Abdul Monaf Chowdhury

University of Dhaka, Bangladesh

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Education

Bachelor of Science in Robotics and Mechatronics Engineering Jan 2019 — Jan 2024

University of Dhaka, Bangladesh

CGPA: ***3.87/4.00****, Ranked* 2^{nd} ***place***

Relevant Coursework:

Artificial Intelligence, Introduction to Machine Learning, Digital Image Processing and Robot Vision, Digital Signal Processing, Human-Robot Interaction, Advanced Robotics

Skills:

Software: C, C++, Python, MATLAB, PyTorch, JAX, Flax, TensorFlow, LaTeX

Language: Fluent in both English and Bangla

Test Scores:

GRE: **318** (Quant 163, Verbal 155, Analytical 4.0)

IELTS: **8.0** (R 8.5, L 9.0, S 7.0, W 7.0)

Research Interests

Multi-modal Learning, Computer Vision, Embodied AI, Vision Language Models, Reinforcement Learning

Research Experience

Research Assistant Feb 2024 – Present

MAIM Lab, University of Dhaka *Dhaka, Bangladesh*

Funding: Wellcome Leap (In Utero, California, USA)

PI: Dr. Abhishek Kumar Ghosh, Co-PI: Dr. Niamh Nowlan

- Collaborated with **University College Dublin** on the **Wellcome Leap In Utero** funded project titled “Translation of a Wearable Fetal Movement Monitor towards Stillbirth Prevention”
- Designed and implemented deep learning-based frameworks to analyze multimodal sensor signals from wearable belts to detect body movements, fetal kicks, and fetal hiccups
- Optimized signal processing of sensor data, presented hardware design feedback based on analytical findings, and validated hardware design changes
- Assisted in attaining **1M$** funding extension, and eventually helped secure translational funding from Wellcome Leap to launch a **startup**

Research Assistant Jan 2023 – Jan 2024

AVIoT Lab, University of Dhaka *Dhaka, Bangladesh*

Supervisor: Dr. Md Mehedi Hasan; [Project Report]

- Collaborated on Unmanned Aerial Vehicle (UAV) based suspicious activity recognition and drone surveillance
- Designed a hybrid model combining modified 3D CNN and FFT-based action recognition module for drone surveillance applications
- Built a lightweight deep learning pipeline using MobileNetV2 + BiLSTM for edge-based human activity detection, significantly reducing inference time

Teaching Experience

Instructor May 2025 – Aug 2025

National Camp, Bangladesh AI Olympiad *Dhaka, Bangladesh*

- Instructed national camp students on Unsupervised Learning, Deep Learning, and Computer Vision algorithms and architectures, took relevant labs, and illustrated Deep Learning evaluation strategies and techniques
- Planned, organized, and executed the AI problem challenge competition on Kaggle to select the final four candidate to represent Bangladesh in the International AI Olympiad 2026

Publications

- *FFT-UAVNet: FFT Based Human Action Recognition for Drone Surveillance System* **[Paper]**
  Abdul Monaf Chowdhury, Ahsan Imran, Md Mehedi Hasan
  5th IEEE International Conference on Sustainable Technologies for Industry 5.0 (STI), 2023

- *U-ActionNet: Dual-Pathway Fourier Networks with Region-of-Interest Module for Efficient Action Recognition in UAV Surveillance* **[Paper]**
  Abdul Monaf Chowdhury, Ahsan Imran, Md Mehedi Hasan, Riad Ahmed, AKM Azad, Salem A. Alyami
  IEEE Access, 2024. IF - 3.4

Manuscript Submitted

- *T3Time: Tri-Modal Time Series Forecasting via Adaptive Multi-Head Alignment and Residual Fusion* **[Paper] [Code]**
  Abdul Monaf Chowdhury, Rabeya Akter Fariya, Safaeid Hossain
  40th Annual AAAI Conference on Artificial Intelligence, 2026

- *LaGEA: Language Guided Embodied Agents for Robotic Manipulation* **[Paper] [Code]**
  Abdul Monaf Chowdhury, AKM Moshiur Rahman Mazumder, Rabeya Akter Fariya, Safaeid Hossain
  14th International Conference on Learning Representations, ICLR '26

