

AMJAD YAGHI

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EDUCATION

University of British Columbia

Bachelor of Applied Science, Engineering Physics (Co-Op)

Vancouver

Expected May 2027

EXPERIENCE

Algorithms, Optimization and Control Lab, UBC

Research Assistant

Vancouver

Oct. 2026 – Present

- Measured what an **autonomous indoor construction drone**'s RealSense depth camera can reliably see, then improved its perception so the drone can fly through a house framed in 2x4s

Generative Models.ai

Software Engineer Intern

Toronto

May 2025 – Aug. 2025

- Designed a **parallelized LLM blog-generation pipeline** that split outlines into per-heading prompts, enforced strict JSON schemas, and recombined validated sections into long-form drafts
- Implemented Django APIs and Temporal workflows to queue long-running analyses and **prevent request collisions**

PROJECTS

Autonomous Badminton-Playing Robot (Capstone) ↗ | C++20, OpenCV, Eigen, CMake

- Designed a modular **C++20 static library** (pimpl, RAII, Eigen) powering a real-time stereo vision pipeline at **~100 FPS** with hardware-synchronized cameras over GPIO triggers
- Implemented an **Extended Kalman Filter** with hand-derived analytic Jacobian for nonlinear aerodynamic drag, plus RK4 forward simulation to predict landing point within **±5 cm**
- Built a replayable set of **hand-labelled stereo flights** that scores every detector and tracker change on the same data, letting us iterate on tracking algorithms and verify the best, which caught **72%** of in-flight frames at 35 ft, up from **19%**
- Traced stereo camera dropouts every **~60 s** to USB 3 signal loss over 5 m cables, ruling out our code by reproducing them in the vendor's viewer, then restored stable capture with a powered hub

RL Robot-Arm Trajectory Tracking ↗ | Python, MuJoCo, Gymnasium, Stable-Baselines3 (PPO)

- Trained a **PPO policy** to track moving 3D targets with a simulated Franka Panda arm in **MuJoCo**; the policy outputs Cartesian lead targets, converted to joint torques via damped least-squares IK + PD control
- Beat the classical IK+PD baseline on a **200-seed paired evaluation** (mean error **-41%**, time-on-target **24% → 73%**, lag **113 → 17 ms**), iterating v1 → v9 in a public build log

Autonomous Mario Kart Robot ↗ | Arduino, STM32 (ARM), C++

- Built a fully autonomous Arduino+STM32 Mario Kart robot using an FSM, **10 kHz** IR-beacon homing (via **convolution filtering**), and sonar edge detection for recovery; built a **zipline claw** that latched reliably to shortcut the course

STUDENT DESIGN TEAM

UBC SAE Aero Design

Payload Subteam, Sensing and Docking

Vancouver

May 2026 – Present

- Own homing for a rover that must find and dock under a landed aircraft: chose its controller in a simulation of the real robot (**1.7 cm** median stopping error) and deployed it as the **same C code** on an **ESP32-S3**
- Built a **constant-current LED driver** that keeps three pulsing IR beacons consistently bright as the supply sags, verified in ngspice that it settles within **7 μs** without overshoot, and turned it into a flashcard set

SKILLS

Languages: C, C++, Python, 8051 assembly, SQL, MATLAB

Embedded: firmware, microcontrollers (AVR, STM32, ESP32), bare metal, interrupts, ADC/DSP, Analog Discovery 2

Robotics & Tools: OpenCV, Eigen, ROS, Gazebo, MuJoCo, CMake, git, GitHub Actions, Docker, Linux