Md. Asaduzzaman Shuvo

AI Engineer · Machine Learning

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PROFESSIONAL SUMMARY

AI/ML researcher and engineer working on low-resource NLP, vision-language models, and retrieval-augmented generation. Author of 5 accepted papers, including WACV 2027 main conference and CVPR and EMNLP 2026 workshops, on Bangla LLM benchmarks, hallucination in vision-language models, and reasoning distillation for compact models with QLoRA. Currently building a production RAG system as an AI/ML Engineer Intern at Parallax Labs, and experienced in shipping end-to-end AI applications with PyTorch, Hugging Face, FastAPI, and hybrid retrieval. Academic reviewer for NeurIPS, EMNLP, ECCV, and COLM 2026 workshops.

EXPERIENCE

AI/ML Engineer Intern Sep 2026 – Present
Parallax Labs

- Building an end-to-end RAG system over 5,000+ arXiv papers (cs.AI, cs.CL, cs.LG); currently integrating LLM generation with hallucination checks and out-of-domain query handling.
- Built a modular text-cleaning pipeline including HTML stripping, Unicode normalization, language filtering, and deduplication, with pytest unit tests and automated dataset validation.
- Embedded 5,007 documents with Sentence-Transformers (all-MiniLM-L6-v2) into ChromaDB using validated batch upserts; benchmarked semantic search at 14.6 ms median and 18.2 ms p95 latency on CPU.

Undergraduate Researcher Jan 2023 – Jun 2026
United International University

- Authored 5 accepted papers at WACV 2027, CVPR 2026 Workshop and EMNLP 2026 Workshops (WiNLP, GroundLM).
- Built and released 2 Bangla NLP benchmark datasets on culturally entangled homographs and register failures; benchmarked 10+ LLMs and improved compact models with QLoRA, 4-bit quantization, and cultural chain-of-thought distillation.
- Co-developed an entropy-gated rectification method that reduces object hallucination in large vision-language models (WACV).
- Built WADE (thesis), a reasoning-annotated benchmark and distillation framework for floating-waste grounding with compact VLMs; contributed to VisText-Mosquito, a multimodal detection, segmentation, and explanation dataset (CVPR 2026 Workshop).

TECHNICAL SKILLS

AI/ML Research:	Large Language Models, Vision-Language Models, Low-Resource NLP, Hallucination Mitigation in LVLMs, Reasoning Distillation, Multimodal Learning, Visual Grounding, Dataset & Benchmark Construction, LLM Evaluation
LLMs & GenAI:	Hugging Face Transformers, LoRA/QLoRA, Model Quantization, Fine-Tuning, Prompt Engineering, RAG (Hybrid Dense + BM25 Retrieval, RRF, Cross-Encoder Reranking), LangChain
Deep Learning & CV:	PyTorch, TensorFlow, scikit-learn, OpenCV, YOLOv8, CLIP, ViT, BERT, Object Detection, Segmentation, Autoencoders
Languages & Tools:	Python, C++, Java, JavaScript, TypeScript, SQL, Bash, NumPy, Pandas, Git, Linux, Jupyter
Data & Deployment:	FastAPI, Next.js, PostgreSQL, MySQL, MongoDB, Pinecone, ChromaDB, Render

PROJECTS

NBR VAT Assistant | *Python, bge-m3, ChromaDB, BM25, Cross-Encoder, OpenAI API* [GitHub]

- Built a Bangla–English RAG system for Bangladesh VAT law question answering with page-level citations; resolved legacy PDF encoding issues across the source corpus.
- Combined dense and BM25 retrieval with Reciprocal Rank Fusion and cross-encoder reranking, improving Recall@5 from 41% to 59% and MRR from 0.30 to 0.51 over a dense-only baseline, with 100% refusal accuracy on out-of-scope questions.

Victor Von Doom – RAG Portfolio Assistant | *Next.js, TypeScript, GPT-4o-mini, REST API, Render* [Live]

- Built and deployed a RAG assistant that answers source-grounded questions on research, publications, projects, and skills, with query routing, context retrieval, backend health monitoring, and retry handling.

AGRONEST – AI Agricultural Platform | *Next.js, FastAPI, YOLO, TensorFlow, PostgreSQL* [GitHub]

- Built a full-stack agricultural platform combining YOLO-based crop disease detection with LLM-powered analysis, recommendations, and real-time weather data; 2nd Runner-Up, UIU CSE Project Show (2025).

PUBLICATIONS

[1] **Entropy-Gated Dynamic Rectification for Object Hallucination in Large Vision-Language Models**
Co-developed an entropy-gated method to reduce object hallucination in large VLMs · **WACV main 2027**

[2] **When a Name Is Not a Name: A Benchmark Dataset and Distilled Reasoning for Culturally Entangled Bangla Homographs in Low-Resource LLMs**

Built a 1,516-sentence Bangla benchmark released on Hugging Face; evaluated open-source LLMs with zero/few-shot and Cultural Chain-of-Thought prompting, and fine-tuned 1–3B models with QLoRA for distilled cultural reasoning · **WiNLP@EMNLP 2026**

[3] **Polite on the Surface, Broken in Practice: A Curated Dataset for Fixing Generation and Register Failures in Low-Resource Bangla Text Generation**
Created a 4,196-sample instruction-tuning dataset to benchmark Bangla LLM generation; fine-tuned open-source LLMs using LoRA and 4-bit NormalFloat quantization · **GroundLM@EMNLP 2026**

[4] **VisText-Mosquito: A Unified Multimodal Dataset for Visual Detection, Segmentation, and Textual Explanation on Mosquito Breeding Sites**
Contributed to a multimodal dataset and framework combining object detection, segmentation, and vision-language models for automated mosquito breeding-site analysis · **AI4RWC@CVPR 2026**

[5] **ADDomics: Enhancing Multi-Omics Fusion with Autoencoders and Deep Neural Networks**
Co-authored a multi-omics data fusion framework using autoencoders and deep neural networks · **IEEE TENSYMP 2025**

[6] **WADE: A Reasoning-Annotated Benchmark for Multi-Instance Floating-Waste Grounding with Compact VLMs**
Built a benchmark of 2,167 real-world images with 13,608 bounding boxes across 10 waste categories; evaluated six vision-language models and improved Qwen3-VL-2B recall from 2.48% to 23.39% using QLoRA · **arXiv 2026 (Under Review)**

EDUCATION

United International University (UIU) — Dhaka, Bangladesh
B.Sc. in Computer Science & Engineering (Major in Data Science), CGPA: 3.60/4.00 — *2022 – 2026*

Govt. K.C. College — Jhenaidah, Bangladesh
Higher Secondary Certificate (HSC) – Science

ACHIEVEMENTS

Awards & Grants	WiNLP Travel Grant, EMNLP 2026; 50% Merit-Based Scholarship
Academic Reviewer	NeurIPS 2026 Workshop VLM4RWD; EMNLP 2026 Grounding Language Models Workshop; ECCV Computer Vision for Ecology Workshop 2026 ; COLM 2026 Efficient Reasoning and Context Beyond Window Workshops
Project Show Awards	1st Runner-Up, DBMS Lab (2023); 2nd Runner-Up, System Analysis & Design Lab (2025); 3rd Runner-Up, Microprocessors & Microcontrollers Lab (2025)
Certification	AI Fluency for Students, Anthropic (May 2026)