Mankaran Rooprai

226-972-6339 | | | | Portfolio

Education

McMaster University Expected Graduation: April 2026

Software Engineering (B.Eng) (GPA 3.87/4.00) *Hamilton, ON*

- **Publication(s):** Integration of Blockchain in Smart Systems
- **Leadership:** Captain of Basketball Intramural Team, GDSC Open Source Backend Team Lead
- **Awards:** Engineering Award of Excellence ($3000), Dean's Honors List
- **Certifications:** AWS Certified Cloud Practitioner, Deep Learning Specialization
- **Relevant Coursework:** Digital Systems and Interfacing, Computer Architecture, Relational Databases, Software Concurrency, Software Design, Natural Language Processing, Linear Algebra, Probability and Statistics

Experience

IBM Consulting - EdgeAI Team Sep. 2024 – Present

Machine Learning Engineering Intern *Toronto, ON*

- Spearheaded the development of a COBOL code summarization service using LangChain LLM and Streamlit.
- Built a memoized DFS algorithm and tree, reducing summary generation time by **75%** and improving accuracy.
- Resolved LLM token limit issue with recursive COBOL text splitting and FAISS vector DB search.
- Devised DB ingestion process by updating summary versioning and handling I/O operations with Psycopg.
- Architected a weighted full-text search engine on PostgreSQL, working with cross-functional teams for integration.
- Developed a pipeline to extract complex tables from PDFs and validate accuracy using a multimodal LLM.
- Integrated a Human-in-the-Loop (HITL) agent with LangGraph, enhancing PDF table extraction results.
- Trained DocumentAI's custom extractor to extract PDF text columns, achieving a **0.6 F-score**.

Questrade - Release Engineering Team May 2024 – Aug. 2024

DevOps Engineering Intern *Toronto, ON*

- Developed a Flask-based package management service to enable Artifactory package deletions from Slack.
- Deployed a logging system to production, providing visibility into **1000+ unauthorized package deletions**.
- Created a role-based authentication service using GitLab API, to prevent unauthorized access attempts.
- Delivered weekly tech talks, promoting learning and knowledge sharing of new technologies.
- Earned all **5-star ratings** from my manager, recognized as the top-performing intern.

Telus - Wireless Networking Team Jan. 2024 – Apr. 2024

Software Engineering Intern *Toronto, ON*

- Automated 5G node alarm email notifications with a Python script, reducing process time by **96%**.
- Deployed the script to production with a Cron Job, running every 2 hours to optimize workflows.
- Reduced Splunk dashboard load time from **30 to 5 seconds** (**83.3% faster**) through SPL optimizations.
- Migrated Splunk analytics to GCP Looker using Pulumi and BigQuery, enhancing dashboard creation.
- Presented Looker dashboards to directors, **securing team licenses** to enhance data analytics.

Intelligent and Cognitive Engineering Laboratory Sep. 2023 – Apr. 2024

Machine Learning Research Assistant *Hamilton, ON*

- Published an SPIE paper on Python blockchain solutions for IoT, focusing on real-time sensor data storage.
- Used Matplotlib to visualize network node data, including CPU, RAM, and power usage.
- Applied scikit-learn's Isolation Forest algorithm to detect and address anomalies in 40% of the dataset.

RBC Capital Markets - Equity Derivatives Team May 2023 – Aug. 2023

Software Developer Intern *Montreal, QC*

- Engineered a C# .NET Web API to connect a cloud-based financial reporting service to external systems.
- Applied MVC architecture in the Web API to optimize data handling through HTTP requests.
- Containerized the reporting service, deploying on Kubernetes and Jenkins to scale for **100+ RBC traders**.

Skills

Programming Languages: Java, Python, C#, JavaScript, HTML/CSS, SQL
Tools: PyTorch, OpenCV, pandas, NumPy, Flask, .NET, React.js, Node.js, Spring Boot, PostgreSQL, MySQL, Docker, Kubernetes, Jenkins, GCP, AWS, Linux, Bash, Agile

Projects

DBAC Companion App | *React Native, Node.js, GCP*

- Collaborating with a frontend and backend team to develop an app that enables McMaster students to log their workouts and easily view gym machine availabilities in the David Braley Athletic Centre (DBAC).
- Implemented a Firebase Firestore DB to provide users gym occupancy levels and machine availability info in real-time.

High-Performance Image Classification | *NVIDIA RAPIDS, cuDNN*

- Developed a high-performance image classification system using NVIDIA RAPIDS for data preprocessing, cuDNN for fast deep learning training, and TensorRT for model inference optimization on NVIDIA GPUs.
- Integrated TensorBoard for real-time monitoring of model training metrics, enabling rapid debugging and optimization of the training process.

Custom GPU-Accelerated Convolution Operation | *C++, CUDA, cuDNN, OpenCV*

- Developed a custom GPU-accelerated convolution operation using CUDA and optimized it with cuDNN for high-performance image processing, leveraging low-level memory and kernel programming for acceleration.
- Validated the custom convolution implementation with comprehensive unit tests and benchmarked performance against cuDNN's built-in operations.

StyleFlow: Real-Time Neural Art for Live Video | *PyTorch, OpenCV*

- Built a real-time neural style transfer application using PyTorch and OpenCV, enabling high-performance artistic transformations on live video streams.
- Designed an efficient video frame buffering system to maintain seamless real-time processing at 30+ FPS on consumer-grade GPUs.

AI-Powered Research Assistant | *NumPy, FAISS, Hugging Face Transformers*

- Designed an AI-powered Research Assistant using RAG (Retrieval-Augmented Generation), LLMs, and FAISS-based retrieval, to automatically generate summaries, research papers, and citations based on user queries.
- Optimized the retrieval system by implementing a hybrid search strategy combining dense and sparse embeddings for improved query relevance.

Dynamic Data Pipeline with Airflow and PySpark | *Airflow, PySpark*

- Designed and implemented a data pipeline using Apache Airflow DAG and PySpark, automating data ingestion, processing, and transformation tasks.
- Created Spark-based data processing logic to filter and transform transaction data, resulting in efficient handling of datasets.

Heart Disease Predictor | *Python, scikit-learn, Matplotlib, NumPy, Pandas*

- Developed a heart disease prediction model in Python with scikit-learn, achieving **88.52%** accuracy and using an 80-20 train-test split; preprocessed data with Pandas, extracting 14 predictive attributes.

Shortest City Pathfinder | *Java, Maven, JUnit*

- Architected a modular Java software suite with four services to generate and visualize 2D meshes, including island and interconnected city generation, using Voronoi Diagrams, Lloyd Relaxation, and Delaunay Triangulation for enhanced realism and complexity.
- Executed Dijkstra's algorithm on Graph ADT, incorporating JUnit testing to ensure algorithm correctness, to facilitate star network establishment; managed priority queue for efficient hub-city connectivity.

Stock Market Investment Simulator | *Java, Java Swing*

- Developed a paper-trading Java application, using OOP principles, that allows users to buy/sell shares.
- Implemented YahooFinance API to fetch real-time stock market data including bid and ask prices.
- Utilized Java's I/O classes to develop a login/sign-up flow by reading/writing user's data from a text file.
- Designed a graphical user interface on NetBeans to allow users to view their active and potential positions.

Plutus @ Hack the North | *React.js, HTML, CSS*

- Worked closely with 2 developers to produce a budget tracker webapp for students to track their expenses.
- Utilized React.js, HTML, and CSS to develop an adaptive, responsive, modern single-page application (SPA).
- Produced application in a timeframe of **36 hours**, working relentlessly to complete project before deadline.