

VARUN PATHAK

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Education

McMaster University

Expected Graduation: May 2027

Software Engineering and Management Co-op (B.Eng.Mgt.)

Hamilton, ON

- Dean's Honors List (2023, 2024)

Relevant Courses:

- Data Structures and Algorithms
- Databases (SQL)
- Software Design Patterns + SDLC
- Object-Oriented Programming (Java)
- Digital Systems + Comp. Architecture
- Financial Accounting + Economics

Relevant Experience

McMaster Artificial Intelligence (AI) Society

2024 – Present

Project Member

Hamilton, ON

- Collaborating with a **team of 5+ members** in building a custom traffic light agent using **OpenStreetMap**, **SUMO-RL**, **Python**, and **TensorFlow** to enable dynamic traffic light control.
- **Improved traffic flow efficiency by 33%** by training and optimizing an **R-learning agent**, applying reward shaping to actively reduce congestion and improve traffic flow efficiency.
- Monitoring agent performance in real-time with **TensorFlow**, tuning hyper-parameters to minimize wait times.

AskTutors. INC

2023 – Present

Tutor (Math + Physics)

Oakville, ON

- One-on-one tutoring sessions (online + in-person) for **12+ students concurrently** in Grades 3-12 in **AP Math, AP Physics, & AP Economics**, and accounting for various learning plans like IEP and ESL.
- Tailored lesson plans to meet diverse student needs and learning styles internationally (inc. **Canada, Dubai, & India**).
- Monitored and assessed student progress, adjusting instructional techniques as needed to ensure optimal growth.

Projects

AI Receipt Management System | Source Code

Flask | Tesseract OCR | PostgreSQL | AWS S3

- Developed a Flask-based web application enabling secure file uploads, with server-side processing using **Flask-WTF** and **Werkzeug** for validation and dynamic feedback.
- Integrated Tesseract OCR & LLMs to extract text from receipt images with **95%+ accuracy**, automating data parsing and **reducing manual entry time by 50%**.
- Designed and managed a PostgreSQL database to **store 10,000+ receipt records**, ensuring data integrity and enabling sub-second query performance.
- Leveraged **AWS S3 buckets** for scalable storage of uploaded images, managing gigabytes of data while **reducing storage costs by 30%** compared to on-premises solutions.

Personal Portfolio | Website | Source Code

HTML | CSS | JavaScript | Google Sheets

- Developed a professional online personal portfolio using **HTML, CSS, and JavaScript** characteristics.
- Exploited **HTML/CSS** tags to create responsive, visual effects.
- Created an **automated text-receive system**, storing contact information in Google Sheets.

Blockchain - "Garden of Eden" | Source Code

Java | MongoDB | BouncyCastle

- Developed a decentralized blockchain wallet system in **Java**, capable of handling high transaction volumes efficiently.
- Utilizes **ECDSA** from **BouncyCastle** for digital signatures and **SHA-256** for hashing, with custom wallet functionality using private/public key-pairs through **Java Security**.
- Integrated scalable storage of transaction-block data, and enabling real-time tracking using a **NoSQL Database**

Technical Skills

Languages: Java, Python, C, C++, MATLAB, Verilog, Bash/Unix, HTML, CSS, JavaScript, SQL, R, LaTeX

Developer Tools / Frameworks: Git, Maven, GitHub, TensorFlow, MongoDB, Apache Log4j, UML, Microsoft Office

Verbal Languages: English (Fluent, Native), French (DELFI B1 Certified), Punjabi (Full Verbal Proficiency).