

Masrur Hasan

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 [Linkedin](#)  [Github\(Portfolio\)](#)

PROFILE

Mechanical engineering graduate (MIST) specializing in physics-informed machine learning and computational topology optimization for additive manufacturing. Research experience spans SIMP-based structural optimization, finite element analysis, and graph/CNN-based surrogate modeling, with both manuscript submitted. Seeking a research-intensive postgraduate program (MRes/PhD or CDT) to develop physics-informed ML methods for engineering design and manufacturing.

EDUCATION

Military Institute of Science and Technology (MIST) **July 2022 – July 2026**
Bachelor of Science, Mechanical Engineering *Dhaka, Bangladesh*

- **GPA: 3.76 / 4.0**
- **Awards:** Dean's List Award (2022 & 2026)

St. Joseph Higher Secondary School **July 2021**
Higher Secondary Certificate (HSC), Science *Dhaka, Bangladesh*

- **GPA: 5.00 / 5.00**

Monipur High School and College **Feb 2019**
Secondary School Certificate (SSC), Science *Dhaka, Bangladesh*

- **GPA: 5.00 / 5.00**

PUBLICATIONS & CONFERENCES

Hasan, M., Shahid, S. T., & Helal, M. A. B. (2026). *A Workflow for Stress-Aware Topology Optimization and Fabrication of Lattice Structures by Additive Manufacturing*. SSRN Electronic Journal. DOI: 10.2139/ssrn.6248518.

- Presented at 15th International Conference on Mechanical Engineering (ICME 2025).
- Available on SSRN as a citable preprint with DOI.

RESEARCH EXPERIENCE

Undergraduate Thesis: Topology Optimization through an Integrated Computational Pipeline for Additive Manufacturing

Military Institute of Science and Technology (MIST), **2025–2026**

- Developed a Python-based workflow integrating stress-aware topology optimization, lattice generation, and additive manufacturing toolpath preparation
- Implemented k-d tree nearest-neighbor interpolation for variable-thickness lattice generation from non-uniform density fields.

MANUSCRIPTS

Architecture-Dependent Mechanical Response and Voxel-FEA Calibration in Topology-Optimised FDM Structures — submitted to Advances in Materials Science and Engineering (Wiley), August 2026

- Developed a novel orientation-dependent penalty integrated into SIMP compliance sensitivity, discouraging steep unsupported overhangs to improve AM manufacturability without a separate post-processing step
- Formulated a multi-load-case optimization (dominant axial + minor lateral loading) to drive branching, self-supporting internal architectures

Physics-Informed Graph Neural Networks vs. U-Net Architectures for Topology Optimization — submitted to Engineering Reports (Wiley), August 2026

- Comparative study evaluating whether physics-informed loss terms benefit graph-based vs. grid-based surrogate models for structural topology optimization
- Conducted rigorous ablation studies and corrected statistical methodology (instance-level significance testing) to ensure robust, reproducible conclusions

TECHNICAL & MACHINE LEARNING PROJECTS

Computer Vision: Drone Human & Car Detection | [Drone-Object-Detection](#)

- Built a YOLO11-based computer vision pipeline for aerial drone imagery to detect and count humans and vehicles
- Integrated ByteTrack for video object tracking and optimized model inference for high-density aerial environments.

NLP: Bangla Fake News Detection | [Bangla-Fake-News-Detection](#)

- Developed an end-to-end NLP system for detecting fake news in Bengali text using TF-IDF and Linear SVM. (Completed as part of the ML Zoomcamp).
- Built a production-ready REST API using FastAPI, containerized with Docker, and deployed via Kubernetes.

Predictive Modeling: Heart Disease Prediction | [Heart-Disease-Prediction](#)

- Built an end-to-end ML pipeline (Random Forest) to predict heart disease risk based on clinical features.
- Deployed the model as a cloud-hosted Flask REST API via Render, complete with reproducible training scripts. (Completed as part of the ML Zoomcamp).

Robotics: Autonomous Object-Avoiding Robot | [Autonomous-Obstacle-Avoiding-Robot](#) Nov 2024

- Designed and programmed an autonomous robot using Arduino and ultrasonic sensors for real-time path correction and environment mapping.

Mechanical Design: Wooden Planetary Gear System | [Wooden-Planetary-Gear](#) Nov 2023

- Machined and assembled a functional wooden planetary gear system with my team using CNC, lathe tools, drilling and other cutting tools.

PROFESSIONAL EXPERIENCE

ASHRAE MIST Student Branch

Dhaka, Bangladesh

Chair (2025–2026) & Co-Chair (2024–2025), Research and Promotion Committee

- Directed a 4-member committee to advance technical research, innovation, and sustainable engineering practices within the MIST student community.
- Mentored and provided strategic direction to final-year students, guiding them to pursue and successfully develop thesis projects in the HVAC&R sector.
- Organized and led research-focused campaigns, fostering technical development and engagement among student members.

Industrial Attachment

May 2025 – June 2025

BanglaCAT Workshop

Ashulia, Savar, Bangladesh

Supervised by Zahid Hasan Shuvo

- Facilitated operations in engine servicing and mechanical systems.
- Executed product support and service procedures utilizing industrial maintenance tools.
- Analyzed mechanical components used in industrial equipment to enhance practical understanding of heavy machinery.

TECHNICAL SKILLS

- **Programming & Tools:** Python, MATLAB, C++, SQL, Git, Docker, Kubernetes, Render (Cloud)
- **Machine Learning:** Scikit-learn, YOLO11, CNNs, GNNs, FastAPI, Flask, Hyperparameter Tuning
- **Engineering & Simulation:** SOLIDWORKS, CFD, CNC, CAD, FEA

CERTIFICATIONS & AWARDS

Machine Learning Specialization – DeepLearning.AI, Stanford University (Coursera)

Issued: Jan 2025 | Credential ID: MXRLEE7DIY12

HVAC Quiz Competition Winner – ASHRAE MIST Student Branch

Issued: Dec 2024

REFERENCES

Available upon request