Musfequa Rahman

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Education

Chittagong University of Engineering and Technology (CUET)

Chattogram, Bangladesh

M.Sc. in Computer Science and Engineering

Jul 2023 - June 2025

CGPA: 3.75 (with Honors) / 4.00 (3.95/4.00 excluding IoT elective)

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Awards: **Dean's Award**

Thesis Focus: Multimodal Deep Learning Approach for Humor Detection in Bengali

Chattogram, Bangladesh

Jan 2018 - Jul 2023

Chittagong University of Engineering and Technology (CUET)

B.Sc. in Computer Science and Engineering

CGPA: 3.91 (with Honors) / 4.00 Merit Position: $3^{\rm rd}$ / 130

Awards: University Merit Scholarship, Dean's Award

Research Interests

My research advances next-generation **artificial intelligence** by uniting multimodal learning, trustworthy deep models, and agentic systems through four interrelated directions:

- Multimodal and Low-Resource AI Vision–language frameworks for humor, sarcasm, and sentiment detection in underrepresented languages, advancing inclusive and efficient multimodal reasoning.
- Generative AI for Research and Decision-Making Reliable generative modeling for digital forensics, biomedical applications, and automated research synthesis using multi-agent LLM orchestration (CrewAI).
- **Agentic and Human-Aligned AI** Multi-agent systems for collaborative problem-solving and decision support, embedding ethical design principles for transparent and responsible deployment.
- Trustworthy and Robust AI Systems Fairness, interpretability, and adversarial robustness in deep learning models with applications in biomedical imaging, food safety, and smart surveillance.

Professional Experience

Present
Jul 2024
Lecturer, Faculty of Food Science and Technology, CVASU
Taught undergraduate courses: Basic Electrical Engineering, Computer Science; MSc courses: Automation and Intelligent Systems for Food Engineering, Machine Learning to 500+ students.

Supervised 2 undergraduate theses (Nutritional Deficiencies, Cardiovascular Disease) and co-supervised

1 MSc thesis (Thin Film Growth).

Present Adjunct Lecturer, Department of CSE, East Delta University Chattogram, Bangladesh Oct 2024 Teaching undergraduate and MSc courses: Neural Networks and Fuzzy Systems, Algorithm-I, Cryptography and Network Security.

Guided student-led projects in applied AI and deep learning.

Jun 2024 Lecturer, Department of CSE, University of Asia Pacific Dhaka, Bangladesh

Jan 2024 Taught undergraduate courses: Competitive Programming, Data Structures and Algorithms, Algorithm-II, Object-Oriented Programming to 300+ students.

Supervised undergraduate projects in AI and systems development.

Dec 2023 Lecturer, Department of CSE, Uttara University Dhaka, Bangladesh Jul 2023 Instructed undergraduate courses: Computer Networks, Data Structures, Object-Oriented Programming,

Structured Programming.

Research Projects / Grants

 $\begin{tabular}{ll} Quality Evaluation of Commonly Consumed Processed Food in Chattogram and Risk Assessment \\ \bf Investigator \\ \it July 2024-Ongoing \\ \end{tabular}$

- Funded by the University Grants Commission (UGC) via Research and Extension, CVASU.
- Implemented by the Faculty of Food Science and Technology, CVASU.

- Funded by the University Grants Commission (UGC) via Research and Extension, CVASU.
- Implemented by the Dept. of Physical and Mathematical Sciences, CVASU.

Notable Publications

(S=In Submission, J=Journal, C=Conference, B=Book Chapter)

[J.3]DeepGuard: Enhancing Violence Detection in Smart Cities through Deep Learning. M.A.M. Provath, Musfequa Rahman, K. Deb, P.K. Dhar, T. Shimamura [IEEE ACCESS] *IEEE Access(IF: 3.9), 2025*

[J.2]CAMFusion: Context-Aware Multi-Modal Fusion Framework for Detecting Sarcasm and Humor Integrating Video and Textual Cues.

Musfequa Rahman, M.A.M. Provath, K. Deb, P.K. Dhar, T. Shimamura IEEE Access(IF: 3.9), 2025

[IEEE ACCESS]

[J.1]ADBNet: an attention-guided deep broad convolutional neural network for the classification of breast cancer histopathology images.

Musfequa Rahman, K. Deb, P.K. Dhar, T. Shimamura IEEE Access(IF: 3.9), 2024

[IEEE ACCESS]

[S.1]CricActionNet: A Comprehensive Framework for Cricket Action Recognition Using Keyframe Extraction and DenseNet-Transformer Based Architecture.

