Gavin Tranquilino
Mechatronics Engineering Student

gavintranquilino.com
gtranqui@uwaterloo.ca
github.com/gavintranquilino
youtube.com/@gavintranquilino
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, MODS, OOP, Microprocessors, Digital Logic

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.

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, 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