

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 in Spring 2026

Achievements

Dean's Scholar Distinction
GPA: 3.74

Technical Skills

- **Languages:** C/C++, Java, Python, MATLAB, Assembly, VHDL, HTML+CSS, Ladder Logic, Structured Text
- **Development Tools:** Arduino IDE, ROS, Gazebo, Pac-Machine Edition
- **Design Tools:** SolidWorks, Inventor, Blender, Fusion 360, Revit, LTSpice, SAP2000

Experience

Hardware Team Lead, Queen's Autodrive

Sept 2024 – Present

- Led a cross-functional team of mechanical and electrical engineers in designing and installing key vehicle components, including sensor suites, HMI mounts, power delivery systems, and AV mode indicators, enhancing system reliability and driver accessibility.
- Utilized **SolidWorks** for the design and development of the prototypes, ensuring compliance with official SAE standards through thorough **FEA** and **GD&T analyses**.
- Led 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.

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.

Hardware Team Member, Queen's Autodrive

Sept 2023 – Aug 2024

- 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.
- 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.

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.

Controls Team Lead, 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 $\pm 5\%$ 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.

Customer Service Associate, Lowe's Canada

May 2021 – Aug 2023

- 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.

Relevant Coursework

MECH 350 – Automatic Controls

- Design and analysis of control systems, including feedback, stability, and dynamic modeling.

ELEC 371 - Microprocessor Interfacing and Embedded Systems

- Microprocessor architecture, embedded systems programming, and hardware interfacing.

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.

MREN 318 – Sensors and Actuators

- Principles and applications of sensors, actuators, and signal integration in mechatronic systems.

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.

CISC 235 – Data Structures and Algorithms

- Explore foundational concepts and techniques for organizing and processing data efficiently, essential for developing optimized algorithms in Python.

APSC 162 – Engineering Graphics

- Explore comprehensive engineering technical drawing techniques, CAD software skills, and Tolerancing

ELEC 353 – Electronics II

- Advanced analog and digital circuit design, including amplifiers, filters, and PCB implementation.

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.