

MD. SAJEEBUL ISLAM SK.



RESEARCH INTEREST

Artificial Intelligence • Machine Learning • Deep Learning • Computer Vision • NLP

PROFESSIONAL EXPERIENCE

Research Assistant	Biomedical Science and Engineering Research Center, BRAC University	Apr'25 - Mar'26
AI Analyst	TMSS ICT, National NGO, Bangladesh	Contractual
Research Assistant	Department of Computer Science & Engineering, BRAC University	Jan'24 - Mar'25

ACADEMIC QUALIFICATION

May 2022 - Sep 2024	Master of Science in Computer Science & Engineering Duration: 2.5 Years • CGPA 3.83 on the scale of 4	BRAC University
Jan 2017 - Feb 2022	Bachelor of Science in Mathematics Duration: 4 Years • CGPA 3.05 on the scale of 4	Khulna University

PUBLICATIONS

- **M. S. I. Sk.**, M. M. H. Shawon, and M. G. R. Alam (2026), "**An Explainable Vision-Language Model Framework with Adaptive PID-Tversky Loss for Lumbar Spinal Stenosis Diagnosis**," *Medical Image Analysis Journal* (Q1), **Under review**. DOI: <https://arxiv.org/abs/2604.02502>
 - Propose an **end-to-end multimodal Vision-Language Model framework** that integrates advanced models (LLaVA-Med, BiomedCLIP, SmoVLM) to accurately classify severity of lumbar spinal stenosis.
 - Introduce an **Adaptive PID-Tversky loss function** for efficiently addressing severe class imbalance in medical image segmentation datasets and design an **integrated Automated Radiology Report Generation module** for translating localized segmentation masks into clear, multi-line clinical reports.
 - Develop a **custom Spatial Patch Cross-Attention module** beyond traditional global-pooling methods that discard crucial spatial hierarchies and achieve SOTA performance in classification **90.69%**, Dice score **0.9512** for segmentation, and CIDEr score **92.80%**.
 - **Supervisor:** [Prof. Dr. Md. Golam Rabiul Alam](#), [Md. Mehedi Hasan Shawon](#)
- **M. S. I. Sk.**, M. Jobayer, M. M. H. Shawon, and M. G. R. Alam (2025), "**FoundationalECGNet: A Lightweight Foundational Model for ECG-based Multitask Cardiac Analysis**," *Journal of Biomedical and Health Informatics* (Q1), **Under review**. DOI: <https://arxiv.org/abs/2509.08961>
 - Propose **FoundationalECGNet**, an efficient automated ECG classification framework with only 7.5 million parameters, addressing signal noise, dataset heterogeneity, and class imbalance challenges.
 - Integrate **Morlet and Daubechies (DB4) wavelet** transforms for noise suppression and combines Graph Attention Module with Time Series Transformers to model spatial, inter-lead, and long-range temporal dependencies.
 - Achieve state-of-the-art performance with an F1-score of **99%** for Normal and Abnormal ECG classification and **98.9%** for five multi-class disease detection with providing clinical risk estimations by Neuro Symbolic AI.
 - **Supervisor:** [Prof. Dr. Md. Golam Rabiul Alam](#), [Md. Mehedi Hasan Shawon](#)
- **M. S. I. Sk.** and M. G. R. Alam (2024), "**Unveiling personality traits through Bangla speech using Morlet wavelet transformation and BiG**," *Natural Language Processing Journal, Elsevier*. DOI: <https://doi.org/10.1016/j.nlp.2024.100113>
 - Create the first comprehensive Bangla speech dataset for personality classification, including 1,750 speech-to-text samples and 1,000 speech samples, addressing a major gap in low-resource language research.
 - Propose **Morlet-based Mel-Frequency Cepstral Coefficients (MoMF)**, capturing both temporal and spectral speech characteristics to improve personality trait detection.
 - Develop two soft-voting ensemble models: **DistilRo** (DistilBERT + RoBERTa) for speech-to-text analysis and **BiG** (Bi-LSTM + GRU) for speech signal analysis that achieving **F1-scores 89% and 90% respectively**, under the Big Five (OCEAN) personality framework.
 - Full Thesis: BRAC University Library
 - **Supervisor:** [Prof. Dr. Md. Golam Rabiul Alam](#)
- S. A., **M. S. I. Sk.**, M. K. N. Islam and M. R. Islam, "**Identification of Drug-addicted People Using Short Length of Voice Signal Through Haar and Symlet Wavelet Transform**," *International Journal of Research and Scientific Innovation (IJRSI) Journal*. DOI: <https://doi.org/10.51244/IJRSI.2025.12050004>

- Identify the limitations of traditional drug addiction testing methods, such as urine or hair tests, which are time-consuming, expensive, and require invasive biological samples.
 - Propose a fast and non-invasive diagnostic framework using only **5-second voice signal segments to detect alcohol or marijuana addiction**, employing **Haar and Symlet (Sym2) wavelet transforms** with power spectrum, Signal-to-Noise Ratio (SNR), and Peak Signal-to-Noise Ratio (PSNR) feature analysis.
 - Unveil distinct spectrograms in addicted voices characterized by asymmetric sharp peaks and statistically validate significant differences ($p < 0.001$) in **SNR and PSNR values**, showing that the **Haar wavelet better captures abrupt vocal discontinuities** associated with addiction. We also used SVM model to classify the difference between two characteristics.
 - **Supervisor:** Prof. Dr. Md. Rafiqul Islam
- **M. S. I. Sk.** (2024), "Bangla Speech Personality Traits Data," *Mendeley Data, Elsevier*. DOI: <https://data.mendeley.com/datasets/fb6dm3yb6m/1>
 - Shared on the National Institute of Allergy and Infectious Diseases (NIAID), U.S. National Institutes of Health (NIH).

