Harsh Upadhyay

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Education

McMaster University **Hamilton, ON**
Honours Computer Science Co-op (B.A.Sc.) *2022 – 2027*

- Presidents entrance scholarship valued at $5000 for incoming students with above an 96% average in high school
- Relevant Coursework: Applied Cryptography, Fundamentals of Machine Learning, Natural Language Processing, Principles of Programming Languages, Operating Systems, Concurrent Programming, Data Structures and Algorithms, Databases.

Experience

Government of Ontario – MPBSDP **May 2025 – December 2025**
Business Analyst Co-op *North York, Ontario*

- Enhanced Match and Merge processes, raising automated throughput from **30% to 70%** by leading **Agile grooming & refinement**, translating requirements into technical tasks, and delivering implementation-ready **Jira** user stories.
- Executed end-to-end **system and integration validation** by exercising **REST APIs** and third-party integrations via **Postman**, simulating production workflows to detect defects, validate edge cases, and enforce business rules.
- Conducted **SQL-driven analysis** to assess migration feasibility from a legacy postal code system by comparing existing data with external sources and GeoJSON boundaries, identifying discrepancies and low-remediation replacement options.

Sciencious - United Arab Emirates **April 2022 – August 2022**
Frontend Developer *Dubai, UAE*

- Drove a **20% increase in user engagement** and a **35% improvement in session duration** by architecting and deploying a production-grade **Next.js** web platform with responsive, performance-optimized UI components.
- Enhanced backend scalability and analytics performance by designing **RESTful APIs** with optimized **PostgreSQL** schemas, reducing query latency and supporting stable real-time data access.
- Reduced feature delivery timelines by **15%** by collaborating cross-functionally with product and design teams to translate business requirements into scalable, maintainable web application features.

Projects

Workout Tracker | *Next.js, TypeScript, Tailwind CSS, PostgreSQL, Prisma ORM, NextAuth.js*

- Architected a **full-stack workout PWA** using Next.js App Router with **React Server Components** and **streaming SSR**.
- Engineered a **type-safe data layer** with Prisma, ensuring **100% type safety** from PostgreSQL to React via TypeScript and Zod.
- Designed a **secure authentication system** using NextAuth.js with OAuth and JWT sessions, hashing credentials with **bcrypt**.
- Built **RESTful APIs** with CRUD operations, session-aware state handling and schema optimization, reducing latency by **40%**.
- Integrated a **context-aware LLM** with **structured prompts**, delivering personalized recommendations from historical data.

PulseHTTP | *C++, Linux, epoll, Multithreading, Sockets*

- Built a high-performance **HTTP server** in **C++** using **POSIX sockets**, **epoll**, and **thread pools**, achieving **7.4× throughput** (**34K req/sec**) with **10K+ concurrent connections**.
- Implemented **event-driven epoll design** to minimize blocking I/O, reduce context switching, and improve CPU utilization.

LinkSnap | *Python, aiohttp, Redis, SQLite, Next.js, pyTest*

- Developed an asynchronous link management service using **aiohttp** and non-blocking I/O, incorporating rate limiting (**10 req/min per IP**) and robust input validation to ensure safe, high-throughput request handling.
- Designed a cache-first resolution pipeline with **Redis** and **SQLite** persistence, reducing database hits by **60%** while guaranteeing deterministic link mappings, surfaced through a lightweight **Next.js** frontend.

ActiveTrack | *Python, Pandas, NumPy, Scikit-Learn, Matplotlib*

- Built a **machine learning model** with **98.9%** accuracy for identifying barbell exercise types from multi-axis **IMU sensor** data.
- Engineered **25+ features** from **accelerometer and gyroscope** time-series using **FFT**, statistical analysis, and clustering.
- Optimized model performance with exhaustive **grid search** across **Random Forest**, **Decision Tree**, and **SVM** classifiers.
- Developed automated rep-counting using **LowPassFilter** and peak detection algorithms, achieving **95%+** counting accuracy.

Technical Skills

Languages: Python, JavaScript, TypeScript, C, C++, C#, Java, SQL, NoSQL, Go, Bash / Shell, Haskell, MATLAB, R
Frameworks: React.js, Next.js, Angular, Node.js, Django, Spring Boot, Spring Framework, Tailwind CSS, FastAPI
DataSci: TensorFlow, PyTorch, OpenCV, DeepFace, Pandas, Scikit-learn, PostgreSQL, MongoDB, Redis, Prisma
DevOps: GitHub Actions, Docker, Kubernetes, CI/CD, Jenkins, Cloudflare, AWS, Linux system administration
Tools: Git, GitHub, Postman, Swagger, SOAP, REST APIs, GraphQL, Unit testing, Integration testing, Agile / Scrum