

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 Health Monitoring
- Intelligent Transportation Systems (ITS).

EDUCATION

Bachelor of Science in Civil Engineering

Chittagong University of Engineering and Technology

January 2019 – Present
Chittagong, Bangladesh

Thesis: Multimodal Corrosion Prediction in Reinforced Concrete Structures

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

Average CGPA: 3.16 out of 4.00

Last Semester CGPA: 3.5 out of 4.00

GRE and TOEFL: scheduled to take in October

ACCEPTED PUBLICATIONS

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 ICCCNT 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 ICCCNT 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 and 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 and Md. Basir Zisan

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

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

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

**Applications of IoT in Intelligent Transportation Systems:
A Comprehensive Bibliometric Analysis and Review of Trends, Challenges, and Future Research.**

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 Intelligent Transportation Systems (ITS) have transformed transportation networks with real-time data processing and predictive analytics. This study addresses the need for a bibliometric analysis to map the growing research in IoT-ITS and the emerging global collaboration in related technologies.
- The study has been conducted on 574 publications indexed in Scopus (2011–2024) to evaluate research trends, global collaborations, technological convergence, and key challenges in IoT-ITS, focusing on AI, blockchain, edge computing, and 5G/6G-V2X connectivity.
- The study shows a rapid increase in research, driven by AI, blockchain, edge computing, and 5G/6G-V2X connectivity. Despite advancements, challenges such as cybersecurity vulnerabilities, interoperability issues, and the need for adaptive governance models remain. Future research should focus on addressing these barriers and expanding bibliometric insights through additional databases and empirical 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.

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

Spring 2025 – Present

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

Status: Submitted to International Conference on Multidisciplinary Computer Science, Electrical, Business Literature (ICMCEL 2025).

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

- Predict household access to heavy rail services based on a range of socio-demographic, vehicular, and location-specific variables within Metropolitan Statistical Areas (MSAs).
- Compare the performance of different supervised learning algorithms, including Random Forest (RF), Support Vector Machine (SVM), K-Nearest Neighbors (KNN), and Extreme Gradient Boosting (XGBoost), in terms of their ability to predict heavy rail access accurately.
- Use the SHapley Additive exPlanations (SHAP) methodology to identify and explain the most influential factors affecting household access to heavy rail, including urban density, proximity to rail stations, and household vehicle availability.

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

Spring 2025 – Present

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

Status: Submitted to IICAET 2025 (IEEE International Conference on Artificial Intelligence in Engineering and Technology, 2025)

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

- To evaluate and compare the performance of three machine learning algorithms Random Forest, XGBoost, and k-Nearest Neighbors in predicting binary travel mode choice (public vs. private transport) using various dataset splits, and assess their predictive accuracy and robustness.
- To apply SHAP (Shapley Additive Explanations) for interpreting the machine learning models, identifying key factors influencing travel mode choice, and enhancing the transparency and practical utility of these models for data-driven, equitable urban transportation planning.

CO₂ Emission Prediction at the Tigerpass Intersection Using Drone Footage, SUMO Simulation, and Interpretable Machine Learning

Keywords: CO₂ emission prediction, SHAP, SUMO simulation, machine learning regression, drone-based traffic monitoring

Status: 7th International Conference on Electrical Information and Communication Technology

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

- Extract detailed vehicle trajectory data from drone footage during peak traffic periods and develop a SUMO-based microsimulation to replicate observed conditions and estimate emissions.
- Train and compare Random Forest, XGBoost, and SVR models for CO₂ emission prediction using simulated data.
- Interpret feature importance using SHAP analysis applied to the best-performing Random Forest model.

ONGOING RESEARCH PAPERS

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

Spring 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.

AWARDS AND HONORS

- **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

TECHNICAL SKILLS

Languages: Python, R-studio

Libraries: Pytorch, Tensorflow, Keras, OpenCV

Developer Tools: Ansys, HEC-HMS, ABAQUS, ETABS, SIDRA, VISSIM, AUTOCAD, SKETCHUP, SHAP 2000, ArcGIS Pro, SUMO.

REFERENCE

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