Md. Muhtashim Shahrier
Email: shahriermuhtashim@gmail.com
GitHub:
LinkedIn: https://www.linkedin.com/in/md-muhtashim-shahrier-9700351b5/

EDUCATION

Bangladesh University of Engineering and Technology (BUET)
Bachelor of Science, Civil Engineering
Feb. 2020 – Mar. 2025
Major in Transportation Engineering, Minor in Structural Engineering
CGPA: 3.96/4.00 (Rank: 5th out of 195 students)

HONORS & AWARDS

Dean's List

- Recognized for outstanding academic performance: Jan 2021, Jan 2022, Jan 2023, Jan 2024

University Merit Scholarship

- Awarded annually for maintaining a top departmental rank based on academic performance in 2020, 2021, 2022, and 2023

International Youth Math Challenge 2023

- Silver Medalist

RESEARCH INTERESTS

AI for Transportation Systems, Public Transit Operations, Urban Mobility, Reinforcement Learning, Game Theory, Emergency Response Optimization, CAVs, Resilient and Equitable Transport Networks

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RESEARCH EXPERIENCE

Undergraduate Thesis
Application of Chaos Theory to Evaluate Pedestrian Behavior Using Deep Learning-Based Video Analytics in Different Diurnal Variations
Supervisor: Dr. Md. Hadiuzzaman
May 2024 – Mar. 2025

- Trained YOLOv8 for road user (Pedestrian, Vehicle etc.) detection in nighttime using custom-annotated data.
- Applied DeepSORT to extract trajectories from surveillance footage.

- Computed Lyapunov Exponents and Approximate Entropy to assess behavioral randomness across day vs. night.
- Aimed to quantify unpredictability in pedestrian motion under visual constraints.

Metadata Analysis of YouTube Comments in Bangladesh
2021 – 2022

- Collaborated on a non-transport project analyzing trends and sentiment in YouTube comment metadata.
- Contributed to early-stage research development despite limited relevance to core field.

PROJECT EXPERIENCE

Capstone Project: Development of a Multifaith Center in Dhaka
Group Leader

- Led interdisciplinary team in planning a multifaith facility combining architecture, transport, and structural analysis.
- Conducted Traffic Impact Assessment (TIA) using four-step model and Level of Service (LOS) analysis.
- Designed pedestrian infrastructure following HCM-based evaluation methods.

Trip Generation Modeling Using Socioeconomic Variables
Course: CE 457 – Urban Transportation Planning and Management

- Built regression models to estimate trip production based on household attributes.
- Identified key predictors (e.g., employment, household size, dwelling type).
- Interpreted R^2 and t-statistics to validate model performance.

Warren Truss Bridge Structural Analysis (MATLAB)

- Simulated different loading conditions using custom MATLAB code.
- Part of CE 206 coursework to build structural computation skills.

PERSONAL PROJECTS

A Spatial Analysis of Transit Coverage and Service Equity in Dhaka's Formal Bus Network *(In Progress)*

- Constructing a GIS-based spatial access model for Dhaka's formal bus network by digitizing routes from government-issued schematics and georeferencing them into a city-wide transport layer.
- Generating transit accessibility heatmaps using buffer-based service catchments, integrating route density and proximity metrics.

- Performing spatial mismatch analysis between population density and transit service levels to classify zones as underserved or overserved.
- Investigating whether underservice resulted from topological limitations in the road network or suboptimal route allocation using overlay and network reachability diagnostics.

Spatiotemporal Simulation of Emergency Dispatch under Uncertain Urban Networks *(In Progress)*

- Engineering a discrete-time simulation on a 10×10 grid representing an urban network with dynamic incident generation, fixed and mobile emergency units, and time-dependent dispatch decisions.
- Modeling edge-level travel time uncertainty using Monte Carlo sampling informed by earthquake-induced z-values and probabilistic road blockages; designing mechanisms to simulate edge failures and rerouting behavior.
- Defining environment components (agents, state space, actions, events, and metrics) to support future integration of reinforcement learning for adaptive dispatch policies, with planned benchmarking of rule-based vs. RL-based methods (e.g., Q-learning, PPO) across metrics such as average response time, incident coverage rate, and system resilience.
- Implementing custom visualizations using Matplotlib to animate time-evolving network states, including unit positions, blocked edges, incident locations, and response trajectories.

Travel Demand Forecasting in a Synthetic 5-Zone City (Four-Step Model)

- Implemented the complete four-step travel demand model: Trip Generation, Trip Distribution, Mode Choice, and Traffic Assignment.
- Developed synthetic socioeconomic data, applied a gravity model for distribution and a multinomial logit model for mode choice.
- Performed all-or-nothing traffic assignment using shortest path algorithm (Dijkstra Algorithm) across a simplified transport network.
- Used Python (pandas, NumPy) for data handling, and custom scripts for model computations, traffic flow mapping, and convergence check

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TECHNICAL SKILLS

- **Programming & Tools:** Python, MATLAB, C++, C, LaTeX, MS Excel, Zotero
- **Libraries & Frameworks:** NumPy, Pandas, Seaborn, scikit-learn, PyTorch, TensorFlow, YOLOv8, DeepSORT
- **Modeling & Simulation:** SUMO (basic), OSMnx, NetworkX
- **GIS & Mapping:** QGIS (learning), Google Earth Engine (basic)
- **Engineering Software:** AutoCAD, ETABS, SAP2000
- **ML & CV:** Object detection, tracking, regression modeling, YOLOv8, Roboflow

ORGANIZATION & LEADERSHIP

Member, Satyen Bose Science Club, BUET
Jan 2023 – Mar 2025

Class Representative, Department of Civil Engineering
Feb 2020 – Jan 2021

- Coordinated academic and administrative activities during transition to online learning.
- Acted as liaison between students and faculty during the pandemic.