Nikola Zupancic

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Education

Queen's University Kingston, ON, Canada

Bachelor of Applied Science; Computer Engineering *September 2021 – December 2025*

- **Relevant coursework:** Computer Systems Architecture, Digital Systems, Data Structures, Algorithms, Microprocessors and Embedded Systems, Operating Systems, Distributed Systems, Cryptography and Network Security, Object Oriented Programming, Database Management Systems, Computer Vision and Deep Learning
- **Awards:** Dean's Honour List 2022-2025

Experience

Teaching Assistant for Digital Systems Engineering January 2025 - April 2025

- Helped students develop and build a mini 32-bit RISC CPU in Verilog during labs
- Graded student demonstrations and reports

Research Assistant May 2025 - August 2025

Undergraduate Research Assistant for Dr. Sean Kauffman

- Developed a dynamic instrumentation tool using **eBPF** and uprobes for Linux.
- Compared overhead and flexibility between dynamic instrumentation tools (Pin, eBPF)

Extra Curriculars

Queen's Cybersecurity and Cryptography Club (Q3C) March 2024 - Present

- Co-founded the **Queen's CTF team** as a subgroup of Q3C
- Participating in weekly CTFs with other students to represent Queen's University
- Represented Queen's at **CyberSci Regionals 2024** in Ottawa, placing 3rd, 12th in Canada
- Lead team meetings, going over CTF challenges and cybersecurity concepts

Projects

IO Switcher (Software KVM Switch) | https://github.com/c-ola/ioswitch July 2024 – Present

- Wrote a **C** program that switches input devices between computers (software based KVM switch)
- Designed a **Client/Server Daemon** that sends/receives **Linux** input events across a network using **TCP**
- Implemented **Bash** scripts and a **Systemd** service to seemlessly incorporate it into my workflow

GameBoy Emulator | https://github.com/c-ola/cassowary-gb June 2023

- Developed a program in **Rust** that **emulates** the 8-bit Gameboy CISC CPU and instruction set
- Emulated **interrupts** generated by input and output hardware, including display, timer, serial and joypad interrupts
- Emulated a pixel processing unit that decodes bytes in VRAM into pixels that are displayed using **SDL2**

Customizable Assembler | https://github.com/c-ola/minisrc-assembler March 2024

- Wrote a **Python** program that assembles **assembly into machine code** given a description of an instruction set
- Used **YAML** and **JSON** to create a config format that allows for the description of **RISC** languages
- Developed support for tags, directives and comments, and windows and linux operating system executables

Patient Cancer Screening Service November 2023

- Achieved **2nd** place in a team of 4 at the Queen's Engineering Competition for Programming
- Wrote a backend in **Python** using **Flask** to process symptoms through a **SVM** to predict lung cancer
- Wrote a frontend using **HTML, Tailwind CSS and React**

Technical Skills

Languages: C/C++, Python, Rust, Verilog, Java, Javascript, Assembly, MATLAB, Bash, HTML, CSS, SQL
Libraries: SDL2, pthread, Raylib, Pytorch, React, Flask
Tools: Linux, Git, Docker, Cloudflare, Android SDK
Hardware: Microcontrollers, FPGAs, Single Board Computers
Cybersecurity & Reverse Engineering: Ghidra, Pwntools, GDB, x64dbg, Binutils, Unicorn