

Meharaj Ul Mahmud

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🐙 Github

🌐 LinkedIn

📁 Portfolio

📝 Medium

PROFESSIONAL SUMMARY

AI/LLM Engineer with 4+ years in ML and backend systems, currently building LLM, OCR and fraud-detection solutions at Dutch-Bangla Bank PLC. Expertise in RAG with hybrid vector + keyword search, self-hosted LLM inference (vLLM, Ollama), LLM-based document processing, agentic tool use and anomaly detection, backed by Python, Java, Oracle PL/SQL and banking systems. Automated financial processes, improving operational efficiency by 90%+.

PROFESSIONAL EXPERIENCE

Dutch-Bangla Bank PLC

Senior Officer - IT Development Division

Dhaka, Bangladesh

May 2024 – Present

○ AI/ML Research & Development

- Led R&D on LLMs, RAG, vector search, voice banking and AI chatbots using Ollama and vLLM, and designed the strategy for an in-house AI/LLM infrastructure focused on data sovereignty, regulatory compliance and horizontal scalability.

○ Internal AI Chatbot (Knowledge Retrieval System)

- Implemented hybrid search combining vector similarity and keyword matching with intelligent query caching, reducing response latency by 60% and computational overhead by 45%.
- Built knowledge extraction pipeline: PDF/image parsing → multi-engine OCR (PaddleOCR, Tesseract) → contextual understanding → vector embedding → vector DB persistence.

○ ML-Based Fraud Detection & Anomaly Monitoring

- Built behavioral fraud detection system profiling customer transactions by velocity, amount distribution, merchant category, geography and timing, with profiles rebuilt every 3–6 months as patterns evolve.
- Combined K-means clustering for customer segmentation with Isolation Forest for real-time anomaly detection of suspicious transactions.
- Deployed for proactive fraud prevention, flagging anomalous transactions in real time while minimizing false positives through continuous model refinement.

○ Intelligent Document Processing & Credit Assessment

- Integrated LLM-based OCR to extract data from CIB reports, bank statements, loan applications and NID cards (PDFs, scanned images, handwritten forms) with multi-layer validation and 95%+ extraction accuracy.
- Engineered CIB data extraction and credit scoring system for automated loan approval, reducing processing time by 75% while improving accuracy.
- Developed automated bank statement conversion with transaction categorization, pattern analysis and anomaly detection.

○ Cross-Border Transaction Automation System

- Architected SWIFT message processing system automating parsing, matching and rule-based transaction classification across MT103, MT940, MT950, MT942 and MT910.
- Built reconciliation engine correlating MT940/MT950 statements, MT942 interim reports and MT910 credit confirmations with MT103 payment instructions, eliminating 90%+ of manual reconciliation effort and cutting processing time from hours to minutes.
- Led migration from legacy MT103 to ISO 20022 pacs.008, ensuring regulatory compliance for cross-border payments.

○ Tech Stack: Python, Django REST Framework, LangChain, vLLM, Ollama, ChromaDB, PaddleOCR, Tesseract, Scikit-learn, PostgreSQL, Java, Spring Boot, Oracle PL/SQL, React, TypeScript

Dutch-Bangla Bank PLC

Management Trainee Officer - IT Development Division

Dhaka, Bangladesh

May 2023 – May 2024

○ AI-Based Face Liveness Detection System (e-KYC)

- Designed and trained a custom CNN on a 100,000+ image dataset, achieving 99.9% accuracy in production.
- Detects 3D masks, printed photos and screen replay attacks through multi-layer checks.
- Deployed as an API consumed by 3 production customer onboarding systems, validated on ~20,000 live requests per day over 6 months (~3.6M requests).

- **Enterprise Captcha Generation Service**
 - Built secure, scalable REST API for dynamic captcha generation with multi-level pattern complexity, configurable distortion levels and character sets.
 - Deployed behind a load balancer and consumed by 15+ customer-facing and internal banking systems with sub-30ms response times, reducing automated bot attacks by 85%.
- **Tech Stack:** Python, Flask, OpenCV, TensorFlow, Keras, CNN, Java, Spring Boot, REST APIs

Mirailit Ltd

Jr. Software Engineer

Dhaka, Bangladesh

February 2022 – May 2023

- Developed and maintained scalable RESTful APIs using Python and Django REST Framework.
- Created an NLP-based product mapping model for intelligent product comparison and recommendation.
- Built and published cross-platform Flutter mobile applications for internal business operations.
- **Tech Stack:** Python, Django, Django REST Framework, NLP, Flutter

PROJECTS

oss-clarity - Self-Hosted Session Replay & Heatmaps for Django

Django, TypeScript, rrweb, Celery

- Released an open-source Django app for session replay, heatmaps and 15 rules-based behaviour signals (rage, dead clicks).
- 4 KB tracker, text masked in the browser, no IPs stored; 300+ tests across Python 3.11–3.14, Django 5.2–6.1, PostgreSQL.

Photon - Local-First Desktop AI Teammate (in progress)

Electron, TypeScript, Django, DRF

- Desktop AI agent: an Electron app runs file and shell tools in the user's workspace, directed by a Django server.
- Agent loop streams model steps, sandboxes tool calls to the workspace and asks approval before writes or shell commands.
- Django REST server with JWT auth, Fernet-encrypted secrets, workspaces and routing across multiple LLM providers.

GoCV - Mobile Resume Builder

Flutter, Dart, Django REST

- Cross-platform Flutter app to create, edit and preview resumes and export them as PDF, in English and Bengali.
- Backed by a Django REST API shared with JobBoard, covering authentication, profiles and resume data.
- Open source on GitHub with 18 stars and 8 forks.

EDUCATION

East West University

Bachelor of Science in Computer Science and Engineering

Specialization: Data Science and Artificial Intelligence

CGPA: 3.64/4.00 (Dean's List, 2021–2022)

Scholarship: Medha Lalon Scholarship (2019–2021) for outstanding academic performance

Relevant Coursework: Machine Learning, Data Mining, Algorithm Design, Database Systems, Software Engineering

Dhaka, Bangladesh

April 2018 – May 2022

TECHNICAL EXPERTISE

AI & LLM	RAG, Hybrid Search, LangChain, vLLM, Ollama, ChromaDB, LLM OCR, Agents
Programming Languages	Python, Java, JavaScript, TypeScript, SQL, Oracle PL/SQL, C/C++
Machine Learning	TensorFlow, Keras, Scikit-learn, OpenCV, NLP, CNN, Anomaly Detection
Backend Technologies	Django, Django REST Framework, FastAPI, Flask, Spring Boot, Node.js
Frontend Technologies	React.js, Next.js, HTML5, CSS3, Responsive Design
Mobile App Development	Flutter, React Native, Native Android
Database Systems	Oracle, PostgreSQL, SQLite, MongoDB, Firebase
DevOps & Cloud	AWS (EC2, S3, Route 53), GCP, Docker, Jenkins
Development Tools	Git, SVN, BitBucket, Redis, Celery, RabbitMQ

PUBLICATIONS & RESEARCH

- **Mahmmud, M.U.**, Ahmed, M.A., Alam, S.M., Imam, O.T., Reza, A.W., Arefin, M.S. (2022). "Human Posture Estimation: In the Aspect of Agricultural Industry." ICIPCN 2022. **Springer Link**
- **Mahmmud, M.U.**, Laskar, M.S., Arafin, M., Molla, M.S., Reza, A.W., Arefin, M.S. (2023). "Improved Virtualization to Reduce e-Waste in Green Computing." ICO 2022. **Springer Link**