

# Gavin Tranquilino

*Mechatronics Engineering Student*

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## 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**.
- Led a **ROS2** workshop for 100+ students, introducing fundamental concepts and streamlining **Docker** installations.
- Built wall-following and swarm 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 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**.
- Established **I2C** and serial comms via 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.

### Computer Vision Enabled Hospital App

- Mobile app to help promote physical activity for geriatric patients to prevent symptoms of hospital-induced delirium.
- Built the backend with **Python**, **OpenCV**, and **MediaPipe** for real-time pose estimation and exercise tracking.
- Awarded by the Grand River Hospital's Tech Innovation Challenge as having "Most Impact".

## 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, VHDL, Verilog, FPGA

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

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

## EDUCATION

### University of Waterloo

June 2028

*Candidate for BAsC in Mechatronics Engineering*

*Waterloo, ON*

- Coursework:** Data Structures, Algorithms, Linear Algebra, Circuits, MODS, OOP, Microprocessors, Digital Logic