SAGNIK DE

+91 9432341459 | sagnikde2003@gmail.com | LinkedIn | Github | Google Scholar | Portfolio

EDUCATION

University of Calcutta **2021-2025**
Bachelor of Technology (B.Tech) | Electronics and Communication Engineering *Kolkata, India*
CGPA: **8.54/10**

Don Bosco School **2021**
Indian School Certificate Examination (ISC) | Class XII *Liluah, India*
Aggregate: **96.25%**

Don Bosco School **2019**
Indian Certificate of Secondary Education (ICSE) | Class X *Liluah, India*
Aggregate: **95.40%**

RESEARCH EXPERIENCE

Indian Institute of Technology (IIT), Delhi **Dec 2024 – May 2025**
Winter Research Intern | Neurocomputing Lab *Delhi, India*

- Graph-based deep learning methods with explainable AI for **anxiety state detection** using brain signals
- Working on graph-based deep learning models for **real-time seizure prediction** in humans using **iEEG**

Maulana Azad National Institute of Technology **Aug 2024 – Nov 2025**
Research Intern | Biomedical Signal Processing Lab *Bhopal, India*

- Development of deep learning assisted solutions for **identification** of **Alzheimer's Disease** and **Frontotemporal Dementia** from EEG signals
- Implementation of a deep learning framework utilizing **cross-modal interactions** for **cognitive task decoding** in **BCI applications** using **EEG–fNIRS** signals.

Indian Institute of Science (IISc), Bengaluru **May 2024 – July 2024**
IASc-INSA-NASI Summer Research Fellow | SPIRE Lab *Bengaluru, India*

- Data-driven approach to predict **acoustic field** in a **rectangular domain** at an arbitrary frequency
- **Dysarthric Speech** processing and analysis for identification of **Parkinson's Disease**

International Institute of Information Technology **Dec 2023 – May 2024**
Winter Research Intern | Biomedical & Speech Processing Lab *Naya Raipur, India*

- Multimodal deep learning based **end-to-end** IoMT framework for diagnosis of **Major Depressive Disorder (MDD)** using EEG and Speech Signals
- Unimodal deep learning approach for objective **detection** and **monitoring** of **MDD** using EEG signals

Centre for Development of Advanced Computing (CDAC) **Apr 2023 – Oct 2023**
Summer Research Intern | High Performance Computing I&E Group *Pune, India*

- EEG-based early detection of **Parkinson's Disease** using advanced signal decomposition and deep learning techniques
- Development of **quantum deep learning algorithms** for analyzing alert and drowsy brain states using multimodal sensor data
- Designed a real-time **ECG data acquisition system** using **STM32 microcontroller**, integrated with a **mobile app** for atrial fibrillation detection

University of Calcutta **Oct 2022 – Apr 2025**
Undergraduate Research Assistant | AI & Robotics (AIR) Lab *Kolkata, India*

- Multimodal deep learning approach using **EEG and sEMG** signals for **Lower Back Pain** assessment
- Explored **brain activity patterns** associated with different **Basic Taste (or gustory)** perception, integrating deep learning methods for enhanced classification
- **B.Tech Thesis:** A **Fuzzy Relation** induced **Causal Brain Connectivity Network** decoding using metaheuristically optimized Hybrid Graph Convolution Network

SELECTED PUBLICATIONS

200+ citations across all publications. A complete list of publications can be found on my **Google Scholar**

Journal Articles

- **S. De**, A. Singh and A.K. Bhandari, "A Novel Vision Transformer based Multimodal Fusion Approach for Clinical MDD Diagnosis Using EEG and Audio Signals," *IEEE Transactions on Computational Biology and Bioinformatics*
- **S. De**, S. Pavuluri, and A. K. Gupta, "Identification of patients with de novo Parkinson's Disease from chemosensory EEG signals using ICEEMDAN domain Entropy Features," *IEEE Sensors Letters*
- **S. De**, P. Mukherjee, and A. H. Roy, "GLEAM: A Multimodal Deep Learning Framework for Chronic Lower Back Pain Detection using EEG and sEMG Signals," *Computers in Biology & Medicine, Elsevier*
- **S. De**, P. Mukherjee, and A. H. Roy,"TasteNet: A Novel Deep Learning Approach for EEG-Based Basic Taste Perception Recognition Using CEEMDAN Domain Entropy Features," *Journal of Neuroscience Methods, Elsevier*
- **S. De**, A. Singh, V. Tiwari, H. Patel, GN Vivekananda, and D.S Rajput, "SLiTRANet: An EEG-based Automated Diagnosis Framework for Major Depressive Disorder Monitoring using a Novel LGCN and Transformer-based Hybrid Deep Learning Approach," *IEEE Access*

