SAZZAD HUSSAIN FARHAAN

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CAREER OBJECTIVE — To contribute to cutting-edge research in Quantum Machine Learning and Explainable Artificial Intelligence by developing interpretable, fair, and ethically aligned machine learning systems. I aspire to pursue doctoral studies that enable me to integrate theoretical knowledge with real-world impact, particularly in domains such as healthcare and scientific discovery. My long-term objective is to advance both the academic community and applied AI through innovative, transparent, and socially responsible research.

RESEARCH INTERESTS

My research interests lie at the intersection of Quantum Machine learning (QML), Explainable Artificial Intelligence (XAI), Multimodal and Cross-Modal Learning, Ethical Model Adaptation, and Machine Unlearning. Specifically:

- **Explainable AI (XAI):** Developing interpretable models that offer transparent decision-making, particularly in high-stakes environments like healthcare and education.
- **Multimodal and Cross-Modal Learning:** Integrating heterogeneous data sources (e.g., text, imaging, genomics) to improve prediction accuracy and contextual understanding in AI systems.
- **Machine Unlearning and Ethical Adaptation:** Designing algorithms that enable selective forgetting and compliance-aware model updates, supporting privacy and fairness.
- **Interdisciplinary AI Applications:** Applying AI frameworks to solve complex problems in precision medicine, digital business and humanities, and socio-technical systems, with an emphasis on accountability and human alignment.

EDUCATION

Bachelor of Science in Computer Science and Engineering   **2016 - 2021**
University of Liberal Arts Bangladesh (ULAB)   *CGPA: 3.69 on a scale of 4.00*
Relevant Courses: Algorithms, Data Structures, Artificial Intelligence, Operating Systems, Differential & Integral Calculus, Discrete Mathematics, Probability & Statistics, Database Systems, Theory of Computation, Software Engineering, Robotics
Thesis + Project: *Natural Language Processing based Quality LMS for Students Evaluation and Engagement Metrics Calculation*

RESEARCH PUBLICATION

1. **Farhaan, S.H.**, Hasan, M.M., Ghani, F.M., Mansoor, N. (2024). Enhancing Student Engagement and Performance Evaluation: An Integrated Approach for Quality Learning Management System. In: Proceedings of World Conference on Information Systems for Business Management. ISBM 2023. Lecture Notes in Networks and Systems, vol 833. Springer, Singapore.

2. Prodhan, M.S., Diip, N.S., Akter, S., **Farhaan, S.H.**, Mansoor, N. (2024). Advancing Fish Species Identification in Bangladesh: Deep Learning Approaches for Accurate Freshwater Fish Recognition. In: Proceedings of World Conference on Information Systems for Business Management. ISBM 2023. Lecture Notes in Networks and Systems, vol 834. Springer, Singapore.

1. **Under Review:** Multi-Modal AI Models for Predicting Radiotherapy Outcomes in Oncology: A Precision Medicine Approach.
2. **Under Review:** Early-Stage Coronary Artery Disease (CAD) Prediction Using Coronary Angiogram for Stenosis Detection.
3. **Under Review:** Visual Parsimony: A Quantitative Complexity Metric for Explainable AI

PROJECTS

AI Chat Summarizer with Intelligent NLP   Hosted in Render and Streamlit

Technologies: Google Gemini API, FastAPI, Streamlit, NLTK, scikit-learn, NetworkX, TF-IDF, TextRank Algorithm, Render.com

Developed a full-stack conversational AI application with advanced text summarization capabilities. Implemented **multi-algorithm summarization** using TF-IDF, TextRank, and frequency-based approaches with intelligent fallback mechanisms. Built configurable AI response system with temperature, top-p, and top-k parameters for customizable conversation styles. Deployed production-ready backend on Render.com with comprehensive API endpoints and real-time chat interface.

EquiJob - AI-Driven Bias Detection in Job Descriptions   Link to Case Study

Technologies: Word2Vec, GloVe, BERT, GPT, EDA, Selenium, Beautiful Soup

Built a dataset of **20,000** Job Descriptions out of **50,000** from **30 countries**. Collaborated in ETL processes to build a tool to **detect and analyse gender-biased terms** in job descriptions and generate **gender-neutral JDs** using NLP techniques.

