Daniel Fichtinger

Security-Focused Software Developer | MSc. Computing | Open Source Contributor

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EDUCATION

Queen's University   Kingston, ON
Bachelor in Computing (Honours) — Cybersecurity   09/2019 — 08/2024

Selected coursework: Software Architecture, Cybersecurity, Cryptography.

Queen's University   Kingston, ON
Master of Science — Computing — NSERC CREATE Cybersecurity   09/2024 — present

Selected coursework: Cyberphysical System Security, AI in Cybersecurity, Release Engineering.

EMPLOYMENT

Queen's University — School of Computing   Kingston, ON
Teaching Assistant   *Various semesters* 2020 — 2025

- Introduction to Cybersecurity.
- Data Structures.
- Introduction to Computing Science.

- *Dec. 2024 — Jan. 2025.*
- *Jan. 2024 — Apr. 2024.*
- *Sep. 2020 — Dec. 2020.*

Waive The Wait   Kingston, ON
Software Developer (Python)   12/2022 — 08/2023

- Refactored and containerized a fragmented codebase previously customized per clinic/EMR.
- Integrated with a legacy EMR lacking an API by repurposing Selenium for robust web automation.

Queen's University — Residence Life   Kingston, ON
Residence Don   08/2022 — 04/2024

- Ensured student safety and well-being in crisis situations.
- Mentored students; inspiring multiple to pursue the Don role.

RESEARCH WORK

SonicAuth: Voice-Based, Time-Synchronized MFA (*Python*)   *AI in Cybersecurity — 2025*

- Designed and implemented a novel voice-based MFA system.
- Developed an algorithm to generate time-based, high-entropy, and deterministic word sequences.
- Integrated open-source AI models for transcription and speaker recognition; implemented fuzzy matching and wordlist-aware Levenshtein alignment for validation.

- Architected the system using modular Python components; 1,000+ lines of code with full type hinting and unit tests.
- Achieved resilience against replay and phishing attacks by requiring synchronized, speaker-verified passphrase submissions.
- Formalized the work in a detailed paper.

Ultrasonic: Continuous Authentication for Vehicles (*Go*)   *Cyberphysical System Security — 2025*

- Designed and implemented a novel continuous authentication system for vehicles, using high-frequency sound as a secure, short-range communication channel.
- Developed a custom 2-FSK audio codec for ultrasonic binary data transmission, with decoding based on FFT and band-pass filtering.
- Implemented a lightweight cryptographic handshake protocol using modern cryptographic algorithms and libraries.

- Built a modular Go codebase (~750 LOC), including independent codec and handshake packages, verified via unit and end-to-end integration tests.
- Demonstrated correct system behavior under simulated conditions and proposed enhancements for real-world noise resilience and transmission efficiency.
- Wrote extensive technical report justifying the project.

SP2P: Peer-to-Peer Sound-Based MFA (*Java, Python, JavaScript*)   *Undergraduate Capstone Project — 2024*

- Designed and developed a peer-to-peer extension of the "Sound-Proof" authentication scheme.
- Authored a comprehensive technical report on the design and implementation of the system.

- Added interoperable communication between Android and Web clients.
- Implemented peer-to-peer WebRTC connection between authenticator and login device facilitated by a WebSocket signaling server.

Linux Vulnerability & Dependency Analysis (*Python*)   *Release Engineering — 2025*

- Conducted an empirical research study on the package ecosystems of Arch Linux and Debian.
- Implemented efficient data mining pipelines, including from sources lacking API access.
- Designed relational and graph database schemas for storage, leveraged NumPy and Pandas for statistical analysis.
- Formulated and answered research questions about connections between dependency relationships and vulnerability windows.

SELECTED PROJECTS

Ashen: Color Scheme   ○ ~ficd/**ashen**, ⬛ ficcdaf/**ashen.nvim**

- Designed a distinctive color scheme with wide adoption across terminal and editor ecosystems.
- Maintains ports for 20+ applications; most self-developed, some community contributed.
- Sourcehut hosted; mirrored by CI to GitHub for accessibility.
- Includes detailed documentation, previews, and contribution guidelines.
- Officially distributed with the Helix editor.
- Neovim plugin has 100+ GitHub stars, extensive configuration options, and diverse plugin support.

Zona: Static Site Generator (*Go*)   ○ ~ficd/**zona**

- Developed an application for generating a static website from Markdown content and HTML templates.
- Used to build and maintain personal website, ficd.ca.
- Implemented extension of Go Markdown parser supporting custom syntax elements and div injections for convenient styling.

Custom Ergonomic Keyboard Firmware (*DTS*)   ○ ~ficd/**zmk**

- Designed and built a multi-layer, 42-key Colemak-DH-based layout for ZMK firmware.
- Used DTS and C pre-processor macros to implement custom key behaviours, including quad-function "smart shift" keys.

TOOLING & CONTRIBUTIONS

Utility Suite   ○ ~ficd/**utils**

- Maintains a well-documented utility suite organized into sub-repositories.
- Features dozens of tools written in Python, Go, Bash, Fish, and Typst.
- Highlights: email formatter, Git utilities, Niri compositor integrations, Waybar modules, Typst libraries, dotfile synchronizer.

Tree-sitter Parsers (*Grammar DSL, Scheme*)   ○ ~ficd/**tree-sitter-mail**, ⬛ helix-editor/**helix**

- Maintains a `mail` parser used by Helix.
- Fixed a critical bug in the `ini` parser shared by Helix and Neovim.
- Authored syntax and text-object queries to enhance multi-language support in Helix.

Ecosystem Stewardship

- Maintains AUR packages for upstreams unfamiliar with Arch Linux, supporting broader platform accessibility.
- Shared config examples, dotfiles, and usage guides with the community.
- Contributor to the Arch Linux wiki & various GitHub wikis.
- Submitted bug reports and documentation to over a dozen open-source projects.
- Participated in issue triaging and code review.

SKILLS

- **Programming**: Go, Python, Java, C/C++, C#, Lua, JavaScript, Bash, Fish. Quick to adapt to new languages and toolchains.
- **Dev Tooling & Maintenance**: Git (rebase, submodules, mirroring), CI/CD pipelines, build systems, packaging.
- **Linux Systems**: Strong knowledge of system internals, shell scripting, and process management. Extensive experience with Arch Linux system administration.
- **Languages**: English (native), Hungarian (native), Japanese (conversational).
- **Security**: Threat modeling, cryptography, authentication protocols, MFA design, penetration testing principles, secure development practices.
- **Research & Data**: Empirical analysis, data mining, database management, problem formulation, technical writing.
- **Collaboration**: Contributor and maintainer in open-source; skilled in code review, effective bug reporting, documentation, community participation, and upstream contribution.