Josh Westlake

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A dedicated and results-driven 3rd Year Mechatronics and Robotics Engineering student at Queen's University passionate about innovative robotics technology. Currently seeking a 12–16-month co-op in a mechanical/robotics-related engineering position to apply technical skills and gain practical experience.

Education

BASc, Queen's University

- Bachelor of Applied Sciences – Mechatronics and Robotics Engineering
- Anticipated graduation Spring 2026

Achievements

Dean's Scholar Distinction
GPA: 3.72

Professional Experience

SCADA Summer Student, Durham Region   **Summer 2023, 2024**

- Assisted in the comprehensive maintenance, support, and deployment of Supervisory Control and Data Acquisition (SCADA) Systems, ensuring seamless operations across water and wastewater facilities in the Durham region.
- Collaborated with multidisciplinary teams to design and implement SCADA system upgrades and expansions, optimizing process performance and scalability.
- Independently developed and implemented Programmable Logic Controller Programs using Ladder Logic, Functional Block Diagrams, and Structured Text, resulting in more robust and reliable system operations.
- Demonstrated expertise in handling software and hardware components related to industrial and engineering domains, including PLC, RTU, HMI, OIT, and UPS Systems.
- Created comprehensive documentation for SCADA systems, including system configurations, operational procedures, and component inventory, using **Microsoft Suite** for effective communication and knowledge transfer across teams.

Customer Service Associate, Lowe's Canada   **May 2021 – Aug 2023**

- Responsible for assisting customers with inquiries by providing professional customer service.
- Anticipate and address customer needs, and provide timely and satisfactory solutions, while building positive relationships, enhancing customer satisfaction and loyalty.
- Consistently met or exceeded sales targets through proactive engagement and solution-oriented service.

Technical Experience

Hardware Team Member, Queen's Autodrive   **Sept 2023 – Present**

- Collaborated with **cross-functional teams** of Mechanical, Electrical, and Mechatronics Engineers to conceptualize and implement sensor mounts for LiDAR, Cameras, and SAE Blue Light for autonomous vehicles.
- Contributed to the development process of the roof-mounted sensor mount assembly, serving as the primary interface between the vehicle and sensory devices, thereby improving data accuracy and reliability.
- Collaborated with perception sub-team to determine the desirable orientation of sensory components, which was further optimized using **MATLAB Simulations,** resulting in an increase of over 10° in the FOV compared to the previous year.
- Utilized **SolidWorks** for the design and development of the prototype, ensuring compliance with official **SAE standards** through thorough **FEA** and **GD&T analyses.**
- Contributed to the assembly process of the final sensor mount, enhancing functionality and precision through the integration of 3D printed sensor mounts, proficient sheet metal fabrication, and utilizing aluminum extrusions.
- Implemented rapid prototyping techniques such as **3D printing** to transform conceptual designs into functional models, significantly reducing development time.

Mechanical Specialist, LifeBot – MREN 203 Project   **Jan – Apr 2024**

- Developed a functional prototype of an **autonomous mobile robot system** by integrating advanced technologies and precise control mechanisms to deploy life-saving equipment like AEDs in controlled environments, revolutionizing emergency medical assistance.
- Integrated advanced technologies such as Raspberry Pi, Arduino UNO Wi-Fi Rev 2 boards, and ROS2 packages for robust autonomous operation, facilitating swift deployment of life-saving equipment.
- Led the design of precise **PID controllers** using Arduino IDE for accurate motor control, ensuring dependable and accurate navigation in indoor environments, and enhancing emergency response effectiveness. The system achieved motor control accuracy within ±5% of the desired speed with a settling time of < 2 seconds.
- Led the design and testing processes for the AED chassis, ensuring structural integrity and safe AED deployment using **SolidWorks** and **FEA analysis**. Demonstrated structural integrity under operational conditions, with a maximum displacement < 2.530 mm (about 0.1 in).

- Developed detailed documentation for the LifeBot project, encompassing design specifications, engineering diagrams, and operational conditions, displaying **proficiency in Microsoft Suite** (Word/PowerPoint/Excel/Teams/Outlook) for effective project management and knowledge dissemination among team members.

Autonomous Systems Engineer, Queen's aQuatonomous   **Nov 2023 – Apr 2024**

- Played a pivotal role within a team dedicated to developing autonomous surface vessels (ASVs) for the RoboBoat Challenge, an international competition promoting maritime robotics for various applications, including environmental monitoring, research, and rescue missions.
- Investigated and implemented advanced path planning algorithms such as A* and D* Lite, optimizing route planning and decision-making processes to enhance the autonomy and efficiency of the ASV's navigation system.
- Leveraged **ROS2** and **Gazebo** simulation environment to iteratively refine autonomous behaviors and validate system performance in simulated scenarios.
- Adapted to various roles and responsibilities, from algorithm development to simulation testing, effectively addressing the diverse needs of the project.

Relevant Coursework

ELEC 274 – Computer Architecture
- Design and organization of computer systems; including CPU architecture, memory systems, and input/output devices.
- Introduces assembly language programming, including instruction set architecture, assembly code development, and low-level system interaction.

ELEC 271 – Digital Systems
- Design and Analysis of Digital Systems using Logic Gates, Sequential Circuits, and Programmable Logic Devices

MREN 241 – Fluid Dynamics & Fluid Power
- Explores the principles of fluid mechanics, including fluid flow behavior, conservation laws, and fluid power

MREN 230 – Thermodynamics and Heat Transfer
- Highlights principles of thermodynamics, including energy transfer, thermodynamic cycles, and heat transfer processes

APSC 143 – Intro to Computer Programming
- Introduces basic programming concepts with a focus on C programming, including data types, control structures, functions, arrays, and pointers.

MREN 178 – Data Structures and Algorithms
- Explore foundational concepts and techniques for organizing and processing data efficiently, essential for developing optimized algorithms in mechatronics applications.

APSC 162 – Engineering Graphics
- Explore comprehensive engineering technical drawing techniques, CAD software skills, and Tolerancing

ELEC 252 – Electronics I
- Fundamentals of electronic devices, circuits, and systems; Including semiconductors, amplifiers, and rectification.

MREN 223 – Signals and Systems
- Explores the analysis and processing of continuous and discrete-time signals and systems.

ELEC 221 – Electrical Circuits
- Explores principles of circuit analysis, including Ohm's Law, Kirchhoff's Laws, and analysis of AC and DC circuits.

MECH 221 – Statics and Solid Mechanics
- Introduces the principles of static equilibrium and the mechanics of materials, including stress, strain, and elasticity.

MECH 229 – Kinematics and Dynamics
- Introduces fundamental concepts in engineering mathematics and their practical application using MATLAB, empowering mechatronics engineers with computational tools for analysis, simulation, and problem-solving.