Vir Patel

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EDUCATION

UNIVERSITY OF TORONTO — Toronto, ON
Bachelor of Applied Science + PEY Co-op — September 2023 – June 2028
Program: Computer Engineering
Cumulative GPA: 3.58/4.0
Relevant Coursework: Operating Systems, Data Structures & Algorithms, Computer Programming (C/C++)

SKILLS

Programming Languages: C/C++, Python, JavaScript, TypeScript, Verilog
Software: Git, Docker, Quartus Prime, ModelSim
Other: GitHub, MongoDB, Node.js, React.js, Tailwind CSS, CSS, HTML

EXPERIENCE

ASK ALAN | *Docker, Python, JavaScript, HTML, CSS* — Toronto, ON
Software Research Intern — May 2025 - August 2025

- Applied retrieval-based **natural language processing (NLP)** techniques to integrate Piazza forum content accessed via a third-party API into a **Retrieval Augmented Generation (RAG)** pipeline, storing data in **Pinecone** vector namespaces and **Elasticsearch** keyword indices, significantly reducing the time required to locate relevant course-specific answers for **500+ unique users**
- Developed **FastAPI** endpoints that utilize background processing to enable course instructors to add/remove Quercus (Canvas LMS), Piazza, YouTube, and site content through the **JavaScript** frontend, reducing content availability time
- Optimized backend performance with non-blocking file operations **(aiofiles)**, network requests **(httpx)**, and index upserts, thereby preventing event loop blocking to allow instructors to view live progress updates during content uploads/deletions
- Automated daily course content updates with **Bash** scripting and **CronJob**, while implementing an on-demand refresh button in the **JavaScript** frontend for instructors, ensuring consistently up-to-date information and giving instructors immediate control over individual courses

UT3 DIRECTORY MEMBER — Toronto, ON
Undergraduate Tutor — January 2025 - Present

- Delivered one-on-one and small-group tutoring sessions for undergraduate courses I had previously completed, focusing on review of core concepts, practice problems, and past exam papers
- Completed **UT3 tutor training** and applied the **GO ADAPT** tutoring model (goal-setting, observation, feedback, and collaborative planning) to structure sessions, encourage student self-assessment, and adapt explanations to individual needs
- Managed **2-hour sessions** that balanced instruction with guided problem-solving, fostering independent learning and exam readiness
- Provided **11+ hours** of tutoring to date, helping students strengthen subject mastery, improve academic performance, and build confidence in applying concepts

PROJECTS

PORTFOLIO WEBSITE V2 | *React.js, Next.js, TypeScript, Tailwind CSS* — August 2025

- Redesigned and rebuilt my personal portfolio using **React, Next.js, TypeScript, and Tailwind CSS**, creating a clean, visually engaging experience with a blog section and custom layout that reflects my unique personal branding and supports future content creation

ENE GIS | *C++* — January 2025 - April 2025

- Implemented **simulated annealing optimization** for multi-destination routing, improving pathfinding quality and contributing to a **14.6%** performance gain over benchmark solutions
- Developed a map drop-down feature in **C++** that dynamically linked UI selections to **OpenStreetMap (OSM)** data, allowing users to quickly navigate to major cities and explore their geospatial features

- Integrated bike share location icons into the GIS by extracting data from **OSM** data and displaying it on the map interface, enhancing usability and eco-transport visibility

FPGA CONTROLLED DRONE | *C/C++* March 2025

- Engineered an **FPGA**-controlled quadcopter interface on the **DE1-SoC** in **C/C++**, developing a keyboard signal interpreter, **VGA** animation system, and **GPIO** controller to enable real-time drone navigation via **PS/2** keyboard input
- Collaborated with a partner to design both hardware and software components, including protoboard voltage translation and real-time video pipeline attempts, demonstrating full-stack **FPGA**-to-drone integration

TEST CASE PLATFORM | *React.js, Vite.js, JavaScript, Tailwind CSS, MongoDB, Node.js* December 2024 - January 2025

- Developed a full-stack platform for contributing and managing programming test cases, enabling users to securely log in with **GitHub OAuth** to upload, view, and delete submissions
- Implemented persistent user sessions with **MongoDB** to extend login duration, improving usability and reducing friction for repeat contributors
- Designed a responsive frontend in **React.js** with **Tailwind CSS**, providing an intuitive interface for browsing and contributing test cases
- Deployed the backend on **Render** for scalable cloud hosting, ensuring reliable access to the platform across devices

PASSWORD CRACKER | *Verilog, Quartus Prime, ModelSim* December 2024

- Designed and implemented the **SHA-256** hashing algorithm as a **Verilog** module, integrating it with a password cracking pipeline to validate user passwords against target hashes
- Collaborated on developing a complementary hash-matching module to compare candidate hashes with stored values, enabling automated password recovery
- Utilized **ModelSim** to simulate and debug **Verilog** modules, resolving integration issues and ensuring accurate functionality of the overall system
- Applied modular hardware design principles in **Quartus Prime** to streamline debugging, improve maintainability, and support efficient testbench development

NOTE TAKING PLATFORM | *React.js, Vite.js, JavaScript, Tailwind CSS, MongoDB, Node.js* October 2024

- Developed a full-stack note-taking application with user authentication, enabling secure account creation and encrypted note storage
- Implemented real-time search using Mongoose queries on MongoDB, allowing users to instantly retrieve notes as they type

PORTFOLIO WEBSITE V1 | *React.js, Vite.js, JavaScript, Tailwind CSS* September 2024 - October 2024

- Built a personal portfolio website with **React.js** and **Tailwind CSS,** integrating **Three.js** to render interactive 3D objects and highlight development skills

DISCORD MUSIC BOT | *Python* May 2024 - July 2024

- Built a Discord music bot in **Python** that fetched and streamed audio using the **YouTube Data v3** API based on user queries
- Designed an interactive UI with **Discord embeds and buttons**, improving usability and playback control

ACCOMPLISHMENTS & AWARDS

REVERSI A.I. TOURNAMENT Toronto, ON
Implemented an artificially intelligent bot that ranked **3rd** on the Reversi Game Leaderboard among submissions from 550 students in the APS 105 Computer Fundamentals first-year programming course. April 2024

FASE ENTRANCE SCHOLARSHIP Toronto, ON
Valued at **$2000** this award is granted to students entering the first year of an Engineering program and is based on outstanding academic achievement in prerequisite courses. May 2023

ADDITIONAL

Languages: Fluent in English, Gujarati; Conversational Proficiency in Hindi