

Aranya Saha

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🌐 Website

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Education

- BSc Bangladesh University of Engineering and Technology (BUET)** March 2025
Department: Electrical and Electronic Engineering (EEE)
Major: Communication and Signal Processing (CSP)
◇ **CGPA: 3.87/4.00**
◇ **Relevant Coursework:** Artificial Intelligence and Machine Learning, Random Signals and Processes, Digital Image Processing, Digital Signal Processing, Linear Algebra, Probability and Statistics, Computer Programming, etc.

Research Interests

Multimodal LLM | Computer Vision | Visual Understanding | Multimodal Learning | Trustworthy AI | AI in Healthcare

Research Experience

- Development of a Multimodal Medical Assistance Chatbot for Domain-Specific Applications** Dhaka, Bangladesh
[Slides] Nov 2023 Mar 2025
◇ Developed a multimodal medical assistance chatbot for dermatology by fine-tuning a vision-language model on the Dermnet dataset; implemented GRPO and DPO for structured reasoning and conversational alignment, integrated DINOv2 and knowledge graphbased RAG for diagnostic precision, and applied structured pruning for efficient deployment, achieving 82% test accuracy and improved patient-like interactions.
◇ *Research Supervisor:* Dr. Mohammad Ariful Haque
- Multi-Sensor Fusion Based Attention Scheduling Framework for Autonomous Driving** Remote Collaboration
Feb 2025 Current
◇ Exploring fusion approaches for signals captured from LiDAR, Radar, and Camera sensors in autonomous driving scenarios. Investigating attention scheduling mechanisms for fused multi-sensor images/signals to enhance perception efficiency.
◇ *Research Supervisor:* Dr. Matthew Caesar; *Collaborators:* Md. Iftekharul Islam Sakib, Zihan Shan
- Efficient Frame Selection for Long Egocentric Video Understanding** Remote Collaboration
June 2025 Current
◇ Working on reducing frames in long videos to enable efficient processing by vision language models.
◇ *Research Supervisor:* Samiul Alam

Publications

[P] = Preprint, [C] = Conference, [J] = Journal

- [P] Aranya Saha*, Tanvir Ahmed Khan*, Ismam Nur Swapnil*, Mohammad Ariful Haque, "CLARIFY: A SpecialistGeneralist Framework for Accurate and Lightweight Dermatological Visual Question Answering", under review at *IEEE Transactions on Human-Machine Systems*. [\[Link\]](#)
- [P] Ismam Nur Swapnil*, Tanvir Ahmed Khan*, Aranya Saha*, Mohammad Ariful Haque, "DermIQ-VLM: A Methodological Approach for Dermatological Reasoning in Vision Language Models under Low-Resource Constraints". [\[Link\]](#)
- [P] Tanvir Ahmed Khan, Aranya Saha, Ismam Nur Swapnil, Mohammad Ariful Haque, "The Effect of Compression Techniques on Large Multimodal Language Models in the Medical Domain". [\[Link\]](#)
- [C] Shadman Sobhan, Aranya Saha, Tanvir Ahmed Khan, Abdur Zami, "Skin Cancer Classification Using Pre-trained CNNs: A Transfer Learning Approach Addressing Imbalanced Data Challenges," **Accepted** at the 2nd International Conference on Next-Generation Computing, IoT and Machine Learning (NCIM), June 2025. [\[Link\]](#)
- [C] Shadman Sobhan, Abdur Zami, Mohiuddin Ahmed, Tanvir Mahtab Zihan, Tanvir Ahmed Khan, Aranya Saha, "A Multi-Stage Deep Learning Approach to Tuberculosis Detection with Explainable Insights," **Accepted** at the 2nd International Conference on Next-Generation Computing, IoT and Machine Learning (NCIM), June 2025. [\[Link\]](#)

Professional Experience

Advanced Chemical Industries Ltd. [\[Website\]](#)

Machine Learning Engineer

Dhaka, Bangladesh
Apr 2025 - Present

Office Projects:

- ◇ *CV Sorter*: LLM-Powered automated CV evaluation system for scoring candidates.
- ◇ *Insight Explorer*: LLM-powered analysis of tabular data to uncover trends and patterns.
- ◇ *Bangla OCR*: Conversion of printed and handwritten Bengali text into machine-readable format.
- ◇ *Self Check-out Intruder Detection*: Computer vision system for fraud detection in self-checkout.

