Syed Nazmul Ahsan

Mechanical Engineering Graduate | Islamic University of Technology (IUT), Bangladesh

Email: nazmulahsan050@gmail.com | **LinkedIn:** linkedin.com/in/syed-nazmul-ahsan

Research interests: heat transfer, thermal energy storage, CFD, supercritical CO_2 power cycles and carbon capture

EDUCATION

B.Sc. in Mechanical Engineering | Islamic University of Technology (IUT), Gazipur | Graduated October 2026
CGPA 3.86/4.00 (3.96 and 3.94 in the final two semesters) | First Class with Honours
Selected A+ coursework: Principles of Heat and Mass Transfer, Applied Heat Transfer, Fluid Mechanics II, Fluid Machinery, Power Plant Engineering, Refrigeration and Air-Conditioning, Computational Mechanics, Numerical Analysis

Higher Secondary Certificate (HSC), Science | Notre Dame College, Dhaka | 2021
GPA 5.00/5.00 | Board of Intermediate and Secondary Education, Dhaka

Secondary School Certificate (SSC), Science | Ideal School and College, Motijheel, Dhaka | 2019
GPA 5.00/5.00 | Board of Intermediate and Secondary Education, Dhaka

RESEARCH EXPERIENCE

Undergraduate Thesis | Department of Mechanical and Production Engineering (MPE), IUT | 2026
Thermal Analysis of a Solar Panel with a PCM-Filled Cavity and Modified Fin Arrangement with a Proposed Pipe-Integrated Configuration
Supervisors: Prof. Dr. Md. Rezwanul Karim and Prof. Dr. Arafat Ahmed Bhuiyan | Group of four

- Modelled an RT25 phase change material (PCM) cavity with five aluminium fins behind a photovoltaic (PV) panel as a 2D transient conjugate heat transfer problem in ANSYS Fluent (enthalpy-porosity method). Drew the 132 mm by 20 mm geometry in DesignModeler and meshed it with about 48,000 quadrilateral cells.
- Ran ten cases with the mathematical model and operating conditions of Jamal et al. (2026): three fin arrangements at average fin lengths of 6, 9 and 12 mm plus an unfinned cavity. Complete melting times were within 3.4% to 5.1% of their published values.
- Processed the results in Python (NumPy, SciPy, pandas, Matplotlib). Fins shortened complete melting by 17.4% to 30.3% but the fastest-melting arrangement was not the coolest. Inclined edge-biased fins at 12 mm lowered the PV-side wall temperature by 9.3 K against a median of 5.0 K for the nine finned cases.
- Concluded that wall temperature is a better criterion than melting time for choosing a fin arrangement, since PV efficiency depends on cell temperature.
- Designed and meshed a follow-up cavity with four coolant channels in the PCM (about 72,000 cells) for future work. Co-wrote the thesis report and presented at the defence.

Gas-Fired Power with CO_2 Capture in Bangladesh: Techno-Economic and Life-Cycle Assessment | 2026
Research project with M. Hassan and S. K. Ahsan | Python

- Tested the carbon capture and storage (CCS) assumptions in Bangladesh's Integrated Energy and Power Master Plan (IEPMP 2023) with a linked model of rate-based MEA post-combustion capture, CO_2 compression and pipeline transport, plant costing and a life-cycle inventory of domestic gas and imported LNG.
- Co-developed the Python model, compiled input data from the plan and published sources, produced the results and figures and co-wrote the report. Uncertainty was assessed with Monte Carlo and Sobol analyses.
- Main findings: the plan's CCS cost matches the model only when the energy penalty of capture is left out. Its fuel budget implies a net efficiency with capture above the record for plants without capture.
- Counted over the full life cycle, the planned 2050 gas-CCS fleet would emit several times the plan's CO_2-equivalent figure.

