# Md. Rifat Hossen

Sontospur, Balughat -2216, Fulbaria, Mymensingh, Bangladesh

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## Career Objective

As an aspiring academic, I am committed to pursuing an MSc with a focus on multidisciplinary research in artificial intelligence and imaging. My goal is to develop innovative methods that bridge strong theoretical foundations with real-world applications, while contributing to high-impact publications and mentoring future researchers. My research interests include machine learning, deep learning, computer vision, and image processing.

## Education

2022 – **B.Sc. (Engg.) in Information and Communication Engineering**, Dept. of ICE, Pabna University of Science and Technology, Bangladesh.
**CGPA: 3.67/4.00 up to 5th semester** (Third Position; Honours).

2019 – 2021 **Higher Secondary Certificate**, Alamgir Monsur Memorial College, Bangladesh. Group: Science, Board: Mymensingh. GPA: 4.92/5.00.

2017 – 2019 **Secondary School Certificate**, Sontospur High School, Bangladesh. Group: Science, Board: Dhaka. GPA: 4.61/5.00.

## Research Experience

**Research Assistant, Dept. of ICE, PUST** Dec 2024 – Present (Part Time)

- Created RViT-FusionNet, a hybrid CNN–Transformer architecture integrating Local Cross-Attention for brain tumor classification using MRI scans, achieving 99.66% accuracy with interpretability supported by Grad-CAM.
- Created a custom dataset to fine-tune a YOLOv8n model for vehicle classification to optimize traffic flow and road safety.
- Designed and implemented a CNN model for traffic sign classification, achieving 99.68% accuracy on GTSRB dataset.

**Research Assistant, CREDIT Lab** Jun 2025 – Dec 2025 (Part Time)

- Machine Learning–assisted optimization applied to a terahertz photonic metamaterial absorber for blood cancer detection, achieving up to 60% reduction in optimization time while maintaining high prediction accuracy.

**Research Trainee, Learnify Research Lab** Feb 2025 – Present (Part Time)

- Conducted a systematic review on the environmental impact and sustainability of Artificial Intelligence, analyzing energy consumption, carbon emissions, and green AI strategies including model optimization, hardware efficiency, and policy frameworks.

**Reviewer [International Conference]** (Part Time)

## Publications

1. A. Miah, S. Al Zafir, J. Das, J. Al-Faruk, S. I. Zim, R. Ahmad, **M. R. Hossen** *et al.*, "Machine Learning–Assisted Optimization of a Terahertz Photonic Metamaterial Absorber for Blood Cancer Detection," In *PLOS ONE,* vol. 21, no. 2, e0340492. [Q1] [Cite Score: 5.6] [IF: 2.6]

2. **M. R. Hossen,** E. Hossain *et al.*, "Tversky Loss Mechanisms: A ResUNet Approach to Improving Brain Tumor Segmentation," *2025 International Conference on Quantum Photonics, Artificial Intelligence, and Networking (QPAIN)*, Rangpur, Bangladesh. [Scopus Indexed]

3. **M. R. Hossen,** K. A. A. Bakar *et al.*, "Enhancing Robustness and Accuracy of Bone-Conducted Speech Emotion Recognition via Transformer Models," *2025 International Conference on Electrical Engineering and Informatics (ICEEI)*, Kuching, Malaysia, 2025. [Scopus Indexed]

4. M. K. Saha, M. S. Hosain, **M. R. Hossen** *et al.*. "Speech Emotion Recognition from Bone-Conducted Speech Using Wav2Vec2 Transformer Model," *2025 IEEE 7th International Conference on Sustainable Technologies for Industry 5.0 (STI)*, Dhaka, Bangladesh, 2025. [Scopus Indexed]

5. **M. R. Hossen,** M. U. Mia *et al.*, "Explainable Machine Learning Framework for Detecting Lumpy Skin Disease with Environmental and Climate Factors," *2025 IEEE 2nd International Conference on Computing, Applications and Systems (COMPAS)*, Kushtia, Bangladesh, 2025. [Scopus Indexed]

