# SAGNIK DE

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## EDUCATION

**University of Calcutta**                                                                 **2021-2025**
*Bachelor of Technology (B.Tech) | Electronics and Communication Engineering*         *Kolkata, India*
CGPA: **8.54/10** *(Rank-5th)*

**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%**

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## RESEARCH EXPERIENCE

**Indian Institute of Technology (IIT), Jodhpur**                            **May 2025 – Present**
*Project Associate | Advisor: Dr. Dipanjan Roy*                                         *Jodhpur, India*
- Modulation of **brain oscillations** with **tACS** to influence **Speech perception**

**Indian Institute of Technology (IIT), Delhi**                            **Dec 2024 – May 2025**
*Winter Research Intern | Advisor: Dr. Tapan Kumar Gandhi*                                 *Delhi, India*
- Optimization of deep learning models for **multimodal anxiety detection** using biopotential signals

**Maulana Azad National Institute of Technology**                            **Aug 2024 – Present**
*Research Intern | Advisor: Dr. Varun Bajaj*                                             *Bhopal, India*
- Development of deep learning approaches for **identification of Dementia** from brain signals

**Indian Institute of Science (IISc), Bengaluru**                          **May 2024 – July 2024**
*IASc-INSA-NASI Summer Research Fellow | Advisor: Dr. Prasanta Kumar Ghosh*           *Bengaluru, India*
- **Dysarthric Speech** Processing and Analysis for identification of **Parkinson's Disease**

**International Institute of Information Technology**                       **Dec 2023 – May 2024**
*Winter Research Intern | Guide: Dr. Anurag Singh*                                   *Naya Raipur, India*
- Multimodal approach for **Major Depressive Disorder** diagnosis using advanced deep learning methods

**Centre for Development of Advanced Computing (CDAC)**                     **Apr 2023 – Oct 2023**
*Summer Research Intern | Guide: Dr. Anil Kumar Gupta*                                     *Pune, India*
- **Deep Learning algorithms** for distinguishing normal and pathological brain states (healthy vs. disease)
- EEG-based early detection of **Parkinson's Disease** using deep learning techniques

**University of Calcutta**                                                  **Oct 2022 – Apr 2025**
*Undergraduate Researcher | Guide: Dr. Anisha Halder Roy*                               *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

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## SELECTED PUBLICATIONS

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

### Journal Articles

- **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**, A. Singh, V. Tiwari, H. Patel, GN Vivekananda, 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*

- **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**, 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*

## Under Review/Pre-prints

- **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** 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, **"A Modified Vision Transformer for Identification of Frontotemporal Dementia and Alzheimer's Disease using EEG Signals,"** *IEEE Sensors Journal*

## 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

## ▬ 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 & ACHIEVEMENTS

Recepient of **IASc-INSA-NASI Summer Research Fellowship Program 2024** and **Satyendra Nath Bose Summer Research Internship Program 2024**, NIT Silchar

Serving as Reviewer for **IEEE Access**, **Artificial Intelligence In Medicine**, **Biomedical Signal Processing & Control**, **Food Chemistry**, **Biological Psychology**, **Scientific Reports** journals

Among **top 5 students** for academic performance in undergraduate program in the department

Won the 3$^{rd}$ Runners Up in **TELECAST 2024** organized by **University of Calcutta, Kolkata** in collaboration with **CTiF, India**

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

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

## ▬ POSITIONS OF RESPONSIBILITY

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|---|---|
| **Secretary**, IEEE Calcutta University Student Branch | **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
**Frameworks & Libraries:** PyTorch, TensorFlow, Keras, NiBabel, OpenCV, Sci-Kit Learn, Pillow, Flask

## REFERENCES

**Dr. Tapan Kumar Gandhi**
Professor
Dept. of Electrical Engineering
Indian Institute of Technology (IIT), Delhi, India
*tgandhi@iitd.ac.in*

**Dr. Anisha Halder Roy**
Assistant Professor
Institute of Radio Physics & Electronics
University of Calcutta, Kolkata, India
*ahrrpe@caluniv.ac.in*

**Dr. Varun Bajaj**
Associate Professor
Dept. of Electronics & Communication Engineering
Maulana Azad National Institute of Technology (MANIT), Bhopal, India
*varun.bajaj@manit.ac.in*

**Dr. Anurag Singh**
Associate Professor
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