

# Shovon Sharma

📍 Khulna, Bangladesh 🗂 GitHub 📞 +880-1300346877  
✉️ sharmashovon875@gmail.com 💬 LinkedIn 🌐 Medium 📄 Portfolio

## Technical Skills

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**Languages:** C/C++, Python, Go, Bash, JavaScript, Solidity

**Databases:** MySQL, PostgreSQL, SQLite, Oracle SQL, ChromaDB

**Frameworks/Tools:** PyTorch, JAX/Flax, FastAPI, Docker, Git, Linux, Blockchain, Hugging Face, Unislot AI

## Projects

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### DMoEBERT – Sparse Mixture-of-Experts for NLU (Thesis) ↗

- Designed a scalable sparse Mixture-of-Experts encoder-only model with dynamic expert routing for Natural Language Understanding.
- Trained 23M/45M models from scratch under tight compute constraints for Natural Language Inference, Sentiment Analysis, Paraphrase Detection, and Topic Classification.
- Outperformed BERT-base (LoRA PEFT) with  $13.5\times$  fewer FLOPs and  $5.3\times$  lower memory.

### Stable Diffusion from Scratch ↗

- Implemented a full Denoising Diffusion Probabilistic Model (DDPM) in PyTorch.
- Built attention-enhanced U-Net and Variational Autoencoder (VAE) for latent-space compression.
- Optimized training using a two-stage approach for stability and low memory use.

### Real-Time Microphone Transcription Web Application (FastAPI + SQLite + WebSockets) ↗

- Built real-time browser-to-backend transcription system using WebSockets + Vosk ASR (CPU-only).
- Implemented React frontend for live microphone capture, FastAPI backend for streaming audio, partial/final transcription, and SQLite session storage (transcript + metadata).
- Dockerized deployment with automated tests using pytest.

### Course Finder – AI-Powered Recommendation System ↗

- Built recommendation engine using Sentence Transformers + ChromaDB.
- Integrated FastAPI backend, Streamlit UI, and Dockerized deployment.
- Designed a multi-factor ranking system (similarity, rating, difficulty).

### Sharma's Drive – Decentralized File Storage Platform ↗

- Developed a blockchain-based file sharing (e.g., audio, image, video, zip) platform using Solidity smart contracts.
- Integrated Node.js backend and React frontend for secure upload and retrieval.

### Task Management API (FastAPI + PostgreSQL) ↗

- Designed RESTful API with full CRUD functionality.
- Built using FastAPI, PostgreSQL, and Docker for containerized deployment.

### Chomp Chase – AI Maze Race Game ↗

- Generated random mazes via DFS with backtracking and implemented AI opponent using the A\* pathfinding algorithm.

## Education

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### B.Sc. in Computer Science and Engineering

2020–2025

Khulna University of Engineering & Technology (KUET)

### Higher Secondary Certificate (HSC)

2017–2019

Govt. M.M. City College, Khulna — *Board Merit Position: 23*

## Technical Writing

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- Contributor on Medium — write technical deep-dives on AI, systems, and programming. Notable Articles :
  - The No-Nonsense Guide to Attention, LinearAttention, GPU Memory & FlashAttention : Math to Code ↗
  - Understanding Vision Transformers from First Principles : Theory & Code ↗
  - The Math Behind Stable Diffusion ↗
  - Let's Take a SQL Adventure: From Theory to LeetCode ↗
  - Let's Explore Go: From Hello World to Data Structures ↗