ARAFAT AHMED

Linkedin GrabCAD ArafatAhmed@iut-dhaka.edu

Professional Experience

Research and Innovation Engineer Sep 2024 – Present

Walton Hi-Tech Industries PLC, Gazipur, Bangladesh

- Contributing to the Design & Advanced Research division with focus on vibro-acoustic development of hermetic reciprocating compressors
- Performing detailed structural dynamics and acoustic evaluations, including harmonic response analysis, modal analysis, and FFT-based noise characterization
- Conducting CFD–FEA coupled studies for suction muffler design and flow-acoustic optimization to enhance noise control performance
- Applying GD&T and dimensional tolerance analysis to identify potential failure risks, incorporating process capability indices (C_p, C_{pk}) to assess manufacturing variability and ensure structural reliability
- Collaborating with cross-functional teams including design, manufacturing, testing, and quality engineering to drive data-informed design decisions and noise-reduction strategies

Research

Optimization of Clamp Numbers and Positions to Mitigate Flow-Induced Vibration in High-Speed Fluid Flow Through a Pipe Elbow, *IMECE2025*, Memphis, TN, USA, 2025. Accepted for presentation and publication.

- Conducted detailed study on mitigating flow-induced vibration (FIV) in pipelines through optimal clamping positions and numbers using Ansys Workbench for CFD and FEA
- Validated simulation methodology through sensitivity analysis and comparisons with existing literature, ensuring reliability and accuracy of the process
- Performed one-way Fluid-Structure Interaction (FSI) analysis to evaluate and optimize clamping configurations for various flow rates
- Utilized Fast Fourier Transform (FFT) for vibrational analysis to identify and minimize pipeline vibrations effectively

Optimizing Thermal Energy Storage: Enhanced ORC and Heat Pump Systems for Improved Efficiency — *70% Work done, submission due*

- Conducted comparative analysis of three heat pump and five ORC configurations to optimize thermal energy storage systems
- Utilized Python for mathematical modeling and validation against existing journal data
- Identified Flash Tank and Closed Feed Organic Heater (CFOH) configurations as optimal for improved system efficiency

Projects

Project Altair - Robotic Vehicle Development — *Lead - Mechanical Team* Apr. 2023 - Jun. 2024

- Led mechanical team in design and fabrication of competition-grade robotic vehicles for international rover challenges
- Conducted comprehensive market research to identify optimal components, materials, and resources within budget constraints
- Managed project timeline and task delegation across mechanical sub-systems including drivetrain, suspension, and chassis design
- Coordinated with electrical and software teams to ensure seamless integration of mechanical and electronic systems
- Prepared detailed technical documentation, CAD drawings, and financial reports for competition submissions
- Successfully delivered multiple prototypes meeting competition requirements and performance specifications

IUT Mars Rover - International Competition Team — *Team Lead* Dec. 2022 - Mar. 2023

- Led cross-functional team of 20+ members across mechanical, electrical, and software divisions for European Rover Challenge
- Established communication protocols and project management systems to track progress across all sub-teams
- Oversaw complete design cycle from concept development to final fabrication and testing of Mars rover prototype
- Coordinated design reviews, ensured compliance with competition rules, and maintained quality standards throughout development
- Managed resource allocation, procurement, and budget planning for the entire project

Design and Fabrication of a 3D Printable Miniature Rover — *SolidWorks, ANSYS, CURA, Hardware* 2023

- Designed 3D printable rover for traversing uneven terrain with dimensions of 520mm wheelbase, 368mm track width, and 152mm ride height
- Created and analyzed components using SolidWorks and ANSYS, ensuring factor of safety of 3
- Fabricated parts using Creality Ender 3 3D printer with PLA+ filaments, followed by assembly with professional-grade adhesive

Design and Fabrication of a Non-Pneumatic Tire — *SolidWorks, ANSYS, CURA, Hardware* 2023

- Designed 3D printable honeycomb wheel with hexagonal structure for optimized strength and weight using Tangent method
- Conducted stress analysis using ANSYS Workbench to evaluate durability and load-bearing capacity
- Fabricated wheel using Creality Ender 3 3D printer with PLA+ filament and 40% infill rate

Environmental Control System (ECS) — *SolidWorks, NI LabVIEW, Hardware* 2023

- Designed Environmental Control System (ECS) for small room to control temperature and smoke levels
- Created data acquisition system using NI LabVIEW and designed logic flow diagram for controlled environment
- Built and assembled ECS hardware, including sensors, actuators, and electric circuits, within acrylic box
- Tested and validated system's functionality, ensuring effective control of temperature and smoke levels

IUT CAD Society - Simulation Training Program — *Chief Simulation Instructor* Dec. 2022 - Jul. 2024

- Developed and conducted comprehensive Ansys Workbench simulation training sessions for society members
- Designed curriculum covering FEA fundamentals, structural analysis, thermal analysis, and modal analysis

Education

Bachelor of Science in Mechanical Engineering

Islamic University of Technology (IUT) — Gazipur, Bangladesh — 2024
CGPA: 3.47/4.00 — OIC Partial Scholarship
Relevant Coursework: Machine Design, Dynamics and Vibrations, Finite Element Analysis, Manufacturing Processes

Higher Secondary Certificate in Science

Police Lines School and College — Rangpur, Bangladesh — 2019
GPA: 5.00/5.00 — General Grade Scholarship

Secondary School Certificate

Rangpur Zilla School — Rangpur, Bangladesh — 2017
GPA: 5.00/5.00

Technical Skills

Simulation & Analysis	ANSYS Workbench, ANSYS MAPDL, SolidWorks Simulation, CFD–FEA Coupling, Acoustic Analysis, Structural Dynamics
Programming	Python, MATLAB, APDL, Simulink
Instrumentation	Vibration Analyzers, Accelerometers, Microphones, LabVIEW, Acoustic Measurement Techniques
Design & Manufacturing	SolidWorks, KeyShot, 3D Printing, Prototype Fabrication, Product Design for Noise and Vibration Reduction
Professional Competencies	Project Management, Technical Documentation, Design Optimization, Cross-Functional Collaboration, Leadership, GD&T, Dimensional Tolerance Analysis (C_p, C_{pk})
Languages	Bengali (Native), English (Professional Working Proficiency)

Achievements

International Rover Challenge 2024 - 6th position (Best science Team) (Team Achievement) India - 2024
European Rover Challenge 2023 - 17th position (Team Achievement) Poland - 2023
International Rover Design Challenge 2022 - 13th position (Team Achievement) Virtual - 2022
European Rover Challenge 2021 - 10th position (Team Achievement) Virtual - 2022
OIC Partial Scholarship Bangladesh - 2020
Nuclear Dilemma - Runners UP Bangladesh - 2020
IUT MPE Capstone Project - Runners UP Bangladesh - 2024

Certifications

Certified SolidWorks Professional (CSWP) Apr. 2024
Dassault Systèmes
ERC Space and Robotics Industry standard practice Program Sept. 2024
European Space Foundation
Industrial Training Course Jun. 2023
BPDB, Rajshahi

Reference

Dr. Md. Zahid Hossain
Professor, MPE Department
Islamic University of Technology, Bangladesh
Email: zahidmce@iut-dhaka.edu

Dr. Mohammad Monjurul Ehsan
Professor, MPE Department
Islamic University of Technology, Bangladesh
Email: mpe.ehsan@iut-dhaka.edu