Saifa Siddika

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Education

Rajshahi University of Engineering and Technology, Bangladesh July 2025
B.Sc. in Mechanical Engineering

Research Interests

- **Advanced Materials for Energy Storage**
- **Integrated Energy Systems**
- **Materials Characterization and Manufacturing**

Research Experience

Undergraduate Thesis: Multi-Objective Evolutionary Optimization of a Stand-Alone Hybrid Energy System with Excess-Energy-Driven Clean Water Generation in a Remote Bangladeshi Community

Thesis Objective: Designed and optimized a hybrid renewable energy system integrating PV cell, wind turbine, diesel generator, PHS, and RO desalination for off-grid coastal Bangladesh. Employed HOMER Pro, NSGA-II and NSGA-III algorithm to minimize cost and emissions.
Publications: 1 [Published in *ICMIME 2024*], 1 [Under review]
Supervisor: Dr. Md Emdadul Haque

Geometry-Driven Multi-Objective Optimization of MXene Electrodes

Research Objective: Developing a geometry-based framework linking measurable electrode descriptors to ion/electron transport, enabling Pareto-optimal MXene electrode design.
Publications: [Under Development]
Supervisor: Dr. Monjur Mourshed

Bio-Derived Materials and Biomimetic Architectures for Electrochemical Supercapacitor Applications

Research Objective: Investigating bio-derived electrode materials and nature-inspired architectures for sustainable supercapacitor design, with emphasis on porosity, surface area, ion transport, electrochemical stability, scalability, and circular-economy potential.
Publications: [Under Development]
Supervisor: Dr. Monjur Mourshed

Publications

Journal

[**J.2**] **Saifa Siddika**, A.S.M. Shahriar Rahman, Priyojit Das Gupta, Md. Dilshadul Alam Maruf, Monjur Mourshed, **State-of-the-Art Advancement in MXene For Energy Storage and Power System Applications**. *Energy Reviews*, Volume 5, 2026, 100187. DOI: 10.1016/j.enrev.2026.100187.

[**J.1**] Asif Jaman, Barun K. Das, Mir Mahim, Ashik Hasan, **Saifa Siddika**, Mim Mashrur Ahmed, Paul C. Okonkwo, **Techno-Econo-Environmental Analysis of Sustainable Hybrid Solar-Wind-Biogas Using Municipal Solid Waste-based Grid Independent Power Plant with Dual Mode Energy Storage Strategy**. *Energy*, Volume 307, 2024, 132777. ISSN: 0360-5442. DOI: 10.1016/j.energy.2024.132777.

Conference

[C.1] **Saifa Siddika**, A. S. M. Shahriar Rahman, Md Emdadul Haque, **Integrating Renewables into Stand-alone Hybrid Energy System and Meeting Freshwater Demand Utilizing Excess Energy**. *International Conference on Mechanical, Industrial and Materials Engineering 2024 (ICMIME 2024)*, Rajshahi, Bangladesh, 2024. Available Online

Professional Experience

Bangladesh Industrial Technical Assistance Center | *Industrial Trainee* Mar. 2024 – Apr. 2024
Assisted in industrial training and hands-on workshops on machining, manufacturing processes, and quality inspection as part of undergraduate industrial attachment.

Projects

[1] **Smart Sensor Integration for Environmental and Flow Monitoring for Real-Time Measurement and Analysis** *(2023)*
Instructor: Dr. Md. Rokunuzzaman, Professor, Dept. of ME, RUET; *Group Project*
Description: Designed and implemented an Arduino-based multi-sensor system with embedded code for real-time calibration, data acquisition, and monitoring.

[2] **Manufacture and Experimental Testing of a Flat Key - UTM Validation and FEA with Mesh Convergence** *(2023)*
Instructor: Dr. Md. Abdul Kader, Assistant Professor, Dept. of ME, RUET; *Group Project*
Description: Modeled a flat key and performed static analysis with a mesh-convergence study. Fabricated the key by 3D printing and validated on a UTM; experimental load–displacement closely matched FEA.

[3] **Design and Finite Element Modeling of a Connecting Rod** *(2023)*
Instructor: Dr. Md. Abdul Kader, Assistant Professor, Dept. of ME, RUET; *Group Project*
Description: Modeled a connecting rod in **SOLIDWORKS (2022)** and imported into **ABAQUS** for static structural analysis.

Affiliations

- **Senior Designer**, Team Annexe RUET, *2023 – 2024*
- **Business Team Member**, Team Annexe RUET, *2022 – 2023*
  – Represented the team at *FMAE FKDC Season-7*, Coimbatore, India; ranked 13th overall and 6th in business category (Oct–Nov 2023)
- **Technical Officer**, TEDx RUET, *2023 – 2024*
- **Chair, Business and Sponsorship Management Committee**, ASHRAE RUET SB, *2024 – 2025*

Core Courses

Energy Engineering and Technology; Power Plant Engineering; Refrigeration and Mechanical Equipment in Buildings; Nuclear Engineering; Aerodynamics; Applied Thermodynamics (2 courses); Thermodynamics (2 courses); Fluid Mechanics (2 courses); Fluid Machineries; Heat Transfer (2 courses); Engineering Mechanics (3 courses); Mechatronic System; Instrumentation and Control; Materials and Metallurgy; Mechanics of Solids; Design of Machine Elements (2 courses); Machine Tool and Tool Design; Production Process; Engineering Drawing; Computer-Aided Drawing; Electrical Circuits; Electrical Machines and Electronics; Computer and Programming Languages (*C, C++*);

IELTS Academic Scores

7.0/9.0 • Listening – 8.5/9.0 • Reading – 7.0/9.0 • Writing – 6.0/9.0 • Speaking – 6.5/9.0 *CEFR Level: C1* Aug 01, 2025

Technical Skills

- **Modeling & Simulation:** MATLAB, Simulink, HOMER Pro, ANSYS, Abaqus, COMSOL
- **CAD Design:** SolidWorks (**Certified Associate**), AutoCAD, Fusion 360

- **Prototyping & 3D Printing:** Ultimaker Cura
- **Programming:** C/C++, Arduino
- **Data Analysis & Tools:** Excel (Advanced), LaTeX, Minitab, ArcGIS
- **Proficiency:** LaTeX, Presentation, MS Word, MS Excel, MS PowerPoint