

Sabbir Hossain Ujjal

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Education

Bachelor of Science in Electrical and Electronic Engineering (EEE)

March 2018-May 2023

Major in Communication & Signal Processing (CSP)

Bangladesh University of Engineering and Technology (BUET)

• CGPA - 3.75/4.00

Relevant Coursework: Random Signals and Processes | Digital Signal Processing I | Continuous Signals and Linear Systems | Control System | Microprocessors and Embedded System

Research Interest

Natural Language Processing (NLP) | Large Language Model (LLM) | Conversational Agents (CA) | Human Robot Interaction | Computer Vision | Deep Learning | Machine Learning

Work Experience

Machine Learning Engineer (Team Lead), [ACI Limited](#)

Aug 2024 - Present

- Leading and mentoring a cross-functional team in developing business-specific automation solutions leveraging machine learning model and systems.
- Design and implement strategic initiatives to optimize AI/ML project scalability and deployment, while overseeing the entire machine learning lifecycle from conceptualization to production, ensuring seamless integration and maximum business impact

Machine Learning Engineer, [ACI Limited](#)

Oct 2023 - Aug 2024

- **Virtual Assistant:** Developed a 24/7 virtual assistant using ASR, LLM, and RAG technologies to provide product information and problem-solving support for the company's field force and customers.
 - Trained Whisper based **ASR** model for Bangla and English audio transcription.
 - Implemented Retrieval-Augmented Generation (**RAG**) with **LLMs** and Vector Databases to efficiently answer product-related queries in a business context.
- **ACI SpeechHub:** Developed a Speech to Text and Natural Language Understanding (**NLU**) system for the company.
 - Implemented Whisper based **ASR** model for Bangla and English audio transcription.
 - Summarization and keyword extraction from transcribed audio using **BERT** based models.
- **Voice Based Ordering System:** Developed an end-to-end Automatic Speech Recognition (**ASR**) system to streamline the ordering process for sales representatives. This voice-command solution significantly reduced order-taking time, effectively **halving the workload** for interactions with retailers.
- **Writing Assistant:** Developed an end-to-end audio-based writing assistant powered by Large Language Models (**LLMs**) for generating professional reports and emails. This innovative system ensures adherence to reporting standards and proper articulation, significantly enhancing employee productivity in document creation.

Machine Learning Engineer, AIEdgeInside - [AI Startup]

Aug 2023 - Oct 2023

- **Computer Vision:** Experimented and developed system utilizing **computer vision** models for various applications.
- **Generative AI:** Researched and experimented with **vision generative models** for various applications.

Publications

- **mTOVA: A Multilingual Task Oriented Virtual Assistant for Human Computer Communication**
 - **Conference:** 5th IEEE International Conference on Telecommunications and Photonics (ICTP) 2023
 - **Authors:** Sabbir Hossain Ujjal, A F M Mahfuzul Kabir, Mohammad Ariful Haque
 - DOI: [10.1109/ICTP60248.2023.10490454](https://doi.org/10.1109/ICTP60248.2023.10490454)

Research Experience

Development of a multilingual conversational agent using deep learning and natural language processing

Supervisor: Dr. Mohammad Ariful Haque

- In our thesis work, we had developed a multilingual conversational agent (CA) which can understand voice command and generate response to help perform day-to-day tasks both in Bangla and English. We used **RASA** platform for deploying our CA and **ASR** and **NLU** models for understanding user voice command.

Development of Bangla Large Language Model (Ongoing)

- Development of efficient Bangla tokenizer using **custom BPE** tokenizers.
- Collection, cleaning and preparation of huge amount of open source **Bangla** text data.
- Pretraining and fine-tuning LLM and benchmarking for downstream tasks.