PROJECTS

- CV **Privacy-Preserving Federated Multimodal Learning with a Latent Diffusion Model for Medical Data Synthesis (sajeeb-ai/Project) [ongoing]**
- Propose a privacy-preserving federated multimodal diagnostic pipeline using **PneumoniaMNIST** and **MIT-BIH Arrhythmia Database** medical datasets.
 - develop a shared-latent multimodal framework with CNN-based encoders, gated attention fusion, private client-side Gaussian mixture summarization, and a latent diffusion model for synthetic latent generation.
 - achieve an F1-score of **0.9203** on real test data.
- CV **Federated vs Non-federated CNN for Image Classification (sajeeb-ai/Project)**
- Evaluated federated and non-federated **CNN** approaches on **CIFAR-10** to address data privacy and security constraints.
 - Demonstrated that the **federated CNN model outperforms** the basic model, achieving 59.62% testing accuracy compared to 56% for non-federated.
- NLP **Bengali Personality Traits Classification through LLM (sajeeb-ai/Project)**
- Fine-tuned **GPT-2 LLM and BengaliBERT** for enhanced context understanding in Bengali personality text classification tasks.
- AI **Speech Emotion Recognition Using HMMs (sajeeb-ai/Project)**
- Evaluate the comparative impact of audio feature selection for model complexity on Speech Emotion Recognition to enhance the emotional intelligence of Virtual Personal Assistants.
 - Implement **Gaussian Hidden Markov Models** to classify human emotions from the **RAVDESS dataset** after applying **Wiener filter** for noise reduction.
 - Demonstrate Log-Mel spectrogram features outperform traditional MFCCs for speech-based emotion identification.
- NLP **Online Sexism Detection Using Transformer (sajeeb-ai/Project)**
- Detect online sexism through **BERT and DistilBERT** and aims to provide a deep learning based solution to identify harassment instantly and fosters more welcoming social media environments.
 - Preprocess a specialized dataset of **14,000 social media comments** through tokenization, padding, truncating, and segment embeddings to appropriately format the text sequences for the models.
 - Fine-tune and demonstrate that the traditional BERT model outperforms DistilBERT in classification accuracy, achieving a higher validation F1-score of **82.72%**.
 - **Supervisor** : Prof. Dr. Farig Sadeque

ML

Defaulter and Loan Status Prediction ([sajeeb-ai/Project](#))

- Developed **end-to-end ML pipeline for loan approval prediction system using GUI interface** to automate eligibility decisions for financial institutions using applicant data (income, credit history, property area and others necessary information).
- Preprocessing data (missing value handling, categorical encoding, scaling), trained Logistic Regression, SVC, Random Forest with **RandomizedSearchCV hyperparameter tuning** and selected tuned Random Forest as optimal classifier.

OTHER EXPERIENCE

- Reviewed a paper for [IEEE International Conference of Young Professionals in Electron Devices and Materials \(EDM\)](#).
- Reviewed a paper for [Asian Journal of Research in Computer Science](#).

TECHNICAL SKILLS

- **Languages:** Python, R, MATLAB, C++
- **Deep Learning and Machine Learning:** PyTorch, TensorFlow, Scikit-learn, OpenCV, Numpy, Pandas, Seaborn, Matplotlib
- **Reinforcement Learning**
- **Natural Language Processing:** NLTK, spaCy, Transformers, Hugging Face
- **Others:** LaTeX, Git, Microsoft Office 365, OpenRefine, SPSS, Unix/Linux

CERTIFICATION

- **Udemy Certification** : *Computer Vision with OpenCV and Python – Beginner to Advanced*
- **Stanford University CS231n:** *Deep Learning for Computer Vision (2016)* - Completed through Andrej Karpathy's website
- **Google Cloud:** *Introduction to Large Language Models – View Badge*
- **DeepLearning.AI:** *Finetuning Large Language Models - View Badge*
- **Google Cloud:** *Introduction to Generative AI – View Badge*
- **Google Cloud:** *Introduction to Responsible AI – View Badge*

ACHIEVEMENTS

- **BRAC University Thesis Scholarship, May 2023**
For securing 2nd position with a GPA 3.90 in 2nd semester masters result
- **BRAC University Academic Merit Scholarship, January 2023**
For securing 3rd position with a GPA 3.77 in 1st semester masters result
- **BRAC University Merit Scholarship, May 2022**
Awarded for achieving 1st place in the CSE Postgraduate Admission Test in Summer 2022 [University Site](#)
- **Achieved 1st merit position in Biology Olympiad at Khulna Division, 2014.**
- **Bangladesh primary school students scholarship exams**
Got Government merit-based allowances from 2008 to 2011

VOLUNTEERING

- Mentored one BRAC University CSE master's student on his ongoing research titled "*Predicting multimodal risk detection in early adolescence via brain imaging*"
- Mentored four BRAC University CSE undergraduate students on their research titled "*An Approach to Unveiling Personality Traits through Bangla and English Speeches of Political Leaders*"
- Volunteer Member, Math Olympiad (2019), Khulna University
- General Secretary of social and cultural organization at Khulna University

ENGLISH PROFICIENCY

IELTS: 6 (S: 6.5; L, R, W: 6) • Master's and Honours completed in English medium

REFERENCES

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