David Chen
Software & Security Developer

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Education/Certifications

Honors Bachelor of Computer Science & Statistics   Sep. 2024 – Dec 2028
University of Toronto   *Toronto, ON*

CompTIA A+, CompTIA Security+   Obtained Aug 2024, 2025

Technical Skills

Languages: Go, Rust, Typescript/Javascript, C/C++, Python, Ruby, Java, Lua, Nix, Solidity, SQL, Haskell, Lisp, Verilog, VHDL, Powershell, Bash

Frameworks & Libraries: React.js, Next.js, Express.js, FastAPI, Tensorflow, QT, Langchain, Android

Databases & Cloud: AWS (EC2, Lambda, S3), GCP (GKE, Gemini, Gmail, Maps), Elastic, Firebase, PostgreSQL, MySQL, Redis, MongoDB, Prisma, Nginx

Tools & Concepts: Docker, Git, UNIX/Linux, QEMU, Visual Studio, Vim, VMWare, Kicad, OOP, FP, SDLC, SOLID, Agile, REST, PKI, OWASP 10 , TCP/IP, FPGA

Work Experience

Computer Science Instructor   Aug 2022 – Sep 2023
RoboEDU   *Toronto, ON*

- **Taught Python, C, Lua and Robotics:** With interactive exercises and tutorial work for 30+ students. Fostered a inquiry-first teaching methodology for software and hardware design.
- **Led a Junior Robotics Team:** Acting as a mentor during the engineering process. Established tests for consistency and stability aswell as routine code audits.
- **Developed Neural Networks and Computer Vision Projects:** Guiding 5 students through the process of developing with Tensorflow and Sklearn.

DevSecOps Intern   Mar 2023 – Jun 2023
Pathway Communications   *Toronto, ON*

- Developed scripts and runbooks to meet NIST benchmarks that update expired certificates, passwords, unused ports and excessive permissions in **110+** firewalls and routers.
- Integrated **Elastic Search & EDR** into company ecosystem using **EC2** cloud servers with production-equivalent environments from IaC. Setup logging with SNMP and Zabbix agents.
- Designed custom **ransomware** and invoked **atomic redteam** tests to validate EDR capabilities.
- Kept organizational knowledge base up-to-date with threat feeds, TPP and CVE crawlers.

Extracurricular Roles

Competitive Security CTF Team Captain | BYTE-BABIES CTF   Dec 2023 - Present

- Ranked **3rd in Canada** scoring high in **30+** international CTF events.
- **1st** place splunkCTF, **2nd** place National Cyber Consortium, **3rd** place ISSessionsCTF, MagpieCTF.
- Published in-depth reference for reversing ELF, PE, Android, Golang and Python. Effective for solving **50+** unique challenges. ⎘
- Developed custom virtual machines, C2 servers, constraint solvers and encryption libraries. ⎘

Cybersecurity Training Lead | UofTCTF   Sep 2025 - Present

- Taught high level **Reverse Engineering** techniques in deobfuscation, symbolic execution, malware behavior and compiler fundamentals to new members. ⎘
- Developed interactive **AI redteaming** workshop that teaches data poisoning, prompt injections, byzantine attacks, model extraction and interpretability-based evasion. ⎘
- Instructed red-team **Web Exploitation** seminar going over practical attacks SQLI, XSS, CSRF, SSRF, Cache Deception, Path Traversal, XXE, ReDos with reporting aligned to **OWASP 10**. ⎘

Director of Systems Programming | CSEC   Sep 2024 - Present
- Presented seminars on **JSX** transpilation engine, **V8 JIT** compilation pipeline, custom **AOT compiler development**, computational theory and turing completeness via **esoteric language development**, workshops on **LLVM** and **VMs** for **emulation** for **80+** students. ⌕
- Developed **x86 CPU emulator** using **Unicorn** and **QEMU** 32-bit environments.
- Published in-depth LLVM reference guide for beginners: ⌕

Research Lead | Epicdemic Research Group   Dec 2024 - July 2025
- **Winner of Research Bunny 2025 Grant**
- Fitted and Fine-tuned XGBoost classifier retrained with Optuna, Holt-Winters encoding and 7-day lag to achieve a **90% capture of variance.**
- Filtered features by using **Exploratory Data Analysis** in univariate and bivariate analysis to cancel out redundant or skewed variables from public sources.

Web Scraper Lead C.R.E.A.T.E - UofT | *Python, Flask, Beautifulsoup*   Sep 2024 - Present
- **Created a News Crawler:** Periodically parses 5 news outlets. Done by establishing bi-weekly meetings for group members to work out project requirements.
- **Led Webscraper, PostgreSQL and AWS Tutorial sessions:** Teaching many novice programmers how to setup development environments and use cloud services by example.

Design Club Executive Design@Bethune | *Linux, 3D Design*   Sep 2023 - Jun 2024
- **Led 7+ Workshops:** On linux, game design, 3D printing, woodworking and graphic design.
- **Established Partnerships Between Art Club:** Allowing for our collaborative sticker printing and graphic design workshops.
- **Managed Club Administration:** By developing budgets and recording existing club resources for future workshops months in advance.

Projects

Procedural C-like Compiler | *C++, LLVM, CMake*
- Developed AOT Compiler targetting a C-like language into a **LLVM** backend. ⌕
- Created **BNF** grammars, recursive descent parser, **AST** tree semantic checker and LLVM codegen subroutines to allow for arbitrary length arithmetic expressions and function support.
- Implemented transformation passes to allow for common subexpression elimination (**CSE**), dead code elimination (**DCE**), allowing up to **30% instruction reduction**.