Competitions

- **Robi Datathon 3.0** [Champion]
 - The biggest data analysis competition in Bangladesh where we have to solve business oriented problem leveraging ML algorithms. My team 'ACI_ServerDown' has become the **champion**, outshining 1,000 teams formed by 3,500 talented individuals.
- **ভাষা-বিচিত্রা: ASR for Regional Dialects** [First Runner-up]
 - The objective of this challenge is to create a robust model which **transcribe Bengali speech** with various regional **dialects** following the orthography set by linguists. My team 'কাকাতুয়া' became the **first runner up** and our model was the fastest model for competing the task among the solutions.
- **Bengali.AI Speech Recognition** [Bronze Medalist][Leaderboard: **59** internationally, **4th** in Bangladesh]
 - The objective of this challenge is to create a robust model which could recognize Bengali speech from out-of-distribution (**ODD**) audio recordings.
- **2nd AVA Challenge@IEEE MIPR 2024** [Second Runner-up]
 - The objective of this challenge is to build a robust model for **video analysis** which can predict the risk of an impending car accident to the recording vehicle

Achievements

- **RISE Student Research Grant Award**
 - Research grant for undergraduate thesis by Research and Innovation Centre for Science and Engineering (RISE).
- **Dean's List Award in multiple semesters**
 - Academic honor by BUET for attaining CGPA of 3.75 for two consecutive terms.
- **President's Scout Award**
 - The highest rank of Bangladesh Scouts
- **Scholarship from Secondary Education Board**
 - Scholarship awarded by Ministry of Education, Bangladesh

Technical Skills

- **Programming Languages:** Python, C, C++, MATLAB
- **Frameworks & Libraries:** PyTorch, TensorFlow, Keras, RASA, FastAPI, Langchain, LlamaIndex, Pandas, Scikit-learn
- **DevOps Services:** RESTapi, FastAPI, Flask, Unicorn, Qdrant, Weaviate
- **Circuit Simulation and Design:** Proteus, PSpice
- **Others Tools/Software:** Git, LaTeX, PowerPoint, Excel

Academic Projects

- **AI Generated Text Detection**
 - Developed a robust deep learning model to accurately distinguish between AI-generated and human-written text, enhancing various evaluation processes.
 - Language/Framework/Model: Python, Pytorch, DeBERTa, Feature engineering
 - Link: [AI Generated Text Detection](#)
- **Resume Classification and Sorting**
 - Engineered a deep learning-based end-to-end system for automated resume classification and sorting, streamlining and enhancing recruitment processes.
 - Language/Framework/Model: Python, Pytorch, BERT, DeBERTa
 - Link: [Resume-Classification](#)
- **Bengali Name Extractor**
 - Developed a robust NLP-based system for accurate person name extraction from text which can be used in any call center and online voice based transaction systems.
 - Language/Framework: Python, Pytorch, BanglaBERT
 - Link: [Bengali-Person-Name-Extractor](#)
- **Drowsiness Detection by PPG signal Analysis.**
 - Designed and implemented a wearable device using PPG signals to detect drowsiness, alerting users to prevent potential road accidents.
 - Language/platform: Matlab, C++, Arduino
 - Link: [Drowsiness Detection by PPG signal Analysis](#)
- **Real Time Covid Patient Monitoring**
 - Developed an IoT-based COVID-19 patient monitoring system with deep learning analytics, providing real-time emergency notifications to relevant parties.
 - Language/platform: Python, C++, Arduino, YAMNet
 - Link: [Covid Patient Monitoring System](#)
- **Bangla Calendar Clock.**
 - Developed a multilingual, multi-calendar microprocessor-based clock displaying Gregorian, Bengali, and Arabic dates, Our developed clock was later selected and hung on the microprocessor lab of BUET EEE department.
 - Language/platform: C++, Arduino
 - Link: [Bangla Calendar Clock](#)
- **Real Time Object Detection for Blind People.**
 - A computer vision based project to developed and end-to-end system for detecting object from an image and audibly sending these detected object messages to the user.
 - Language/platform: Python, Colab, YOLO, Faster-RCNN
 - Link: [Real-Time-Object-Detection-for-Blind-People](#)

Courseworks

- Deep Learning Specialization by [DeepLearning.AI](#). [[Certificate](#)]
- Machine Learning by Stanford University [[Certificate](#)]
- Python for Everyone by University of Michigan [[Certificate](#)]
- Introduction to TensorFlow by [DeepLearning.AI](#) [[Certificate](#)]
- Mathematics for Machine Learning Specialization by Imperial College London [[Certificate](#)]

Reference

Dr. Mohammad Ariful Haque

Professor

Electrical & Electronic Engineering (EEE), BUET

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Dr. Ahmed Zubair

Associate Professor

Electrical & Electronic Engineering (EEE), BUET

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