# MEHEDI HASAN

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Ⓢ Scholar   🆔 ORCID

## RESEARCH INTEREST

I am a **Software Engineer** specializing in Algorithms & Research at Chaldal. Outside of work, I am involved in academic research. My primary area of interest is **Human Computer Interaction**, including **Accessibility**, **Security & Privacy**, **Health & Eudaimonia**. 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*

CGPA: 3.57/4.00    Last Two Terms: 3.82/4.00

Notable Courses:

| | |
|---|---|
| CSE 305 - Computer Architecture | CSE 309 - Compiler |
| CSE 321 - Computer Networks | CSE 463 - Introduction to Bioinformatics |
| CSE 471 - Machine Learning | CSE 409 - Computer Graphics |
| CSE 461 - Algorithm Engineering | MATH 247 - Linear Algebra |
| CSE 313 - Operating System | MATH 145 - Calculus and Coordinate Geometry |
| CSE 405 - Computer Security | HUM 477 - Sociology for Science and Technology |

## ENGLISH PROFICIENCY

**TOEFL iBT**                                                                                                 **December, 2023**

*Reading: 25/30, Listening: 28/30, Speaking: 30/30, Writing: 29/30   Total: 112/120*

## 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., Chrysanthis, 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.**, Noor, 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.

## 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

**State of the Map Asia 2024**                                                 **30 Nov-1 Dec, 2024**
*Cox's Bazar, Bangladesh*
Invited to present a talk on the opportunities of OpenStreetMap and how to contribute to the community

**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.

**NSysS 2023 - 10th International Conference on Networking, Systems and Security**    **21-23 December, 2023**
*BUET, Dhaka, Bangladesh*
Presented our paper accepted in the conference alongside my co-author

**EAI MobiQuitous 2023 - 20th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services**                                                        **14-17 November, 2023**
*RMIT University, Melbourne, Australia*
Presented our research work at the time alongside my co-author

## EXTRACURRICULAR ACTIVITIES AND LEADERSHIP

**BUET CSE Fest AI Contest**                                                    **15-23 July, 2022**
*Lead Organizer*
Actively managed, set problem and judged the submissions of AI contest that had over 100 participants, hosted in codingame.com

## Achievements and Awards

| Year | Rank | Award |
|------|------|-------|
| 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 |
| 2016 | $2^{nd}/100$ | Laboratorians Festival Math Olympiad |
| 2015 | $8^{th}/1000$ | Regional Math Olympiad |
| 2014 | $2^{nd}/500$ | National Astronomy & Astrophysics Olympiad |

## Selected Projects

**Trapped (Game)**
*Unity Game Engine, C#*
Developed a 2D action and puzzle platformer

**Codingame: Steal The Flag**
*Java*
Developed and hosted a game on codingame.com

**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

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