6. M. I. S. Shad, S. Khan, M. S. Hosain, A. Mahdi, M. C. Chanda, **M. R. Hossen,** "Attention-Based Deep Learning for Scalable Speech Emotion Recognition with Synthetic Bone-Conducted Speech," *2025 IEEE 2nd International Conference on Computing, Applications and Systems (COMPAS)*, Kushtia, Bangladesh, 2025. [Scopus Indexed]

7. N. T. Susmi, M. C. Chanda, M. S. Hosain, **M. R. Hossen** *et al.*, "Enhancing DeepFake Classification Performance Using a CNN and XceptionNet-Based Pipeline," *2025 IEEE 2nd International Conference on Computing, Applications and Systems (COMPAS)*, Kushtia, Bangladesh. [Scopus Indexed]

8. M. U. Mia, M. S. Hosain, M. T. W. Mulk, M. N. Bhuiyan, **M. R. Hossen** *et al.*, "Brain Tumor Detection in MRI Images with YOLOv12," *2025 IEEE 2nd International Conference on Computing, Applications and Systems (COMPAS)*, Kushtia, Bangladesh, 2025. [Scopus Indexed]

9. J. Al-Faruk, **M. R. Hossen** *et al.*, "Evaluating Targeted Productivity in Bangladesh's Garment Sector Using Machine Learning and Deep Learning with Explainable AI: A Data-Driven Method for Enhanced Production Planning," *3rd International Conference on Big Data, IoT and Machine Learning (BIM 2025)*, Dhaka, Bangladesh, 2025. **[Book Chapter, Taylor & Francis Group]**

10. M. S. Hosain, **M. R. Hossen** *et al.*, "Exploring the EmoBone Dataset with Bi-Directional LSTM for Emotion Recognition via Bone Conducted Speech," *International Workshop on Nonlinear Circuits, Communications and Signal Processing (NCSP'25)*, Pulau Pinang, Malaysia, Feb. 2025.

11. **M. R. Hossen,** M. U. Mia *et al.*, "Facial Expression Recognition: A Machine Learning Approach with SVM, Random Forest, KNN, and Decision Tree Using Grid Search Method," *International Workshop on Nonlinear Circuits, Communications and Signal Processing (NCSP'25)*, Pulau Pinang, Malaysia, Feb. 2025.

12. **M. R. Hossen,** M. S. Hosain, "Intelligent Overspeed Control in Autonomous Vehicles with DQN Deep Reinforcement Learning," *RUEC 1st International Research Conference*, University of Rajshahi, Bangladesh, Aug. 2025. **[Abstract Only]**

## Manuscripts Under Review

1. T. H. Zadida, S. A. Tanim, **M. R. Hossen** *et al.*, "Rethinking Green AI for Sustainable Computing: A Review," *Computers & Electrical Engineering (Elsevier, Q1, Impact Factor 4.9, CiteScore 10.7).*

2. J. Al-Faruk, **M. R. Hossen** *et al.*, "Attention Enhanced EfficientNet-B4 Framework for Robust Jute Pest Detection in Precision Agriculture," *IET Image Processing, Wiley, [Q2]*

3. **M. R. Hossen,** J. Al-Faruk *et al.*, "Towards Explainable Plant Pathology: Vision Transformer-Based Grape Leaf Disease Classification with LIME and SHAP," *Plos One, [Q1]*

## Dataset

- A. Al Rafi, **M. R. Hossen** *et al.*, "Multi-Source Dental X-Ray Dataset Using Image-to-Image Transformation," *Mendeley Data*, V1, 2025.

