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
- Object-Oriented Programming (Java)
- Databases (SQL)
- Digital Systems + Comp. Architecture
- Software Design Patterns + SDLC
- 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.

Personal Projects

AI Receipt Management System | *Source Code* **Flask | Tesseract OCR | PostgreSQL | AWS S3 | AWS IAM**

- 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 & AWS IAM roles 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.
- 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: Git, Maven, GitHub, TensorFlow, MongoDB, Apache Log4j, UML, Microsoft Office, AWS, JUnit

Verbal Languages: English (Fluent, Native), French (DELF B1 Certified), Punjabi (Fluent).