Sarah Yoo

g4yoo@uwaterloo.ca | (226) 808-2589 | Website | GitHub | LinkedIn

TECHNICAL SKILLS

- **Languages:** C, C++, C#, Java, Python, Javascript / Typescript, Dart, SQL, NoSQL, Bash
- **Tools:** Git, STM32, ESP-IDF, OpenGL, OpenCV, SolidWorks, Docker, AWS, CMake
- **Technologies:** FreeRTOS, PID, ADC, PWM, CAN, SPI, UART

EXPERIENCE

Software Team Lead – *UW Biomechatronics Design Team* Sep 2025 – Present

- Led the software subteam of 15 within the Biotro Exo team building a powered exoskeleton for ACE.
- Owned the firmware for motor control from bring-up to deployment; tuned PID controls to achieve required precision and response time; communicate with sensors and motors over CANbus.
- Developed a GUI app for real-time control, debugging, and live PID tuning over UART.
- Taught members about firmware development and control theories while leading the projects above.

Embedded Flight Software (EFS) Developer – *UW Aerial Robotics Group (WARG)* Sep 2025 – Present

- Collaborated with EFS subteam members on the drone's flight system for the AEAC competition.
- Developed firmware for flash memory operations: read, write, erase with CRC and block header metadata.
- Implemented a circular buffer FTL for safe sequential overwrites; prototyped hybrid mapping algorithms (BAST, FAST, Super Block, etc) to optimize flash memory updates.
- Achieved real-time logging with strict timing using FreeRTOS.

FIRST Robot Programmer & Technician – *FIRST Robotics Team 3683 (DAVE)* Sep 2022 – Jun 2025

- Built a robot that led the team to place 2nd in Canada and 34th worldwide in the 2025 FRC season.
- Programmed robot subsystems including swerve drive, elevator, turret, intake, and end effector.
- Implemented command-based autonomous routines utilizing PID control and motion profiling.
- Repaired control system and mechanical components during competitions under high-pressure conditions.

PROJECTS

Swervable Autonomous Vacuum Robot | C++, OpenCV, SolidWorks Nov 2025 – Present

- Designed and machined the robot chassis from aluminum and carbon fiber.
- Modeled and built a custom coaxial swerve module with dual brushless motors and encoders,
- Engineered and 3D-printed a vacuum turbine generating up to 36 kPa suction (≈180% of a household vacuum).
- Integrated sensors and OpenCV for mapping and coverage planning; implemented closed-loop drive/steer control.

Voxel World | C++, OpenGL, OpenAL | Demo Link Apr 2025 – Jun 2025

- Built a playable voxel engine (e.g. Minecraft) to develop an efficient procedural terrain generation logic.
- Managed GPU memory (VBO/VAO) for mesh rendering, ensuring efficient resource utilization.
- Optimized chunk rendering via back-face culling, space partitioning, and frustum culling.
- Implemented DDA raycasting, swept AABB collision detection, physics, and 3D audio using OpenAL.

EDUCATION

University of Waterloo

Bachelor of Software Engineering (Co-op) 2025 – 2030