## Research, Programming & Computer Skills

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| Machine Learning | Linear Regression, Logistic Regression, Decision Tree, Random Forest, Support Vector Machine (SVM), KNN, Naïve Bayes, Gradient Boosting, XGBoost, AdaBoost, LightGBM, PCA, K-Means, Hierarchical Clustering. |
| Deep Learning | ANN, CNN, RNN, LSTM, GRU, Diffusion GAN, Transformer, Attention Mechanism, Vision Transformer (ViT), Federated Learning. |
| Computer Vision Models | LeNet, AlexNet, VGG, GoogLeNet, ResNet, DenseNet, MobileNet, EfficientNet, UNet, SegNet, Mask R-CNN, Faster R-CNN, YOLO (v3–v12). |
| Frameworks & Libraries | PyTorch, TensorFlow, Keras, Scikit-learn, OpenCV, Pandas, NumPy, Matplotlib. |
| Programming Languages | Python, C, C++, R, MATLAB, SQL, JavaScript, PHP, HTML, CSS. |
| Tools & Platforms | VS Code, Git, XAMPP, MS SQL Server, Proteus, mikroC, PICkit, PCB Design. |

## Achievements

- **Researcher of the Year Award – 2025** for outstanding contributions to the field of research.
- **Academic Excellence Award – 2025** for academic performance and commitment to pursuit of knowledge.
- **2nd Runner Up, ICE Fiesta Idea Showcasing Competition - 2025** – Smart Waste Management System, an AI-integrated IoT solution aimed at revolutionizing waste collection and recycling.
- **University Merit Scholarships** (2023).

## Talks & Presentations

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| Feb 2025 | ICE Fest 2025— ICE Association Reunion-2025; showcase *Smart Waste Management System, an AI-integrated IoT solution aimed at revolutionizing waste collection and recycling* |
| Feb 2025 | International Conference talks: "Exploring the EmoBone Dataset with Bi-Directional LSTM for Emotion Recognition via Bone Conducted Speech", NCSP'25, Malaysia. |
| Aug 2025 | International Conference talks: (1) "Tversky Loss Mechanisms: A ResUNet Approach to Improving Brain Tumor Segmentation", QPAIN 2025, Rangpur, Bangladesh. (2) "Intelligent Overspeed Control in Autonomous Vehicles with DQN Deep Reinforcement Learning", IRC 2025, Rajshahi, Bangladesh. |
| Sept 2025 | International Conference talks:"Evaluating Targeted Productivity in Bangladesh's Garment Sector Using Machine Learning and Deep Learning with Explainable AI: A Data-Driven Method for Enhanced Production Planning", BIM 2025, Dhaka, Bangladesh. |
| Dec 2025 | International Conference talks: "Enhancing Robustness and Accuracy of Bone-Conducted Speech Emotion Recognition via Transformer Models", ICEEI 2025, Malaysia. |

## Certifications

• Machine Learning Specialization (Stanford University & DeepLearning.AI) • Deep Learning with PyTorch: Image Segmentation (Coursera) • Introduction to Data Science (Cisco Networking Academy) • Neural Networks and Deep Learning (Coursera) • Data Structures and Algorithms (Coursera) • Introduction to Git and GitHub (Coursera)

## Industry Experience & Job Simulations

• BCG – Data Science Simulation (Forage), Jun 2024 • J.P. Morgan – Software Engineering Simulation (Forage), Jul 2024 • BCG – Generative AI Simulation (Forage), Jul 2024 • Software Engineer Intern Simulation – HackerRank, Jun 2024

## Competitive Programming

• Solved 180+ problems on Codeforces and 243+ on LeetCode. • Solved 100+ problems on CodeChef. • HackerRank (SQL,C++) • Additional practice on other platforms.

## Leadership & Volunteering

- **Secretary, English Club – ICE Association** (2025 – Present) Organizing English speaking sessions, workshops, and activities to improve students' communication skills.
- **Executive Member, ICE Association** (2024 – 2025) Assisted in organizing technical and co-curricular events and supporting club activities.
- **Campus Ambassador – Learn and Tech Fest, Feel Physics and Love Physics** (2019 – 2021) Promoted technical events and workshops, coordinated with students, and assisted in outreach and participation activities.

## Languages

- Bangla — Native Language
- English — Have a good command in speaking, listening, reading, and writing. English is the instruction medium of B.Sc. (Engineering).

## References

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## Declaration

**I hereby declare that all information provided is true.**