

# Md. Muhtashim Shahrier

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## PROFILE

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Transportation engineering graduate from BUET exploring the use of machine learning, optimization and uncertainty modeling to improve urban mobility systems. I believe thoughtful research can create real impact, and I'm specially interested in how intelligent systems can promote equity, resilience, and access in transportation. I enjoy working on interdisciplinary problems and hope to contribute meaningfully to solving real-world challenges through my work.

## EDUCATION

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### Bachelor of Science, Civil Engineering

02/2020 – 03/2025

Bangladesh University of Engineering and Technology (BUET)

Major in Transportation Engineering, Minor in Structural Engineering

CGPA: 3.96/4.00 (Top 5 out of 211 students)

## RESEARCH INTERESTS

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Machine learning for urban mobility, uncertainty-aware modeling of transportation systems, and data-driven optimization and traffic assignment for resilient and equitable transport systems.

## RESEARCH EXPERIENCE

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### Undergraduate Thesis 🔗

*Application of Chaos Theory to Evaluate Pedestrian Behavior Using Deep Learning-Based Video Analytics in Different Diurnal Variations*

**Supervisor:** Dr. Md. Hadiuzzaman

Developed a deep learning and chaos-theoretic framework to evaluate pedestrian behavior across diurnal variations in Bangladeshi traffic; trained a custom YOLOv8 model for nighttime road user detection, applied DeepSORT to extract pedestrian trajectories, and analyzed movement patterns using Lyapunov Exponent and Approximate Entropy to quantify behavioral unpredictability.

## AWARDS

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### Dean's Award

Recognized for outstanding academic performance in each academic year of undergraduate study.

### BUET Academic Merit Scholarship

Awarded for outstanding academic performance in each term of undergraduate study.

### International Youth Math Challenge 2023

Silver Medalist

## ACADEMIC PROJECTS

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### Capstone Project: Multifaith Center Development in Azimpur, Dhaka 🔗

Led a 7-member team in a multidisciplinary capstone project for the development of a Multifaith Center. Conducted feasibility studies, detailed architectural and structural design, environmental and cost assessments, and performed a Traffic Impact Assessment using ITE trip generation methods, Highway Capacity Manual (HCM) based LOS analysis, and pedestrian flow modeling.

### Trip Generation Modeling (Term Project)

Modeled student trip generation in Dhaka using linear regression; performed data preprocessing, variable selection, and evaluation with Python and Excel.

### Warren Truss Bridge Analysis (MATLAB Term Project)

Simulated Warren truss under moving loads using custom MATLAB code; visualized tension/compression forces and solved internal forces via matrix methods.

## INDEPENDENT PROJECTS

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### Synthetic Four-Step Travel Demand Modeling in Python

Built a custom Python-based four-step travel demand model for a synthetic city, implementing all components from scratch without simulation tools to reinforce transportation planning concepts.

### Bus Route Access Heatmap of Dhaka

Developed a GIS-based heatmap of Dhaka's bus service coverage by scraping route data, geocoding stops, clustering services, and overlaying population density to identify underserved areas.

### Facility Location Optimization on a Synthetic Grid Using Monte Carlo Simulation

Implemented a Monte Carlo simulation on a 5x5 grid with random demand points and uncertain travel times to identify robust facility locations, using custom Python code without specialized optimization tools.

### Road Segment Importance Prediction with Graph Neural Networks (GNNs)

Built a full GNN pipeline to classify road segment importance in the Dhaka road network (~250k edges) using OpenStreetMap data. Engineered structural features, assigned multi-class labels from highway tags, and trained both MLP and GCN (GCNConv) models using PyTorch Geometric.

## TECHNICAL SKILLS

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- **Programming Languages & Tools:** Python, MATLAB, C++, C
- **Data Science & ML Libraries:** NumPy, Pandas, Roboflow
- **Computer Vision & Deep Learning:** YOLOv8, DeepSORT, OpenCV
- **Modeling & Simulation:** OSMnx, NetworkX
- **Geospatial & Engineering Software:** QGIS, AutoCAD, ETABS, SAP2000

## ORGANIZATIONAL & LEADERSHIP ACTIVITIES

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### Member

01/2023 – 03/2025

*Satyen Bose Science Club, BUET*

### Class Representative

02/2020 – 01/2021

*Department of Civil Engineering, BUET*

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