Tahsin Tariq Banna

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Education

Master of Science April 2023 – May 2025

University of Dhaka *Dhaka, Bangladesh*

Major: Robotics and Mechatronics Engineering *CGPA: 3.98 out of 4.00, Ranked 1st place*

Dissertation: Interactive Communication with Contextual Action Inference using LLM for Human Robot Interaction

Advisor: Dr. Sejuti Rahman, Associate Professor & Chairperson, Department of RME, DU

Bachelor of Science August 2017 – January 2023

University of Dhaka *Dhaka, Bangladesh*

Major: Robotics and Mechatronics Engineering *CGPA: 3.64 out of 4.00, Ranked 3rd place*

Dissertation: Predicting Image Memorability using Graph Convolution Networks

Advisor: Dr. Sejuti Rahman, Associate Professor & Chairperson, Department of RME, DU

Higher School Certificate (HSC) 2015 – 2017

Bangladesh Air Force Shaheen College, Dhaka, Bangladesh *GPA: 5.00 out of 5.00*

Secondary School Certificate (SSC) 2013 – 2015

Rajshahi Collegiate School, Rajshahi, Bangladesh *GPA: 5.00 out of 5.00*

Experience

Machine Learning Engineer January 2025 – Present

Management Information Systems (MIS) *Advanced Chemical Industries (ACI)*

Full-time Machine Learning Engineer at ACI, one of the largest conglomerates in Bangladesh with a rich multinational heritage. My role involves exploratory work across diverse areas of machine learning, including computer vision, speech processing, and natural language processing. These efforts are aimed at developing and deploying innovative solution for existing business challenges.

Projects:

- *LLM-OCR*: Made a pipeline to judge the performance of different LLM models when performing zero-shot OCR. Pipeline was used to gauge cost and model requirements for different businesses.
- *Regional ASR*: Involved in a project to create Automatic Speech Recognition (ASR) model that can recognize the different Bangla accents. My task was dataset collection, data cleanup, audio diarization, preprocessing and model finetuning
- *Shawpno Voice Based Ordering*: Developed a model on for Voice based ordering for Shwapno supershop. The chat model was made using RASA. The realtime audio transcription was capable of handling both English and Bangla.
- *ACI Call-Center Bot*: The ACI call center bot was also developed on RASA for both Bangla as well as English audio. It was deployed with Asterisk using the AGI protocol.
- *API HitCounter*: Worked on a project that tracks the API hit counts for all the deployed services to identify unique users and measure user activity.

Research Assistant January 2023 – Present
Department of Robotics and Mechatronics Engineering *University of Dhaka*
*Intelligent Hospital Assistance Robot (**IHABOT**)* ***Advisor**: Dr. Sejuti Rahman*

- Helped develop the IHABOT robot, designed to address the challenges of understaffed healthcare systems in BD
- Designed methods to automate the collection of vital signs from patients, eliminating the need for direct intervention by doctors or nurses
- Developed a machine learning model to assess patient health based on vital signs for automated health evaluations
- Created a recommendation system to provide actionable insights for healthcare providers, enhancing decision making efficiency

Undergraduate Research Assistant August 2020 – February 2024
The Ministry of Science and Technology *The Government of People's Republic of Bangladesh*
*Artificial Intelligent Supported Climate-Smart Agriculture (**AIAgri**)* ***Advisor**: Dr. Shamim Ahmed Deowan*

- Developed a machine learning-based solution for automating agricultural processes
- Proved that soil parameter prediction is achievable through analysis of localized environmental factors

Undergraduate Research Assistant June 2020 – December 2022
Department of Robotics and Mechatronics Engineering *University of Dhaka*
AI Driven Cost Effective Endoscopy Machine for Tumor Detection ***Advisor**: Dr. Shamim Ahmed Deowan*

- Developed a low-cost endoscopy machine
- Equipped the machine with Artificial Intelligence for image enhancement and lesion detection
- Deployed the system on a Raspberry Pi for cost-effective operation

Regional Representative (Pop_Rep!) 2021 – Present
Pop_OS! *System76*
*I currently serve as the official representative for Bangladesh for the linux operating system, **Pop_OS!***

Volunteer 2020 – 2023
Bangladesh Robot Olympiad (BDRO)

Publications

Beyond Words: Integrating Personality Traits and Context-Driven Gestures in Human-Robot Interactions Published: 2025
***Tahsin Tariq Banna**, Sejuti Rahman and Mohammad Tareq* *Link* | *Paper* | *Code*
Accepted: The 24th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2025)

