

Allison Bentley

allison@bentley.sh
Portfolio: bentley.sh

EMPLOYMENT

HopNet | `hopnet.app` June 2025 - Present
Founder, Lead Engineer Remote

- Designed a distributed filesystem focused on ease-of-use, privacy, and native platform integration
 - HotStuff-2 style high-speed consensus protocol
 - Dynamic Reed-Solomon erasure coding for redundancy with graceful node failure recovery
 - Cryptography: ChaCha20-Poly1305 file & AES-SIV path encryption, Ed25519 auth
- Built cross-platform core application using **Rust**
 - **Svelte/TypeScript** frontend with integrated web server for headless installs, **Tauri** for desktop
 - Built native macOS FileProvider integration in **Swift** for Finder support
- Seeking NGI grant funding to advance open-source release

Mycro Harvest October 2023 - April 2025
Founding Engineer, Software Engineering Lead Waterloo, ON, Canada & Remote

- First full-time hire; software and hardware engineer through company's Berkeley SkyDeck seed round
 - Contributed over **80%** of frontend and **75%** of API codebase lines
 - Produced product demonstration video, see here: youtu.be/66sFVMiE6ps
- Designed frontend interface and spearheaded end-to-end development from a Figma mockup to a deployed **TypeScript/NextJS/Tailwind** product
 - Enforced component isolation and built interaction/visual testing with **Storybook** and **Chromatic**
- Architected the REST API responsible for data ingress from farm-deployed edge sensors and egress to the frontend interface for consumption (**FastAPI/Python**)
- Productized early prototype machine learning models and created active learning infrastructure
 - Tuned **YOLOv8** models for segmenting mushrooms & mushroom blocks from images
 - Developed cloud pipeline for ML-based 3D reconstruction from sparse images, based on in-house InstantMesh derivative, for predicting harvested mushroom yield & cap diameter
- Orchestrated SaaS on **Kubernetes** with GitHub Actions CI/CD; led AWS to GCP migration
- Deployed edge routers to clients with fully-automated **NixOS** infrastructure and LTE modem services
- Collaborated on IoT PCB design and **FreeRTOS** firmware; built toolchain for zero-touch OTA updates
- Managed SaaS development interns, wrote onboarding documents and presentations for new hires, and increased onboarding speed through the use of Nix development environments

EDUCATION

University of Waterloo | *MASc, Mechatronics Engineering* 2024

- Thesis title: *Statistical Optimization of CNN-LSTM Network Architectures: A Case Study in Autonomous Vehicle Control*
 - Used Tree-structured Parzen Estimator to optimize CNN-LSTM architectures under 200ms inference constraints; found spatial resolution more impactful than temporal sequence length
 - Built **Python** interface to PCSX2 emulator with memory decomposition pipeline for extracting in-game map and velocity data, following OpenAI Gymnasium standard
 - Built distributed inference architecture with **PyTorch/ZeroMQ** using LIFO queuing for real-time responsiveness; validated with imitation and sparse reward reinforcement learning models
- Relevant coursework: SYDE675 (Pattern Recognition), SYDE671 (Advanced Image Processing), CS680 (Introduction to Machine Learning), SYDE644 (Human Factors Testing). cGPA: 91.75%

- Capstone project: *Autonomous Pet Monitor, Software Lead*
 - Configured Microsoft Kinect with RTABMap for Simultaneous Localization and Mapping (SLAM)
 - Built real-time **TensorFlow** pipeline for pet detection from camera feed
 - Implemented Dijkstra's algorithm for path planning around pets, fusing 2D ground occupancy from SLAM with ML-derived pet locations; used occupancy data to select distant ball throw targets
 - Designed microservice architecture with **ROS** and **Docker** separating data capture, inference, and control for fault-tolerant operation on embedded hardware
 - Implemented with NVIDIA Jetson Nano, winning GeoTab Data Intelligence Award

PROJECTS

Coords coord.is	Present
<ul style="list-style-type: none">• Built a privacy-first location sharing app with end-to-end encryption and federation<ul style="list-style-type: none">– Cryptography: Ed25519 signatures, X25519 key exchange, AES-256-GCM multi-recipient encryption– Offline reverse geocoding with embedded city/region database• Rust core library and relay server with compact 20-byte binary wire protocol<ul style="list-style-type: none">– Stateless relay; hosts default federation endpoint, CI, F-Droid repository, NixOS packaging– UniFFI bindings from core to native clients• Native clients on iOS (Swift/SwiftUI) and Android (Kotlin/Jetpack Compose)<ul style="list-style-type: none">– iOS: BGTaskScheduler with significant location change API integration– Android: WorkManager for background updates; no Play Services dependency, custom fused location	

Real-Time Depth Image Processing Pipeline for DeMF 2022

- Developed a real-time capture and inference pipeline for the DeMF 3D object detection model, fusing RGB and point cloud data for classified 3D bounding boxes; implemented ROS bridge for use in robotics

Solar Energy Analysis 2021

- Built prototype solar capture system with weatherized enclosure and Raspberry Pi data logging to measure generation potential over winter
- Developed predictive model combining prototype data with Calgary rooftop LiDAR to estimate solar production potential and profitability city-wide

INTERNSHIPS

Toyota Motor Manufacturing Canada <i>Intern, QC Engineering</i>	September 2019 - December 2019 <i>Cambridge, ON, Canada</i>
<ul style="list-style-type: none">• Revamped Toyota RAV4 fit-and-finish audit workflow by developing a cross-plant frontend and database solution designed around operator ergonomics and process standardization• Designed system in direct collaboration with end users to optimize workflow efficiency<ul style="list-style-type: none">– Designed frontend interface that naturally mapped to their movement and measurement style– Integrated Bluetooth calipers for high-speed measurement• Built automated statistical analysis framework to present audit results to other factory groups instantly<ul style="list-style-type: none">– Built shared SQL backend across multiple plants for cross-line comparisons– Initiated Toyota QIMS integration for per-vehicle traceability and defect root-cause analysis• Direct productivity improvement of 28hrs+ per week from statistical analysis component alone	

Groupe NouvLR <i>Intern, Design Management</i>	September 2018 - December 2018 <i>Montreal, QC, Canada</i>
<ul style="list-style-type: none">• Liason between design team for REM light-rail network in Montreal and Ville de Montreal city planners, ensuring design & construction plans met city-enforced constructability constraints (noise/vibration, etc.)	

Aecon Group Inc.	May-Aug 2017, Jan-Apr 2018, Jan-Apr 2019, Sep-Dec 2020
<ul style="list-style-type: none">• Completed four work terms across construction lifecycle including on-site in remote areas of BC	