Blain Polishak Computer Science

Portfolio: blainpolishak.com | **GitHub:** https://github.com/blainp

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Languages & Frameworks: Python, Java, C, C++, C#, SQL, JavaScript, PHP, HTML/CSS, ASP.NET MVC, scikit-learn, Firebase, AJAX

Tools & Platforms: Git, Docker, Linux, Android Studio, Arduino, MQTT/ThingsBoard, LaTeX, XAMPP

EDUCATION

Thompson Rivers University, Kamloops BC **Expected Graduation: Dec 2027**
Bachelor of Computing Science, Fourth Year **GPA:** 4.08 Overall | 4.12 In-Major

Relevant Coursework: Data Structures and Algorithms, Operating Systems, Computer Networks, Software Architecture & Design, Programming Methods, Web Design and Programming, Internet of Things, Behavioural Biometrics.

Scholarships: Delta Trades & Technical Career, BC District/Authority, Glacier Media STEM (2021)

WORK EXPERIENCE

BC Hydro **May 2025 - Aug 2025**
Software Developer and IT Systems Analyst (C#, ASP.NET MVC, SQL, JavaScript, Chart.js)

- Built core workflow pages for an internal web application that automates access privileges for remote and high-security BC Hydro sites, replacing a manual paper request process. The system is now in production company-wide.
- Developed the key checkout, monitoring, and administrative interfaces covering most of the end-user workflow, including SQL-backed clearance verification that validates a worker's authorization before issuing time-bound digital access keys.
- Diagnosed and fixed a performance defect in which every page refresh reloaded the full database table, reworking all pages to fetch only new records against a cached local table and cutting redundant data transfer across the application.
- Evaluated data visualization libraries against the constraint of low-bandwidth access from remote work sites, built mockups, and authored a recommendation document that was approved by senior management and adopted. Implemented the resulting Chart.js dashboard reporting key checkout and check-in activity by type and security level.

Piedmont Sheet Metal **Sep 2020 - May 2025**
Waste Disposal Crew - Foreman

- Supervised a crew of 5 to 7 workers on weekend shifts over five years, scheduling daily disposal work around variable shop demands including incoming material loads and one-off operational priorities.
- Trained roughly 10 new crew members on disposal procedures and BC workplace safety compliance, including the handling and disposal of hazardous materials.

Personal TV Repair Business **Jun 2021 - Present**

- Diagnosed and repaired 30+ LED televisions at the component level, working across power supply boards, mainboards, and T-con boards, including micro-soldering, SMD component sourcing and replacement, backlight repair, and firmware reflashing.
- Developed a systematic diagnostic process using manufacturer schematics and board-level probing to isolate faults when the failure point was not visually apparent.
- Operated the business independently end to end, handling unit sourcing, repair, customer negotiation, parts procurement, and resale.

TECHNICAL PROJECTS

Behavioural Biometric Identification Using MIDI Performance Signatures, (Python, scikit-learn) **Jan 2026 - August 2026**

- Designed a behavioural biometric system which uses machine learning to model ingrained motor and stylistic behaviours of pianists, identifying individual musicians by matching freestyle MIDI keyboard performances against known performer signatures.
- Engineered a feature extraction pipeline which transforms raw MIDI events into 17 compound performance features, including velocity, pitch, arpeggiation, and articulation dynamics, which proved the most effective for identifying individual musicians.
- Trained and benchmarked machine learning classifiers on extracted features, reaching roughly 80% mean confidence in identification across 7 tested performers.
- Co-authored the resulting research paper; preprint published to Zenodo (doi.org/10.5281/zenodo.22061940).

Algal Bloom Detection Water Monitoring System, (C++, Python, MQTT, ThingsBoard, Docker) **Sep 2025 - Present**

- Designed and built the physical IoT sensing platform for the system which flags harmful algal bloom risk from low-cost water quality markers, selecting and integrating pH, temperature, turbidity, and water level sensors, in addition to an RGB sensor with a colour reagent, used to measure dissolved phosphorus where no affordable sensor existed.
- Engineered the electronics and fluid handling on an Arduino MKR WiFi 1010, including driver circuits and a boost converter for a 12V solenoid on 3.3V supply, with failsafe-prioritized edge logic that interrupts pumping on reservoir overfill and polls sensors sequentially to stay within the board's current budget.
- Contributed to a Docker-hosted ThingsBoard cloud pipeline providing a live dashboard, remote device control, and automated email alerts on positive bloom classification.
- Co-authored the resulting paper on a system reaching 78% accuracy and 0.68 macro F1 using chlorophyll-a as a surrogate training target, eliminating the need for an expensive chlorophyll sensor in deployment. Preprint on Zenodo (doi.org/10.5281/zenodo.23321293).

Six Axis Robot Arm, (Arduino, Python, C++, Fusion 360) **Jan 2026 - Aug 2026**

- Designed, 3D printed, and assembled a custom multi-axis robot arm driven by five NEMA 17 stepper motors plus wrist and claw MG996R servos, controlled with AccelStepper and the Arduino Servo library.
- Built a 1:5 scale potentiometer twin of the arm as a physical controller, replacing keyboard input that proved unworkable across that many axes with direct one-to-one joint mapping.
- Developed a Python serial bridge between the controller and arm Arduinos, smoothing raw potentiometer input and applying deliberate latency to suppress jitter from noisy analog reads.
- Full system breakdown and files at github.com/blainp/5-Axis-Robotic-Arm-and-1-to-5-Scale-Potentiometer-Twin-Controller

Aura, Android Dating Application, (Android Studio, Java, Firebase) **May 2024 - Nov 2025**

- Built a functional Android dating application in Java with Firebase Authentication and cloud-backed storage for user accounts, profiles, and images.
- Implemented real-time asynchronous chat between devices, handling message synchronization and live updates across concurrent users.
- Developed the matching system, scoring users against stated preferences and an in-app aura score to determine mutual matches.
- Source files available at https://github.com/blainp/Aura.

Inventory Management SQL Database Website, (SQL, PHP, AJAX, XAMPP) **Feb 2025**

- Built a full-stack inventory management system in PHP and SQL with hashed-password authentication and role-based access control over an encrypted schema storing item records and images.
- Designed normalized many-to-one relational tables to support scalable addition and retrieval of linked entries.

Vacuum-Pump Wall Climbing Suit, (C, C++, Arduino, Fusion 360) **Mar 2022 - Present**

- Engineered a vacuum-powered wearable climbing system with custom-designed suction pads, real-time PSI monitoring, and fail-safe shutdown on pressure loss.
- Fabricated custom gaskets selected for airtight seal and friction coefficient against vertical surfaces. Source and design files at https://github.com/blainp/Vacuum-Suit-for-Vertical-Surface-Scaling.

Wearable Separation Alert Beacon, (C++, ESP32, Wi-Fi, Fusion 360) **Apr 2025**

- Built an ESP32-C3 wearable that maintains a persistent Wi-Fi handshake with a paired smartphone and triggers automated emergency alerts through iOS Shortcuts upon a dropped connection, with disconnection as the trigger rather than proximity.
- Optimized the firmware's duty cycle and sleep states to reach 18 hours of runtime on a 600mAh cell, cycling the Wi-Fi modem dynamically once a handshake is established.
- Designed an enclosure for concealed wear in Fusion 360 and documented constraints such as attenuation from body tissue. Design files at https://github.com/blainp/Integrated-ESP32-Wearable-for-Automated-Distress-Separation-Alerts