

Sustainable and Renewable Energy Research Laboratory

Teesta University, Rangpur

Mission

The primary objective of the Teesta University Recharge Laboratory is to present the university's name in international journals, provide students with knowledge of research, and enhance their research skills. Our goal is to make a world-class contribution to sustainable and renewable energy research and to enable students to solve real-life problems effectively.

Vision Statement

To become a globally recognized hub for sustainable and renewable energy innovation, where cutting-edge research meets real-world application. We aim to empower students and researchers to pioneer solutions that address the energy challenges of the future, foster interdisciplinary collaboration, and contribute to a cleaner, more resilient world.

Research Topics

1. Advanced Energy Storage Systems

- High-capacity lithium-ion and solid-state batteries
- Supercapacitor integration for renewable grids

2. Solar Energy Innovation

- High-efficiency perovskite solar cells
- Solar tracking and optimization using AI

3. Wind and Hydropower Optimization

- Small-scale wind turbine efficiency in low-wind regions
- Micro-hydro energy recovery from irrigation canals

4. Bioenergy & Waste-to-Energy

- Livestock waste biogas production
- Algae-based biofuel development

5. Smart Energy Management Systems

- AI-driven grid load balancing
- IoT-based home and industry energy monitoring

6. Hydrogen Energy Technology

- Green hydrogen production from renewable sources
- Hydrogen storage and transportation methods

7. Climate Impact and Sustainability Studies

- Renewable energy's role in reducing carbon footprint
- Community-based renewable energy adoption models

8. Hybrid Renewable Systems

- Integrating solar, wind, and biomass for rural electrification
- Energy system simulation and optimization

Publications

1. M. S. Shah, **M. K. Hasan**, S. C. Barman, J. A. Bhuiyan, H. Mamur, and M. R. A. Bhuiyan, "Enhancing PV performance of Al/ZnO/CdS/GaAs/NiO/Au solar cells through diverse layer combinations by SCAPS-1D," *Next Research*, p. 100143, Jan. 2025, [doi:10.1016/J.NEXRES.2025.100143](https://doi.org/10.1016/J.NEXRES.2025.100143).
2. S. Sikder, **M. K. Hasan**, H. Mamur, and M. R. A. Bhuiyan, "Optimizing layer configuration and material selection to enhance CIGS solar cell performance through computational simulation," *Hybrid Advances*, p. 100460, Mar. 2025, [doi: 10.1016/j.hybadv.2025.100460](https://doi.org/10.1016/j.hybadv.2025.100460).
3. M. B. Hossain, K. T. Firdous, **M. K. Hasan**, J. A. Bhuiyan, H. Mamur, and M. R. A. Bhuiyan, "Enhancing the performance of FAPbI₃ using organic and inorganic transport layers in perovskite solar cells," *Total Environment Engineering*, vol. 4, p. 100026, 2025, [doi:10.1016/j.teengi.2025.100026](https://doi.org/10.1016/j.teengi.2025.100026).
4. R. Hosen, M. M. Haque, **M. K. Hasan**, J. A. Bhuiyan, H. Mamur, and M. R. A. Bhuiyan, "Optimizing FASnI₃ perovskite solar cells: Advancements with organic and inorganic transport layers," *Next Research*, vol. 2, no. 3, p. 100576, 2025, [doi: 10.1016/j.nexres.2025.100576](https://doi.org/10.1016/j.nexres.2025.100576).
5. A. Kharmouch, **M. K. Hasan**, E. Y. Sabik, H. Bouali, H. Mamur, and M. R. A. Bhuiyan, "Numerical optimization of multi-stage thermoelectric cooling systems using Bi₂Te₃ for enhanced cryosurgical applications," *Thermo*, vol. 5, no. 3, p. 22, 2025, [doi: 10.3390/thermo5030022](https://doi.org/10.3390/thermo5030022).
6. **M. K. Hasan**, M. R. Akter, and M. S. Islam, "Investigation of electrical and thermal properties of perovskite solar cells through multidimensional simulations to enhance performance and stability," *Kashmir Journal of Science*, vol. 4, no. 2, pp. 1–19, 2025, [doi: 10.63147/krjs.v4i02.55](https://doi.org/10.63147/krjs.v4i02.55).

7. M. R. Akter, **M. K. Hasan**, and M. S. Islam, "Assessment of maternal health status of pregnant women at Rangpur Medical College and Hospital, Bangladesh: A descriptive cross-sectional study," *Kashmir Journal of Science*, vol. 4, no. 2, pp. 34–55, 2025, doi: [10.63147/krjs.v4i02.87](https://doi.org/10.63147/krjs.v4i02.87).
8. "Optimizing the TEC performance of PbTe through numerical modeling using COMSOL Multiphysics," Journal: *International Journal of Refrigeration (Elsevier Publication)*; Status: *"Revision in Process."*
9. "Optimization of conductor influence on Bi₂Te_{2.70}Se_{0.30} thermoelectric modules using COMSOL Multiphysics," Journal: *Kashmir Journal of Science*; Status: *"Under Review."*
10. "Design and implementation of an automated fumigation system for effective sterilization in confined and hard-to-reach spaces," Journal: *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi*; Status: *"Under Review."*
11. The impact of COVID-19 on the physical health, psychological well-being, and financial stability of host and forcibly displaced Myanmar nationals (FDMN) communities in Cox's Bazar," Journal: *Kashmir Journal of Science*; Status: *"Under Review."*
12. "Performance analysis of source localization technique using DOA estimation," Journal: *Franklin Open (Elsevier Publication)*; Status: *"Under Review."*

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