

# Maliha Tabassum

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## RESEARCH INTERESTS

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Explainable AI, AI in Healthcare, Computational Neuroscience, Reinforcement Learning, NLP

## EDUCATION

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### Bangladesh University of Professionals

*Bachelor of Science in Information and Communication Engineering*

CGPA: **3.96/4.00** (Highest in Batch)

Dhaka, Bangladesh

Nov 2021 – Sept 2025

**Thesis:** *Real-time Explainable Conversational AI for Early Diagnosis Using Large Language Models*

**Relevant Coursework:** Machine Learning, Artificial Intelligence, Data Warehousing & Data Mining, Linear Algebra & Fourier Analysis, Probability & Statistics, Calculus, Ordinary & Partial Differential Equations, Discrete Mathematics, Data Structures, Analysis & Design of Algorithms, Object-Oriented Programming, Database Management Systems

## TECHNICAL SKILLS

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**Programming Languages:** Python, Java, JavaScript, C++

**ML Frameworks:** Pytorch, TensorFlow, Keras

**Tools & Libraries:** CUDA, FAISS, OpenCV, Mediapipe, HuggingFace, Jupyter Notebook

**Data & Visualization:** Pandas, NumPy, Matplotlib

## RESEARCH EXPERIENCE

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### Manuscript in Preparation

Dec 2024 – Nov 2025

*Towards Explainable Conversational AI for Early Diagnosis Using Large Language Models*

- Developed an LLM-based explainable diagnostic chatbot using GPT-4o with RAG and structured chain-of-thought prompting for 14 common diseases.
- Performed ablation studies and applied fine-tuning strategies to reduce hallucination.
- Designed a two-phase diagnostic pipeline (symptom-based diagnosis followed by lab-test-augmented evaluation of the top three predicted diseases), achieving 90% accuracy and 100% top-3 accuracy across 540 evaluated conversational turns. A web implementation of the system is available here: <https://xaimedicalbot.azurewebsites.net>

*Supervised by Dr. M. Shamim Kaiser.*

### Ongoing Research

Oct 2025 – Present

*Towards a Causal Counterfactual Segmentation Framework for Disease Progression Modeling in Diabetic Retinopathy (estimated)*

- Developing a causal counterfactual segmentation framework to improve causal consistency and disease-progresson explainability, evaluated on the BRSET dataset (16,266 images from 8,524 patients).

*Supervised by Dr. Mohammad Abu Yousuf*

## ACADEMIC PROJECTS

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### • Skin Disease Detection Using EfficientNet

*GitHub*

Developed a skin cancer classification system capable of detecting ten dermatological conditions using transfer learning on EfficientNet, achieving 70% accuracy. Created an interactive diagnostic interface and performed model training, evaluation, and fine-tuning as part of the Artificial Intelligence course.

### • Comparative Analysis of ML Models for Employee Attrition

*Colab — Report*

Conducted a comparative study on employee attrition prediction using 10-fold cross validation on Logistic Regression, SVM, Random Forest, and XGBoost, where SVM performed the best among all, achieving 84% accuracy and F1 score of 0.54. Performed preprocessing, feature engineering, and evaluation as part of a course project requiring a structured research-style paper.

## INDUSTRY EXPERIENCE

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### Software Engineer

Nov 2024 – Sept 2025

*Integrated Software and Technologies Ltd.*

#### • LLM-Based Legal Assistance Chatbot | *FAISS, HuggingFace Transformers, LLaMA, Python*

- Developed a LLaMA-based legal QA system using RAG and optimized prompts, producing consistently accurate intent detection with high-confidence outputs.
- Built a hybrid query pipeline combining CAG for low-latency repeats and RAG for retrieval-based answers.
- Implemented semantic search and domain-specific chunking for effective retrieval from unstructured legal PDFs.

#### • Biometric Authentication Pipeline (E-Visa System) | *Python, Mediapipe, Azure AI Vision*

- Developed a unified biometric pipeline for face verification, liveness detection, passport OCR, and fingerprint extraction.
- Improved reliability through normalization, denoising, and image-quality filtering.
- Deployed secure FastAPI endpoints for real-time biometric processing on Linux servers.

## ACHIEVEMENTS

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- Achieved the highest CGPA in my cohort in the Faculty of Science and Technology, BUP
- Awarded the BUP Merit Scholarship for all eight semesters for maintaining a GPA above 3.90
- Received the Dean's Appreciation Letter in the final two semesters
- Champion — INDCon 2024 Presentation Competition

## EXTRACURRICULAR ACTIVITIES

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### Beta Student Ambassador, Microsoft Learn

Jul 2023 – Present

Mentored peers through technical sessions, contributed to community-building initiatives, and participated in AI-focused projects, including an AI-based learning platform and an AI-based waste-sorting application.