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, OOP, Microprocessors, Digital Logic (FPGA, PLCs), 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.

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