

Emilien Breton

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— EXPERIENCE —

EcoSafeSense

FIRMWARE ENGINEER

Ottawa | October 2024–Present

- Writing firmware for an ESP32-based air quality sensor and complementary test bench.

Cohere

DATA QUALITY SPECIALIST — ADVANCED MATHEMATICS

Freelance | October 2024–April 2025

- Wrote, audited and corrected LLM prompts and responses to produce spotless training data in formal logic, combinatorics, number theory, graph theory and mathematical optimization.

— PROJECTS —

DFA Regex Engine

- Built a regex engine in C99 that compiles regular expressions down to minimal deterministic finite automata to match input strings in linear time without backtracking.
- Wrote a test suite of over 500 end-to-end tests to ensure correctness of the engine and catch regressions.
- Developed a grep-like tool to stress-test the engine and achieved performance on par with GNU grep.

Multilayer Perceptron

- Wrote a static reverse-mode automatic differentiation library in C99 for use in deep learning.
- Designed a multilayer perceptron model atop the library and implemented stochastic gradient descent with momentum, ultimately achieving 97% accuracy on the MNIST database after 3 minutes training on 16 threads.

Purely Functional Language

- Developed an interpreter for a lazily-evaluated untyped λ -calculus augmented with monadic I/O.
- Bootstrapped the interpreter into a usable language by writing a 2500-line prelude complete with booleans, integers, pairs, optionals, lists, strings, and type classes for total orders, monoids, functors, monads, foldables...

Breadboard Microcomputer

- Designed an 8-bit microcomputer from logic gates upwards, including an assembler, emulator and rudimentary C compiler in Rust, totaling over 20 000 SLOC and 750 hours of work.
- Wrote various programs running natively on the microcomputer, including a Wozmon-like memory monitor, 16×16 sprite editor, native assembler, postfix notation calculator and Tetris clone.
- Built the microcomputer in hardware by hand-wiring discrete 74HC-series logic chips on breadboards.

— VOLUNTEERING —

Computer Science Club

CLUB EXECUTIVE

University of Ottawa | June 2022–Present

- Running a growing community of over 1500 computer science students at the University of Ottawa.
- Collaborating with the executive board to brainstorm, plan, fund and market monthly events and meetups, such as workshops on Vim bindings and a mini-course on the λ -calculus.

Hack the Hill Hackathon

DEVELOPMENT MANAGER — DEVELOPMENT TEAM

Ottawa | November 2022–October 2024

- Led development of an open-source event management system based on Next.js and Prisma and used by over 1000 hackers and 50 organizers throughout the hackathon.
- Built and maintained an internal payment portal powered by Stripe and React.js in collaboration with the sponsorship team that processed upwards of 20 000\$.

— AWARDS —

- IEEE x HTB CTF — 2nd place January 2026
- Tech-NoI-Hack 2025 — 2nd place October 2025
- AIT Hackathon 3.0 — 1st place, Mocha track September 2025
- uOCTF 2025 — 1st place March 2025
- uOtaHack 6 — 1st place, QNX track January 2025
- CS Games 2024 — 1st place, IoT track March 2024
- uOCTF 2024 — 1st place November 2023
- DeFi The Conventional — 1st place, DeFi track March 2022

— SKILLS —

- Languages — C • Rust • Python • Haskell • JavaScript
- Tools — GNU/Linux • GDB • GNU Make • Vim • React