Web-based video engine | *Socket.io, Websockets, ReactJS, FastAPI, OpenCV*
- Created PWA with real-time camera filters generated through custom transformer architecture.
- Developed duplex communications with websockets optimized through client-side interpolation, frequency-based encodings and forward error correction.
- Designed **ReactJS** frontend compatible with mobile and desktop interfaces, provided caching with PWA service workers.

PuzzleQL | *PostgreSQL, ReactJS, FastAPI*
- Developed web-based **SQL transpiler** using a block-based scratch-like design for converting visual code into raw SQL queries. Done by implementing a **BNF grammar** to allow for **recursive descent parsing** into node structures.
- Provided SQL interfaces in **FastAPI** designed to sanitize and forward CRUD requests to user-owned **Postgres** databases.

Proxmox Homelab | *Proxmox, LXC, Docker, Bash, CRON*
- Serving **FOSS** services to **3K+ daily visitors**.
- Hardened homelab security through **microservice containerization**, restricting open services via **reverse proxy**, **firewall policies**, **Cloudflare tunnels** and setting up an **internal VPN**.

Geminaut Browser | *Go, ReactJS, Electron, TailwindCSS*
- Implemented **parser** and **renderer** for the GEMINI Internet Protocol In **Golang**, creating APIs to parse page data into a json representation of the **DOM**.
- Developed frontend in **Electron**, **Tailwind**, **ShadCN** complete with caching, tabbing, history and page rendering implemented via **ReactJS** hooks, allowing for greatly improved UX.

PhishNet.work | *AWS, ReactJS, NextJS, Twilio. SageMaker*   UoftHacks 12 2025
- **Built off Twilio API:** Making endpoints for outbound and inbound calls to be recieved and serialized for text interpreting.
- **Configured AWS Ecosystem:** With EC2 server setup, firewall rules and webhooks to connect Twilio and Sagemaker.
- **Setup Transcription to Scam Detection Pipeline:** By converting muVal audio data into text and then passing it into BERT classificaton for phishing weight.
- **https://dorahacks.io/buidl/21620**

Split Ergo Keyboard | *KiCAD, CAD, 3D, PCB, Soldering*
- Developed custom keyboard using **KiCAD** to create PCB traces allowing for LED and **microcontroller** support. Created firmware with **QMK** and **C** to control OLED and keys.
- Designed 3D Case in **Blender** and assembled PCB, diodes, OLED, LED, GPIO pins, debug ports.

ZYNQ FPGA | *FPGA, Verilog*
- Emulated real hardware via various FPGA projects: LED controller, array multiplier, ALU with corresponding FSM, **System Verilog** descriptions and constraint mapping files.
- Synthesized programs using **Vivado** to control GPIO, switches, LEDs and buttons.

Data Dam | *ReactJS, Flask, Google Maps, Open-Meteo, IWLS, Sklearn*   CTRL+HACK+DEL 2024
- **Data-mining of Historical Climate Data:** By curating and sanitizing 2 online datasets used for training in the forest classification ML model for stream intensity.
- **Integrated Location APIs:** With Google maps. Open-Meteo and IWLS APIs to measure local temperature, humidity and water-levels from a user's IP address.
- **https://devpost.com/software/data-dam**

Room.IT | *AWS, ReactJS, NextJS, NodeJS*   Hack The Student Life 2024
- **Deployed with AWS Amplify:** Used it to monitor API requests with AWS's API gateway.
- **Setup API Endpoints:** With NextJS to interface PrismaDB with custom defined CRUD operations.
- **https://devpost.com/software/room-it-zjpel6**

Scan2Donate | *React, Flask, OpenCV, YOLO, PSQL, Openstreetmaps*   Hack The Valley 2024
- **Trained an Object-Detection Neural Network:** Using YOLO for detecting 20+ food items.
- **Setup Backend APIs:** For IP to location-finding and interfaces for between Flask and ReactJS.
- **Designed Scalable PostgreSQL Schema:** With automatic API calls to maintain entries.
- **https://devpost.com/software/scanforgood**

EcoNom-y | *PostgreSQL, Streamlit, Flask, Gemini*   Terrahacks 2024
- **Created PostgreSQL Database:** With APIs for interface designed to query a large database of recipe data at low latency.
- **Developed APIs for Computer Vision and NLP resources:** Allowing for input results to be rendered naturally for the frontend application.
- **Workshopped and Designed the Front-End:** Created in Streamlit with templates for displaying recipes.
- **https://devpost.com/software/econom-y**

Indigenous Archive | *Java, Jsoup, Processing*
- **Created a Fast Java Webscraper:** Which periodically parses Imgur and Pinterest for cultural art.
- **Integrated Internet Archive API:** For periodic archival of scraped images.
- **https://github.com/digitalyoshixi/indigenous-archive-test**

Winter Ocean | *Python, Pygame, Git*   Bearhacks 2020
- **Created a World Generation Algorithm:** Using random noise for replayability.
- **Applied Linear Algebra:** For manipulated input vectors to achieve natural and precise character movement.
- Final project was praised for being highly addictive.
- **https://replit.com/@DavidChen98/hackingthon-ioindian-ocean-game**

Contests

DS3 Datathon 2025 | *Tensorflow, Data Mining, Machine Learning, OpenCV*

- **Ranked 8/27**
- **Preprocessed and feature engineered** by removing biased and similar features while engineering shared features. Removed image impurities like bad crops and noise.
- **Extracted key features** via OpenCV Filters, ORB detection, Canny Edge detection and SIFT matching allowing for 23% valid spore identification rate.