Research Project

Amodal Counting through Prompt Guided Feature Inpainting Aug 2025 – Present
Multimodal Learning, Vision Language Model, Representation Learning

- Developing a prompt-guided feature-level inpainting framework for **amodal** counting, where user queries guide the inference of abstract representations for occluded objects, which are then reintegrated into the pipeline to enable more complete and robust scene-level object estimation

Language Guided Embodied Agents[Code] [Paper] Mar 2025 – Sep 2025
Embodied AI, Vision Language Model, Reinforcement Learning

- Designed and integrated a **Qwen 2.5VL-3B** VLM driven "episodic reflection" module, automatically generating rich, natural-language self-assessments of each trial—highlighting successes and pinpointing failure causes—to provide the agent with human-like introspection
- Fused multimodal reward signals by combining these verbal reflections with CLIP-style vision–language feedback from task descriptions and goal images, crafting a dense, semantically grounded reward model
- Engineered a reward-aligned **Soft Actor Critic**-based learning pipeline, where the enriched feedback loop accelerated exploration and policy refinement, consistently reducing training time and reliably converging on optimal behaviours across the Meta-World manipulation tasks

Tri-Modal Time Series Forecasting [Code] [Paper] Apr 2025 – Aug 2025
Large Language Model, Deep Learning, Signal Processing

- Architected an Adaptive Dynamic Multi-Head Cross-Modal Attention module with channel-wise residual skip-connections, enabling fine-grained alignment between temporal and auxiliary features and boosting representational capacity across modalities
- Engineered an **FFT**-based Frequency-Domain Processing pipeline, projecting real-valued spectra into learnable tokens and applying transformer-based attention with weighted pooling to extract robust spectral embeddings for each sensor channel
- Designed a Trainable Adaptive Rich-Horizon Gating Fusion to dynamically combine spectral and temporal encodings—replacing naıve concatenation—and beat the state-of-the-art benchmark on multivariate time-series forecasting

Proxemics & Social Interaction Patterns in ASD Children Sep 2023 — Jan 2024
Human-Robot Interaction, Deep Learning

- Formulated a **YOLOv8**-based system to determine the ideal proxemics of autism spectrum disorder (ASD) children in front of **NAO** Robot
- Examined and analyzed the behavioural responses of twenty children diagnosed with ASD in the presence of specific actions performed by the NAO robot

Automatic Stock Trading [Report] Aug 2022 — Nov 2022

Reinforcement Learning

- Implemented Approximate Q Learning for three Bangladeshi stocks to generate Buy, Sell, and Hold orders
- Achieved 11% return of investment for the 3 stocks beating the DSE 30 index

Awards & Scholarships

- Dean's Award - for best Undergraduate Result, University of Dhaka, 2024
- Engineering Faculty Undergraduate Merit Scholarship, University of Dhaka, 2024
- 5th, Dataverse Challenge - ITVerse, Bangladesh, 2023; Report
- 2nd, Intra-Department Soccer Bot Championship, University of Dhaka, 2019
- Sylhet Board Scholarship, Higher Secondary Certificate Examination 2018

Workshop/Conference Attended

- 5th International Conference on Sustainable Technologies for Industry 5.0 (STI), Dhaka

Reviewer

- IEEE Access
- AAAI 26

Leadership/Volunteer Activities

General Secretary Mar 2022 — Feb 2024

RMEDU Student Club, University of Dhaka

- Successfully organized and supervised frequent cultural events, sports events, and competitions
- Arranged and delegated paper reading sessions, workshops, and training sessions
- Addressed numerous concerns and issues of the student body and issued relevant responses

Academic Team Mentor Sep 2019 — Aug 2022

Bangladesh Robot Olympiad

- Developed questions for the National Robotics Olympiad and organized workshops
- Helped materialize the National Robotics Olympiad for 4 years

Program Co-Ordinator Jul 2021 -– Jun 2022

IEEE Robotics & Automation Society, University of Dhaka

- Directed and facilitated several webinars, interactive sessions, and expert talks
- Collaborated with other IEEE societies across the country and accelerated IEEE RASDU membership by 15%