Under Review/Pre-prints

- **S. De** and T. K. Gandhi, "HYGRA: A Hybrid Graph Connectivity Framework for EEG-based Human Anxiety State Identification," *IEEE Signal Processing Letters*
- **S. De**, V. Bajaj and A. J. Prakash, "KAN-ADViT: A Modified Vision Transformer with Kolmogorov Arnold network for Alzheimer's Disease Detection using EEG signals," *IEEE Sensors Journal*
- **S. De**, P. Mukherjee, and A.H. Roy, "A Novel Capsule Network with Explainable AI-driven channel selection for Neuropathic Pain diagnosis from EEG signals," *IEEE Signal Processing Letters*

Conferences

- **S. De**, S. Pavuluri, A. Sayyad and A. K. Gupta, "Maestro: A Robust Multi-Head Attention Enhanced CNN Architecture for Heat-Induced Stress Recognition Using EEG Signals," *IEEE CSITSS 2024*
- **S. De**, A. Sayyad, H. Kotian and A.K. Gupta, "ParViT: A modified Vision Transformer architecture for Parkinson's Disease identification using EEG signals," *IEEE ICSSES 2024*
- **S. De**, and A.K. Gupta, "A Quantum Machine Learning framework for Driver Drowsiness Detection using Biopotential Signals and Head Movement Analysis," *IEEE ICWITE 2024*
- **S. De**, P. Mukherjee, and A. H. Roy, "A Hybrid Pain Assessment Approach with Stacked Autoencoders and Attention-Based CP-LSTM," *IEEE AIKIIE 2023*

PATENTS

An Innovative Method for Estimating Blood Pressure and Classifying Hypertension Levels Using PPG, Sagnik De, Prithwijit Mukherjee, Anisha Halder Roy, Application No.: 202431068453 A, Indian Patent Journal, India **(Published on 20/09/2024)**

AWARDS & HONOURS

Recepient of **INSA-IASc-NASI Summer Research Fellowship 2024**

Recepient of **Satyendra Nath Bose Summer Research Internship 2024**, **NIT Silchar**

Won the 3rd Runners Up in **TELECAST 2024** organized by **University of Calcutta, Kolkata** in collaboration with **CTiF (Denmark), India**

Awarded the **Outstanding Volunteer 2023-24** by **IEEE Calcutta University Student Branch**

Won the 1st Prize in **COGNITECH 2023**, organized by the **AI & Robotics Club** in collaboration with the **IEEE Calcutta University Student Branch**.

Won the 1st Prize in **Research Work Presentation 2023** organized by **IEEE Photonics Society Kolkata Chapter, IEEE APS Kolkata Chapter** & **IEEE Calcutta University Student Branch**

LEADERSHIP & OUTREACH

Secretary, IEEE Calcutta University Student Branch (CUSB) **Nov 2023 – Apr 2025**
President, AI & Robotics Club, IEEE CUSB **Nov 2023 – Apr 2025**
Founding Secretary, AI & Robotics Club, IEEE CUSB **May 2023 – Oct 2023**
Media Coordinator, Hult Prize, University of Calcutta Chapter '23 **Sep 2022 – Jan 2023**
Outreach Coordinator, Hult Prize, University of Calcutta Chapter '22 **Jan 2022 – Mar 2022**

RELEVANT COURSEWORK

Artificial Intelligence & Machine Learning, Data Structures and Algorithms, Digital System Design, Signals and Systems, Engineering Mathematics, Computer Architecture and Organization, Digital Signal Processing

TECHNICAL SKILLS

Programming: Python, Java, C, Javascript, MATLAB
Softwares: Freesurfer, Nilearn, FSL, SPM, AFNI, Anaconda, EEGLab, Git
Web Technologies: HTML/CSS, Django, React
Frameworks & Libraries: PyTorch, TensorFlow, Keras, NiBabel, OpenCV, Sci-Kit Learn, Pillow, Flask