OSMAN ASIF

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EDUCATION

Toronto Metropolitan University   *Toronto, ON*
Bachelor of Engineering – Mechatronics   *Sep. 2023 – Apr. 2028*
Minor in Computer Science – Computer Vision and Machine Learning

Relevant Coursework: Thermodynamics & Fluids, Electric Machines & Actuators, Electromechanical Design, Computer Structures & RTOS, Machine Mechanics & Design, Control Systems, Intro to Robotics

WORK EXPERIENCE

MiON Science — *Mechatronics Design Intern*   *Sep. 2025 – Dec. 2025 | Remote*
- Performed **electronic component selection and trade-off analysis** for a mechatronic prototype, while collaborating to **refine mechanical design decisions** based on power requirements, communication interfaces, cost, and manufacturability constraints.
- Developed detailed **wiring diagrams** and contributed to **ESP32 firmware setup**, configuring **Bluetooth communication for bench testing** and **USART-based communication for field testing**, while supporting reliable system-level integration.

ELIXIR Lab — *Undergraduate Assistant*   *Aug. 2025 – Aug. 2025 | Toronto, ON*
- Calibrated and synchronized a **dual-camera vision system** in **ROS 2** using **AprilTags**, aligning camera coordinate frames with the robotic arm and configuring a unified perception pipeline to ensure consistent operation during arm motion.
- Engineered a new camera mounting clamp in **SolidWorks** to resolve **slippage and vibration** issues from a previous design, ensuring a **high-friction** fit required for precise base camera tracking during rapid arm rotation.

TMU Velocity — *Software Developer*   *Jul. 2025 – Present | Toronto, ON*
- Collaborate with the software team to develop **perception algorithms** for a high-speed autonomous race vehicle, processing **real-time LiDAR data** to implement **SLAM** and improve multi-sensor fusion performance using **Python** and **ROS 2**.
- Leverage **Gazebo** and **RViz** to design, validate, and iterate on a robust **sim-to-real workflow**, enabling high-fidelity testing and verification of perception algorithms prior to deployment on the physical race vehicle.

TMU Chem-E-Car — *Mechanical Designer*   *Aug. 2025 – Present | Toronto, ON*
- Collaborate with the mechanical team to design the vehicle chassis in **SolidWorks**, conducting **load analysis** to ensure **structural integrity** and **optimal component placement** for integrated electrical and chemical subsystems.
- Designed a **gearbox-based drivetrain** to optimize power transmission from motors, implementing **shaft–bearing assemblies** to transmit torque through the motor–gearbox–shaft–wheel chain while improving vibration support and mechanical reliability.

TECHNICAL PROJECTS

3-DOF Mobile Manipulator — *SolidWorks, DFM/DFA, 3D Printing, ESP32, C/C++*   *Sep. 2025 – Dec. 2025*
- Designed and manufactured a **3-DOF robotic arm mounted on a mecanum-wheel mobile base**, enabling autonomous grasping, onboard storage, and controlled release of blocks through a custom mechanical storage mechanism.
- Led end-to-end **mechanical CAD and DFM-driven fabrication** in SolidWorks, producing **manufacturing-ready drawings** and optimizing geometry for single-print assemblies, minimal fasteners, modular part replacement, and rapid design iteration.

Automated Bike Lock System — *Python, Arduino, C/C++, SolidWorks, 3D Printing*   *Sep. 2024 – Dec. 2024*
- In a four-person team, developed a **dual-authentication bike lock system** integrating keypad override and a **facial recognition pipeline** using Python, OpenCV, and MediaPipe, achieving **90%+ recognition accuracy** in real-world testing.
- Designed and **3D printed custom housing** in **SolidWorks**, integrating mechanical constraints for electronics, and developed **Arduino firmware** (C/C++) to control a servo actuator, achieving **sub-1-second** unlock response following user authentication.

Engineering Design Solution — *SolidWorks, Mechanical Design, Human Factors*   *Sep. 2024 – Dec. 2024*
- Designed a **human-centered mechanical system** for a children's assistive transport device in **SolidWorks**, converting accessibility-driven user needs into ergonomic, safety, and usability-focused design features while developing detailed system drawings
- Developed formal engineering documentation (**PRS, SKB, PDS**) and applied **subsystem decomposition**, **subsystem matrices**, and **design choice matrices** to compare design alternatives, manage trade-offs, and support design requirements.

Ball Sorting System — *SolidWorks, Tolerance Analysis, DFM/DFA, Mechanical Design*   *Jan. 2025 – Apr. 2025*
- Designed a manually operated mechanical sorting system to separate balls, incorporating a **parallel four-bar linkage** for controlled motion and a **geared rotating base** for precise positioning, supported by **manufacturing drawings** for repeatable assembly.
- Designed a **three-fingered, elastic-assisted claw** and applied **DFM/DFA principles** in **SolidWorks** to reduce part count, simplify assembly, and maintain a critical **±0.5 mm** tolerance across interfaces.

TECHNICAL SKILLS

Languages: C/C++, Python, MATLAB, Assembly

Frameworks/Libraries: ROS 2, OpenCV, MediaPipe, Arduino/ESP32

Tools: SolidWorks, ANSYS, Git, VS Code, Gazebo, RViz, Ms Project, Excel Simulink

Electrical/Embedded PWM, H-bridge drivers, Sensor Interfacing, Machines & Actuators, Power Electronics

Mechanical/Manufacturing: GD&T, DFM/DFA, 3D Printing, Laser Cutting, Metrology (CMM, calipers, gauges), Soldering