

Nicholas Short

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ABOUT ME

Embedded firmware engineer specializing in connected devices and hardware/software integration. Currently developing GreenBox, a field-deployed HVAC control platform installed in 50+ homes across Canada and the United States. Experienced across the full embedded product lifecycle, from PCB design and board bring-up to firmware architecture, cloud connectivity, diagnostics, and deployment.

EXPERIENCE

GreenBox Energy Technology Corporation

May 2022 – Present
Toronto, Canada

Founding Engineer

- Led all embedded firmware and hardware engineering for GreenBox, a cloud-connected HVAC control platform deployed in 50+ homes across Canada and the United States for heat pump/furnace control, monitoring, diagnostics, and field data collection.
- Designed 5+ custom PCB hardware revisions from schematic capture through layout, manufacturing, assembly, bring-up, and field iteration across ESP32 and STM32-based embedded systems.
- Architected production-style ESP-IDF firmware in C around reusable hierarchical state machines for HVAC control, relay sequencing, Wi-Fi connectivity, cloud communication, provisioning, diagnostics, and failure recovery.
- Developed on-device efficiency estimation for heat pumps, calculating coefficient of performance (COP) from equipment air temperature, runtime, defrost, and outdoor-condition data to support autonomous heating optimization and historical performance recalculation.
- Designed OTA update, rollback, reboot-management, and diagnostic infrastructure with alternate-partition firmware download, post-reboot validation gates, flash-backed logging, local dashboard streaming, and cloud-synchronized fault reporting.
- Owned field deployment and customer-facing validation, coordinating directly with homeowners across Canada and the United States to install devices, debug HVAC compatibility issues, collect field data, and translate feedback into hardware and firmware revisions.

Bibliocommons

May 2022 – August 2023
Toronto, Canada

Platform Engineer Intern

- Developed and shipped production web features using Ruby on Rails, embedded Ruby, JavaScript, and Java; deployed and configured applications on AWS EC2 infrastructure.

Metrolinx TOTM Project Team

July 2021 – August 2021
Toronto, Canada

Software Developer

- Developed a RabbitMQ queue health-monitoring service in .NET Core, containerized it with Docker, and integrated Redis for high-availability state management.

PROJECTS

Digital Guitar Pedal

- Designed a custom STM32H7-based mixed-signal audio PCB interfacing with a 24-bit audio codec, full analog front-end/back-end circuitry, and real-time embedded DSP effects including delay and overdrive.

MP3 Player

- Designed and built a custom STM32F4-based portable MP3 player with SD card storage, USB-C Li-ion charging, SPI/FAT filesystem firmware, audio playback pipeline, and biquad-filter-based dynamic range compression.

EDUCATION

University of Toronto

2019 – 2024

BASc in Electrical and Computer Engineering, Honours

Toronto, Canada

- Minor in Artificial Intelligence and Robotics.
- Awards: Certificate of Distinction for EEG-to-image decoding capstone; Edward S. Rogers Sr. Admissions Scholarship;
- Publication: “Alljoined1: A Dataset for EEG-to-Image Decoding,” arXiv:2404.05553, 2024.

TECHNICAL SKILLS

Languages & Platforms: C, C++, Python, ESP-IDF, FreeRTOS, STM32 HAL/LL, ESP32, STM32, ARM Cortex-M

Hardware & Tools: KiCad, Altium, board bring-up, mixed-signal, RF, and high-speed digital PCB design

IoT & Concepts: OTA updates, HIL testing, Wi-Fi, BLE, Zigbee, HTTP, MQTT, real-time audio, control theory