

# MAHERA ROKSANA ISLAM

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## Education

### University of Dhaka

January 2020 – Ongoing

*Bachelor of Science (BSc.) in Electrical and Electronic Engineering*

*Dhaka, Bangladesh*

- CGPA: 3.66 (up to 6th semester). Last 2 semesters' GPA 3.81 – highest in my batch.
- Ranked in the **top 0.5%** amongst around 90,000 students in **the most competitive university admission exam in Bangladesh, 2019**.
- Member: IEEE SB DU, SIGHT, WIE, Computer Society, and DU Writer's Hub.
- Secretary at IEEE SIGHT (2024 onwards): Organized club meetings and activities. Arranged several skill-building workshops.
- Webmaster at IEEE SIGHT(2020-2024): Created and maintained the official website.
- Relevant Coursework: Digital Signal Processing, Industrial and Medical Instrumentation, Signal and Systems, Linear Algebra and Numerical Methods.

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## Publication

- **M. R. Islam**, A. M. Ferdous, S. Hossain, M. A. Rahman Ahad and F. Alnajjar, “**Optimizing Endotracheal Suctioning Classification: Leveraging Prompt Engineering in Machine Learning for Feature Selection**,” 6th International Conference on Activity and Behavior Computing (ABC), Japan, May 2024. [**IEEE**] [**PDF**]

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## Research Experience

### Undergraduate Thesis

January 2024 – Ongoing

*University of Dhaka*

*Dhaka, Bangladesh*

- **Title: Enhanced Classification of Microbial Images using Generative Adversarial Networks**
- **Supervisor(s):** Prof. Md Atiqur Rahman Ahad, Dr. Md. Zasim Uddin, Prof. Mosabber Uddin Ahmed.
- Developed a segmentation model based on customized CycleGAN architecture for enhanced segmentation of microbial artifacts across limited datasets.
- Currently running ablation tests to tune the model performance across several datasets.
- Explored various methods to train stable GANs on smaller datasets.
- Plan to develop similar end-to-end model for microbial detection.
- Skills & Tools: Pytorch, Python (Conda), Bash

### Research Assistant

January 2023 – June 2023

*University of Dhaka*

*Dhaka, Bangladesh*

- Worked with a research team on an unpublished literature review on neuromorphic computing. Investigated 100+ papers in this field. Learned to assess trends, compare research methodologies, and identify potential research gaps across papers.

## Professional Experience

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### Data Science Intern

September 2023 – December 2023

*iFarmer*

*Dhaka, Bangladesh*

- Developed preprocessing techniques and algorithms to identify and visualize patterns on agricultural datasets to aid Bangladeshi rural farmers.
- Designed sensor-based systems for performing soil analysis and fertilizer recommendations.
- Skills & Tools: Python (Numpy, Pandas, Scikit-learn, Seaborn, Regex, etc.), Bash, SQL

### Data Analysis Intern (Part-time)

June 2023 – August 2023

*Plexus Cloud*

*Dhaka, Bangladesh*

- Developed and implemented SQL queries to extract, clean, and analyze large datasets from relational databases, and generated data-driven insights. Developed Bash scripts to streamline data extraction and loading from various sources into centralized repositories.
- Collaborated with Operations and Finance departments to understand data requirements and objectives. Helped to communicate data-driven insights using BI tools to upper-level managers.
- Skills & Tools: SQL, Bash, Python, MS Excel, BI Tools

### Teaching Assistant & Lab Instructor

December 2019 – April 2023

*Inspiration Coaching Center (Gulshan)*

*Dhaka, Bangladesh*

- Led three weekly lab sessions for Cambridge A Level Biology students and two sessions for A Level Physics students.
- Guided students in mastering lab equipment usage to support experiments and projects.
- Assisted with course preparation, exam question setting, schedule planning, and grading for Biology and Physics classes (Grades 9-12).
- Skills & Tools: MATLAB, LTSpice, Oscilloscope, Light Microscope, Centrifuge, other typical lab instruments, MS Office

## Selected Projects

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### Activity Recognition of Endotracheal Suctioning Procedure using Skeleton and Video Dataset with Generative AI

- **Supervisors:** Prof. Md Atiqur Rahman Ahad, Dr. Shahera Hossain, Dr. Fady Alnajjar
- Employed chain-of-thought prompting to several large language models (LLMs) to identify and select key features from the skeletal data.
- Implemented several classical machine and deep learning models to predict nurse care activities from extracted skeletal points data. Explored GANs to augment the skeletal dataset.
- Subsequently wrote a challenge paper and presented it at **6th International Conference on Activity and Behavior Computing (ABC)**, Japan, May 2024.
- Skills & Tools: Pytorch, Python (Conda, Colab), LLMs (GPT, Claude, Gemini, etc.)

### EEG Classification Using LSTM models

- Developed LSTM models to analyze EEG time series data in predicting mental state of samples.
- Explored Bayesian optimization for hyperparameter tuning, PCA for dimensionality reduction methods and utilized Shapley additive explanations (SHAP) for feature selection.
- Skills & Tools: Pytorch, Python (Conda)

### Archer: A Cost-Effective Single-Board Computer System

- Developed and deployed cost-effective single-board computer (SBC) systems to a rural school in Mymensingh, Bangladesh. Provided on-site training and continually offered remote and online assistance for maintenance.
- Secured project funding from **IEEE HTB**.
- Skills & Tools: OrangePi, Python, Linux, various open-source educational software

## Beshuddho: A Tank-Based Water Purification System

- Designed and deployed a microcontroller-based UV filtration system to purify water in lower-income urban households of Dhaka.
- Secured project funding from **IEEE HAC** (now called HTB).
- Skills & Tools: Arduino, C/C++

## NASA Space Apps Challenge: Global Nominee

- Worked on project to design 3D tools tailored to the unique conditions of Mars which was selected as the Champion from Dhaka region by BASIS, the local organizer of the competition.
- Skills & Tools: AutoCAD

## Skills, Tools, and Frameworks

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**Frequently use:** Pytorch, Python (OpenCV, Numpy, Pandas, Scikit-learn, SciPy, Regex, Matplotlib, Seaborn, Beautiful Soup, etc.), Bash, Git tools,  $\text{\LaTeX}$ .

**Often use:** MATLAB, SQL (PostgreSQL, T-SQL, Oracle DB), Docker, BI/Office tools.

**Know:** C/C++, LTspice, AutoCAD, Cadence Virtuoso.

## Miscellaneous

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### Selected MOOCs:

- [Advanced Linear Algebra – edX](#)
- [Generative Adversarial Networks \(GANs\) Specialization – Coursera](#)
- [Deep Learning Specialization – Coursera](#)
- [Machine Learning Specialization – Coursera](#)

## References

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Available upon request.

**Prof. Md Atiqur Rahman Ahad**, [mahad@uel.ac.uk](mailto:mahad@uel.ac.uk), University of East London, UK.

**Prof. Mosabber Uddin Ahmed**, [mosabber.ahmed@du.ac.bd](mailto:mosabber.ahmed@du.ac.bd), University of Dhaka, Bangladesh.

**Prof. Zasim Uddin**, [zasim@brur.ac.bd](mailto:zasim@brur.ac.bd), Begum Rokeya University, Rangpur, Bangladesh.