Udhay Chowdhury

Aspiring Biosensor Researcher | Electrochemical & Wearable Biosensors | Sustainable Healthcare Innovator

Chattogram, Bangladesh

✉ chowdhuryudhay02@gmail.com | 🔗 Udhay Chowdhury | 🌐 Portfolio

Profile

I am a passionate researcher focused on electrochemical and wearable biosensors. I have experience in simulation-based design, nanomaterials, and using machine learning for renewable energy and healthcare. In Bangladesh, many people face health risks due to lack of easy and affordable diagnostic tools. That is why I want to build affordable and easy-to-use biosensors for point-of-care diagnosis, so harmful bacteria and diseases can be detected quickly anywhere, especially in underserved communities. My goal is to make these tools widely accessible to improve healthcare for all. I have the skills to design and improve biosensors independently, lead teams, and publish research papers. I am seeking PhD opportunities to help turn these ideas into real solutions that improve lives.

Education

BSc in Electrical and Electronic Engineering *Expected July 2026*
Chittagong University of Engineering & Technology (CUET), Bangladesh
Focus: Biosensor design & simulation, microprocessors, renewable energy systems
CGPA: 3.69 / 4.00 (up to 5th semester)

Higher Secondary Certificate (HSC) *2020*
Chattogram College, Bangladesh
GPA: 5.00 / 5.00

Secondary School Certificate (SSC) *2018*
Chattogram Collegiate School, Bangladesh
GPA: 5.00 / 5.00

Key Research Projects

- **Wearable Electrochemical Biosensor Simulation for Glucose Detection**
Developed and optimized 3D **COMSOL Multiphysics** model simulating enzyme kinetics and mass transport to enhance sensitivity by 15%. Integrated graphene-based nanomaterials for improved electrode performance.

- **Perovskite Solar Cell (PSC) Design and Parameter Optimization**
Led SCAPS-1D simulations optimizing absorber and ETL layers for triple absorber PSCs, projecting >25% power conversion efficiency. Coordinated data analysis and co-authored the resulting publication.

Professional & Research Experience

- **Research Member, STARLAB (Machine Learning in Renewable Energy)** *Jan 2024 – Present*
CUET

    - Designed and implemented SVM and Random Forest models to forecast solar and wind energy output, improving prediction accuracy by 12% over baseline.
    - Independently preprocessed data and validated model performance using cross-validation techniques.
    - Co-authored 2 manuscripts: one published and one under peer review.

- **Head of Department, HULT PRIZE at CUET** *Jan 2025 – Present*

    - Relaunched CUET On-Campus Round after 4 years, leading 15 volunteers and managing 20+ teams.
    - Increased participation by 30% and managed the entire social media campaign.

- **Membership Development Coordinator, IEEE CUET Student Branch** *Oct 2024 – Present*
  - Led campaign onboarding 400+ new members, setting a chapter record and increasing active participation by 50%.

Technical Skills

- **Simulation & Modeling:** COMSOL Multiphysics (Electrochemical, Semiconductor, RF), MATLAB & Simulink, SCAPS-1D
- **Programming:** Python (NumPy, Pandas, Scikit-learn), C/C++, Assembly
- **Hardware & Electronics:** Microcontrollers (Arduino, ESP32, STM32), Sensor Integration, Prototyping
- **Biosensors:** Optical Sensors, Nanomaterials (Graphene, ZnO, TiO_2), Surface Functionalization
- **Tools:** Git, GitHub, OriginPro, ImageJ, MS Office, EndNote, LaTeX

Publications & Presentations

- **Simulation and Optimization of a $CsSnI_3$/$CsSnGeI_3$/$Cs_3Bi_2I_9$ Based Triple Absorber Perovskite Solar Cell**, *Journal of Physics and Chemistry of Solids*, Mar 2025, **Co-author**
- **Numerical Modeling of Perovskite Tandem Solar Cell with $CH_3NH_3SnI_3$ Bottom Absorber**, *4th Int. Conf. on ECE*, 2024, **First-author; Under Review at IEEE Xplore**
- **Doping Optimization of ZnO as ETL for $KSnI_3$ Based Perovskite Solar Cells**, *4th Int. Conf. on ECE*, 2024, **Co-author**

Achievements & Awards

- **1st Runner-Up** — Discussion with the Changemaker (Waterlogging Solution, Chattogram)
- **2nd Runner-Up** — Face the Case 3.0 (Electric Vehicles Business Case, Bangladesh)
- **IEEE R10 Ethics Champion** — Ethics Super Power Challenge (Year)
- **Honourable Mention** — IEEE Day Poster Presentation (Induction Motor Team)

References

Available upon request.

Future Goals

Pursue a PhD in biosensors or biomedical engineering, focusing on the design of electrochemical and nano-enabled wearable biosensing systems for point-of-care diagnostics and self-powered sustainable healthcare solutions. Aim to translate innovative research into real-world impact through international collaboration.