Benjamin Blair

Dana Point, CA | (949) 449-7749 | 1benblair@gmail.com | github.com/Ben-Blair | U.S. Person (export-control eligible)

Summary

Computer Science student building software for physical systems — real-time sensor processing, computer vision, embedded firmware, and production full-stack platforms. Experience spans C++ firmware on microcontrollers to cloud-deployed TypeScript services, with a track record of owning projects end to end and shipping to real users. Seeking software engineering work with direct real-world impact.

Education

University of Colorado Boulder — Boulder, CO

B.S. Computer Science — Major GPA: 3.7; planning to continue into an M.S. in Computer Science — *Expected May 2027*

- **Relevant Coursework:** Design & Analysis of Algorithms, Data Structures, Computer Systems Architecture, Database Systems, Advanced Programming Languages, Software Engineering, Software Development Methods & Tools, Introduction to Robotics, Human–Computer Interaction, Linear Algebra, Calculus I–II, Discrete Mathematics, Physics I–II

Experience

Niguel Point Property Management — Laguna Niguel, CA

Full-Stack Software Engineer Intern — *Summer 2026*

- Built and self-hosted a full-stack business-operations platform that replaced the company's third-party SaaS subscription, eliminating ∼$3,400/year in recurring fees across the team.
- Developed the platform in Next.js 16 / React 19 / TypeScript (∼16K LOC, 20+ feature modules) on Supabase — Postgres with row-level security, Google OAuth, object storage — with Tailwind CSS v4 and Recharts dashboards.
- Engineered an automated reporting service that scrapes 6 external systems via Playwright headless-browser automation (∼2,300 lines of Python) and delivers 4 seller and 70 listing reports weekly, replacing a full employee's worth of recurring manual work.
- Designed a serverless cloud execution model running the scraping pipeline in an ephemeral Vercel Sandbox (Firecracker microVM), dispatched detached and reporting results through a token-authenticated async HTTP callback.
- Implemented AES-256-GCM encrypted credential storage, TOTP-based automated 2FA re-login with self-refreshing session cookies, and dual-factor callback authentication.
- Instrumented run metrics and structured logs to monitor pipeline health, triage failures, and root-cause scraper breakages; shipped behind Vitest suites, Husky/lint-staged pre-commit hooks, and GitHub Actions CI.

Projects

Real-Time Indoor Presence & Location Tracker | *C++, TypeScript* | ben-blair.github.io/presence-scan

- Wrote custom embedded firmware in C++ (ESP32-C3, PlatformIO/Arduino) that parses raw HLK-LD2450 mmWave radar frames over UART and streams up to 3 tracked targets in real time as JSON over an on-device WebSocket server.
- Implemented an autonomous simulation mode using an 8-connected A* search algorithm (octile heuristic) with multi-agent obstacle avoidance over an occupancy grid derived from a splat point cloud; smoothed live radar jitter with a per-target One Euro adaptive filter.
- Produced a photorealistic 3D asset end to end with COLMAP structure-from-motion and a locally trained 3D Gaussian Splatting model (Rust/wgpu), owning the pipeline from capture through real-time in-browser rendering.
- Rendered each tracked person as an animated avatar depth-occluded by the 3D scan in PlayCanvas (WebGL2/WebGPU) with custom Gaussian-splat shaders in GLSL and WGSL. (∼4,900 LOC, 8 Vitest suites, GitHub Actions CI/CD)

Smart-Room Security & Automation System | *Python, Raspberry Pi*

- Owned the full ML pipeline for an unsupervised Anomalib PatchCore (PyTorch) anomaly-detection model — dataset capture, preprocessing, training, inference — and calibrated detection thresholds with hysteresis and multi-frame confirmation to cut false positives on ROI-cropped frames.
- Built a real-time acoustic event-detection service using YAMNet (TensorFlow Lite) that classifies a target sound from a live microphone stream over overlapping 1s/0.5s-hop windows and triggers a weather-conditioned spoken response via A2DP/PipeWire, exposed through a Flask REST API and React dashboard.
- Engineered an always-on computer-vision security system (Motion daemon, 1280x720@15fps) that selects the clearest intruder face via a two-pass sparse-then-dense scan and OpenCV YuNet DNN face detection with CLAHE low-light normalization, then auto-emails an HTML alert; archived clips to cloud storage with a two-pass H.264/FFmpeg re-encoder that budgets bitrate per clip against a hard 50MB cap.

Activities, Leadership & Certifications

Level 1 High-Power Rocketry Certification | *Tripoli Rocketry Association* — Summer 2026

- Built, flew, and recovered a high-power rocket to earn Level 1 certification.

STEPCon | *Presenter*

- Led a team building a Titanic survival-prediction model with feature engineering, logistic regression, random forest, SVM, and XGBoost under cross-validation; achieved 79.4% accuracy, top 12% on the Kaggle competition.

Circuit Workshop | *Teaching Assistant*

- Guided participants through hands-on electronics exercises.

Technical Skills

Languages: Python, C++, TypeScript, JavaScript, Java, SQL
Algorithms & Systems: Data structures, search & pathfinding, real-time signal filtering, embedded firmware (ESP32/PlatformIO), Raspberry Pi, mmWave radar over UART, WebSockets
Front-End Frameworks: React, Next.js, Tailwind CSS, Recharts
Backend & Storage Systems: Node.js, Flask, REST APIs, PostgreSQL, Supabase, AES-256 encryption, OAuth/TOTP
Cloud Infrastructure & Tooling: Vercel serverless / Firecracker microVMs, Docker, GitHub Actions CI/CD, Git, Playwright, Vitest, FFmpeg
ML & Computer Vision: PyTorch, TensorFlow/TF Lite, OpenCV, scikit-learn, NumPy, Pandas
Graphics & Sensing: WebGL/WebGPU, GLSL/WGSL, PlayCanvas, 3D Gaussian Splatting, COLMAP photogrammetry