MAHMUD WASIF NAFEE

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EDUCATION

Bangladesh University of Engineering and Technology (BUET) *April 2019 – July 2024*
Dhaka, Bangladesh
BSc. in Biomedical Engineering
CGPA: 3.80/4.00

WORK EXPERIENCE

Cyber Physics Intelligence Laboratory, IAT, BUET July 2024 -
Research Assistant

· Deep Learning-Based Autism Detection and Assistance development for care and wellbeing of children with Autism Spectrum Disorder

RESEARCH INTEREST

Machine learning, Health Informatics, Medical Imaging, Biosignals, NLP, Computer Vision, Human Computer Interaction

RESEARCH EXPERIENCE

AI powered Chest Xray Report Writing Assistance for Radiologists July 2023-June 2024
Supervisor: Dr. Taufiq Hasan
Dept. of Biomedical Engineering, BUET

· Developed a Chest X-Ray report writing tool to assist radiologists, addressing the shortage of professionals in Bangladesh, where only 700 radiologists are available to meet the demand for approximately 14,000.
· Investigated vision language models like Florence-2, Paligemma, and Vision Encoder-Decoders, and studied pretrained CNN models to integrate and enhance automated report generation, enabling radiologists to focus on complex cases and improve diagnostic efficiency.
· Conducted an in-depth study of literature and compared the approach with state-of-the-art methods such as CXR-RePaiR and RGRG. Future plans include integrating multimodal retrieval techniques to enhance report accuracy and contextual relevance.

Deep Learning-Based Autism Detection and Assistance development (July 2024-)
Supervisor: Dr. Tahsina Farah Sanam
Institute of Appropriate Technology, BUET

· In Bangladesh, where the demand for autism detection far exceeds expertise, we are developing deep learning models leveraging Wi-Fi CSI data to bridge the gap in timely diagnosis and support.
· Applying a combination of supervised learning techniques and unsupervised methods such as clustering and Independent Component Analysis (ICA), along with investigating filtering techniques for denoising, to extract meaningful patterns.
· Assisted in establishing data collection methods at schools for children with autism, ensuring the availability of quality data for research and model development.

LLM editing via In-Context Learning (December 2024- July 2025)
Supervisor: Dr. Haipeng Chen, Dr. Yanfu Zhang
W&M Data-Driven Decision Intelligence (D^3i) Lab, College of William & Mary

- Exploring how *dynamic retrieval strategies* influence the balance between factual accuracy and generalization in knowledge-editing tasks.
- Investigating *context selection mechanisms* that enhance large-scale model reliability while minimizing unnecessary computation.

PUBLICATIONS

M.W. Nafee, M. Jiang, H. Chen, Y.Zhang, **Dynamic Retriever for In-Context Knowledge Editing via Policy Optimization**, EMNLP 2025

M.W. Nafee, T. Rahman, T. Hasan, **RadTextAid: A CNN-Guided Framework Utilizing Lightweight Vision-Language Models for Assistive Radiology Reporting**, GenAI4Health-AAAI 2025

M.W. Nafee, A.H. Juicy, **Enhanced Mitotic Figure Detection in Glioma Using Super-Resolution Images and High-Frequency Content Maps**, IEEE ISBI 2025

M.W. Nafee, M.K. Joarder, M. Rahman, T.F. Sanam, **Descriptor: A Word-Level Wi-Fi CSI-Based Deep Bangladeshi Sign Language Dataset (WiBaSL)**, IEEE Data Descriptions

A.H. Juicy, T. Rahman, M.W. Nafee, S.N. Ali, **BabyBelt: A Low-Cost Wearable Uterine Contraction Monitoring Belt Using Velostat Sensors**, IEEE EMBS BSN 2025

ACADEMIC PROJECTS

BABY BELT: A Low-Cost Uterine Contraction and Fetal Heart Rate Monitoring Belt

- Uterine Contraction (UC) is measured using fully fabric-based piezoresistive sensors, utilizing a low-cost Velostat sheet that changes its resistance in response to uterine contraction pressure.
- Audio signals collected from the belt are processed to calculate the fetal heart rate, providing valuable insights for diagnosing fetal distress.
- Winner of Crystal Sea Award: Rice360 Global Healthcare Competition 2023

Github Repo: https://github.com/mwnafee/BME300

Preprocessing for Reconstruction and Quantification of 3D Iris Surface for Angle-Closure Glaucoma Detection in Anterior Segment OCT

- Applied data augmentation techniques in MATLAB to enhance input data diversity for training.
- Fused high-resolution encoder features with decoder features using skip connections and introduced a Wavelet Refinement Block (WRB) to reduce redundant information and enhance feature learning.

Github Repo: https://github.com/mwnafee/BME404

ECG Filtering Circuit

- Designed an analog circuit capable of filtering out powerline noise and undesirable signals from clinical ECG data, improving signal quality for medical analysis.

Replication of "An Improved Temperature Control System for Neonatal Incubator"

- Modeled a neonatal incubator temperature regulation system using a microcontroller-based PID controller.
- Conducted subsystem modeling, Simulink simulations, and Zeigler-Nichols tuning to optimize system performance, achieving enhanced robustness and stability.

Github Repo: https://github.com/mwnafee/BME306

SELF INITIATED PROJECTS

AFib Wave Synthesis: Generating Realistic Atrial Fibrillation ECG Signals Using GAN

DIY Fundus Camera and Glaucoma Detection Model

SKILLS AND PROFICIENCIES

Languages	English (Professional), Bengali (Native) TOEFL score: 111 (R-30, L-26, S-27, W-28)
Programming	C/C++, MATLAB, R, Python (Pandas, Numpy, Streamlit, Tensorflow, Keras, PyTorch)
AI and Cognitive Computing Skills	Supervised and Unsupervised ML techniques, CNN, RNN, Transformer-based architectures, fine-tuning LLMs and VLMs, RAG implementation
Image Processing Tools	MATLAB, ITKSnap, CVAT, Label Studio
Data Analysis Software	Excel, PowerBI
Graphic Designing	Canva
CAD	Solidworks
Version Control	Git
OS	Windows, Linux
Supply Chain Analysis	ISCEA Certified Supply Chain Analyst

ACHIEVEMENTS

Competitions:

2nd Runner-up, Glioma-MDC 2025 challenge (ISBI) *2025*

International Awards:

Crystal Sea Award: Rice360 Global Healthcare Competition 2023, Rice University, Texas, USA *2023*

ISCEA Ptak Prize Scholarship: International Supply Chain Case Competition Winner *2019*

Academic Excellence:

Dean's List Awardee *Sophomore, Senior year*

Awarded University Stipend multiple times

Multiple-time Education Board Scholarship recipient

Extracurricular Activities:

BUP National Quiz Fest 2023: Runner-Up *2023*

Dhaka University CWC Quiz 2023: Champion *2023*

RELEVANT COURSEWORK

Communicating Protocols for Biomedical Instruments Sessional(EHR), Bioinformatics Algorithms, Medical Imaging, Magnetic Resonance Imaging, Molecular Biology, Object Oriented Programming, C Programming, Artificial Intelligence, Signals and Systems, System Control, Linear Algebra, Probability and Statistics, Integral and Differential Calculus, Microcontrollers, Complex and Vector Calculus, Matrix, Differential Equations