

Aditya Mahes

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EDUCATION

University of Waterloo

Waterloo, ON

BASc in Biomedical Engineering – GPA: 3.8/4.0

SKILLS

Hardware: SolidWorks, Altium, STM32CubeIDE/MX, Ansys/FEA, KiCad, Fusion 360, Arduino, Bambu Studio (3D Printing)

Software: Git, Python, C++, MATLAB, ROS2, MuJoCo, PyTorch, OpenCV, NumPy, Pandas, BrainFlow

EXPERIENCE

Robotics Engineering Intern

May 2026 – Sep 2026

Wireless Sensors & Devices Lab, University of Waterloo (Apple Collaboration)

Waterloo, ON

- Designed and built **hardware prototypes** for an Apple **embodied AI** research project, from requirements and trade-off analysis through mechanical and electrical design; ran reliability testing and applied **DFMA** to fix integration failures
- Deployed control policies on **robotic arms**; authored formal BOMs, assembly instructions, and specifications enabling the partner to replicate the system and continue research in-house; presented weekly to **Apple executives** and senior professors

Hardware Team Lead

Dec 2025 – Present

Watolink

Waterloo, ON

- Leading a **6-person team** designing an **EEG headset** and **low-noise amplifier PCB** in **SolidWorks** and **Altium**
- Collected and labeled EEG data with **BrainFlow** and **NumPy**, built a signal processing pipeline (bandpass filtering, FFT, artifact suppression), and trained a CNN in **PyTorch** to decode 3 motor imagery classes at **85% accuracy**
- Implemented a **TCP/IP** bridge that streams model outputs from a laptop to a custom Android app, which relays control commands to a drone through the **DJI Android SDK**, enabling neural flight control

Humanoid Hardware Designer

Oct 2025 – Apr 2026

WATonomous

Waterloo, ON

- Halved actuator count (10 to 5)** in a cable-driven humanoid hand by replacing motor-driven finger extension with a passive return mechanism, reducing cost, weight, and wiring
- Designed a **2-DOF knuckle joint** (flexion & adduction), a testing jig, and **10+** DFMA-optimized assemblies in **Fusion 360**

PROJECTS

Modular UMI-style Gripper for Robot Learning

[Demo](#)

- Built a handheld gripper that records demonstrations using a phone's camera and IMU plus onboard gripper-width and tactile sensors; collected **200 demonstrations** and trained a **diffusion policy** that picks up a cube on an **OpenArm**
- Designed a trigger-driven gearbox and quick-change interface so one handle drives **interchangeable gripper heads** (2-finger parallel and 2-finger adaptive), iterating in **SolidWorks** with off-the-shelf gears/springs, machined parts, and 3D-printed parts
- Developed an encoder and microcontroller PCB in **Altium**, wrote firmware to stream encoder data to a phone app, and implemented app-side calibration to compute gripper width; integrating tactile sensors in progress

Exoskeleton for Stroke Rehabilitation

- Designed the electrical system in **Altium** and the elbow joint mechanical assembly, with an **STM32** communicating over SPI, I2C, and UART with a motor driver, magnetic encoder, ESP32, and two EMG sensors
- Implemented **Field-Oriented Control** and assist-as-needed firmware for a 3-phase BLDC motor, scaling torque inversely to muscle activation so assistance tapers as the user recovers and activation increases
- Developing an EEG-based deep learning model to detect motor imagery and trigger torque assistance, with the ESP32 handling wireless telemetry and commands from the brain-computer interface

5-DOF Robotic Arm

- Designed a 5-DOF robotic arm with a 2-finger gripper & Tesla Optimus-inspired wrist in **SolidWorks**; paired MG996R servos at the shoulder and elbow and validated joint torque and range of motion in **MuJoCo**
- Programmed an Arduino in **C++** for pick-and-place of small objects, comparing numerical optimization, Jacobian transpose, and geometric **inverse kinematics** methods

Hawking AI

[Demo](#)

- Built an end-to-end EMG speech aid for speech-impaired users in a team of 4, reaching **25 words per minute** vs. 1–2 unaided
- Engineered the masseter EMG pipeline: reference subtraction and sliding-window RMS features feeding a **Schmitt trigger** clench detector that maps single, double, and held clenches to grid navigation
- Streamed gestures over **LSL** and **WebSockets** to a **FastAPI** backend and React word grid, where **Gemini 2.0 Flash** predicts words from transcribed conversation context and **ElevenLabs** speaks in the user's cloned voice