

HASAN MASUM

Software Engineer / Researcher / Web3 & blockchain developer

Dhaka, Bangladesh

hasanmasum1852@gmail.com ♦ (+880) 1572342835 ♦ hmasum52.github.io ♦ linkedin.com/in/hmasum52 ♦
github.com/hmasum52 ♦ twitter.com/hmasum52 ♦ youtube.com/@hmasum52

RESEARCH INTERESTS

My primary research interest lies in applying NLP, LLMs, and generative AI to software engineering, with a particular interest in software testing and large-scale system design. Although I'm new to the generative AI field, I'm eager to collaborate on new projects to gain practical experience. I'm dedicated to creating innovative, reliable systems (or tools) that enhance developer efficiency and user experience. My journey has been shaped by both my academic and professional experiences, leading me towards the goal of pursuing a Ph.D. in software engineering.

PUBLICATIONS

[Undergrad Thesis] Towards Intelligent Traffic Signaling in Dhaka City Based on Vehicle Detection and Congestion Optimization.

[Under Review] Submitted to ACM Sensys 2024 on July 2024

RESEARCH EXPERIENCE

Automated RestAPI Test Generation & Execution

Automated Testing RestAPI LLM Test Case Generation Test Case Execution Prompt Engineering Fine Tuning

Supervisor: Dr. Anindya Iqbal, CSE, BUET

July 2024 – Present

- Developing an LLM based tool for automated test case generation and execution for RestAPI leveraging prompt engineering and fine tuning language model.

[Undergraduate Thesis] Developing An Intelligent Traffic Signaling System for Non-lane based and Heterogeneous Traffic in Dhaka City in Low Resource Environment Using Object Detection And Multi-objective Optimization Algorithm.

Computer Vision Object Detection RTSP Stream Processing Traffic Signal Optimization NSGA-II Raspberry Pi 4B

Supervisor: Dr. A. B. M. Alim Al Islam, CSE, BUET

August 2023 – June 2024

- Developed an intelligent traffic signaling system for the non-lane-based, heterogeneous traffic of Dhaka City, Bangladesh.
- Integrated real-time video feeds with low-resource processing using Raspberry Pi 4B to detect and classify heterogeneous traffic.
- Utilized a state-of-the-art YOLO-based object detection model trained on the NHT-1071 dataset to accurately identify and categorize traffic in developing countries.
- Applied a multi-objective optimization algorithm, NSGA-II, to generate optimized traffic signal timings, reducing waiting time and enhancing vehicle throughput.
- Successfully tested the system at a five-road intersection in Palashi, Dhaka, showcasing its potential to improve traffic management in urbanizing cities.

Traffic Image Dataset for Non lane-based and Heterogeneous Traffic for Adaptive Traffic Signal Scheduling.

Traffic Image Dataset Non lane-based Traffic Heterogeneous Traffic Adaptive Traffic Signal Scheduling Traffic Signal Control

Traffic Flow Prediction

Supervisor: Dr. A. B. M. Alim Al Islam, CSE, BUET

January 2024 – March 2024

- Developed a Novel Traffic Image Dataset for Non lane-based and Heterogeneous Traffic in YOLO format.
- Benchmarked the dataset with SOTA object detection models like YOLOv5 and YOLOv8.

[Machine Learning Project] Single Image Super Resolution Using Practical Higher Order Degradation Technique

Super Resolution Higher Order Degradation Image Processing Reconstruction Swin Transformer SISR

Image quality assessment (IQA) NIQE

Supervisor: Dr. Mohammad Saifur Rahman, Professor, CSE, BUET

January 2024 – March 2024

- The research compared RealESRGAN and SwinIR for single image super-resolution. RealESRGAN consistently outperformed SwinIR in terms of naturalness, as measured by the NIQE score. The study also found that integrating RealESRGAN's degradation algorithm into SwinIR improved its performance.

EDUCATION

Bangladesh University of Engineering and Technology

Dhaka, Bangladesh

Bachelor of Computer Science and Engineering in Computer Science

April 2019 – July 2024

- **Honors:** 3.71 / 4.0 CGPA, Dean's List (2 times)
- **Courses:** Structured and Object-Oriented Programming, Data Structures and Algorithms, Computer Organization and Architecture, Database Management Systems, Software Engineering, Compiler Design, Operating Systems, Computer Networks, Artificial Intelligence, Machine Learning
- **Thesis:** Towards Intelligent Traffic Signaling in Dhaka City Based on Vehicle Detection and Congestion Optimization
- **Activities:** Cricket, Hackathon

CUET School & College

Chittagong, Bangladesh

Higher Secondary School Certificate (HSC) in Science

July 2017 – April 2019

- **Honors:** 5.00 / 5.0 CGPA
- **Courses:** Physics, Chemistry, Mathematics, Biology, English, Bangla, ICT
- **Activities:** Science Olympiad [1st in Regional, 18th in National]

CUET School & College

Chittagong, Bangladesh

Secondary School Certificate (SSC) in Science

July 2015 – April 2017

- **Honors:** 5.00 / 5.0 CGPA, Board Scholarship
- **Courses:** Physics, Chemistry, Mathematics, Biology, English, Bangla
- **Activities:** Math Olympiad [Regional 2nd Runner-Up, National Participation], Physics Olympiad [16th in Regional] Science Olympiad [1st in Regional], Board Scholarship in Junior School Certificate Exam

WORK EXPERIENCE

Pridesys IT Ltd.

