

# Mansuba Tabassum

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## EDUCATION

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### University of Liberal Arts Bangladesh

Bachelor of Science in Computer Science and Engineering, CGPA : 3:19

Bangladesh,Dhaka

Aug. 2019 – may 2025

## EXPERIENCE

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### Founding Engineer

July 2025 – Present

*Nextudio*

*Dhaka, Bangladesh*

- \* AI Business Automation Agent: Developing a RAG-based AI agent application to help businesses automate workflows, streamline operations, and enhance decision-making using retrieval-augmented generation (RAG) techniques and large language models (LLMs).
- \* Implementing document ingestion pipelines and vector database integration (FAISS/ChromaDB) to enable semantic search and contextual response generation.
- \* Integrating LLMs with a FastAPI backend to deliver real-time, query-based responses for business knowledge bases.
- \* Computer Vision & Diffusion Models: Designing AI-powered image enhancement and generation solutions using Stable Diffusion and ControlNet.

### Impact Scholars Proposal Reviewer (Deep Learning)

Aug 2025 – Present

*Neuromatch*

*California, USA*

- \* Reviewing and evaluating research proposals in deep learning, vision-language models, and LLMs from scholars worldwide, supporting innovative AI research and contributing to global scientific impact.
- \* Collaborating with an international panel of domain experts to ensure fair, rigorous, and constructive feedback for submitted proposals.

### Machine Learning Fellow

Sep 2023 – Apr 2024

*Fellowship.AI*

*California, USA*

- \* Wrinkle Removal Application: Developed an AI-powered application using Stable Diffusion and ControlNet, integrated with Mediapipe's segmentation model, to remove wrinkles from clothing in images in real time.
- \* Minor Hair Removal Application: Led the development of an application to remove minor hair from images using ControlNet and Stable Diffusion models for precise image enhancement. [Code]

### Deep Learning Intern

Nov 2023 – Jan 2024

*Mentorness*

*Gujarat, India*

- \* Developed and implemented a deep learning model using computer vision to detect and map facial landmarks for identity verification and emotion recognition. [Code]
- \* Music Popularity Prediction: Created a machine learning model to predict song popularity by analyzing text features and metadata using traditional ML techniques. [Code]

### Deep Learning & Computational Neuroscience Summer Schools

Jul 2023 – Aug 2024

*Student Researcher — Neuromatch Academy*

*USA*

- \* Music Trend Detection: Implemented an NLP-based machine learning model to analyze lyrics and identify music trends, predicting popular songs based on linguistic patterns. [Code]
- \* Reinforcement Learning Behavioral Analysis: Conducted a comparative study of RL agent behavior versus real mice using CNNs, replicating an RL environment from the Steinmetz dataset and generating a synthetic image dataset with OpenCV. [Code]

## RESEARCH EXPERIENCE

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- \* Interpretable Flow Feature Extraction via Neuron-Guided Sparse Latent Autoencoder: Designed a deep learning model that extracts key features from fluid dynamics datasets using neuron-guided sparsity, improving interpretability and enabling efficient analysis of turbulent flows. (Writing Stage)
- \* BanglaCLIP: Developed a vision-language model to learn cross-modal representations for Bangla text and image alignment using contrastive learning techniques. This project bridges semantic understanding between Bangla text and images to improve retrieval and generation tasks. (Writing Stage)

## PROJECTS

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**ML/DL** | *Python, Pytorch, Keras, NLP, Computer Vision, Langchain, LLM*

June 2020 – Present

- \* **Detecting Multiple Rice Diseases with EfficientNet + ViT Ensemble Method.** [Code]
- \* Developed an **AI-powered Python Learning System** using **LLMs**. Enabled **dynamic content generation**, **real-time feedback** on code, and **automated grade reporting** to personalize and enhance the programming learning experience. [Code]
- \* **AI-Powered Music Analysis Application:** Developed an AI-driven system that analyzes instrumentation, musical features, and predicts virality potential of any audio track using LLMs and YAMNet. The app provides detailed insights into music composition and trends to help creators and analysts. [Code]
- \* Developed an **LSTM model in TensorFlow** to detect **disaster-related tweets** for emergency response analysis. [Code]
- \* **Hate Speech Detection in Bengali:** Implemented **ML and DL models** to detect hate speech in Bengali text written in English script, leveraging ML techniques for accurate classification. [Code]
- \* **Bangla Text-to-Image Generation:** Developing a **Few-Shot Diffusion Model** for generating Bangla text-to-image outputs, while building a custom **BanglaCLIP** model to align text and visual representations. [Code]

**Development** | *JAVA, Flask, Flutter, Git*

Jan 2022 – May 2024

- \* **Hospital Management System:** Developed a comprehensive hospital management system using Java, streamlining patient records, appointments, and billing processes for efficient healthcare administration.[Code]
- \* **Animal Care App:** Developed a Flutter-based mobile app for animal care, enabling users to book vet appointments, search for pet adoptions, and make donations to pet shops.[Code]

## AWARDS AND ACHIEVEMENTS

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- Positioned among Top 25 at IEEE IES Generative AI Hackathon Challenge 2024 (Multicategory Virtual Try on) with diffusion model. [on-going]
- Winner at New Normal Hackathon.
- Accepted at OXML Oxford Machine Learning Summer School.(University of Oxford)
- 1st Runners Up at BUP Mindexperia Idea Contest
- 2nd Runners Up ULAB Case Solving Competition
- National Level Participants at Bangladesh Astronomy Olympiad
- Best Ambassador at IEEE Aerospace and Electronic Systems Society BRACU Student Branch Chapter

## CO-CURRICULAR EXPERIENCE

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**Competitive Programming** |

2021 – May 2024

- Learnt various algorithms and data structures on graphs, trees, number theory, and dynamic programming. Solved 100+ problems on online platforms such as Codeforces and Leetcode.
- Participated in various programming competitions on online platforms.

**IEEE CS BDC Spark Administration Management** |

2021 – May 2024

- Organized technical seminars, workshops, and competitions. Responsible for academic event planning, workshop design, and managing conferences.
- Played a role in organizing several inter-university events with 200+ participants.

**Vice Chair/Secretary** | *IEEE Computer Society ULAB Student Branch Chapter*

Feb 2020 – April 2023

- Organized and led 30+ technical seminars, workshops, and competitions, demonstrating strong leadership and event management skills.
- Supported organization of inter-university events with 100+ participants.

## TECHNICAL SKILLS

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**Languages:** Java, Python, C/C++, SQL, HTML/CSS, JavaScript, Dart, Flutter

**Frameworks:** PyTorch, Keras, Flask, FastAPI, Gradio, Langchain, OpenCV

**Developer Tools:** Git, Tableau, Google Colab, Visual Studio, PyCharm, Docker, CI/CD

**Libraries:** pandas, NumPy, Matplotlib, Scikit-learn