

# RASHEDUL ALBAB

+880 1834616407     albabahmed74@gmail.com     rashedulalbab253     Rashedul albab     Rashedul Albab

## RESEARCH INTEREST

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AI in Healthcare    Computer Vision    Physics-Informed AI    NLP    Electromagnetics AI    AI in Renewable Energy

## EDUCATION

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- **B.Sc. in Electrical and Electronic Engineering (EEE)** January 2020 – June 2025  
Sylhet Engineering College, Shahjalal University of science and Technology, Sylhet, Bangladesh  
◦ CGPA: 3.45/4.00  
**Relevant Courseworks:** Continuous Signal and Linear System    Digital Signal Processing    Artificial Intelligence and Machine Learning    Fundamentals of Biomedical Engineering    Renewable Energy Systems    Random Signal and Processes  
◦ Power Electronics    Power System Protection    Power Plant Engineering    VLSI    Control System    Communication System    Probability and Statistics    Linear Algebra    Deep Learning

## RESEARCH EXPERIENCE

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- **Undergraduate Thesis (LesionNet: Lightweight CNN-Based Skin Lesion Classification)** 2025  
Supervised by [Salman Fazle Rabby, Assistant Professor, Dept. of EEE, Sylhet Engineering College.](#)
  - **Proposed a lightweight and computationally efficient CNN (LesionNet)** for multiclass dermoscopic image classification using **28×28×3 inputs**, eliminating the need for heavy pre-trained models or full fine-tuning.
  - **Addressed severe class imbalance in the HAM10000 dataset (10,015 images)** through **data augmentation and oversampling**, ensuring balanced generalization across **seven skin lesion classes** with minimal computational overhead. [pdf: Click to view.](#)
- **Research Assistant at Dept. of EEE, Sylhet Engineering College.** December 2024 – July 2025
  - Conducted research on explainable machine learning for multi-class power quality disturbance classification, implementing preprocessing pipelines, classical ML models (LR, SVM, RF, XGBoost), and a 1D-CNN architecture, **accepted at ICCIT(IEEE), 2025.**
  - Performed model interpretability analysis using SHAP and feature importance methods.
- **Research Trainee ( ML, DL & NLP ) at Mahdy Research Academy** January 2024 – December 2024  
Supervised by [Dr. Mahdy Rahman Chowdhury, Professor, Dept. of ECE, North South University.](#)
  - Phase 1 (Advanced ML & DL Foundations) - Mastered a comprehensive curriculum ranging from foundational statistical models to advanced architectures like Transformers and Explainable AI (XAI), with hands-on implementation using Python, TensorFlow, and scikit-learn. **LoR: Click to view.**
  - Phase 2 (Research Application & Scientific Communication) - Developed a novel AI research project through iterative methodology refinement, resulting in the authorship of a publication-ready journal manuscript and a professional technical poster. **LoR: Click to view.**

## PUBLICATIONS

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- M.F.Ahmed, **Rashedul Albab**, Md.Al Amin Chy, M.A.H Sakib Opu, Tahsin Hadi, Tanvir Ahamed. ICCIT(IEEE), 2025, “*Explainable Machine Learning for Multi-Class Power Quality Distrurbance Classification Using SHAP and Fearture Importance Analysis.*” (accepted)
- M.F. Ahmed, **Rashedul Albab**, M.A. Ahmad, Md. Al Amin Chy, S.N. Mehdi. ICCIT (IEEE), 2025, “*Quantifying the Relationship between Socioeconomic Status and Parent-Child Attach*” (accepted)
- M.F. Ahmed, R.A. Opi, **Rashedul Albab**, S.N. Mehdi, A.H. Tahsin, Md. S.Iqbal. ICCIT (IEEE), 2025, “*Enhancing Wind Farm Operational Efficiency Through Power Output Classification Using MLP and Ensemble Models.*” (accepted)
- Md.Al Amin Chy, S.A Chowdhury, **Rashedul Albab**, T.H. Tasneem, M. Mihad, Arif Ahammad. ICCIT(IEEE), 2025, “*Time Dependent Control of Voltage and Current via a Tunable Metasurface.*” (accepted)
- **Rashedul Albab**, Syed Nadim Mehdi, K.A. Jaygirdar, T.I.P. Miskat. “*Automated Multi-Class Classification of Mpox and Vesicular Skin Lesions Using Vision Transformers.*” (ongoing)

## TECHNICAL SKILLS

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- **Programming:** Python, MATLAB, C/C++, LaTeX
- **Tools & Frameworks:** PyTorch, TensorFlow & Keras DL framework, Scikit-Learn, Huggingface Transformers

- **Softwares & DevOps:** Simulink, Proteus, AutoCAD, FastAPI, Docker, Git, LangGraph,
- **AI/ML:** Core Machine Learning (Supervised and Unsupervised Learning), Deep Learning (Neural Networks, Transformer), Fundamentals of NLP, LLM, Multimodal LLM, Rag, Generative Models (GAN), Reinforcement Learning
- **Computer Vision:** Image Segmentation, Object Detection, Digital Image Processing (Feature Extraction, Enhancement), Optical Character Recognition (OCR), Vision Language Model (VLM)
- **Hardware Skills:** Arduino, FPGA

