Sudipto Sarkar

+8801774024354 | sudiptosarkarjoy@gmail.com | Website

sudipto-sarkar-256b15227 | GitHub | Google Scholar

Department of Electrical and Electronic Engineering, BUET, Dhaka, Bangladesh

Summary

- Electrical and Electronic Engineering graduate from Bangladesh University of Engineering and Technology (BUET) with research experience in Deep Learning, Computer Vision, Multimodal AI, Speech Recognition, and Foundation Models. Author of peer-reviewed publications and an arXiv preprint, with multiple top placements in IEEE AI competitions. Experienced in PyTorch, TensorFlow, model optimization, multimodal learning, and developing practical AI systems.

Education

- **Bangladesh University of Engineering and Technology (BUET)** *2022 (January) – 2026(Expected)*
  B.Sc. Engg., Electrical and Electronic Engineering (Level 4) Dhaka, Bangladesh
  - CGPA: 3.21 (up to Level-4 Term 2)
- **Notre Dame College** *2018 – 2020*
  Higher Secondary School Certificate (HSC), Science Dhaka, Bangladesh
- **Kushtia Zilla School** *2012 – 2018*
  Secondary School Certificate (SSC), Science Kushtia, Bangladesh

Professional Experience

- **Langgol – Agritech** *2025 – present*
  Founder and Senior Software Developer Dhaka, Bangladesh
- **Udvash (Education Institute)** *2023 – Present*
  Math Instructor Dhaka, Bangladesh
- **Somakolon – the learning app** *2020 – present*
  Founder and Senior Developer Dhaka, Bangladesh

Publications

[1] F. Labiba, M. A. Hasan, S. Sarkar, A. Shahriar, N. Tasnim, and S. A. Fattah, "Real-Time Multi-Modal Drone and Bird Tracking Using Modality-Aware Adaptation and Physics-Aware Filtering," in *2025 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE)*, Cox's Bazar, Bangladesh, 2025. [IEEE Xplore]

Preprints

[2] S. Sarkar, M. A. Hasan, K. A. Shahriar, F. Labiba, N. Tasnim, and S. A. H. Fattah, "EGD-YOLO: A Lightweight Multimodal Framework for Robust Drone-Bird Discrimination via Ghost-Enhanced YOLOv8n and EMA Attention under Adverse Conditions," *arXiv preprint arXiv:2510.10765*, 2025. [arXiv]

[3] Md. Nakib, S. Sarkar, A. J. A. J. Talukder, and M. A. Haque, "PairCLIP-SWA: Similarity-Guided Balancing and Stochastic Weight Averaging for Generalized Deepfake Image Detection with OpenCLIP," *arXiv preprint arXiv:2610.37874*, 2026. [arXiv]

Under Review

[4] S. Sarkar and H. Imtiaz, "GLFNet: Gated Local-Focus Network for EEG-Based Visual Semantic Decoding," *Manuscript under review*, 2026. [SSRN]

Technical Skills

- **Programming Languages:** Python, C++, C, JavaScript, SQL, PHP, HTML, CSS, MATLAB
- **Machine Learning & AI:** PyTorch, TensorFlow, OpenCV, Scikit-learn, Hugging Face Transformers, OpenCLIP, YOLOv8, OCR, Whisper, Wav2Vec2, LoRA, Pandas, NumPy
- **Backend & DevOps:** Node.js, Firebase APIs, Docker, Git, GitHub
- **Hardware & Robotics:** Arduino, ESP32, Raspberry Pi 4B, Pixhawk, FPGA, ROS
- **Tools:** Kaggle, Vast.ai, Visual Studio Code, Blender, Figma, PSS/E, LTspice, Mission Planner, RealVNC, Microsoft Word, Excel

Research Interests

- Brain-Computer Interface (BCI)
- Computer vision
- Quantum Computing and Quantum Machine Learning
- Deep Learning
- Foundation Models & LLMs & Federated Learning
- Biomedical AI

Leadership and Extra-Curricular Activities

- **President** *2025 – Present*
  BUET Robotics Society
- **Vice Chairperson** *2025 – Present*
  IEEE BUET Student Branch Chapter
- **Senior Coordinator** *2025 – Present*
  Team Interplanetary - Drone Sub-Team
- **Treasurer** *2024 – 2025*
  BUET Robotics Society

Relevant Coursework

- AI & ML
- Random Signal Processing
- Power Electronics
- Digital Signal Processing
- Communication System
- Control System
- Digital Electronics
- Matlab
- Robotics and Automation

Projects

- **Precision Pesticide Spray and Crop Health Monitoring Drone** | GitHub *2026*
  Precision Agriculture, UAV, Crop Health Monitoring, Precision Spraying
  - Developed a drone-based system for precision pesticide spraying and crop health monitoring.
  - Focused on targeted pesticide application and data-driven crop monitoring to support efficient, sustainable agriculture.