GEMM: A Graph Embedded Model for Memorability Prediction Published: 2023
***Tahsin Tariq Banna**, Swakshar Deb, Sejuti Rahman and Shafin Rahman* *Link* | *Paper* | *Code*
Accepted: 2023 International Joint Conference on Neural Networks (IJCNN), Melbourne, Australia

Enhancing Agricultural Automation through Weather Invariant Soil Parameter Prediction Using Machine Learning Published: 2024
*Monisha Mushtary Uttsha, A.K.M. Nadimul Haque, **Tahsin Tariq Banna**, Shamim Ahmed Deowan, Md. Ariful Islam and Hafiz Md. Hasan Babu* *Link* | *Paper* | *Code*
Accepted: Heliyon 10, no. 7 (2024)

GRAFF-MM : Graphs Frequency Filtering for Multi-Modal Memorability Prediction In process: 2025

***Tahsin Tariq Banna**, Swakshar Deb, Sejuti Rahman and Shafin Rahman*

Accepted: IEEE Transactions on Multimedia

Research Projects

Multimodal Image Memorability Prediction Jan 2023 – Present

Keywords: Graph Neural Networks, Visual Saliency, Graph Frequency Filtering

Funding: Ministry of Science and Technology, Government of Bangladesh

- Development of a multi-modal model involving image, visual saliency, text caption and spatial graph relation
- Improve existing GCN architectures by addressing both high and low frequency information through a multi-frequency filter bank

Personality Congruent Interactive Communication for HRI May 2024 – May 2025

Keywords: Human Robot Interaction, Personalization, Emotion

- Development of a real-time interaction system that takes into account human personality for personalized conversation.

Zero-shot LLM Generated Actions for HRI Apr 2023 – Jan 2025

Keywords: Human Robot Interaction, LLM, Generative, Action

- Proposed a novel LLM based method for generating arbitrary robot action on the go adhering to conversational context

Detection and Classification of Microplastics in Local Grocery and Food Items Aug 2023 – Present

Keywords: Microplastic, Detection, Classification, Public Health

- Using models such a YOLOv8, Faster R-CNN, SAM etc. to detect and classify microplastics in daily products
- Implement the system on a Raspberry PI for deployment

Other Projects

Cartography using GeoSpatial Data 2024

Developed highly detailed maps of suburban areas by analyzing and visualizing geospatial data

Real-time Stable Voronoi Filter 2023

Designed a voronoi filter using GLSL and python for real-time video stylization. For stability, a custom seed based pseudo-random sampling was used on top of heavy preprocessing.

Molecule Classification using Graphs 2023

Classification of molecules based on their solubility using Graph Attention Networks

Random Crawlers 2022

Designed a novel pseudo-natural movement-based agents inspired by spider behavior (Variation on random walk). It uses undamped multi-pendulums of varying lengths as the controller for the agents where the end-effector is the position of the agent.

Conway's Game of Life 2021

Designed an extremely efficient implementation of cellular automata using Rust and Webassembly (Runs at 60fps on 4k)

Self Solving Eight Puzzle Game 2020

Designed and implemented an interactive Eight Puzzle Game with the A-star algorithm to solve the puzzle

Procedural Terrain Generation 2020

Created and documented a procedural terrain generation algorithm, integrating advanced noise functions

Real-time Floyed-Steinberg Dithering 2018

Implemented the Floyd-Steinberg dithering algorithm for real-time stylized video processing

Scholarships & Awards

- **2024 National Science & Technology (NST) Fellowship** (Awarded for excellent master's thesis)
- **2024 IFIC Bank Scholarship** (Awarded for excellent research potential in the M.Sc. thesis)
- **2023 Dhaka University Student Scholarship** (For excellent academic performance)
- **2023 IFIC Bank Scholarship** (Awarded for the excellent undergraduate project dissertation)
- **2022 1st runner up** for poster presentation in **Dhaka University Science Fair**
- **2022 IFIC Bank Scholarship** (Awarded for excellent research potential in the B.Sc. project)
- **2020 DACSU Science and Technology Olympiad Champions Award** (Robotics & Artificial Intelligence)
- **2018 Luna Samsuddoha - Janata Bank Scholarship** (Awarded for excellent academic performance)

Technical Skills

Languages: Python, Rust, JavaScript, HTML/CSS, P5JS, Processing, LaTeX
Frameworks: Pytorch, Tensorflow, Keras, Nannou, ThreeJS, D3,
Developer Tools: Git, Docker, VS Code, Visual Studio, PyCharm, Metashape, Choreographe
Softwares: SolidWorks, Blender, Photoshop, Illustrator, Lightroom, Premiere Pro
Libraries: Pandas, NumPy, Matplotlib, OpenCV, Scikit-Learn, Seaborn, GeoPandas, ZeroMQ
Operating Systems: Linux, OpenBSD, Windows