Musfequa Rahman

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🌐 MusfequaRahman.github.io 🎓 Google Scholar

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)*
Awards: **Dean's Award**
Thesis Focus: Multimodal Deep Learning Approach for Humor Detection in Bengali

Chittagong University of Engineering and Technology (CUET)	**Chattogram, Bangladesh**
B.Sc. in Computer Science and Engineering	*Jan 2018 – Jul 2023*

CGPA: 3.91 (with Honors) / 4.00
Merit Position: 3$^{\text{rd}}$ / 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 in CSE, Faculty of Food Science and Technology, Chattogram Veterinary and Animal Sciences University (CVASU)**　　　　　　　　　　**Chattogram, Bangladesh** 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 **Oct 2024**	**Adjunct Lecturer, Department of CSE, East Delta University**　　**Chattogram, Bangladesh** Teaching undergraduate and MSc courses: *Neural Networks and Fuzzy Systems, Digital Image Processing, Cryptography and Network Security, Algorithm-I.* Guided student-led projects in applied AI and deep learning.
Jun 2024 **Jan 2024**	**Lecturer, Department of CSE, University of Asia Pacific**　　　　**Dhaka, Bangladesh** 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 **Jul 2023**	**Lecturer, Department of CSE, Uttara University**　　　　　　　　**Dhaka, Bangladesh** Instructed undergraduate courses: *Computer Networks, Data Structures, Object-Oriented Programming, Structured Programming.*

Research Projects / Grants

Quality Evaluation of Commonly Consumed Processed Food in Chattogram and Risk Assessment
Investigator *July 2024 – Ongoing*

- Funded by the University Grants Commission (UGC) via Research and Extension, CVASU.

- Implemented by the Faculty of Food Science and Technology, CVASU.

Artificial Food Colorants in Processed Foods: A Machine Learning Study on Perception and Health Risks
Principal Investigator   *July 2024 – June 2025*
- 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(IF: 3.9), 2025   [IEEE ACCESS]

[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]

[S.2]   Face Spoof Detection Using Feature-Enriched Compact Convolutional Transformer.
        Sayeda Tahmina, **Musfequa Rahman**, K. Deb
        Journal of Computer Science and Technology(IF: 1.3), 2025   [JCST]

[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.3]   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.2]   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.1]   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]

Projects   ⌂ GitHub

Academic Research Assistant
- Built a 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
- 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.

Mitochondria Detection and Segmentation in SEM Images
- Created a microscopy dataset (170 SEM images, 3 cellular classes) for mitochondria detection and segmentation.
- Achieved **69.4% mAP@0.5** using optimized YOLOv8/YOLOv11 models with real-time inference (4.9ms/image).
- Enhanced small-object segmentation through targeted augmentation.

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
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