- **Autonomous Rescue Drone for Locating Survivors** | GitHub *Sep 2024 - Dec 2024*
  Computer Vision, AI, UAV
  - Developed an AI-powered drone for search and rescue in disaster areas.
  - Implemented real-time human detection using a tracking algorithm and OpenCV.
  - Integrated GPS-based autonomous flight control for structured coverage and waypoint navigation.

- **Deepfake Detection using CLIP-ViT** *Oct 2024 - Jan 2025*
  OpenCLIP, ViT, PyTorch
  - Developed a deepfake detection model using OpenCLIP-ViT trained on a balanced dataset.
  - Achieved 98% training and 97% validation accuracy using strict mini-batch training and augmentation.
  - Evaluated the model on the IEEE SP Cup 2025 dataset (43k real, 219k fake images).

- **Multi-Modal Political Meme Classification** | GitHub *2025*
  Computer Vision, NLP, Multimodal AI, PyTorch
  - Proposed a **novel dual co-attention framework** integrating CLIP, XGLM, EasyOCR, and PaddleOCR for multimodal political meme classification.
  - Achieved **90.7%** validation accuracy and **82.8%** test accuracy on a large-scale political meme dataset.
  - Enabled **interpretable cross-modal feature fusion**, improving classification robustness for multilingual political memes.

- **Shabdotori: Bengali Dialect Speech Recognition** | GitHub *2025*
  Speech Processing, ASR, Deep Learning, LoRA
  - Proposed a **two-stage Bengali dialect ASR pipeline** combining Wav2Vec2-based dialect classification with LoRA fine-tuned Whisper models.
  - Achieved significant improvements in **WER** and **CER** over dialect-agnostic ASR through region-specific transcription.
  - Enhanced recognition robustness using comprehensive **audio data augmentation** for low-resource Bengali dialects.

- **Brain Tumor Detection on MRI Images** | **GitHub** *Dec 2023 - Feb 2024*
  Digital Image Processing, MATLAB
  ◦ Developed a CAD system for automated brain tumor detection in MRI images.
  ◦ Improved MRI image clarity through advanced image processing and filtering techniques.
  ◦ Achieved high sensitivity and specificity in tumor detection (results from validation experiments).

- **FPGA Based Home Automation System** | **GitHub** *Sep 2024 - Jan 2025*
  Quartus, FPGA, Verilog
  ◦ Implemented an IoT-based home automation system on FPGA using Quartus and Verilog.
  ◦ Device regulation in a room controlled by the number of individuals (sensor-driven logic).

- **Underfrequency Load Shedding Implementation** | **GitHub** *Dec 2023 - Mar 2024*
  PSS/E
  ◦ Analyzed underfrequency load shedding schemes using PSS/E on the IEEE 24-bus test system.
  ◦ Simulated load shedding strategies and assessed system recovery and stability.

- **Ultrasonic Obstacle Mapping Bot** | **GitHub** *2025*
  Embedded Systems, Robotics, IoT
  ◦ Developed an autonomous robot using NodeMCU and HC-SR04 ultrasonic sensor for real-time indoor mapping.
  ◦ Implemented obstacle avoidance and 180° environment scanning using a servo-based sensing mechanism.
  ◦ Designed a web-based interface to visualize mapped surroundings dynamically.
  ◦ Built as a low-cost, educational DIY platform for robotics and embedded systems experimentation.

Thesis

- **NeuroVision: EEG-to-Video Generation using Multimodal Deep Learning** *2025–present*
  Brain signal driven video generation and cross-modal representation learning

Honors and Awards

- **2nd Runner Up: IEEE VIP-CUP 2025** *2025*
  Designed a lightweight multimodal drone–bird detection and tracking system for the IEEE VIP-CUP international competition
- **1st Runner Up: IEEE IAS Humanitarian Contest 2025** *2025*
  Autonomous disaster response drone for search and rescue and medical supply delivery
- **1st Runner Up: Project Showcasing** *2024*
  EEE DAY 2023
- **2nd Runner Up: Project Showcasing** *2025*
  Intra BUET Robo Challenge
- **1st Runner Up: IEEE-WIE Robotics for Climate Change** *2024*
  WIE BD Summit
- **Champion: University Innovation Hub Programme 2025** *2025*
  IC4, BUET
- **Finalist: Orange Corners Bangladesh Ideation Challenge** *2025*
  IC 5.0
- **Finalist: Datathon CUET CSE FEST 2025** *2025*
  Developed a novel pipeline using paddle-OCR to classify meme as political and non-political
- **Finalist: Hult Prize at BUET** *2024*

Additional Information

Languages: Bengali (Native), English (Fluent), Hindi
Interests: Robotics, Quantum Physics, Technology Innovation, Data Security, Education Science Communication