

# Michael Yu

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## Education

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### University of Waterloo

BASc, Mechatronics Engineering (GPA 4.0)

Sep 2025 – Present

Waterloo, Ontario

### International Baccalaureate

Diploma Programme (41/45)

2023 – 2025

Calgary, Alberta

## Technical Skills

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**Languages:** C++, C, Python, Simulink, HTML, CSS, JavaScript (React, Node.js)

**Embedded Systems/Controls:** RTOS, Platform IO, HIL testing, Closed-loop Control, Unit Testing, PID Control

**Design:** Solidworks (CSWP), AutoCAD, 3D Printing, GD&T, Engineering Drawings

**Tools:** Git, GitHub, Docker, MATLAB, VS Code, STM32Cube IDE, Microsoft Office

## Experience

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### Waterloo Rocketry

Controls Team Member

Sep 2025 – Present

Waterloo, Ontario

- Implemented HIL simulation in Simulink to validate flight control logic against a dynamic rocket model, decoupling software verification from physical hardware
- Developing a CAN bus communication layer in embedded C between a STM32H7 microcontroller and servo motors, implementing closed-loop angular position control with real-time feedback
- Diagnosed STM32 peripheral faults and timing issues using STM32CubeIDE, containerizing the toolchain with Docker to enforce a reproducible cross-compilation environment
- Automating a cross-language unit test harness comparing MATLAB and C outputs to validate numerical consistency between simulation and embedded implementation

### City of Calgary

Recreation Leader

June 2023 – August 2024

Calgary, Alberta

- Created daily summer camp programming for youth aged 5-12, maintaining high levels of engagement
- Managed administrative logs and incident reports for up to 30 children daily
- Facilitated professional communication with members of the public, addressing inquiries and representing City values

## Projects

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### Anthropomorphic Robot Hand | – SolidWorks, 3D Printing, C++, Python, Arduino, OpenCV

- Designed finger linkage geometry in SolidWorks with iterative prototyping cycles in FDM, tuning joint clearances and wall thickness to meet stiffness and range-of-motion requirements
- Developing a 5-DOF tendon-driven actuation system coordinated by a PCA9685 PWM driver over I2C, with an Arduino Nano scheduling servo position commands per finger
- Implementing a real-time hand retargeting pipeline using MediaPipe landmark estimation, mapping 21 keypoint joint angles to servo PWM values with a calibrated scaling function

### Autonomous Pick and Place Robot | – C++, PID Control

- Built an autonomous mobile manipulator on VEX hardware capable of locating, gripping, and placing game objects on a predefined field map
- Implemented a PID path-following controller with encoder-based odometry, tuning gains to reduce steady-state heading error and overshoot on curved trajectories
- Wrote and debugged **modular C++ code** for sensor data processing and motor actuation to ensure reliability

### SpecterBot | – JavaScript, Python, HTML, CSS

- AI legal consultant using hybrid (vector + full-text) search, of a PostgreSQL database consisting solely of official Canadian federal law statutes, eliminating hallucinations
- Gemini/Groq API + RAG pipeline retrieves relevant sections and provides user with direct citations in React frontend, with analysis and summaries
- Three custom-designed voices using ElevenLabs, supporting text-to-speech functionality