RASHEDUL ALBAB

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RESEARCH INTEREST

AI in Healthcare ○ AI for Renewable Energy & Smart Power systems ○ Computer Vision & Deep Learning ○ NLP & LLM ○ AI in Electromagnetic & RF Systems

EDUCATION

- **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

- **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

- 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

- **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

- **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

- **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

- **Organizing Secretary:** EEE Association(*March 2024-June 2025*)
  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 phtotograhpic association frequently uploaded my captured images for public demonstration.

HOBBIES

Photography & Videography ○ Reading Books ○ Competitive Football

REFERENCES

Md. Salah Uddin
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Mahedi Kamal Ahmed
Lecturer, Dept. of EEE
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