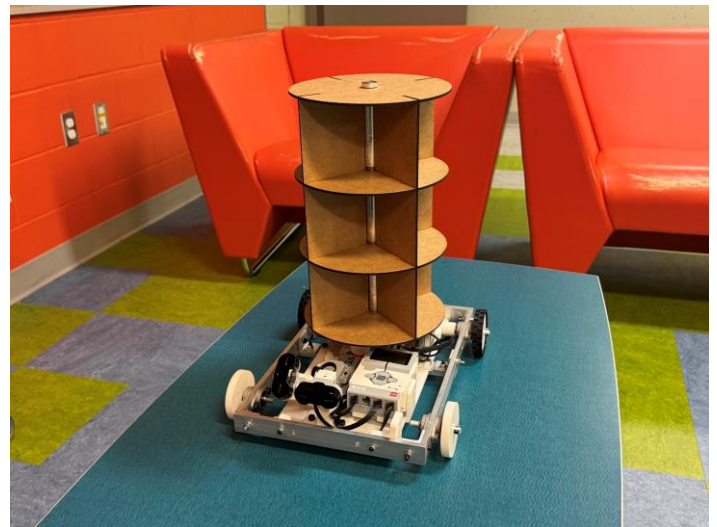
- Designed mechanical linkage for canard system.
 - Designed gearbox to ensure that canards locked to affect roll only with minimal backlash.
 - Calibrated canard positions and programmed servo to limit actuation to safe interval.
 - Incorporated layers of mechanical soft and hard stops to ensure safe operation.
- Conducted aerodynamic analysis of canard behavior and rocket dynamics.
 - Conducted dispersion analysis for failure of unlinked canards, determining non-viability.
 - Developed model for canard flutter, adapting standard models to control surfaces by independently considering aerodynamic forcing and restoring effects.
 - Sized canards for optimal control authority and determined required servo specs.
- Developed roll forcing and damping, atmosphere, and sensor components of rocket simulation.
 - Used simulation to validate controller algorithm and perform HIL testing.
 - Verified mechanical system and actuator response using simulation.
- Set data logging and communication standards for maximal functionality and future development.

Prototype Space Lander (CanSat)



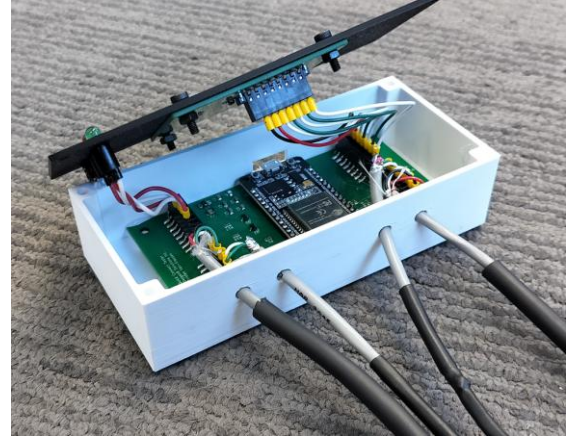
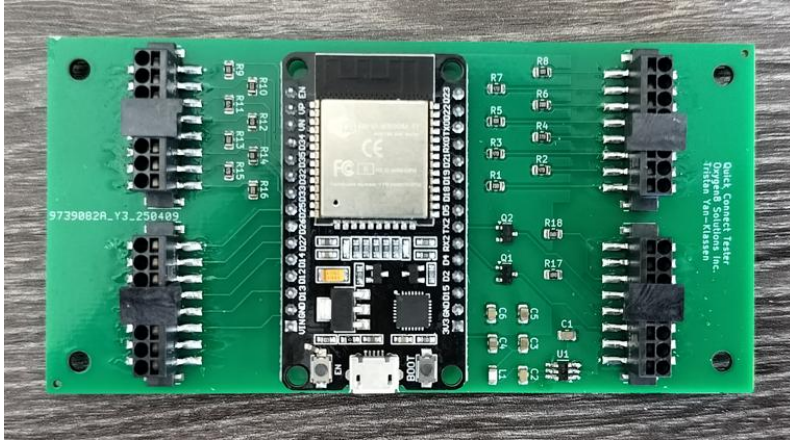
- Designed drilling apparatus composed of landing legs, drill apparatus, and testing chamber.
 - Elastically powered landing legs to upright CanSat upon landing.
 - Custom machined drill bit fastened to motor and deployed via lead screw.
 - Compact testing chamber to test soil sample for presence of amino acids.
 - FPV camera in drill apparatus to remotely operate testing system.
- Designed optimized electrical bay and modelled entire lander to ease integration.
 - Integrated LiPos, radio, recovery, custom PCB, and wire harness into 30mm depth.
- Code, CAD, and more on [project page](#).

Smart Tool Rack



- Turned shafts, milled shafts, and laser cut shelving to manufacture frame.
- PID control on operator distance and heading to maintain desired distance and orientation.
- Remote control to adjust desired distance, mode of operation, and rotate tool rack.
- Rear facing ultrasonic sensor used to detect objects and prevent collisions.

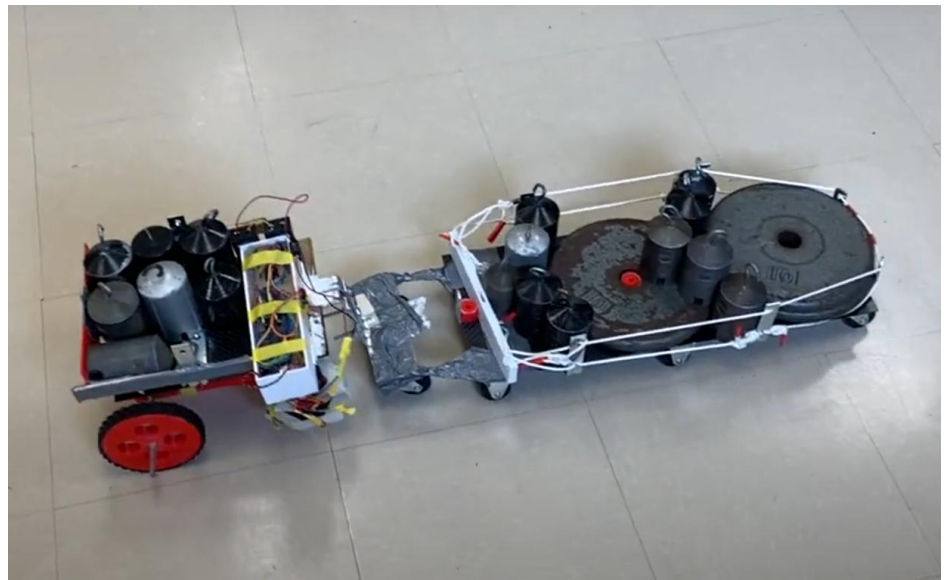
Quick Connect Tester



- Designed custom PCB to test quick connect wires.
- Reliably detects shorts and incorrect wiring.
- Built around ESP32 with voltage dividers to check wires.
- SPI LCD screen used for data tracking and feedback.
- Efficiently powered by AA batteries with buck converter.



DC Motor Car



- Built a BLDC motor powered by custom breadboard ESC for maximal power output.
- Designed and 3D printed drive train to tow nearly 100 pounds on two 9V batteries.
- Constructed trailer out of carbon fiber for maximal carrying capacity.