Meftah Uddin

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EDUCATION

PhD Mechanical and Aerospace Engineering, University of Missouri-Columbia, CGPA: 3.92 **Aug 2021- present**
MS Mechanical and Aerospace Engineering, University of Missouri-Columbia, CGPA: 3.88 **July 2024**
BS Mechanical Engineering, Bangladesh University of Engineering & Technology (BUET), CGPA: 3.54 **Feb 2017**

Skills: Building Energy Modeling, Design of Experiment (DoE), Statistical Analysis (ANOVA, Regression, Optimization etc.), Machine Learning, Energy Analysis, Time Series Analysis, Computational Fluid Dynamics (CFD).

EXPERIENCE

Graduate Teaching Assistant, University of Missouri-Columbia **Jan 2023 - present**

- MAE 3800: Instruct and evaluate around 100 students in both Fall and Spring semester for Instrumentation and Measurement lab.

Key Experimental Devices: Oscilloscope, Digital Multimeter, Function Generator, Operational Amplifier, Soldering, etc.

- MAE 7001: Teach building energy simulation, compliance study with ASHRAE 90.1 for energy, ASHRAE 55 for thermal comfort, and ASHRAE standard 62.1 for ventilation requirement during Fall semester.

Energy Auditor (Intern), Midwest IAC, Columbia, Missouri **Sep 2022 - present**

Conducted almost 40 industrial and commercial audits.
Key responsibilities include but not limited to:

- Visit factory premises and collect data related to electricity, water & gas consumption; to measure HVAC parameters, lighting, and amount of wastewater and any other utilities.
- To offer energy savings recommendations, provision to use renewable energy with associated probable project costs and payback periods (ASHRAE II).

Graduate Research Assistant, University of Missouri-Columbia **Aug 2021 - present**

- HVAC energy analysis and model development using Energy Plus software and CFD analysis.
- Machine Learning and Deep Learning applications for time series forecasting.
- Prompt Development and Supervised Finetuning of opensource LLM models with domain specific tasks.

Assistant Engineer, Sirajganj 225×3 MW CCPP (NWPGCL), Bangladesh **Jul 2018 - Aug 2021**

Activity performed:

- Maintenance & Troubleshooting of Gas Turbine (Siemens SGT5-2000E) & auxiliaries; Steam Turbine & auxiliaries; HRSG & auxiliaries; Compressed Air System & Nitrogen Generation System; Water Treatment and Distribution Plant.
- Procurement of required spares, tools & consumables and assist to prepare & execute Annual Procurement Plan

Accomplishment:

- Major Overhauling of the Steam Turbine (Leak test of HRSG, X-ray and Dye penetration test of turbine rotor and blades)
- Minor Inspection of Gas Turbine (Borescope inspection turbine and compressor, and Dye penetration test of combustion chamber)

Executive Engineer, Square Pharmaceuticals Ltd., Dhaka, Bangladesh **Oct 2017- Jun 2018**

Activity performed:

- Maintenance of HVAC system, Water Treatment Plant, Boilers, Compressed Air System, Nitrogen Generation Plant
- Responsible for writing and updating Standard Operating Procedure; scheduling, planning using ERP (SAP) Software.

Project Completion:

- 2D Drawing and associated civil works for the installation of Air Compressor and auxiliaries.
- Responsible for monitoring HVAC design, Cooling Load and Air Flow rate calculation for Nasal Spray production line installation.

TECHNICAL PROFICIENCIES

Programming Language: Python, Ruby, MATLAB, R.
Data Analysis & Visualization: Excel, Power BI, R, SQL and Python.
HVAC Energy Simulation: Ladybug and Honeybee with Open Studio (Energy Plus), BEopt.
Drawing and Design Tool: SOLIDWORKS, AutoCAD 2D, Rhino, Revit.
CFD Simulation: ANSYS Fluent.

MASTER'S THESIS

Smart strategy for building energy efficiency: Integrating occupancy-based HVAC control and machine learning prediction.
DOI: 10.13140/RG.2.2.14818.34241

- Implementing occupancy-based control (OBC) for ventilation rate and temperature setpoints/setback can save up to 26% energy consumption in campus building.
- Neural network based timeseries forecast facilitate demand prediction and tuning HVAC schedules.

PROJECT EXPERIENCE

OpenStudio Measure Development

- Developed and contributed two energy modeling measures, AddPCMtoEnv and AddSolarPVT, to the OpenStudio ecosystem, enabling users to simulate phase change materials (PCM) and solar photovoltaic-thermal (PVT) systems in building energy models. Measures are published on the NREL Building Component Library (BCL) and available on GitHub under Openstudio_Measures_meftah for public use and collaboration.
- AddPCMtoEnv allows users to create custom materials with phase change properties and integrates them into EnergyPlus IDF files for simulation.
- AddSolarPVT facilitates the addition of PVT systems to airloop outdoor air systems or plant loops, enhancing renewable energy modeling capabilities.

Statistical Analysis of building energy use intensity (EUI)

- The energy use intensity (EUI) between commercial and residential building among five cities in the United States are statistically compared using dataset from BPD website.

Net Zero Building Design

- To design a baseline residential building model complying with ASHRAE Standard 90.1.2016 using perspective path.
- Addition of renewable source to the baseline model to ensure NetZero building.

Experimentally calculate the major loss of UPVC pipe

- To build the setup to calculate the major loss of UPVC pipe, measure the weight of water using the bucket method and compare the results with numerical study.

PUBLICATIONS

- Uddin, M., Virk, A. S., and Park, C. (August 29, 2023). "Natural Convection in the Melting of Phase Change Materials in a Cylindrical Thermal Energy Storage System: Effects of Flow Arrangements of Heat Transfer Fluid and Associated Thermal Boundary Conditions." ASME. J. Thermal Sci. Eng. Appl. November 2023;15(11): 111010. https://doi.org/10.1115/1.4063045
- JB Kim, F Wang, … Uddin, M. "Digital Twin Framework for Smart Campus to Reduce Greenhouse Gas Emission." Accepted, 2023 IEEE Smart World Congress (SWC) https://doi.org/10.1109/SWC57546.2023.10448799.
- Uddin, M., Aman, J., JB Kim. "A Digital Twin Framework for Carbon Emission Monitoring and Building Operation Feedback." Accepted in CAADRIA25

AWARD

- First Prize in poster presentation, Engineering & Science, Show Me Research Week **Apr 2024**

CAMPUS INVOLVEMENT

President, Bangladesh Student Association (BSA), University of Missouri **Sep 2023 – Sep 2024**
Department Representative, Graduate Professional Council (GPC), University of Missouri **Aug 2023 – Sep 2024**