

# Gavin Tranquilino

*Mechatronics Engineering Student*

[gavintranquilino.com](https://gavintranquilino.com)

[gtranqui@uwaterloo.ca](mailto:gtranqui@uwaterloo.ca)

[github.com/gavintranquilino](https://github.com/gavintranquilino)

[youtube.com/@gavintranquilino](https://youtube.com/@gavintranquilino)

[linkedin.com/in/gavintranquilino](https://linkedin.com/in/gavintranquilino)

## EDUCATION

### University of Waterloo

June 2028

*Candidate for BASc in Mechatronics Engineering*

*Waterloo, ON*

- **Coursework:** Data Structures, Algorithms, Linear Algebra, Circuits, OOP, Microprocessors, Digital Logic (FPGA, PLC), Mechanics of Deformable Solids, Structure and Properties of Materials, Statistics, Ordinary Differential Equations

## EXPERIENCE

### Undergraduate Research Assistant

September 2024 – December 2024

*University of Waterloo - Engineering IDEAs Clinic*

*Waterloo, ON*

- Instrumented a wearable knee crutch, allowing force readings for gait analysis and material selection via **FEA**.
- Built swarm robots using **Gazebo** and **TurtleBot3**, showcasing **LIDAR** integration and **odometry** in Python.
- Implemented **adaptive cruise control** on physical robots using **PID** controllers in **C++** and **Python** packages.
- Utilized **Docker** to enable robot development across all operating systems, streamlining the deployment of **ROS2** apps.

### Mechanical Engineering Associate

January 2024 – April 2024

*Sheartak Tools Ltd.*

*Waterloo, ON*

- Designed 15 custom mechanical assemblies with **DFMA** 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 a digital CAD twin of an existing knee crutch in **SolidWorks**.
- Developed a **data aquisition** system using **I2C** and Arduino, converting a bathroom scale for real-time load measurements.
- Researched and integrated **strain gauges** and **load cells**, raising load measurement range from 10kg to 50kg.
- Prototyped **3D-printed** mounts and knee platforms for strain gauges, ensuring user comfort.
- Built **Python** scripts for force distribution visualization in **Matplotlib**, with data logging for **gait analysis**.

### Self-Balancing Unicycle

- Utilized **C++** and **CMake** to develop a graphical simulator that demonstrates **PID control** to keep the unicycle upright.
- Implemented **Git** submodules to reference third-party **OpenGL** wrappers, to visualize the simulation.

### 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.

## TECHNICAL SKILLS

**Mechanical:** SolidWorks, AutoCAD, GD&T, CAD, FEA, FEM, DFMA, 3D Printing, Machine Tools, Onshape, Fusion360

**Electrical:** KiCAD, I2C, SPI, UART, Arduino, ESP-IDF, Soldering, Oscilloscope, LiDAR, PLC, LAD, VHDL, FPGA

**Software:** Python, C, C++, CMake, OpenGL, JavaScript, TypeScript, HTML, CSS, Bash, SQL, LaTeX, ROS2, Docker

**Libraries/Frameworks:** OpenCV, Mediapipe, Linux, Ubuntu, Git, SSH, Django, Flask, NumPy, Matplotlib, Node.js, React