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)
- Software Design (Android SDK)
- Digital Systems + Comp. Architecture
- Agile Methodology

Technical Skills

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

Developer Tools: Git, GitHub, AWS, Android SDK, Maven, MongoDB, Apache Log4j, UML, Microsoft Office, JSON

Certifications: MATLAB Onramp, Simulink Onramp, Control Design Onramp with Simulink, DELF B1.

Relevant Experience

McMaster Artificial Intelligence (AI) Society   **2024 – Present**
Software Developer   *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 Computer Science, AP Math, AP Physics, & AP Economics.
- Tailored lesson plans to meet diverse student needs (inc. IEP & ESL) 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*   **AWS S3 | AWS IAM | Flask | PostgreSQL | Tesseract OCR**

- 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**.
- Leveraged AWS S3 buckets & AWS IAM roles for scalable storage of uploaded images, **reducing storage costs by 30%**.

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

Maze Solver | *Source Code*   **Java | Apache Log4j**

- A maze-solving approach that adheres to the right-hand rule and breadth-first searching (BFS) algorithms including dynamic direction changes based on wall detection and directional turns.
- Enabled detailed traceability of algorithm execution and path-finding decisions, which improved debugging capabilities and facilitated performance analysis using Apache Log4j.
- Emphasized clean code principles and best practices in Java, including encapsulation, modular design, and clear method documentation.