CAMRON SABAHI

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SKILLS

Languages Python, C++, C, MATLAB

Libraries/Frameworks Brax, Jax, ROS/ROS2, NumPy, SciPy, MuJoCo, MatPlotLib, AMBF, libfranka

Tools/Technologies Git/Github, Docker, Linux, Franka Research 3, SolidWorks, SimulationX, 3D Printing

EDUCATION

BASc Honors Mechatronics Engineering | GPA: 3.93 | University of Waterloo **Sep 2022 – Apr 2027**

- Systems Models (MATLAB, SimX), Actuators/Power Electronics, RTOS, Sensors, Linear Systems/Signals, DSA (C++)

National University of Singapore (Exchange Semester) **Aug 2025 – Dec 2025**

EXPERIENCE

Robotics Research Engineering Intern | SickKids | *ROS, Python, C++, Jax, NumPy* **Apr 2025 – Aug 2025**

- Developed force-guided human-robot interaction controller for a collaborative robot built for Craniosynostosis operations with UI supporting operation in **real** hardware, **simulation** with AMBF, and **digital twin** environments
- Modeled movement of custom tendon continuum robot attached to Franka Research 3 with augmented Jacobian inverse kinematics **Follow-The-Leader algorithm** to achieve movement with 9-degrees of freedom robotic system
- Achieved position error **<1mm** in skull cutting using a 2nd order system admittance controller in **C++** and **ROS** with force filter/smoothing and advanced virtual fixture constraints for **collaborative** motion and **teleoperation**
- Shared 1st author of *Force Control and Simulator with Follow-the-Leader Motion for Surgical Bone-Cutting Robot,* submitted to **ICRA 2026**

Robotics Engineering Intern | BH Frontier | *ROS2, Docker, Linux, EtherCAT* **Sep 2024 – Dec 2024**

- Developed an autonomous mobile farming robot to zap weeds with a novel mechanism and controls software
- Achieved **3km/h** movement speed using a broad-phase filtering algorithm to detect collisions between 600 weeds and 60 electrodes at a **53µs** runtime to feed into torque-PID controlled servos through **EtherCAT**
- Increased position tracking resolution to **10mm** by implementing **Visual-Inertial Odometry** with ROS2

Optical Systems Engineering Intern | Musashi AI | *Bash, Solidworks, Basler* **Jan 2024 – Apr 2024**

- Designed systems for AI defect detection in factory parts, including mechanical design, data capturing, and processing
- Implemented feature-tracked focus stacking algorithm with **OpenCV,** reducing scan time by **87.5%** of **150µm** defects
- Developed **multi-threaded** Python programs to reduce data collection time by **43%** with camera and motor APIs
- Redesigned and upgraded vision systems to increase defect detection by **29%** through Photometric Stereo imaging

R&D Engineering Intern | Bend All Automotive ULC | *GD&T* **May 2024 – Aug 2023**

- Led the deployment of hydrogen fuel lines in material selection, design testing, and **prototype manufacturing**
- Designed **3D printed** models to create visual representations of AC product assemblies for R&D feasibility
- Decreased experimental cycle time by **17%** by designing tooling for coupling integrity step blocks using **SolidWorks**

PROJECTS

Co-Founder | UW RoboSoccer | *Python, MuJoCo, Brax, Circuit Design* **Aug 2024 – Present**

- Co-founded team and co-led controls subteam to autonomous build bipeds, to play in RoboCup's 4v4 soccer matches
- Utilizing Reinforcement Learning to develop complex behaviour skill policies such as kicking and running with **MuJoCo** and **Brax**, along with a **Zero-Moment Point** classical controls stabilizer
- Designed electrical system prototype for power management, integrating servos, RaspberryPi, and various sensors

Embedded Software Engineer | Waterloo Aerial Robotics | *C, C++* **Jan 2024 – Aug 2024**

- Improved flight controller stabilization with a **PID controller**, converting angles and yaw rates to motor percentage
- Developed firmware to convert **CAN** signal from ArduPilot to **PWM** on STM32 board to control servo motors