

Elizabeth Shim

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SKILLS

CAD Design: Siemens NX, SolidWorks, AutoCAD, MicroStation, Revit, BIM360, Teamcenter, PDM, Autodesk

Hardware: Rapid prototyping, soldering, assembly design, cabling and wiring, drill press usage, heat setting, safety circuitry

Software: Python (Arduino, Serial, Script), C/C++, JavaScript (Node.js), HTML/CSS, Docker, Git, Bash, Linux, MATLAB, Simulink

EXPERIENCE

Product Operations Support | Apple

May 2024 - Aug 2024

- Developed and constructed a robust **mechanical enclosure** with safety interlocks, emergency stops, and a full safety barrier system. Designed and implemented the **safety circuitry** and controls system to ensure secure operation of the robotic system, preventing accidental contact during testing and improving **safety compliance by 100%**
- Designed and built a **modular optical testing bench system** with adjustable degrees of freedom using aluminum extrusions and rapidly prototyped **3D-printed components** that reduced setup time for design of experiment (DOE) research by 4 minutes, improving efficiency and ensuring stable, consistent data reproduction and repeatability for continuous R&D testing and feasibility studies
- Utilized **Siemens NX** to create a **3D CAD model** for a new testing station, integrating **custom hardware mountings** and safety barriers, optimizing mechanical assembly time by ensuring precise alignment of components and reducing the number of parts
- Collaborated and coordinated with vendors to **develop a budget** and source cost-effective replacement components to resolve part compatibility issues, improving system hardware performance and **increasing cost-efficiency** by several hundred thousand dollars

Mechanical Engineering Assistant | Arcadis IBI Group

Jan 2024 - Apr 2024

- Performed **thermal load calculations** and **airflow analyses** to select fans and louvers, ensuring mechanical ventilation systems were designed and sized in accordance with the Ontario building code requirements
- Revised mechanical designs and shop drawings using **MicroStation**, ensuring accuracy and full compliance to design specifications
- Modelled and sized HVAC systems and mechanical components including plumbing fixtures, compressed air drop systems, drainage, and pneumatic systems in **Revit**, coordinating with external teams to ensure proper integration, alignment and component placement, optimal performance, and compliance with both customer requirements and project specifications

Advanced Research and Collaboration Engineer | Christie Digital Systems

May 2023 - Aug 2023

- Designed and prototyped a **mobile autonomous robot** using **3D-printed components** in a fast-paced environment, integrating a LiDAR depth sensor, servo motors, and dynamic projection mapping for real-time, in-focus content projection during motion
- Developed and assembled a **mechatronic** system using an Arduino-based control in C, creating an algorithm that processed camera vision data to calculate projector focus based on the distance from a wall. Utilized servo motors to drive a **crank lever mechanism** after simulating distance vs. angle relationship in **Solidworks**, enabling real-time, automated focus adjustments, reducing manual adjustment time by at least 5 seconds and dynamically adjusting focus based on distance
- Established **communication protocols** between the **Arduino** and the **Jetson Nano** via **serial USB communication**, using **WebSocket** integration to improve data transmission efficiency
- Integrated an open-source speech-to-text service using Docker, optimizing voice command recognition and **reducing errors by 40%**

PROJECTS

Autonomous Mobile Car

Sept 2023 - Dec 2023

- Built and tested an **autonomous** line-following robot in collaboration with a multidisciplinary team, utilizing a **STM32F01 Nucleo 64 microcontroller** and integrating RGB and IR sensors for precise line detection and navigation
- Developed a control system using **PID controller logic** for real-time adjustments, enabling the robot to autonomously adapt to dynamic changes in its environment. Utilized polling and global interrupts to ensure timely responses, optimizing autonomous task execution based on sensor inputs such as RGB colour readings or event triggers
- Processed sensor data through **analog-to-digital converters** (ADC) for accurate readings, applying custom data formatting to improve sensor integration and increase system efficiency in data reading and processing
- Implemented motor control algorithms using PWM modulation, enhancing the robot's maneuverability in completing the course

EDUCATION

University of Waterloo - Mechatronics Engineering, Co-op (BASc - Honours)

Sept 2020 - Apr 2025

Relevant Courses: Autonomous Mobile Robots, Power Electronics, Digital Control Systems, Microprocessors and Digital Logic

Cumulative GPA: 3.7/4.0