Onsite / Dhaka, Bangladesh

Software Engineer II

June 2024 – Present

- **Redesigned** the existing monolithic on-premis ERP system to **cloud based microservices architecture**.
- Automated infrastructure provisioning using **OpenTofu** (i.e. **Terraform**)
- Developed a CI/CD pipeline using **GitHub Actions**, accelerating integration and deployment across multiple microservices.
- Deployed the microservices on **AKS (Azure Kubernetes Service)** and **ACR (Azure Container Registry)** reducing the overall infrastructure cost by 30%.
- Configured Ingress Controller as **load balancer** and **api gateway** for microservices with **NGINX** using internal authentication.
- Designed and implemented a **multi-tenant** architecture for the cloud ERP system.
- Designed REST APIs for the microservices using **OpenAPI** and **Swagger**.
- Developed RestAPI for using **Springboot** and **Hibernate**.

AI Samurai JAPAN Ltd (Chowagiken)

Remote / Tokyo, Japan

Machine Learning Intern

April 2023 – July 2024

- Developed a deep learning pipeline for **background removal** of an object using **instance segmentation** techniques, mostly using **zero-shot models** like **Grounded Dino** and **Segment Anything**.
- Used **RealESRGAN** to increase image resolution.

PROJECTS

xv6-riscv OS [ugrad project]

- Implemented **system calls**, **virtual memory**, and **paging** in the xv6 operating system.

A 'C' compiler from scratch [ugrad project]

- Developed a C compiler from scratch using **Flex**, **Bison**, and **Emu8086**.
- Implemented **Symbol Table**, **Lexical Analyzer**, **Parser**, **Semantic Analyzer**, **Intermediate Code Generator**, **Code Optimizer**, and **Code Generator**.

Shoot the balls, A game developed in C [ugrad project]

- Developed a game in "C" using the "igraphics" library (a beginner-friendly OpenGL wrapper).
- Implemented the "enemy AI", "collision detection", and "scoring system".

Deutsch-Jozsa algorithm

- Implemented the Deutsch-Jozsa algorithm using **Qiskit** and executed the algorithm on **IBM's 5-qubit quantum computer** to showcase its quantum advantage over classical computing.

HONORS AND AWARDS

Second Runner Up - HackTheVerse Hackathon 2023 by DU-IIT

- Developed a Web3 based marketplace for artwork using Solidity, Wagmi, Etherscan, and Hardhat.

Second Runner-Up - Therap Java Fest 2023

- Developed a AI based secured patient document management and sharing platform in **Spring Boot (JAVA)**.

1st Runner-Up - Code Samurai Hackathon 2022

- Developed a Govtment project visualization portal for general public engagement using **React, Node.js, Express, PostgreSQL**.

First Runner-Up - Affine Blockchain Hackathon 2022 by BdOSN

- Developed secured patient document management and sharing platform in web3 using **Solidity, Web3.js, React, IPFS**.

First Runner-Up in Bangladesh, Honorable Mention in International - Blockchain Olympiad 2022

Second Runner-Up - BUET CSE-FEST Hackathon 2022

- Developed a certificated verification platform using **React, Web3.js, Solidity**.

Global Nominee, Local Champion (Dhaka) - NASA Space Apps Challenge 2021

- Developed an android app to track space debris using NASA API.

Global Winner Honorable Mention, Local Champion (Dhaka) - NASA Space Apps Challenge 2020

- Developed an android and web app to track and visualize satellite using NASA API

LEADERSHIP AND ACTIVITIES

Badhan BUET Zone, A Voluntary Blood Management Organization

Dhaka, Bangladesh

President

June 2023 – June 2024

- Led a team of 20 members to and managed 1000+ blood donors from BUET and the surrounding area.
- Developed a blood management app to connect donors with patients in need, increasing donation rates by 20%.
- Collected and distributed fund for flood-affected people in Bangladesh.

EEE Faculty Cricket Team, Inter Faculty Cricket Tournament, BUET

Dhaka, Bangladesh

Captain

November 2023 – January 2024

- Became Runner Up in the Inter Faculty Cricket Tournament, BUET 2024.
- Led the team to victory in the semi-finals against the Civil Engineering Faculty Cricket Team.
- Won Man of the Tournament for scoring the highest runs and taking the most wickets in the tournament.

SKILLS, LANGUAGES, INTERESTS

- **Languages:** Bangla (Native speaker), English (Basic proficiency (2nd language))
- **Programming:** C/C++, Java, Python, Javascript, Dart, Go, SQL, PostgreSQL, Typst, LaTeX
- **Tools:** Git & GitHub, Github Actions, Docker & Kubernetes, Visual Studio Code, Android Studio, Figma, OpenAPI & Swagger, Bruno (API testing), Jira
- **Web Development:** React, Next.js, Node.js, Express, Springboot
- **Mobile Development:** Flutter, Android
- **Databases:** PostgreSQL, Oracle, MongoDB
- **Cloud Computing:** Azure, GCP
- **Machine Learning:** PyTorch, Scikit-learn, OpenCV, YOLO (v8,v9,v10), RTDETR

REFERENCES

- **[Thesis supervisor] Dr. A. B. M. Alim Al Islam**
Professor, Department of Computer Science and Engineering, Bangladesh University of Engineering and Technology
- **[Project supervisor] Dr. Anindya Iqbal**
Professor, Department of Computer Science and Engineering, Bangladesh University of Engineering and Technology
- **[Team Lead] Mahbub Zaman**
Principal Technical Architect, Optum