

EDUCATION

University of Waterloo

June 2028

Candidate for BAsC in Mechatronics Engineering

Waterloo, ON

- **Coursework:** (DSA) Data Structures and Algorithms, Linear Algebra, OOP, Microprocessors, Digital Logic (FPGA, PLC), Mechanics of Deformable Solids, Materials, Statistics, Ordinary Differential Equations, RTOS (STM32)

EXPERIENCE

Humanoid Robotics Engineering Co-op

May 2025 – Present

WATonomous

Waterloo, ON

- Building **robotic arms** (6DoF) with tendon driven anthropomorphic hands (20DoF each), aiming for VR teleoperation.
- Developed **CAN bus** interface to high-level **ROS2** commands to low-level embedded systems.
- Containerized ROS2 system in **Docker**, mounting CAN transceivers to enable communication between subsystems.
- Designed **URDF** models to define the transform **TF tree** for **RL simulation** and training in **NVIDIA Isaac Sim**.
- Built visualization infrastructure connecting **Gazebo** simulations to **Foxglove** for real-time debugging and data analysis.
- Assembled **PCBs** with 0.5mm pitch **SMD components**, soldered by hand, reducing assembly costs by 30%

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**.
- Designed a digital CAD twin of an existing knee crutch in **SolidWorks**.
- Developed a **data acquisition** system using **I2C** and C++, converting a bathroom scale for real-time load measurements.
- 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**.

Mechanical Engineering Associate

January 2024 – April 2024

Sheartak Tools Ltd.

Waterloo, ON

- Designed 15 third party woodworking machinery upgrades with **DFMA** in **SolidWorks** to meet OEM specifications.
- Applied **GD&T** principles to guarantee manufacturing accuracy for custom machine parts.
- Collaborated with clients to create tailored part designs, improving machine performance and meeting specific customer requirements.
- Created 25 detailed installation manuals, including parts lists and assembly instructions, ensuring ease of use for customers.

PROJECTS

IoT Wearable - Modular Programmable Smart Watch - Other Hand

- Built **ESP32** wearable IoT device with rotary encoder, implementing **BLE** wireless communication to Python framework.
- Developed **C++ firmware** using **ESP-IDF** frameworks with state machine architecture for Bluetooth control.
- Created a **Python Flask** web app to control the watch via **Bluetooth**, enabling remote interaction and data visualization.

Self-Balancing Unicycle

- Built a simulator from scratch using **C++** and **CMake**, integrating **OpenGL** to create a custom physics environment.
- Developed a **CartPole**-inspired control system focused on wheel **torque control**.
- Implemented **cascading PID controllers** to control: balancing and achieving precise position tracking.

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

Software/Languages: Python, C, C++, CMake, SSH, Bash, Gazebo, Foxglove, Linux, Ubuntu, JS, HTML, CSS, SQL, LaTeX

Libraries/Frameworks: ROS2, Docker, OpenCV, Ultralytics YOLO, Git, MediaPipe, Flask, Selenium, NumPy, OpenGL

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

Electrical: I2C, SPI, UART, CAN Bus, Arduino, Raspberry Pi, ESP-IDF, Soldering, Oscilloscope, LiDAR, PLC, HMI