Gavin Tranquilino

Mechatronics Engineering Student

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Education

University of Waterloo — Waterloo, ON
Candidate for BASc in Mechatronics Engineering — *Expected Jun. 2028*

Experience

Mechanical Engineering Associate — Jan. 2024 – Present
Sheartak Tools Ltd. — *Waterloo, ON*

- Utilized SolidWorks to model custom spiral cutterheads for woodworking tools sent in by clients, ensuring precision and adherence to manufacturing specifications.
- Recorded, edited, and garnered over 1,000 views on YouTube tutorial videos, enhancing Sheartak's online presence and user engagement.
- Developed a Python script to streamline 200+ product uploads, ensuring consistency across various platforms.

Intake Mechanism Designer — Nov. 2021 – Jun. 2023
FIRST Robotics Canada — *Waterloo, ON*

- Collaborated to design an intake mechanism using SolidWorks for large tennis balls, contributing to our qualification for the FIRST Robotics Worlds championship.
- Leveraged CNC machining to craft a wooden prototype, uncovering the opportunity to enhance chain engagement by 10% through optimized linkage placement.
- Enhanced intake reliability and maneuverability through material testing, 3D modelling and 3D printing boosting pickup success from 50% to 80% and optimizing tight-corner performance.

Robotics Design Team Leader — Feb. 2023 – May 2023
Skills Ontario Competition — *Etobicoke, ON*

- Employed innovative design techniques, utilizing drill batteries and avoiding pre-built kits for electronics housing to reduce 80% of project expenses.
- Leveraged Arduino programming and electrical signal processing to enhance wheel torque through 3-phase motors.

Projects

ML Self-Balancing Unicycle | *C++, Raylib, Control Theory, AI/ML, Genetic Algorithm*

- Utilized a genetic algorithm to fine-tune PID constants, optimizing system performance and stability.
- Derived equations of motion for the ML Self-Balancing Unicycle system, ensuring accurate modeling of dynamics.
- Implemented PID control algorithms to stabilize the unicycle, effectively maintaining balance during operation.

AI Agents: Large Model Query Language Demo | *LMQL, Python, AI Agents, AI/ML, Tokenization*

- 1st place winner at AI Agents Hackathon
- Utilized LMQL Playground and OpenAI API to integrate LMQL features into the platform, enhancing user experience and enabling advanced search functionalities, resulting in a 20% increase in user engagement.
- Researched and implemented cutting-edge AI concepts such as AI, transformations, models, and tokenization, effectively improving platform functionality and staying ahead of industry trends.

Blink Twice If You Need Help | *Python, OpenCV, Twilio, Git, GitHub, Face Tracking*

- Engineered wearable device for real-time double blink detection, triggering immediate calls for assistance.
- Integrated Twilio for swift emergency contact, reducing response time by 50%.
- Collaborated on blink detection and call systems, achieving seamless functionality in 24-hour hackathon.

Light Switch Bot/Mount | *Python, Flask, 3D Modelling, 3D Printing, Fusion360, Linux, HTTP, TLS*

- Designed a 3D-printed mount with an integrated web application for remote light switch control.
- Implemented a Raspberry Pi web server, enabling remote access to room lights globally.
- Innovatively enhanced safety by designing a physical light switch mount, eliminating high-voltage work.