# Nazmun Nahar

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## RESEARCH INTEREST

**Digital Health** | **HCI** | **Mental Health** | **Human-centered AI** | **Data Science** | **Social Computing**

## PUBLICATIONS

1. Shariar Kabir; **Nazmun Nahar**; Mamunur Rashid; Shyamasree Saha."Automatic Speech Recognition for Biomedical Data in Bengali Language" **arXiv preprint arXiv:2406.12931** [pdf] [**2024**]
2. **Nazmun Nahar**; Shariar Kabir; Sumaiya tasnia khan; Suparna Das; Shyamasree Saha; Mamunur Rashid. "AmarDoctor: First Multilingual Digital Platform For AI-Driven Primary Care Triage And Patient Management System For Bengali Speakers". [pdf][suppl. data] [**in-progress**]

## RESEARCH EXPERIENCE

**R&D SOFTWARE ENGINEER & TECH LEAD - MedAi Limited [2021-Present]**

*Research Focus: AI-driven healthcare systems, multilingual NLP for medical applications*

- Developed novel clinical decision support algorithms achieving **87%** diagnostic accuracy.
- Conducted research on Bengali ASR for biomedical applications (**published arXiv 2024**)
- Designed computer vision-powered dietary recommendation system that automatically assess food images and provide personalized nutritional guidance based on patient medical history.
- Implemented automated conversion of paper-based medical documents to electronic health records using LLM-enhanced OCR techniques, focusing on prescription and diagnostic test image processing to improve healthcare data accessibility and interoperability.

## RESEARCH PROJECTS

### Automated Medical Document Digitization System [ongoing]

- **Research Problem**: Manual conversion of paper-based medical records creates healthcare digitization bottlenecks in resource-limited settings.
- **Methodology**: Developed multimodal AI system combining OCR with large language models to extract and structure clinical data from prescription and diagnostic test images.
- **Impact**: Streamlined medical record digitization workflow, reducing manual data entry time and improving healthcare data accessibility.
- **Innovation**: Novel application of LLM-enhanced OCR for accurate medical document processing and structured EHR generation.

### AmarDoctor: Multilingual AI Health Platform [2021-24]

- **Research Problem**: Lack of AI-driven primary care access for Bengali speakers, creating healthcare accessibility barriers for South Asian populations.
- **Methodology**: Designed comprehensive medical knowledge graph comprising symptoms, diseases, and weighted relationships; developed clinical decision support algorithms for multilingual symptom assessment and diagnostic recommendations.
- **Impact**: Deployed platform serving **10,000+** patients with **2,300+** consultations, achieving **87%** diagnostic accuracy validated against physician assessments using **185** simulated patient cases.
- **Publications**: 2 papers (1 published arXiv, 1 in preparation.)

### Personalized Food Recommendation System for Disease-Based Dietary Guidance [2024]

- **Research Problem**: Gap between visual food recognition technology and personalized medical dietary counseling for chronic disease management.
- **Methodology**: Integrated computer vision-based food classification with medical knowledge systems for condition-specific dietary filtering and recommendation generation.
- **Impact**: Proved feasibility of real-time dietary guidance automation, potentially improving patient adherence to medical dietary restrictions.
- **Innovation**:Novel integration of visual food recognition with medical dietary guidelines for automated nutrition therapy.

### Conversational Symptom Assessment Chatbot Using RASA [2023]

- **Research Problem**: Limited accessibility to preliminary health assessment tools through natural conversational interfaces, particularly for mental vs. physical health triage.
- **Methodology**: Developed intent-based conversational AI using RASA framework with dynamic dialogue management, implementing looped questioning system for symptom classification.
- **Impact**: Demonstrated feasibility of automated health triage through conversational interfaces, enabling preliminary classification between mental and physical health concerns.
- **Innovation**: Application of intent pattern analysis for health condition categorization through natural dialogue.

### Bengali Text Recognition Using Deep Learning [2018-2019] (Undergraduate Thesis)

- **Research Problem**: Lack of effective optical character recognition systems for Bengali printed text, hindering digitization of Bengali literature and documents.
- **Methodology**: Developed novel Bengali word image dataset from printed documents, designed and trained deep neural network architectures for character sequence recognition.
- **Impact**: Achieved **87.3%** word recognition accuracy, contributing to low-resource language NLP research and digital preservation of Bengali texts.
- **Supervision**: Professor Dr. Md. Monirul Islam, BUET.

## EDUCATION

**BSc. Computer Science & Engineering [2015-2019]**

**Bangladesh University of Engineering and Technology (BUET)**
**Coursework**: AI, Structured programming language, OOP language, Data Structures, Algorithms, Database, Computer architecture, SE and information system design, Software development, Basic graph theory, VLSI Design, and others.

## TECHNICAL SKILLS

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| **PROGRAMMING LANGUAGES** | Python, C/C++, Java, SQL, PostgreSQL, TypeQL, Assembly, Bash |
| **AI/ML FRAMEWORKS & LIBRARIES** | Scikit-Learn, Tensorflow, Keras, Transformers, Diffusers |
| **RESEARCH TOOLS** | Data analysis (Pandas, NumPy), Visualization (Matplotlib, Seaborn) |
| **AI APPLICATIONS** | Gen AI, LLM, RAG |
| **SOFTWARE DEVELOPMENT** | Django, REST API, Firebase & VOIP notification, Git, Locust, CI/CD |
| **AWS** | EC2, Route53, S3 bucket, API Gateway, SES, AMI, Load balancer, Auto Scaling Group, VPC, Launch Template, Lambda Function |

## ACADEMIC ACTIVITIES & AWARDS

- **Teaching Experience**: Bangladesh Institute of Science and Technology [**2019-2020**].
- **Awards**: MIT Solve Global Health Equity Challenge (6/2200+ submissions) [**2024**].
- **Merit Scholarships**: BUET University Merit Scholarship [**2015-19**].

## REFERENCES

**1. Dr. Mamunur Rashid**

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