

Postgraduate Seminar Series

Venue: Graduate Seminar Room

Date & Time: September 12, 2026 at 3:30 PM

Speaker Information

A M Zoraf (Std No. 1018052050) is a part time M.Sc. student in the department of CSE, BUET. She completed his undergraduate studies from Bangladesh University of Engineering and Technology (BUET) in 2016. His research interest lies in the field(s) of Machine Learning and Deep Learning. He is currently doing her postgraduate thesis under the supervision of Dr. A. B. M. Alim Al Islam. He will be speaking about his ongoing research in this talk.



SATELLITE IMAGE BASED PREDICTION OF THE WATER QUALITY OF RIVERS AROUND DHAKA CITY

Surface water pollution in Bangladesh's rivers poses a critical environmental issue due to rapid industrialization, urbanization, and the unregulated use of fertilizers and insecticides. This is particularly important for the rivers around Dhaka city, including the Buriganga, Turag, Balu, etc. As such, monitoring the quality of the surface water in these rivers has become necessary to support effective water resource management. However, traditional in situ methods for monitoring the quality of surface water are generally expensive, slow, and have limited spatial and temporal coverage. This study investigates whether satellite-based remote sensing and machine learning can provide a more efficient, scalable, and repeatable approach to monitoring and predicting surface water quality.

The research will combine satellite observations from Sentinel-2, MODIS, and Landsat with water-quality measurements collected from authoritative sources at 135 locations across 12 rivers and canals surrounding Dhaka city. Different satellite-derived indices and spectral attributes, including NDWI, MNDWI, NDVI, Turbidity_RG, NDCI, FAI, NDMI, WRI, B5/B4 Ratio, Blue/Green Ratio, and temperature, will be examined to understand their relationships alongside measured water-quality parameters. To identify the most important features, the study will explore several feature ranking methods (i.e., XGBoost, SHAP, and correlation analysis) and feature selection methods (i.e., K-needle/Elbow, Probe-Feature, and RFE). These methods support isolating the attributes with the strongest predictive power for surface water quality. The selected features will then be used to evaluate a range of machine learning and deep learning models, including XGBoost, Random Forest, AdaBoost, CatBoost, LSTM, CNN, ConvLSTM, and STF-GNN. Each model is chosen for its capacity to capture diverse types of relationships in the data: ensemble methods such as XGBoost and Random Forest are effective for tabular and non-linear data, while deep learning models such as LSTM, CNN, and ConvLSTM are suitable for sequential and spatio-temporal modeling typical of remote sensing observations.

The study concentrates on predicting 12 key water-quality parameters: BOD, COD, pH, DO, turbidity, EC, phosphate, TDS, ammonia, TSS, temperature, and TC. By combining satellite observations with model-based predictive systems, this research intends to identify reliable approaches to assessing river water quality around Dhaka city.