Gavin Tranquilino

Mechatronics Engineering Student

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Education

University of Waterloo **June 2028**
Candidate for BASc in Mechatronics Engineering *Waterloo, ON*

- **Coursework**: Data Structures, Algorithms, Linear Algebra, Circuits, Structure and Properties of Materials, Object Oriented Programming

Technical Skills

Mechanical: SolidWorks, AutoCAD, Fusion360, GD&T, CAD, 3D Printing, Machine Tools

Electrical: KiCAD, I2C, SPI, UART, Arduino, ESP-IDF, Soldering, Oscilloscope

Software: Python, C, C++, ROS2, Docker, CMake, OpenGL, OpenCV, Linux, Ubuntu, Git

Experience

Undergraduate Research Assistant September 2024 – December 2024
University of Waterloo - Engineering IDEAs Clinic *Waterloo, ON*

- Designed, instrumented, and analyzed a digital twin of a crutch in **SolidWorks**, optimizing material selection via FEA for realistic load scenarios.
- Led a **ROS2** workshop for 100+ students, introducing fundamental concepts and streamlining **Docker** installations.
- Built and demonstrated wall-following robots using **Gazebo** and **TurtleBot3**, showcasing **LIDAR** integration and sensor interfacing in Python.
- Implemented **PID** control algorithms in **C++** and **Python** packages, providing practical demos for 100+ attendees.

Mechanical Engineering Associate January 2024 – April 2024
Sheartak Tools Ltd. *Waterloo, ON*

- Designed 15 custom mechanical assemblies in **SolidWorks** for woodworking machinery to ensure precise fit and function.
- Applied **GD&T** principles to guarantee manufacturing accuracy for custom machine parts.
- Created 25 detailed installation manuals, including parts lists and assembly instructions, ensuring ease of use for customers.
- Developed a **Python** script to upload 2000+ products on Shopify, saving 5 hours of manual work per week.

Robotics Engineering Team Lead February 2023 – May 2023
Skills Ontario *Etobicoke, ON*

- Developed embedded **C/C++** Arduino program to drive 3-phase motors and bluetooth controls.
- Designed custom protoboard assembly using **SMD** and **TH soldering**, saving 30% chassis space.
- Routed electronics using **KiCad**, resulting in efficient and customized layouts for a custom robot from scratch.
- Drafted aluminum chassis using **AutoCAD**, increasing durability and space in the robot chassis.

Projects

Instrumented Knee Crutch |

- Designed **SolidWorks CAD** digital twin of crutch, simulating load for educational demos used by 300+ attendees.
- Performed **FEA** to analyze the material selection of the knee crutch.
- Researched and integrated strain gauges and load cells, raising load measurement range from 10kg to 50kg.
- Created single-board load cell schematics in **KiCAD**, streamlining sensor integration.
- Established **I2C** and serial comms via Arduino, converting a bathroom scale for real-time load measurements.
- Built **Python** scripts for force distribution visualization in Matplotlib, with data logging for workshop analysis.

Blink Twice If You Need Help |

- Engineered a computer vision wearable using **OpenCV** for real time eye tracking, triggering immediate calls for assistance.
- Integrated Twilio for swift emergency contact, reducing response time.

IoT Light Switch Bot/Mount |

- Designed a **3D-printed** mount with an integrated web application for remote light switch control.
- Implemented an Ubuntu **Linux** web server, enabling remote **HTTP** access to room lights globally.
- Innovatively enhanced safety by designing a physical light switch mount, eliminating high-voltage work.