Matthew Watts

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Skills

Hardware: Circuit and PCB Design, Sensor Integration, Rapid Prototyping, Electromechanical Systems Design, Soldering

Firmware: Embedded C/C++. Arduino, STM32, RTOS, Sensor Interfacing (I^2C, UART), PWM Control, Motor Drivers

Software: Python, MATLAB/Simulink, Git, Linux Command-Line, SolidWorks, AutoCAD, Signal Processing, Verilink, MQTT

Experience

Mechatronics Research Assistant, Ideas' Clinic – Waterloo, ON *Jan 2025 - Apr 2025*

- Supported deployment of **5+ Ideas Clinic modules** by setting up labs, debugging hardware/software interfaces (**including Node-RED, HMI programming, and Ignition Systems**), and providing technical coaching to **100+ students**.
- **Integrated 3 load-sensing sensors** into assistive devices (crutch), enabling **real-time data acquisition of 600 data points/min and 3D modeling** by leveraging **Arduino** capabilities for **sensor interfacing** and **signal processing.**
- Developed and programmed **embedded activities** using **STM32 microcontrollers**, utilizing **peripheral interfaces** (I2C, SPI, ADC) for seamless sensor communication and data collection in electrical and computer engineering education.

PLC Engineering Student, West Fraser – Barwick, ON *May 2024 - Aug 2024*

- Interpreted **electrical schematics**, **ladder logic diagrams**, and equipment documentation to diagnose issues and recommend **design improvements** for manufacturability and maintainability.
- Assisted in programming, troubleshooting, and maintaining **PLC-controlled automation systems** to optimize lumber mill production processes and equipment reliability to decrease downtime by ∼7%.

Product Design Assistant, Viryl Technologies – Toronto, ON *Sept 2023 - Dec 2023*

- Interpreted and iterated on **20+ CAD assemblies** and engineering drawings to **cut design costs by 10% through DFMA** (Design for Manufacturing and Assembly) practices and **increase aesthetic appeal**.

Supply Chain Intern, PepsiCo – Peterborough, ON *Jan 2023 - Apr 2023*

- Automated 3 quality control sanitation testing processes with **VBA scripts**, **reducing manual data entry time by 70%**.

Projects

Conveyor Retrofit - *Associated with Ideas' Clinic* *Jan 2025 - Apr 2025*

- Retrofitted conveyor system by improving **PLC integration with Ignition HMI and sensor arrays using Node-RED;** Designed structures in **SolidWorks** to improve payload pathing; **Prototyped pneumatic subsystem** to replace inefficient diverting mechanics, reducing maintenance time by ∼95% as well as reducing operational costs and resource consumption.

Bionic Bulb - *Associated with PRISM Art Tech Collective* *Mar 2025 - Present*

- Kinetic sculpture inspired by a flower bulb and the engineer / artist Daric Gill. The sculpture integrates a **MAX9814 microphone, Arduino-based microcontroller, stepper motor with A4988 driver, and MOSFET-switched LED array to create a reactive, noise-triggered flower mechanism** that actuates and activates the LEDs based on the ambient noise.

Bicycle Generator - *Personal* *July 2024*

- Prototyped a user-powered 12V DC energy generation system by **integrating mechanical and electrical components** from repurposed materials, capable of powering small electronics (up to 50W) and **charging a 20Ah battery** using a solar charge controller.

Education

University of Waterloo - *Bachelor of Applied Sciences in Mechatronics Engineering* *Sept 2022 – Present*

- **Relevant Coursework:** Actuators and Power Electronics, Design and Dynamics of Machines, Introduction to Computer Structures and Real-Time Systems, Microprocessor Systems and Interfacing

Extracurricular Leadership

Vice President Communications - *The Waterloo Engineering Society* *November 2024 – Present*

- Elected to a **16-month executive role representing 8600+ Waterloo Engineering Engineering students at provincial and federal conferences** collaborating with student leaders to implement practices that enhance society initiatives.
- Managed **a 38-person team** to execute the society's advertising, marketing, and branding strategies.

Project Lead - *PRISM Art Tech Collective* *January 2025 - Present*

- Led **budgeting, coordination, design,** and public presentation of the Bionic-Bulb project at the **Socratica Design Symposium with PRISM**, an emerging multidisciplinary collective of **artists and engineers** at the University of Waterloo.