TM Mitul, Musfequa Rahman, K. Deb

Engineering Science and Technology, an International Journal(IF: 5.4), 2025

[JESTECH]

[B.1]Classifying Breast Cancer Using Deep Convolutional Neural Network Method. Musfequa Rahman, K. Deb, K.H. Jo International Workshop on Frontiers of Computer Vision, 2023

[IWFCV'23]

[C.4]CounterfeitFace: A Convolution Neural Network Approach to Face Spoof Detection. S Tahmina, Musfequa Rahman, S.M.M. Hossain, K. Deb 27th International Conference on Computer and Information Technology, 2024

[[ICCIT'24]

[C.3]A Deep Learning Based Approach for the Categorization of Actions in Cricket Videos. TM Mitul, Musfequa Rahman, K. Deb 2nd International Conference on Information and Communication Technology, 2024

[ICICT'24]

[C.2]Efficient Bangla Multimodal Humor Detection with Lightweight Dictionary-Based Transformations. Musfequa Rahman, M.A.M. Provath, K. Deb 3rd International Conference on Mathematical Analysis and Applications, 2024. [ICMAAM'24]

[C.1]Smart Surveillance: Real-Time Violence Detection Using Deep Learning. M.A.M. Provath, Musfequa Rahman, K. Deb 3rd International Conference on Mathematical Analysis and Applications, 2024.

[ICMAAM'24]

GitHub **Projects**

Academic Research Assistant – Multi-Agent LLM System

- Built CrewAI-based system for automated literature synthesis and proposal generation.
- Showcased advanced LLM orchestration, reasoning, and knowledge integration.

CAMFusion: Context-Aware Multi-Modal Fusion Framework

- Published in *IEEE Access*, 2025; detects sarcasm and humor in Bangla videos.
- Curated multimodal dataset; fused MobileNetV2 (visual) with BiLSTM/GRU (textual).
- Achieved 90% accuracy; proposed novel Bangla Text Extraction Algorithm for robust context retrieval.

Job Scraper Email Bot

- Flask-based tool analyzing job postings and aligning them with portfolios.
- Integrated LangChain, Groq API, ChromaDB, and real-time web scraping.
- Generated AI-assisted, customized outreach emails for intelligent job-market engagement.

Awards and Achievements

- Dean's Award for Academic Excellence CUET (2023, 2025)
- University Merit Scholarship Govt. of Bangladesh; awarded to top 3% students (2019–2023)
- Research Excellence Award Principal Investigator, UGC-Funded Project (2024)

Cocurricular & Leadership Activities

Academic Service:

- Reviewer International Conference on Data Science, AI and Applications (2025)
- Organizing Committee 17th International Annual Scientific Conference, CVASU (2025)
- Committee Member Strategic Planning Committee, Faculty of Food Science & Technology, CVASU Leadership Roles:
- Finance Manager CUET Computer Club; managed 50+ member research-driven initiatives (2022)
- Team Leader International Collegiate Programming Contest (ICPC) Regional (2020–2021)
- Team Leader National Girls' Programming Contest, Bangladesh (2019–2021)

Skills

- AI/ML Frameworks: PyTorch, TensorFlow, Keras, Hugging Face Transformers, scikit-learn, XGBoost
- Deep Learning Expertise: Transformer Architectures, Multimodal Fusion, LLM Fine-tuning, GANs
- Programming Languages: Python (Expert), C/C++, Java, R, SQL, JavaScript
- Research Tools & Platforms: Git/GitHub, Docker, Linux, Weights & Biases, MLflow, Jupyter, Google Colab, LaTeX
- Specialized Domains: Medical Image Analysis, Video Understanding, Cross-Modal Learning, Explainable AI, Trustworthy AI
- Data Science & Analytics: Pandas, NumPy, Matplotlib, scikit-learn, Statistical Analysis, Large-Scale Data Processing
- Cloud & Deployment: AWS, Google Cloud, Flask, Django, RESTful APIs

Online Courses

- Deep Learning Specialization Coursera
- AI For Everyone Coursera
- Python Data Structures Coursera
- Programming for Everybody (Getting Started with Python) Coursera

References

• Dr. Kaushik Deb

Professor, Department of Computer Science & Engineering, CUET Email: debkaushik99@cuet.ac.bd

• Dr. Mahfuzulhoq Chowdhury

Professor, Department of Computer Science & Engineering, CUET

Email: mahfuz@cuet.ac.bd

• Shayla Sharmin

Assistant Professor, Department of Computer Science & Engineering, CUET

Email: shayla sharmin@cuet.ac.bd