Teaching Experience

Robotics Bootcamp 2025 [\[Website\]](#)

Institute of Robotics and Automation, BUET

Dhaka, Bangladesh
June 2025

- ◇ Delivered a lecture on [PID Control for Robotics](#), introducing feedback control fundamentals, PID components, and tuning methods with practical analogies.
- ◇ Included interactive simulations and discussed common real-world issues like steady-state error, oscillation, and sensor noise.

Leadership Experience

Association for Computing Machinery (ACM) [\[Website\]](#)

Student Executive, ACM SIGCOMM

Remote
Apr 2024 - Feb 2025

- ◇ *Appointment*: First-ever Student Executive of ACM SIGCOMM, leading initiatives for thousands of networking professionals alongside Chair [Dr. Matthew Caesar, Professor, CS, UIUC](#).
- ◇ *Technical Contributions*: Developed [official SIGCOMM website](#) under direct mentorship of the Chair.
- ◇ *Community Building*: Co-established official paper reading group; [presented a research paper](#).

Projects

EchoLens: Multimodal Conversational AI Engine

[GitHub](#)

- ◇ Integrated smolVLM for vision-language, Whisper for speech-to-text, enabling multimodal input fusion.
- ◇ Designed persistent conversational memory using JSON storage to maintain context over sessions.

Simple MedQA-GPT: GPT Tailored for Medical Q&A

[GitHub](#)

- ◇ Fine-tuned GPT-2 with supervised learning on curated clinical Q&A datasets using Hugging Face Trainer.
- ◇ Deployed scalable FastAPI REST service with Docker, enabling low-latency medical inference.

Autonomous Delivery Drone for Remote and Inaccessible Areas

[Report](#)

- ◇ Designed autonomous drone system optimized for remote area operations (1kg payload capacity)
- ◇ Presented the project idea at the **IEEE WIE BD Summit 2024**, and showcased the complete project at the **13th ICECE Conference 2024**.

IoT-Based Patient Health Monitoring System

[GitHub](#) [Report](#)

- ◇ Developed a comprehensive IoT sensor network for real-time patient parameter monitoring.
- ◇ Implemented real-time data visualization dashboard with alert systems.

MATLAB-Based Fingerprint Recognition System

[GitHub](#) [Report](#)

- ◇ Implemented advanced fingerprint recognition using signal processing techniques.
- ◇ Focused on feature extraction algorithms and pattern matching optimization.

Technical Skills

- ◇ **Hardware**: Microcontrollers, IoT Devices, Sensors.
- ◇ **Programming**: Python, MATLAB, C/C++, Pandas, NumPy.
- ◇ **ML/DL/NLP**: PyTorch, TensorFlow, Hugging Face Transformers, CNNs.
- ◇ **DevOps & Tools**: Docker, FastAPI, Git, LaTeX, Microsoft Office.

Competition

- ◇ **1st Runner Up - Poster Competition (AI)**
Poster Title: *AI-Powered Dermatological Assistant: Bridging Healthcare Gaps Through Multimodal Intelligence* [\[Poster\]](#)
BEAR Summit - Bangladesh National Semiconductor Symposium 2025 [\[Certificate\]](#)

Honors and Awards

- ◇ **University Merit Scholarship** (4 semesters) BUET, for outstanding academic performance
- ◇ **Dean’s List Award** (Years 1-2) BUET, for high cumulative GPA achievement
- ◇ **29th Rank out of 10,000+** candidates in BUET Undergraduate Admission Test (2019)
- ◇ **31st Rank (Male Category) out of 300,000+** in Dhaka Board HSC; **Talent Pool Scholarship** recipient with 96.83% in Physics, Chemistry, Mathematics and 91.15% overall
- ◇ **Perfect Attendance Certificate** Notre Dame College, for flawless attendance during Classes 11-12

References

Dr. Mohammad Ariful Haque [\[Profile\]](#)
Professor, Department of EEE
Director, Institute of Robotics and Automation
Bangladesh University of Engineering and Technology
Email: arifulhoque@eee.buet.ac.bd
Relationship: Undergraduate Thesis Supervisor

Dr. Quazi Deen Mohd Khosru [\[Profile\]](#)
Professor, Department of EEE
Bangladesh University of Engineering and Technology
Email: deen@eee.buet.ac.bd
Relationship: Academic Advisor