Early Detection and Diagnosis of Alzheimer's Disease   Open in Hugging Face

Technologies: Nibabel, OpenCV, Scikit-Image, Keras, TensorFlow, PyTorch, CNN Transfer Learning, DeepChecks, Docker, FastAPI

Developed a CNN-based model for early detection of Alzheimer's disease using **6,400 MRI images**. Achieved an accuracy of **99.22%**. **Deployed as a REST API** using Docker and Streamlit, hosted on Hugging Face Spaces.

Travel Agent Large Action Model (LAM)   Open in GitHub [Private Repository]

Technologies: Amadeus API, OpenAI API, 8-bit Quantization, Few Shot Learning, Mistral LLM, Ollama LLM, LangChain, spaCy

Collaborated on a travel assistant application integrating OpenAI API and Amadeus API. Contributed to a **Large-Action Model (LAM)** pipeline and built an interactive chatbot interface. Strengthened skills in **LLMs**, low-resource deployment, and prompt engineering.

WORK EXPERIENCE

Associate BI Analyst   08/2024 – 06/2025
CS Meta Limited, Dhaka, Bangladesh   *Full-time - Onsite*
- Delivered financial insights, with **3x faster reporting cycles**, by building **Python**-based **ETL** scripts and **Power BI** dashboards.
- Enhanced stakeholder decision-making, by adoption of **BI tools across 3 departments**, through predictive analysis.
- Streamlined report generation, with a **50% reduction in manual effort**, by designing reusable **CTE Templates** and **SQL** queries.

Project Coordinator (AI Data Training)   05/2024 – 05/2025
Genmorphics AI Solutions, Dhaka, Bangladesh   *Part-time - Remote*
- Boosted model performance by **23%** through the design and validation of over **1,200 engineering-focused prompts**, spanning **mechanical**, **electrical**, and **software** domains for LLM training.
- Enhanced training efficiency by **40%** and reduced annotation correction cycles by **25%**, by implementing a scheduling system, refining technical prompts, and introducing performance checkpoints.
- Improved AI output quality and safety by reviewing **350+ instances** of bias and inaccuracies, and strengthened communication pipelines via **weekly stand-ups** and stakeholder alignment initiatives.

Associate AI Developer   04/2024 – 10/2024
Web and More Limited, London, United Kingdom   *Part-time - Remote*
- Achieved **30% faster** image processing, using advanced denoising and **OCR** with **OpenCV** and **Tesseract**.
- Reduced OCR error rates via custom filters and **Python** preprocessing techniques.
- Enabled backend deployment of ML modules by containerising solutions with **Docker**.

Machine Learning Engineer   11/2021 – 02/2024
Creative IT Institute, Dhaka, Bangladesh   *Full-time - Onsite*
- Trained and mentored over **100 students**, achieving a **90% completion rate**, via hands-on modules in **computer vision**, **NLP**
- Improved student outcomes, evidenced by **30+ capstone projects** showcased in local hackathons.
- Standardised content across **4 cohorts** using modular approach and public datasets.

FELLOWSHIP

Data Scientist   10/2023 – 12/2023
Fellowship.AI, California, United States   *Fellowship - Remote*
- Reduced ETL runtimes by **40%** for NLP pipelines with large transformer models.
- Enhanced ML interpretability via modular code design and stakeholder documentation.
- Enabled API-based model access using **RESTful endpoints** and **Hugging Face** integration.

INTERNSHIP

Machine Learning Engineer   09/2023 – 03/2024
Omdena, Toronto, Canada   *Internship - Remote*
- Cut model training time by **2 weeks** via structured data curation from **50,000+ web pages** using web scraping.
- Deployed **3 ML models** with **FastAPI** and demoed with **Streamlit**.
- Improved model accuracy by **+5%** using augmentation and fine-tuning with **PyTorch** and **TensorFlow**.

Undergraduate Teaching Assistant   11/2017 – 04/2019
University of Liberal Arts Bangladesh   *Part-time – Onsite*
- Tutored over **150 students** across **Calculus, Programming**, and **Differentials**, achieving a **15% average grade improvement**.
- Boosted student engagement and retention by **offering 1-on-1 mentoring** and tailored academic support.
- Supported faculty in streamlining course delivery by **assisting with grading**, lab supervision, and curriculum coordination.
- Contributed to **curriculum-aligned research discussions** by facilitating student-led projects on algorithmic thinking and foundational computer science topics.

