SADIQ SIRAJ EBRAHIM

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Education

Jadavpur University **2021 – 2025**
Bachelor of Engineering - Electronics and Telecommunication *Kolkata, India*
*First Class Distinction with Honours (Cum. GPA: **8.65/10**)*

South Point High School **2018 – 2020**
*Higher Secondary Education, AISSCE; Percentage: **94.2%*** *Kolkata, India*

South Point School & South Point High School **2005 – 2018**
Secondary Education, AISSE *Kolkata, India*

Research Interests

Generative Modelling, Explainable AI, Computer Vision, Hardware for AI, Face Biometrics, Hardware Security and Trustworthy AI. Currently, I am working on Explainable AI, with a focus on improving the explainability of Graph Neural Networks.

Research Experience

Imaging, Vision and Pattern Recognition(IVPR), Jadavpur University Aug 2024 - 2025
Supervisor: Dr. Ananda S. Chowdhury

- **Research Areas:** Explainable AI, Graph Neural Networks, Medical Imaging
- Currently exploring advanced explainability techniques for Graph Neural Networks, with the goal of developing a novel framework that enhances interpretability of GNNs.

Image Analysis and Biometrics Lab, IIT Jodhpur May 2024 - 2025
Supervisors: Dr. Richa Singh & Dr. Mayank Vatsa

- **Research Areas:** Generative AI, Biometrics, Facial Recognition
- Currently focused on the development of a novel generative model for facial age transformation, leveraging Generative Adversarial Networks (GANs) to achieve realistic and controllable age progression and regression.
- Conducted extensive experiments to evaluate the impact of using synthetic data versus real data for training in age-invariant face recognition. Focused on assessing the AQUAFace model's performance in handling quality and age variations in selfie vs. ID verification tasks. The experiments demonstrated the advantages of combining synthetic data with real data, leading to enhanced recognition performance across multiple challenging datasets.

Computer Vision and Data Analytics Lab, Jadavpur University Nov 2023 – Apr 2024
Supervisor: Prof. Sheli Sinha Chaudhuri

- **Research Areas:** Computer Vision, Remote Sensing
- Developed SundariNet, a novel multi-scale deep learning architecture for land cover classification in the Sunderban mangrove ecosystem, achieving 99.64% classification accuracy. The model made use of dual-polarized Sentinel-1 data and enhanced multi-scale contextual feature extraction with skip connections and inception modules. It sets a new benchmark in land cover classification.
- Conducated in-depth studies on the automatic techniques to detect mangrove deforestation by critically assessing state-of-the-art algorithms in deep learning and machine learning. Reviewed most of the sources and methodologies relating to remote sensing data.

Publications

- S. Agarwal, J. Chaudhary, **S. S. Ebrahim**, M. Vatsa, R. Singh, S. P. Adhikari, S. R. Battu, *"AQUAFace: Age-Invariant Quality Adaptive Face Recognition for Unconstrained Selfie vs ID Verification,"* accepted at **AAAI Conference on Artificial Intelligence, 2025**.
- **S. S. Ebrahim**, A. Bhattacharjee, S. Banerjee, S. S. Chaudhuri, *"SundariNet: A Multi-Scale Deep Learning Approach for Sunderban Mangrove Ecosystem Landcover Classification,"* 9th IEEE WIECON-ECE 2023, doi:10.1109/WIECON-ECE60392.2023.10456530
- A. Bhattacharjee*, **S. S. Ebrahim***, S. Banerjee, R. K. Gupta, S. S. Chaudhuri and S. Moulik *"A Critical Review of Methods for Automated Detection of Mangrove Deforestation,"* 7th International Conference on Electronics, Materials Engineering and Nano-Technology 2023, doi:10.1109/IEMENTech60402.2023.10423490

Skills Summary

Programming Languages: Python, C, C++, MATLAB, 8085 Assembly, LaTeX
Hardware Descriptive Language: Verilog
ML/DL: Sklearn, Numpy, Pandas, Matplotlib, Seaborn, PyTorch, Tenserflow, Keras, OpenCV
Hardware: Digital Circuit Design, Computer Architecture, Microprocessors, Analog Circuit Design, FPGA
Circuit Design Tools: Xilinx Vivado, ModelSim, LTspice, Circuit Maker, Multisim
Other Tools: Docker, GIT, Matlab, Google Colab, Jupyter Notebook, Adobe Illustrator, Adobe Photoshop, MS Word, MS Excel

Relevant Coursework

- Differential Calculus
- Linear Algebra
- Data Structures & Algorithms
- Signal Processing
- Computer Architecture
- Neural Networks and Deep Learning (Coursera)
- Probability & Statistics
- Control Systems Engineering
- Sequence Models (Coursera)
- Generative Adversarial Networks (Coursera)
- Internet of Things
- Digital Circuit Design
- Embedded Systems

Major Projects

HardNet: FPGA Implementation of Neural Network | *Github* | *Verilog, PyTorch* 2024
Developed a neural network for digit recognition on an FPGA platform, leveraging its parallel processing capabilities for faster inference. Custom neurons were designed using Verilog, showcasing efficient hardware acceleration.

SafeRoads: AI Enabled Accident Detection | *Github* | *PyTorch, Yolo, React* 2024
Built an AI-driven system utilizing computer vision and deep learning to analyze road footage from CCTV cameras, detecting accidents in real-time and instantly notifying emergency services.

SundariNet: A Multi-Scale Deep Learning Approach | *Python, TensorFlow, QGIS* 2023
Designed a specialized Convolutional Neural Network (CNN) for classifying land cover in the Sundarban Mangrove Ecosystem. Integrated skip connections to optimize performance across multiple convolutional layers, achieving a 99% accuracy on dual intensity phase data..

Car Number-Plate Identification and Data Extraction | *YOLO, Python, TensorFlow* 2023
Developed a model to detect car number plates in images, followed by automated data extraction. Trained on a pre-labeled dataset, this system has applications in traffic law enforcement and fugitive tracking.

WIFI based Home Automation System | *Arduino, ESP8266, Electronics* 2023
Designed an ESP8266-powered, app-controlled switchboard with relay switches, capable of managing up to four appliances simultaneously for home automation.

Detection of Breast Cancer using KNN Algorithm | *Colab* | *Scikit-Learn* 2022
Implemented a machine learning model based on the K-Nearest Neighbors algorithm to detect breast cancer, using the Breast Cancer Wisconsin dataset. Achieved a validation accuracy of 98%.

Achievements

- Achieved an overall band score of **8.0** in **IELTS Academic Exam**
- Recipient of the prestigious **SRFP fellowship** to work on cutting-edge research.
- Completed the **ACM IKDD Uplink Internship**.
- Awarded **2nd Runner-up at the IEEE WIE Hackathon** on Green Energy-based Sustainable Technology, organized by the IEEE Kolkata Section.
- Honored by IEEE COMSOC for orchestrating an Industry 4.0 IoT workshop.
- Secured **All India Rank of 361** in WBJEE among 100k competing candidates.

Volunteering Experience

- Secretary of IEEE ComSoc Studnet Chapter, Jadavpur University Jan 2024 - Present
- Class Representative for the ETCE Batch of 2025 Apr 2023 - Present
- Student Organiser, Industry 4.0 IoT workshop, in collaboration with IEEE ComSoc