

# SYEDA TAMZIDA AKTER

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## RESEARCH INTEREST

- AI for Urban Mobility and Transportation Systems
- Smart Infrastructure and Disaster Resilience
- Predictive Maintenance and Structural Monitoring
- Intelligent Transportation Systems (ITS)

## EDUCATION

### CHITTAGONG UNIVERSITY OF ENGINEERING AND TECHNOLOGY

2020-2025

B.Sc in Civil Engineering

Thesis: Multimodal Corrosion Prediction in Reinforced Concrete Structures

Advisor: [Dr. Bipul Chandra Mondal](#), Professor, Department of CE, CUET

Average CGPA: 3.16 out of 4.00 ( Last Semester: 3.50 / 4.00)

GRE and TOEFL: scheduled to take in October

## TECHNICAL SKILLS

**Transportation Engineering:** SUMO, VISSIM, SIDRA

**Geospatial Analysis:** ArcGIS Pro

**Programming and Statistical Analysis:** Python, R-studio

**Structural :** Ansys, ABAQUS, ETABS, SHAP 2000

**General :** MS Office, Auto CAD, SKETCHUP

**Libraries:** Pytorch, Tensorflow, Keras, OpenCV

## CONFERENCE PAPERS AND PRESENTATIONS

### CO<sub>2</sub> Emission Prediction at the Tigerpass Intersection Using Drone Footage, SUMO Simulation, and Interpretable Machine Learning

**Authors:** [Syeda Tamzida Akter](#), [Sayed Shahriar Islam Lamun](#)

Keywords: CO<sub>2</sub> emission prediction, SHAP, SUMO simulation, machine learning regression, drone-based traffic monitoring

7th International Conference on Electrical Information and Communication Technology (EICT 2025)

Resources: [\[Paper\]](#)

### Explainable Machine Learning for Understanding Trip Mode Choice: Evidence from the 2022 U.S. National Household Travel Survey

**Authors:** [Mahbub Hassan](#), [Syeda Tamzida Akter](#), [Sayed Shahriar Islam Lamun](#), [Touhid Bhuiyan](#), [Md Maruf Hassan](#)

Keywords: Travel Mode Choice, Public Transport, Private Transport, Machine Learning, KNN, XGBoost, Random Forest, SHAP

IEEE International Conference on Artificial Intelligence in Engineering and Technology (IICAET 2025)

Resources: [\[Paper\]](#)

### Explaining Household Access to Heavy Rail Services Using Interpretable Machine Learning: Evidence from the 2022 U.S. National Household Travel Survey

**Authors:** [Syeda Tamzida Akter](#), [Sayed Shahriar Islam Lamun](#)

Keywords: Machine learning, Transportation planning, SHAP, Public transportation, Travel behavior

IEEE International Conference on Signal Processing, Information, Communication and Systems 2025 (SPICSCON 2025)

Resources: [\[Paper\]](#)

### ChatInSi: A Data-Driven Approach for Integrating Large Language Models with Real-Time Traffic Incident Data

**Authors:** [Mahbub Hassan](#), [Md Emtiaz Kabir](#), [Syeda Tamzida Akter](#), [Urmila Bhanja](#), [Monalisa Nayak](#)

Keywords: Artificial Intelligence, Large Language Models, Real-Time Traffic Data, Semantic Search, Intelligent Transportation Systems.

16th ICCNT 2025: 16th International IEEE Conference on Computing Communication and Networking Technologies

Resources: [\[Paper\]](#)

### Online Delivery Adoption in the U.S. During COVID-19: A Machine Learning Approach Using NHTS 2022

**Authors:** [Arpita Paul](#), [Abdullah Al Nafees](#), [Mahbub Hassan](#), [Syeda Tamzida Akter](#), [Urmila Bhanja](#), [Monalisa Nayak](#)

Keywords: COVID-19, NHTS 2022, consumer behavior, home delivery, machine learning.

16th ICCNT 2025: 16th International IEEE Conference on Computing Communication and Networking Technologies

Resources: [\[Paper\]](#)

### **Analyzing Public Transit Service Patterns Using GTFS Data: A Machine Learning Approach**

**Authors:** Mahbub Hassan, Md. Emtiaz Kabir, [Syeda Tamzida Akter](#), Urmila Bhanja, Monalisa Nayak, Debapriya Parida

**Keywords:** GTFS, Public transit, unsupervised learning, machine learning, sustainable transportation.

**16th ICCCNT 2025:** 16th International IEEE Conference on Computing Communication and Networking Technologies

Resources: [\[Paper\]](#)