TECHNICAL COMPETENCIES

Programming Languages: Python, **SQL**, JavaScript

Machine Learning & Deep Learning: Supervised learning, **Unsupervised learning**, **CNNs**, **RNNs**, **LSTM**, **Transformer Architectures**, **Model training**, **Model evaluation**, **Parameter tuning**, **Multimodal learning**, **Attention mechanisms**, **Transfer learning**

Computer Vision: Edge detection, Histogram equalization, Morphological operations, Filtering techniques, Image denoising, Object detection, Image segmentation, **Optical character recognition (OCR)**

Libraries and Frameworks: TensorFlow, **Keras**, **PyTorch**, DLTK, **OpenCV**, **Scikit-learn**, Scikit-image, **NumPy**, **SciPy**, **Tesseract OCR**, **Seaborn**, **Streamlit**, **LangChain**, **SpaCy**, **FastAI**, React Native, Expo CLI, **Hugging Face Transformers**, librosa, **torchaudio**, **Fairseq**

Tools & Platforms: Git, **GitHub**, **Jupyter Notebooks**, **HuggingFace**, **Docker**, **AWS Sagemaker**, Roboflow, Data Annotation, LaTeX, SPSS, Power BI, Beautiful Soup, Selenium

ACADEMIC AWARDS

Vice Chancellor's Honors List Scholarship, Summer 2016

Awarded Merit based Scholarship worth 3,500 USD from the University of Liberal Arts Bangladesh

LEADERSHIP AWARDS

The Gold Standard Awardee, The Duke of Edinburgh's International Award 2025: Awarded by the **British High Commissioner** for achieving the Gold Standard in skill, physical recreation, social welfare, and adventurous activities.

The Silver Standard Awardee, The Duke of Edinburgh's International Award 2024: Silver Standard achieved in skill, physical recreation, social welfare, and adventurous activities.

The Bronze Standard Awardee, The Duke of Edinburgh's International Award 2022: Achieved Bronze Standard in skill, physical recreation, social welfare, and adventurous activities.

Lead Volunteer, IJCCI 2019: Led a team of more than 50 volunteers to successfully organize the International Joint Conference on Computational Intelligence 2019.

Peer Mentor Award, ULAB Student Affairs Office 2019: Recognised for mentoring first-year students, contributing to their academic progress and successful transition into university life.

Lead Publication, Team SPARK 2019 – IEEE Computer Society Bangladesh Chapter: Recognised with a Certificate of Appreciation for valuable contributions as the Publication Lead.

Volunteer, IEEE WIE International Leadership Summit 2018: Received a Certificate of Appreciation for leading as a volunteer in the Leadership Summit organised by IEEE WIE and the IEEE Bangladesh Section.

TECHNICAL AWARDS

Top 40, NASA Space Apps Challenge 2018, Regional Round: Project - Sustainable Multi-Source Energy Harvesting System: Solar Tracking and Raindrop Kinetic Conversion in a Hybrid Photovoltaic Array.

Champion, ULAB Techfest 2019, Idea Contest: Project - AI Integrated Wellness Tracker: A comprehensive mobile application for personalized nutritional monitoring, calorie balance, and exercise optimization.

1st Runner-Up, ULAB Techfest 2019, Poster Display: Project - Acoustic Energy Harvesting in Urban Environments: Converting Noise Pollution into Sustainable Electric Power.

CO-CURRICULAR EXPERIENCE

Chairperson, IEEE CS ULAB Student Branch Chapter
04/2019 – 08/2020
Founding Chairperson of the Student Branch Chapter. Led the executive team for 25 collaborative and internal events.

Secretary, IEEE ULAB Student Branch Chapter
07/2017 – 04/2018
Delegated activities from the Regional Section to the Student Branch. Increased membership from 10 to 70+ members.

Chairperson, IEEE ULAB Student Branch
03/2018 – 04/2019
Prepared the Branch Annual Plan. Organized and coordinated more than 20 flagship and international events for the student branch. Increased membership drive to 250%.

Lead Publication, Team Spark, IEEE CS Bangladesh Chapter
07/2019 – 08/2020
Facilitated collaboration among 23 IEEE-affiliated universities in Bangladesh, fostering research groups for professional and student members to bridge the industry-academia gap.

REFERENCES

Prof. Mohammad Shorif Uddin
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