

Md Moynul Hasan

[Mail](#) | [Website](#) | [LinkedIn](#) | [GitHub](#) | [Kaggle](#)

Research & Work Experience

Graduate Teaching Assistant (Part-Time)

[Jan, 24 – Present]

The University of Toledo

Department of Engineering Technology

- Engaged in grading homework assignments for courses ENGT 2500 & ENGT 3600.

Research Assistant (Full-Time)

[Oct, 22 – Jul, 23]

Bangladesh University of Engineering & Technology (BUET)

Department of Naval Architecture & Marine Engineering (NAME)

- Analyzed the effect of wedge tail thickness on NACA 0021 airfoil performance, revealing that 12.5% chord length wedge tail increased lift coefficients by 60-100%.
- Predicted scantling requirements for cargo and container ships across various classification societies using ANN, achieving an impressive R^2 value of 0.998.
- Developed MHP network for 125x faster wedge tail airfoil aerodynamics predictions.

Undergraduate Research Work

[Apr, 21 – May, 22]

Thesis Title: "*Predicting Aerodynamic Characteristics of Airfoils Using Artificial Neural Network*"

- Used ANN to predict lift coefficient (C_L) and drag coefficient (C_D) of five NACA airfoils.
- Achieved high prediction accuracy with $RMSE < 0.12$ for C_L and < 0.025 for C_D .
- Validated results using RANS-CFD simulations and experimental data, demonstrating agreement in stall shape and aerodynamic characteristics at angle of attacks ranging from 0° to 30° .

Machine Learning Engineer Intern

[Aug, 21 – Oct, 21]

Animo.Ai

- Conducted Principal Component Analysis (PCA) and T-distributed Stochastic Neighbor Embedding (t-SNE) on datasets to extract relevant features and visualize data patterns.
- Conducted time series analysis on datasets using machine learning algorithms.
- Applied techniques such as auto-regressive integrated moving average (ARIMA), long short-term memory (LSTM), and other models to make time series predictions.

Publications

- Md. Moynul Hasan**, Md. Mashiur Rahaman and N. M. Golam Zakaria. "Fast aerodynamics prediction of wedge tail airfoils using multi-head perceptron network", Arabian Journal for Science and Engineering, 2023. DOI: <https://doi.org/10.1007/s13369-023-08686-9>
 - Developed an MHP network method to predict the aerodynamics of wedge tail airfoils
 - Achieved high prediction accuracy with R^2 score close to 1 on test data
 - Significantly improved prediction speed by 125 times compared to conventional computational fluid dynamics (CFD) techniques
- Md. Moynul Hasan**, Md. Mashiur Rahaman and N. M. Golam Zakaria. "The Effects of Wedge Tail Thickness on NACA 0021 Airfoil Performance", Journal of Maritime Research (JMR), 2023.
 - Analyzed effects of wedge tail thickness on NACA 0021 airfoil performance through two-dimensional RANS-CFD simulations using ANSYS
 - Determined the highest C_L increase (60% ~ 100%) for a 12.5% wedge tail thickness
- Md. Moynul Hasan**, Mohammad Fahim Faisal, Md. Mashiur Rahaman and N.M. Golam Zakaria. "Predicting Aerodynamic Characteristics of Airfoils Using Artificial Neural Network", Journal of Aerospace Engineering, 2022. **(Under Review)**
 - Developed an ANN-based method to predict the aerodynamic characteristics of airfoils, including NACA 0012, NACA 0015, NACA 0018, NACA 0021, and NACA 0025
 - Trained the ANN model to achieve an $RMSE$ of less than 0.12 for C_L and 0.025 for C_D
- Md. Latifur Rahman, Nusrat Binta Nizam, Prasun Datta, **Md. Moynul Hasan**, Taufiq Hasan, and Mohammed Imamul Hassan Bhuiyan. "A Wavelet-CNN Feature Fusion Approach for Detecting COVID-19 from Chest Radiographs". In Proceedings of the 11th International Conference on Electrical and Computer Engineering (ICECE), 2020. DOI: <https://doi.org/10.1109/ICECE51571.2020.9393085>
 - Proposed an automatic chest x-ray image classification model for detecting COVID-19
 - SVM classifier achieved high accuracy (97.73%), sensitivity (97.84%), specificity (97.73%), F1 score (97.73%), and precision (98.79%) with a wavelet and MobileNetV2 feature

Education

1. MS in Mechanical Engineering [Jan, 24 – Present]
The University of Toledo
2. BSc in Naval Architecture & Marine Engineering (NAME) [Feb, 17 – Aug, 22]
Bangladesh University of Engineering & Technology (BUET)

Projects

Title: Ship Scantling requirements prediction [Oct, 22 – Present]

- Developed an Artificial Neural Network (ANN) model to predict structural strength requirements for cargo & container vessels using ships' rule length, breadth, and draft.
- Predicted scantling requirements for cargo and container ships across various classification societies using ANN, achieving an impressive R^2 value of 0.998.
- Improved the speed compared to the empirical formula used by classification societies.

Title: Speaker Recognition System [Jun, 22 – Jul, 22]

- Generated a voice record dataset to train a machine learning model.
- Achieved almost 99% accuracy in speaker recognition with the trained model.

Title: Design of a General Cargo Ship Of 2500 Tonnes Cargo Capacity [Jul, 19 – Dec, 20]

- Designed a 2500-tonne general cargo ship for Dhaka-Chittagong-Dhaka route.
- Carried out the structural calculations and constructed different structural plans for construction.
- Performed Hydrostatic calculation, Scantling, Tank capacity calculation.
- Submitted the project to the Department of Naval Architecture & Marine Engineering, BUET as a requirement for the Ship Design Project and Presentation course.

Title: Obogoto: An app to inform about COVID-19 [Mar, 20 – Mar, 20]

- Participated in the Obogoto app project promoting COVID-19 awareness in Bangladesh.
- Contributed to data collection and data analysis tasks for the project.

Industrial Training

Industrial Trainee, Khulna Shipyard Ltd [Jan, 20 – Feb, 20]

- Gained comprehensive experience in industrial practices, including engineering project management, product fabrication, shipbuilding techniques, and ship-repairing processes.

Technical Skills

- **Engineering software:** AutoCAD, Rhinoceros 3D, ANSYS, OpenFoam
- **Languages:** Python, MATLAB, C++, Fortran
- **ML library:** TensorFlow, Keras, Scikit-learn, OpenCV
- **Data analysis:** NumPy, Pandas, MS Excel
- **Data visualization:** Matplotlib, Seaborn, OriginPro, Paraview, Tecplot
- **Writing:** LaTeX, MS Word

Test Scores

GRE		Quantitative	Verbal	AWA	
Score		161	143	3.0	
TOEFL^{IBT}	Total	Reading	Listening	Speaking	Writing
Score	96	23	27	20	26

Online Courses

- Machine Learning DeepLearning.AI
- Deep Learning Specialization DeepLearning.AI
- TensorFlow Developer Professional Certificate DeepLearning.AI
- A Hands-on Introduction to Engineering Simulations CornellX
- MATLAB and Octave for Beginners EPFLx