

Neel Upadhyay

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SUMMARY

Software Engineering student (Cybersecurity Stream) at York University with hands-on experience in RTL hardware design, embedded systems, and secure hardware-software integration. Proven ability to architect cryptographic systems at the register-transfer level, deploy real-time inference pipelines on constrained edge hardware, and build autonomous embedded control systems from the ground up.

TECHNICAL SKILLS

Hardware & HDL: Verilog, FPGA (DE10-Lite), RTL design, FSM design, ALU design, RAM interfacing, LFSR

Embedded Systems: Microcontroller programming, motor drivers, sensor integration, Jetson Nano, edge inference

Languages: C/C++, Python, Verilog, Java, Bash

Cryptography: AES-128 (hardware RTL), LFSR stream cipher, hardware key generation, secure data flow

Protocols & Interfaces: GPIO, UART, I2C, WebSocket, REST APIs, SQL

Software & Tools: Git, Linux / Unix, Bash scripting, OOP, Algorithm Design

Certifications: Google Cybersecurity Certificate (2025), Java HackerRank Certificate (2024)

PROJECTS

AES-128 Hardware Encryption — FPGA | Verilog, DE10-Lite, RTL Design, FSM, LFSR

2025 – 2026

- Implemented full AES-128 encryption and decryption in Verilog at the register-transfer level on a DE10-Lite FPGA, coding SubBytes, ShiftRows, MixColumns, and AddRoundKey transformations directly in hardware.
- Designed a hardware key-expansion module alongside an LFSR-based stream-cipher architecture, generating pseudorandom keys on-chip without relying on software-side key management.
- Built modular RTL components including a custom ALU, RAM storage module, and FSM controller to orchestrate secure data flow between encryption stages.
- Engineered switch-based I/O modes for plaintext input, key generation, encrypt/decrypt execution, and RAM address control — demonstrating full hardware-level cryptographic system integration.

Real-Time ANPR & Campus Parking Lot Monitoring — Capstone | Jetson Nano, Python, AWS EC2, WebSockets, REST API, React

2025 – 2026

- Deployed a YOLOv8 detection and PaddleOCR extraction pipeline on a Jetson Nano, performing real-time Automatic Number Plate Recognition at the edge under GPU-constrained embedded hardware conditions.
- Optimized the inference pipeline for the Jetson Nano's hardware constraints, balancing model accuracy against real-time throughput for live parking lot monitoring.
- Integrated the Jetson Nano with an AWS EC2 backend over WebSocket, streaming live video and structured JSON detection payloads (plate data, timestamps, confidence scores) to the cloud in real time.
- Built a Python REST API and React frontend dashboard to log detection events, support historical queries, and visualize live vehicle entry data for security staff.

Autonomous Fire-Fighting Robot | C/C++, Microcontroller, Sensors, Motor Drivers

2025 – 2026

- Designed and programmed an autonomous fire-fighting robot integrating temperature sensors, flame detection logic, and motor drivers into a unified embedded control system on a microcontroller.
- Implemented real-time obstacle avoidance and autonomous navigation algorithms, enabling the robot to dynamically locate and move toward heat sources while adjusting its path.
- Assembled and validated the full hardware prototype, managing component wiring, power distribution, and sensor calibration to ensure reliable operation under test conditions.

WORK EXPERIENCE

TJX Companies — Mississauga, ON

Sept 2024 – Dec 2024

Real Estate Market Analyst Co-op

- Automated repetitive reporting workflows using Python scripting, improving data accuracy by 15% and freeing analyst hours for higher-value work.
- Analyzed store performance data in Excel to identify high-performing trade areas and recommend retention or relocation strategies.

Manefa Contracting Inc. — Brampton, ON

June 2021 – Aug 2022

Software Developer Intern

- Engineered a Java application with a SQL backend to automate material cost tracking, cutting manual entry errors by 60% and improving data integrity across project records.
- Built real-time Excel dashboards for project tracking and forecasting, boosting operational efficiency by 30%.

EDUCATION

Lassonde School of Engineering — York University

Sept 2022 – Dec 2026

Honours Bachelor of Engineering, Software Engineering | Cybersecurity Stream