

MEHEDI HASAN

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RESEARCH INTEREST

I am a **Software Engineer** specializing in Research at Chaldal. Outside of work, I am involved in academic research. My primary area of interest is **Human Computer Interaction**. I'm also passionate about **Visualization**, **VR/AR**, and **Ubiquitous** technologies. Through my work experience, I've gained expertise and interest in **Algorithms** and **Systems**, including **Networking**, **Distributed Systems** and **System Design**.

EDUCATION

BSc in Computer Science and Engineering

May 2023

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

Notable Courses:

CSE 305 - Computer Architecture

CSE 321 - Computer Networks

CSE 471 - Machine Learning

CSE 461 - Algorithm Engineering

CSE 313 - Operating System

CSE 405 - Computer Security

CSE 309 - Compiler

CSE 463 - Introduction to Bioinformatics

CSE 409 - Computer Graphics

MATH 247 - Linear Algebra

MATH 145 - Calculus and Coordinate Geometry

HUM 477 - Sociology for Science and Technology

ENGLISH PROFICIENCY

TOEFL iBT

December, 2023

Reading: 25, Listening: 28, Speaking: 30, Writing: 29

Total: 112

PUBLICATIONS

- Mubassira, T., Hasan, M., Sharmin, S. (2024). "Reading the Mind's Eye: Detecting Trauma-Vulnerability in Individuals by Analyzing Attention Through Eye-Tracking". In: Zaslavsky, A., Ning, Z., Kalogeraki, V., Georgakopoulos, D., Chrysanthi, P.K. (eds) Mobile and Ubiquitous Systems: Computing, Networking and Services. MobiQuitous 2023 (EAI MobiQuitous 2023). DOI: 10.1007/978-3-031-63992-0_28
- Mubassira, T., Hasan, M., Mukta, J., Islam, A (2024). "Enhancing EmoBot: An In-Depth Analysis of User Expectation and Satisfaction in An Emotion-Aware Chatbot". In: International Conference on Networking, Systems and Security, 2024. (Peer Reviewed)

RESEARCH EXPERIENCE

Detecting Sentiment in Anonymous Submissions: A Study on User Report Data

Human Computer Analysis, Sentiment Analysis

Sep 2024 - Current

- **Supervisor:** Dr. A. B. M. Alim Al Islam, Professor, CSE, BUET
- **Contribution:** Performed sentiment analysis on crowd sourced anonymous reports

Towards perceiving and resolving the impediments to reporting for the developing countries

Human Computer Interaction, Generic Reporting System

Aug 2024 - Current

- **DOI:** 10.1109/NSYSS2.2017.8267790
- **Live At:** ureporter.cse.buet.ac.bd
- **Supervisor:** Dr. A. B. M. Alim Al Islam, Professor, CSE, BUET
- **Collaboration:** With Tarik Reza Toha, University of North Carolina at Chapel Hill
- **Contribution:** Improved the system in collaboration with the research team

Fine-Tuning GPT-2 for Bengali Auto Text Completion Using Literary Corpus: A Qualitative Analysis

Natural Language Processing, Machine Learning

Jan 2023 - Mar 2023

- **Presentation:** Slides
- **Supervisor:** Dr. Mohammed Eunus Ali, Professor, CSE, BUET
- **Contribution:** Fine-tuned GPT-2 with a Bengali literature corpus to improve auto text completion

INDUSTRY EXPERIENCE

Chaldal Ltd.

June 2023 – Present

R&D

ASAP Delivery

- Designed an algorithm to **calculate geographical area overlapping a route**, through which a driver can detour for a specific slack time period to deliver to a new location without impacting other deliveries in the route
- **Impact:** Grocery delivery within 20 to 40 minutes in Dhaka

Last Mile Routing Algorithm

- Designed a new **routing algorithm** using different heuristic and probabilistic search methods
- **Impact:** Increased on-time delivery by 15%

Traffic Estimate

- Developed a **timeseries database** and supervised an interpolation project using **spatio-temporal models** to fill missing traffic speed data.
- **Impact:** Improved estimates for Dhaka roads by 53.53% for cycles, 28.83% for motorbikes, and 28.73% for vans

Automate Task Assignment

- Designed and deployed an algorithm for solving the **task assignment problem** via an API endpoint, integrated into a system for periodic task assignment within the warehouse.
- **Impact:** Increased on-time dispatch by 16%

System Design

Micro-services communication

- Designed and implemented a **gRPC-based communication system** across three services to transmit information at specific events, tested it in a QA environment, and oversaw its system-wide deployment.
- **Impact:** Decreased driver idle time by 7 minutes

Spatial Database Model

- Developed a **spatial database model** which can store polygonal area and query with intersecting geolocation
- **Impact:** Enhanced vehicle utilization by restricting certain vehicle types in specific areas

Re-Modeling Task Assignment system

- Designed a more efficient task assignment model, refactored existing models, redesigned the UI, and improved underlying logic.
- **Impact:** Increased picker's efficiency by 1.2x

CONFERENCES AND TALKS

EAI MobiQuitous 2023 - 20th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services

17 November, 2023

RMIT University, Melbourne, Australia

Presented our research work at the time alongside my co-author

NSysS 2023 - 10th International Conference on Networking, Systems and Security)

22 December, 2023

BUET, Dhaka, Bangladesh

Presented our paper accepted in the conference alongside my co-author

How BUET Alumni Help Build Infrastructure of Bangladesh through Software

05 March, 2024

BUET, Dhaka, Bangladesh

Discussed my work, its impact on Bangladesh's infrastructure, and how it differs from a traditional software engineering role.

ACHIEVEMENTS AND AWARDS

2022	5 th /50	Code Samurai Hackathon
2021		Hackerrank: Problem Solving (Intermediate)
2020		Codeforces Max Rating: Expert (1871)
2019	8 th /86	BUET CSE FEST IUPC
2019	10 th /84	DUET IUPC
2019	13 th /59	NSU Cybernauts National Programming Contest
2019	13 th /96	RUET IUPC
2019	14 th /84	IUT IUPC
2019	18 th /109	SUB IUPC
2019	34 th /119	SUST IUPC

SELECTED PROJECTS

Trapped (Game)

Unity Game Engine, C#

Developed a 2D action and puzzle platformer

P5js-Raycasting

Javascript, HTML

Implemented raycasting using p5-js library for visualization

xv6 Memory Management (OS)

Linux, C, bash, kernel programming

Enhanced the xv6 operating system by adding support for memory management.

Simple C Compiler

C, YACC, Bison

Developed a C compiler capable of reading small C programs and generating corresponding machine code for execution.

CNN from Scratch

Python

A simple implementation of a convolutional neural network using Python and NumPy, trained on the NumtaDB dataset to recognize Bengali digits.

Chaldaal (Web App)

django/python, oracle/sql, HTML/CSS, JS

Created an online grocery shop similar to chaldal.com

Smart Construction Work System (Web App)

Django, SQLite, HTML/CSS, JS

Developed a citywide smart construction management system

REFERENCES

Dr. Sadia Sharmin

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