Elizabeth Shim

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SKILLS

CAD Design: Siemens NX, SolidWorks, AutoCAD, MicroStation, Revit, BIM360, Teamcenter, PDM, Autodesk
Software: Python, C/C++, MATLAB, Simulink, JavaScript, TypeScript, Node.js, Bash, Git, Docker, Linux, TensorFlow, PyTorch, HTML/CSS

EXPERIENCE

Product Operations Support | Apple — May 2024 - Aug 2024

- Constructed a robust mechanical enclosure and designed **safety circuitry** and **control systems** with interlocks and emergency stops for robotic testing stations, improving **safety compliance** by 100%
- Designed and built a **modular optical test bench system** with adjustable degrees of freedom using aluminum extrusions and **3D-printed mounts** 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
- Modeled a 3D CAD testing station in **Siemens NX**, integrating custom hardware mounts and safety barriers to optimize alignment and minimize part count for improved **mechanical assembly**
- Collaborated and coordinated with vendors to **develop a budget** and source cost-effective components, resolving part compatibility issues and increasing system hardware performance and **cost-efficiency** by several hundred thousand dollars

Mechanical Engineering Assistant | Arcadis IBI Group — Jan 2024 - Apr 2024

- Performed **thermal load** and **airflow calculations** to size ventilation systems in accordance with the Ontario Building Code
- Revised shop drawings using **MicroStation**, ensuring accuracy and full compliance to design specifications
- Modelled and sized **HVAC** and mechanical components in **Revit**, coordinating with external teams for alignment and performance
- Reviewed mechanical drawings and submittals to **verify compliance** with design specifications, identifying discrepancies and ensuring accurate execution during fabrication and installation

Advanced Research and Collaboration Engineer | Christie Digital Systems — May 2023 - Aug 2023

- Prototyped a **mobile autonomous robot** with LiDAR depth sensor, servo motors, and dynamic projection for real-time focus adjustment
- Calibrated a monochrome **FLIR camera using C** to enable accurate depth estimation and image processing
- Used drill press, rotary tools, and hand tools for **mechanical prototype fabrication**, and designed custom 3D-printed parts
- Assembled and designed a **mechatronic** system with an Arduino-based control loop and servo-actuated crank lever mechanism for distance-based focus automation
- Established **serial USB communication** between the Arduino and Jetson Nano using **WebSocket integration** to improve data transmission
- Integrated a speech-to-text service using **Docker**, improving voice recognition accuracy **by 40%**

PROJECTS

Autonomous Boat Trailering System — Sept 2024 - Mar 2025

- Implemented **AprilTag** detection with **OpenCV** on a calibrated **Raspberry Pi camera** for real-time pose tracking and orientation
- Developed embedded control system with **serial communication** between the Raspberry Pi and Arduino for system coordination
- Controlled three thrusters with **PWM motor control**, enabling **3 degree of freedom motion** and differential steering
- Applied **PID** and **inverse dynamics feedback control** to compute thruster forces based on real-time position error
- Diagnosed and repaired robotic hardware during development testing, resolving electrical and mechanical issues during assembly

Autonomous Mobile Car — Sept 2023 - Dec 2023

- Built an **autonomous** line-following robot using a **STM32F01 Nucleo 64** and RGB/IR sensors for line detection and real-time navigation
- Implemented a **PID control** system with global interrupts for responsive path correction and event-based task execution
- Processed sensor data through **analog-to-digital converters** and applied custom formatting to improve data accuracy and efficiency
- Programmed differential steering using **PWM modulation** for precise maneuvering through dynamic environments

EDUCATION

University of Waterloo - Mechatronics Engineering, Co-op (BASc - Honours) — Sept 2020 - Apr 2025

Relevant Courses: Autonomous Mobile Robots, Control Applications, Digital Control Systems, Mechatronics Design Workshop, Power Electronics, Microprocessors and Digital Logic, Real-Time Systems, Linear Systems & Signals, Computational Intelligence
Cumulative GPA: 3.7/4.0