Emilien **Breton**

613-913-9909 • mail@emilien.ca • github.com/Bricktech2000 • linkedin.com/in/emilien-breton • https://emilien.ca/

—— EXPERIENCE ——————————————

EcoSafeSense
FIRMWARE ENGINEER   *Ottawa | October 2024–Present*

Zeptile Software
SOFTWARE ENGINEER — WEB3   *Remote | October 2022–October 2023*
- Implemented various smart contracts in Solidity and ensured **100% test coverage** through Chai and Hardhat.

—— PROJECTS ——————————————

LTRE Regex Engine
A FAST REGULAR EXPRESSION LIBRARY WRITTEN IN C99   *C*
- Built regex engine in C99 that compiles regular expressions down to minimal deterministic finite automata to match input strings in **linear time** without backtracking.
- Wrote extensive test suite of over **300 tests** to ensure end-to-end correctness of engine and catch regressions.
- Developed grep-like tool as real-world stress test for engine, with command-line options for case-insensitive and smart-case matching, fixed-string patterns, full-match and partial-match searches, and more.

Atto-8 Microcomputer
A MINIMALIST 8-BIT MICROCOMPUTER WITH STACK-BASED MICROPROCESSOR   *Rust • C • Assembly*
- Designed entire microcomputer from from logic gates upward, including instruction set architecture, from-scratch assembler and cross-platform emulator, totaling over **20 000 SLOC** and **750 hours** of work.
- Wrote various utilities in Assembly running natively on microcomputer — Wozmon-inspired memory monitor • 16×16 sprite editor • Tetris clone • native assembler • postfix notation calculator.
- Built microcomputer in hardware by hand-wiring discrete 74HC-series logic chips on breadboards.

Atto-8 C Compiler
A RUDIMENTARY C99 COMPILER FOR THE ATTO-8 MICROARCHITECTURE   *Rust • C • Assembly*
- Building C99 compiler from scratch in Rust targeting Atto-8 Assembly language, consisting of preprocessor, parser, typechecker, optimizer and code generator.
- Implemented dead code elimination, constant folding and strength reduction, resulting in average of **20% increase** in generated code performance and **10% reduction** in binary size.
- Developed extensive C standard library, including heap allocator supporting **malloc and free**, string handling functions such as **strlen and memcpy** and input/output routines including **printf** supporting conversion specifiers %d, %u, %x, %c, %s and %p.

DBLess Password Manager
A HASH-BASED, DATABASE-LESS PASSWORD MANAGER   *C • Python*
- Devised custom hash procedure based on SHA-256 in Python which deterministically generates passwords on demand without requiring encryption or password storage.
- Reimplemented password generation algorithm in C along with SHA-256 routines as per FIPS PUB 180-4 for use as interactive CLI tool.

—— VOLUNTEERING ——————————————

uOttawa Computer Science Club
CLUB EXECUTIVE   *University of Ottawa | June 2022–Present*
- Building community of **over 1000** computer science students at the University of Ottawa.
- Collaborated with executive board to brainstorm and organize a dozen events by designing marketing material with Figma and hosting workshops for over **100 students**.

Hack the Hill Hackathon
DEVELOPMENT MANAGER — DEVELOPMENT TEAM   *Ottawa | November 2022–October 2024*
- Led development of open-source participant tracker built with Next.js and Prisma, used by over **1000 hackers** and **50 organizers** throughout hackathon.
- Built and maintained internal sporsorship payment portal powered by Stripe and React.js in collaboration with sponsorship team, enabling processing of over **20 000$**.

—— SKILLS ——————————————

- **Languages** — C • Rust • Python • JavaScript • HTML/CSS • JSON • YAML • Markdown • LaTeX • Lua • C++
- **Developer Tools** — GNU/Linux • Vim • Bash • Fish Shell • Git • GDB • GNU Make • Docker
- **Other Technologies** — React • Node.js • Express • Figma • Notion • Cloudflare • GitHub