## PROFESSIONAL TRAINING & TEACHING EXPERIENCE

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- **Training Institute for Chemical Industries (TICI)** *January 2024*  
**Industrial Training – Central Training Institute of BCIC, Polash, Narsingdi, Bangladesh**  
 3-week intensive industrial technology course at TICI, covering advanced Electrical Engineering & Instrumentation, including motor control, substation distribution, DCS and PLC/SCADA systems. [Verified Certificate](#)
- **Visit – Kanaighat Electrical Substation** *February 2025*  
 As part of academic training to gain hands-on exposure to power system operations, including control panels, fault detection, safety protocols, and equipment connections.
- **Physics, Mathematics and ICT Instructor** *2020 - Present*  
**Odommo Academy, Bright Teaching Home**  
 I have been teaching Physics and Higher Mathematics at the HSC level for 5 years. Designed exam questions to develop problem-solving skills and prepare students for competitive exams.

## NOTABLE PROJECTS

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- **Medibot AI: Retrieval-Grounded Clinical Assistant** 2025  
 Built a production-grade RAG-based clinical assistant that grounds LLMs in medical literature to reduce hallucinations, deployed on AWS with Docker, CI/CD, LangChain, Pinecone, and GPT. [GitHub](#)
- **Albab ExamAI – Real-time AI-powered Exam Management System** 2025  
 Developed an AI-powered Exam Management System using FastAPI, Groq Llama 3, and Docker for automated grading of MCQs and subjective answers. Implemented real-time feedback, anti-cheat security, and crash-resilient exam sessions. Deployed a scalable production-ready platform with background evaluation queues and CI/CD pipelines. [GitHub](#)
- **Multi-Agent Research Assistant(CrewAi)** 2025  
 Orchestrated a multi-agent Research Assistant Framework (MARA) using CrewAI and FastAPI to automate systematic literature reviews, data synthesis, and IMRAD-structured report generation. Implemented specialist AI agents for research, quantitative analysis, and technical writing, with Docker-based deployment and CI/CD integration for production-ready scalability. [GitHub](#)
- **BengalVision ALPR – AI-powered Bangla number plate detection and recognition System.** 2025  
 Engineered an AI-powered ALPR system for real-time detection and recognition of Bangladeshi vehicle number plates using YOLOv11. Implemented FastAPI dashboards with confidence tuning, session tracking, and Docker-based deployment. Optimized inference with PyTorch, ONNX, and OpenVINO, achieving ~92% accuracy in complex urban environments. [GitHub](#)
- **CourtVision:AI-Powered Tennis Match Analysis System** 2025  
 Developed a computer vision-based Tennis Analysis System using YOLOv12, fine-tuned YOLOv5, and ResNet-50 for player tracking, tennis ball detection, and court keypoint localization. Implemented geometry-based player filtering to accurately identify on-court players from match videos. [GitHub](#)
- **IoT-Based Environmental Data logger(ESP32)** 2024  
 Designed and implemented a real-time environmental monitoring system using ESP32 and multiple sensors, enabling cloud-based data logging and remote access through Google Sheets. [View report](#)
- **Feasibility Study for a Small-Scale Solar Photovoltaic (PV) Project in North Baghbari, Sylhet, Bangladesh** 2024  
 Performed a techno-economic feasibility analysis of solar PV and wind energy systems using NREL's System Advisor Model (SAM), integrating weather, location, and energy-yield data to evaluate system performance and local renewable energy viability. [View report](#)

## ACHIEVEMENTS & CO-CURRICULAR ACTIVITIES

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- **Organizing Secretary:** EEE Association(*March 2024-June2025*)  
Served as Organizing Secretary, spearheading end-to-end logistics and coordination for 5+ departmental events and technical workshops, leading 15+ volunteers to ensure seamless execution for 200+ participants
- **Champion,**Engineer Football League(*December 2023*)&*Estrada:The- glory* IndoorFootball Tournament(*March 2024*)
- Played as Right Winger; contributed to the team's success in securing the championship title.
- **Social works:** Active Member of **SEC Blood Bank** – Regularly donated blood and manage emergency blood supplies as part of this volunteering organization.
- **Clubs:** Regular member of **SEC Debating Society** – Actively listened & participated in debates held by them ; **SECPA** – As member of phtotografhic association frequently uploaded my captured images for public demonstration.

## HOBBIES

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Photography & Videography      ○ Reading Books      ○ Competitive Football

## REFERENCES

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**Md. Salah Uddin**  
Head & Assistant Professor, Dept. of EEE  
Sylhet Engineering College, Sylhet, Bangladesh  
Email: [sumeceee@mec.ac.bd](mailto:sumeceee@mec.ac.bd)

**Mahedi Kamal Ahmed**  
Lecturer, Dept. of EEE  
Sylhet Engineering College, Sylhet, Bangladesh  
Email: [mkahmed@sec.ac.bd](mailto:mkahmed@sec.ac.bd)