### **Analyzing Vehicle Emissions and Mitigation Strategies in Chittagong City Using SIDRA**

**Authors:** Farhana Mehjabin, [Syeda Tamzida Akter](#), Samia Shafique, Mahbub Hassan

**Keywords:** Vehicle emission, SIDRA, Roundabout, Urban Mobility

**8th International Conference on Engineering Research, Innovation and Education (ICERIE 2025)**

Resources: [\[Paper\]](#)

### **Spatio-Temporal Analysis of Accident Blackspots in Melbourne, Australia Using DBSCAN Clustering**

**Authors:** [Syeda Tamzida Akter](#), Sayed Shahriar Islam Lamun, Kamol Debnath Dip

**Keywords:** Spatio-temporal analysis, Accident blackspots, Road crash data, GIS, DBSCAN clustering

**16th ICCCNT 2025:** 16th International IEEE Conference on Computing Communication and Networking Technologies

Resources: [\[Paper\]](#)

### **Evaluation of Concrete Strength by Using Fly Ash and Brick Kiln Ash as a Partial Replacement for Cement**

**Authors:** [Syeda Tamzida Akter](#), Debashish Biswas, Aprita Debnath, Md. Basir Zisan

**Keywords:** Brick Kiln Ash, Fly Ash, Finite Element Analysis, Sustainable Material, ANSYS, Compressive Strength

**8th International Conference on Engineering Research, Innovation and Education (ICERIE 2025)**

Resources: [\[Paper\]](#)

## **UNDER REVIEW SUBMISSIONS**

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### **Applications of IoT in Intelligent Transportation Systems:**

#### **Research landscape, technological innovations, challenges, and future opportunities**

Spring 2025 – Present

**Keywords:** Artificial Intelligence, Bibliometric analysis, Cybersecurity, Digital twins, Internet of Things (IoT), Intelligent Transportation Systems (ITS)

**Status:** Under review at Internet of Things

Resources: [\[Paper\]](#)

- IoT-driven ITS enhance transportation networks with real-time data and predictive analytics. This study provides a bibliometric analysis of research growth and global collaboration in IoT-ITS.
- The study analyzes 574 Scopus-indexed publications (2011–2024) to assess research trends, global collaborations, and key challenges in IoT-ITS, with a focus on AI, blockchain, edge computing, and 5G/6G-V2X connectivity.
- The study highlights rapid research growth in AI, blockchain, edge computing, and 5G/6G-V2X connectivity, while facing challenges in cybersecurity, interoperability, and governance. Future work should tackle these issues and expand insights through more databases and case studies.

### **Machine Learning in Travel Mode Choice Studies:**

#### **A Systematic Literature Review of Applications, Methods, and Challenges**

Spring 2025 – Present

**Keywords:** Travel Mode Choice, Machine Learning, Transport Modeling, Behavior Prediction, Reinforcement Learning, Smart Mobility

**Status:** Under review at Result in Engineering

Resources: [\[Paper\]](#)

- To systematically review and synthesize recent applications of machine learning in travel mode choice modeling, focusing on their methodological approaches, predictive performance, and behavioral implications.
- To evaluate the strengths and limitations of machine learning techniques including feature engineering, model optimization, interpretability, and reproducibility in comparison to traditional discrete choice models.
- To identify research gaps and propose future directions aimed at enhancing behavioral realism, model transparency, and scientific rigor in travel behavior prediction.

## ONGOING RESEARCH

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### AI-Driven EV Flow Pattern Prediction for Traffic Optimization in Washington State

Fall 2025 – Present

Keywords: Electric Vehicles (EVs), EV Flow Prediction, Battery Efficiency, Charging Networks, EV Stop Time Reduction

Status: Ongoing

- Proposes an AI-powered model to predict EV flow and optimize traffic signal timing.
- Utilizes ML algorithms and real-world data (WSDOT, charging networks, traffic volume).
- Adaptive signal control reduces EV stop times by 20% and lowers energy consumption.
- Contributes to sustainable urban mobility through improved traffic efficiency.

### Hybrid Approach: Combining Finite Element Analysis (FEA) with Machine Learning for Earthquake Damage Prediction

Spring 2025 – Present

Keywords: Earthquake damage prediction, Hybrid FEA + ML, Structural response

Status: Ongoing

- Proposes a hybrid approach combining Finite Element Analysis (FEA) and Machine Learning to improve earthquake damage prediction.
- Synthetic data from FEA simulations (SAP2000) and real earthquake data are used to train ML models like XGBoost and Neural Networks.
- Physics-Informed Neural Networks (PINNs) ensure predictions respect structural laws and physical constraints.
- Enables real-time applications such as Earthquake Early Warning Systems and smart infrastructure retrofitting.

