

# Shay McKim *Mechatronics Engineering - Student Athlete*

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## Skills

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**Software:** C++, Python, JavaScript, HTML/CSS, Java, RobotC, Arduino IDE

**Hardware:** Arduino, Microcontrollers, Embedded Programming, Motor Control, Power Electronics, Sensor Integration, PCB Design, Circuit Wiring, Soldering, Oscilloscope, Multimeter, Power Supply

**Tools:** Fusion 360, SolidWorks, AutoCAD, 3D Printing (FDM), UART, I2C, PWM, GPIO

**Manufacturing:** Rapid Prototyping, Design for Manufacturing (DFM), Systems Integration

**Certifications:** Google Project Management Certificate, Lean Six Sigma Yellow Belt

## Selected Projects

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**Algorithm Powered 4-Axis Robotic Arm, Unbeatable Game Opponent** 2024

- Engineered a low-cost, fully autonomous 4-axis robotic arm by designing and fabricating 10+ custom components in Fusion 360, and developing C++ firmware to drive 5 servo motors with  $\pm 5\text{mm}$  positional accuracy.
- Implemented an unbeatable opponent AI using a Python-based minimax algorithm, enabling real-time gameplay through serial communication with the microcontroller.

**Spring-Loaded Net Launcher, Sub-500g Drone Capture System** 2025

- Independently engineered 8 individual components in Fusion 360, optimizing designs for FDM 3D printing to reduce weight to  $<0.5\text{kg}$ .
- Optimized the launcher's geometry through 20+ design iterations for a smoother, more reliable trigger system.

**Automated Culinary Robot, Full-Stack Team Leadership** 2024

- Lead a 4-member team to design and deliver a fully integrated pudding-preparation robot, overseeing task delegation, system integration, and automation of dispensing, mixing, and cup handling.
- Programmed DC motor control and LCD interface in C++ using timing-based logic for smooth, accurate operation.

**Award-Winning Water Filtration System,  $>100\text{L}/\text{Day}$  Output** 2024

- Led a 5-member team to design a high-performing water filtration system for northern communities, exceeding the 100L/day goal and earning top cohort recognition for reliability and output quality.
- Programmed Arduino-based chlorination and agitation system in C++; sourced components and wired electronics for full automation.
- Modeled and 3D-printed custom water pump in Fusion 360 to reduce costs.

**200lb Trebuchet, 250ft Range Siege Engine** 2025

- Designed and fabricated a 12-foot trebuchet using triangulated frame geometry, supporting 150lb counterweight dynamic loads while maintaining 2-person transportability
- Engineered remote pin-and-block release mechanism, achieving 250+ foot projectile range through iterative launch angle optimization

## Work Experience

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**CAD Electrical Technologist, MBLL - Provincial Crown Corporation** 2025

- Independently updated large-scale AutoCAD electrical and fire alarm drawings for 2 multi-floor casinos and over 60 retail stores, improving drawing accuracy for internal maintenance and external renovation firms.
- Interpreted and incorporated handwritten electrician markups, resolving layout and circuiting discrepancies between outdated plans and current machine locations using layers and Xrefs.
- Developed a 21-column spreadsheet, gathering and summarizing key data for 60+ liquor store locations streamlining project prioritization by supervisors and senior managers.
- Coordinated with electricians and architects to verify drawing details, and ensure alignment with internal standards.

**Web Scheduling Application Developer, PolySense Solutions - Mechatronics Startup** 2024

- Designed and built a lightweight scheduling interface using HTML, CSS, JavaScript, and FullCalendar.js to integrate with PolySense's website and enable machine booking and usage tracking.
- Improved lab and equipment utilization by enabling clients to visualize demand patterns and coordinate scheduling, reducing the perceived need for redundant machines.

**E-Commerce Founder, 3D Printed Product Design & Manufacturing** 2023

- Designed, iterated, and manufactured custom products using Fusion 360 and FDM 3D printing, delivering tailored solutions through small-batch production.
- Performed preventive maintenance and mechanical troubleshooting on printers to reduce downtime and maintain consistent quality.
- Ran all aspects of a small-scale e-commerce business, from product design to client communication and shipping, delivering customized solutions with efficiency.

## Education

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**University of Waterloo, Mechatronics Engineering** Current

- Member of the Varsity Men's Volleyball Team, dedicating up to 30 hours per week to high-performance training and competition while managing a full-time engineering course load.