Computational Reproduction of Combined S-CO_2/ORC Power Cycles for Solar Power Tower Plants | 2026
Independent research project | Python, CoolProp

- Reproduced the thermodynamic and techno-economic results of Fan et al. (2024, *Applied Thermal Engineering*) for four supercritical CO_2 (S-CO_2)/organic Rankine cycle (ORC) layouts: recuperated, recompression, intercooling and partial cooling. Checked efficiency and cost against curves digitised from the paper.
- Wrote the code in Python on CoolProp's low-level AbstractState interface, with equipment cost correlations and CEPCI cost escalation. The first version needed about 115 million property calls. Vectorisation and cached interpolation brought the run time down.

INDUSTRIAL EXPERIENCE

Project-Based Industrial Internship | Unilever Bangladesh Ltd. | Sep 2025 - Oct 2025

Kalurghat, Chattogram | 4 weeks | Project: HVAC Chilled-Water System Analysis

- Studied energy losses in the factory's chilled-water HVAC system as part of a project team. Located the main pressure drops across the evaporator and distribution lines with pipe head-loss analysis.
- Estimated the total system pressure drop at about 3.3 bar (about 33 m of head) and evaluated the chiller pump. Major changes to the pump system were not needed under the conditions studied.
- Identified two options for reducing losses: lower flow rate through smart pump control and better evaporator performance. Presented the findings and received a **Certificate of Excellence for Project Based Work**.

ACADEMIC PROJECTS

MAGLEV-Based Vertical Axis Wind Turbine for Efficient Energy Generation | Mar 2026

Capstone Design II | Team Leader (six members) | Supervisor: Dr. Mohammad Nasim

- Led a six-member team that designed, built and tested a small vertical axis wind turbine. NdFeB permanent magnets partly levitate the rotor to reduce bearing friction and a multi-coil generator sits at the base.
- Divided the work among the team and tracked the BDT 15,000 budget. Handled the test-data analysis, report writing and presentation.
- In airflow tests against a bearing-supported turbine of similar size, the prototype started more easily and gave higher open-circuit voltage at low wind speeds.

Energy, Exergy and Parametric Analysis of Eight S-CO_2 Power Cycle Configurations | 2026

Course project (Complex Engineering Problem), Power Plant Engineering (ME 4805) | Python, CoolProp

- Compared eight S-CO_2 cycles through energy, exergy and parametric analysis: four bottoming cycles for a 5 MWe landfill-gas turbine (Kim et al., 2016) and four solar power tower layouts (Fan et al., 2024).
- Checked the bottoming-cycle models against published values (mean absolute deviation of 2.63% over 28 comparisons) and added automatic checks for exergy closure and heat-exchanger temperature crosses.

Cooling Load Estimation for a Commercial Space

Refrigeration and Air-Conditioning (ME 4713) | Six-member group assignment

- Estimated the design cooling load of a 40 m² room at a retail outlet in Board Bazar, Gazipur by the CLTD/CLF method. Envelope, glazing, ventilation and internal gains came to about 6.5 kW in total.

TECHNICAL SKILLS

Simulation and CAD: ANSYS Fluent, ANSYS DesignModeler, SolidWorks

Programming: Python (NumPy, SciPy, pandas, Matplotlib, CoolProp), MATLAB, C

Methods: computational fluid dynamics (CFD) with phase-change modelling, conjugate heat transfer, energy and exergy analysis, techno-economic modelling, life-cycle assessment, Monte Carlo and Sobol sensitivity analysis, cooling-load estimation (CLTD/CLF), pipe head-loss analysis

Office and data: Microsoft Excel, Power BI, Word, PowerPoint

AI tools: ChatGPT and Claude for coding support and data analysis

AWARDS AND CERTIFICATES

Certificate of Excellence for Project Based Work, Unilever Bangladesh Ltd. | Oct 2025

Recognition of Achievement, Capstone Design Project, Department of MPE, IUT | Mar 2026

Recognition of Achievement, Cezeri Lab Annual Project Showcase Competition 2024 (1D Ball Balancing Robot), Department of MPE, IUT | Dec 2024

Champion, Badminton (Doubles), IUT Annual Badminton Competition | 2024

REFERENCES

Available on request.