# Gavin Tranquilino

*Mechatronics Engineering Student*

gtranqui@uwaterloo.ca
gavintranquilino.com
linkedin.com/in/gavintranquilino
github.com/gavintranquilino

## 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** | *SolidWorks, C++, Python, Matplotlib, KiCAD, 3D Printing, Machine Tools*

- 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** | *Python, OpenCV, Twilio, Git, GitHub, Face Tracking*

- 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** | *Python, Flask, 3D Modelling, 3D Printing, Fusion360, Linux, HTTP*

- 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.

## 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

## 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