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.

Work Experience

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

- Enhanced Match and Merge workflows, increasing automated throughput from **30% to 70%** by leading **Agile grooming & refinement** sessions, translating requirements into technical tasks, and delivering implementation-ready **Jira** user stories.
- Performed end-to-end **system and integration validation**, exercising **REST APIs** and third-party integrations via advanced **command-line tools** (`curl`, `httpie`), simulating workflows to detect defects, validate edge cases, and enforce business rules.
- Conducted **data validation** and **migration feasibility analysis** via **Python-SQL analytics**, comparing legacy postal code records against external datasets and **GeoJSON boundaries**, identifying replacement opportunities for reliable, low-effort integration.

Sciencious **April 2022 – August 2022**
Frontend Developer *Remote*

- Architected and deployed a production-grade **Next.js** platform, implementing scalable **JavaScript/TypeScript** UI components via end-to-end **software design & development**, resulting in a **20% increase in user engagement** and **35% longer sessions**.
- Designed and implemented scalable **RESTful APIs** with optimized **PostgreSQL schemas** and indexing strategies, integrated with **CI/CD pipelines** to enable automated deployments and **sub-100ms** query response times for real-time analytics.
- Reduced end-to-end feature delivery time by **∼10 engineering hours / sprint** (**15%**) by leading cross-functional execution with product, design, and QA teams, translating complex requirements into maintainable, modular, and scalable full-stack 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** with NextAuth.js, integrating **OAuth2**, **JWT**, and **SHA-256–based hashing**.
- 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, Scala, SQL, NoSQL, Go, Bash / Shell, Haskell, MATLAB, R
Frameworks: React.js, Next.js, Angular, .NET, Node.js, Django, Spring Boot, Spring Framework, Tailwind CSS, Flask, 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