### Multimodal Corrosion Prediction in Reinforced Concrete using Surface Roughness from Image, Resistivity and Half Cell Data

Fall 2024 – Spring 2025

Keywords: Surface Roughness, Concrete Resistivity, Half-Cell Potential, Corrosion Percentage, Corrosion Percentage, Sobel Edge Detection, OpenCV, Scikit-learn, Structural Health Monitoring (SHM).

Resources: [\[Thesis Book\]](#)

- Surface Roughness Extraction: The project extracts surface roughness from concrete images using Sobel edge detection, influencing corrosion rates.
- Model Training: A Random Forest Regressor is trained on Surface Roughness, Concrete Resistivity, and Half-Cell Potential to predict corrosion percentage.
- Corrosion Prediction from Image: The model predicts corrosion percentage from a new image by extracting surface roughness and using predefined values for Surface Resistivity and Half-Cell Potential.
- Application: The model offers a non-destructive method to assess steel corrosion in concrete structures for health monitoring and predictive maintenance.

## EXTRA CURRICULAR ACTIVITIES

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### Flood Resistant Modular House Using Autoclaved Aerated Concrete

June 2022

My team, FRAAC, was the champion of the ACI Intra-CUET Concrete Solutions Competition 2022 and represented our university globally. We also placed 11th in the global ACI Concrete Solutions Competition, proudly showcasing our work on the world stage

Resources: [\[Presentation\]](#)

### Eco-concrete Solution

September 2022

In 2022, my team Concretologers earned 4th place in the ACI Intra Eco-Concrete Competition. We designed an eco-friendly concrete mix using Portland cement, silica fume and coal fly ash. Our mix achieved 30.2 years of durability, 2.54 times that of the base mix, while reducing environmental impact by 16.1%, verified with Life 365 Software.

Resources: [\[Report\]](#)

### Fire Resistant Inflatable Concrete Dome House Using Concrete Canvas

April 2023

My team Mockingbird secured third place in the National Concrete Idea Competition with our innovative solution of fire-resistant inflatable concrete dome houses made from Concrete Canvas. This design addresses the critical challenges facing slum dwellers in Dhaka, including frequent fire accidents, economic instability, and the lack of durable and portable building materials.

Resources: [\[Presentation\]](#)

### 24h Concrete Cube Competition

March 2023

Became a finalist in the 24h Concrete Cube Competition and received the award for the most innovative mix design.

Resources: [\[Report\]](#)

## Co-Founder of TWO MIN CIVIL ENGINEERING

January 2023

A YouTube channel dedicated to delivering concise, easy-to-understand explanations of civil engineering concepts, bridging the gap between theory and practice.

Resources: [\[Link\]](#)

## ENGINEERING PROJECTS

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### Accident Risk Prediction in Melbourne, Australia

June 2025

- \* Analyzed Victoria Road Crash Dataset to identify accident patterns.
- \* Developed chatbot for real-time warnings on high-risk zones.).
- \* Provided safety insights (severity, fatalities, crash types) and personalized driving recommendations.

Resources: [\[Chatbot\]](#)

### ML-Driven Chatbot for Concrete Corrosion Prediction

April 2025

- \* Applied ML and image processing to predict corrosion in reinforced concrete.
- \* Developed a software tool enabling engineers to input field data and get real-time corrosion risk predictions.).
- \* Supported infrastructure maintenance planning and long-term durability forecasting.

Resources: [\[Corrosion Prediction\]](#)

### Structural Design of a Residential Building

May 2024

As part of our final semester course Structural Engineering & Sessional-III (CE-412), we gained valuable hands-on experience in structural design and analysis.

- \* Software Skills: Learned to model and analyze structures using ETABS.
- \* Project Work: Designed a residential building for Pink City, Chattogram, considering real-world loads, materials, and safety factors.).
- \* Practical Application: Applied structural engineering principles to ensure the design was both safe and efficient.
- \* Technical Detailing: Prepared supporting drawings and details using AutoCAD.

Resources: [\[Report-1\]](#), [\[Report-2\]](#)

## AWARDS

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- **ACI Intra Concrete Solutions Competition 2022**, Champion
- **ACI Concrete Solutions Competition 2022**, 11th position internationally
- **ECO concrete 2022**, 4th in intra CUET
- **National Concrete idea competition**, 3rd in nationwide
- **24h Concrete Cube Competition**, Most innovative concrete mix design.

## REFERENCE

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- [Dr. Md. Basir Zisan](#)  
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