SAGNIK DE

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EDUCATION

University of Calcutta **Oct 2021 - Present**
Bachelor of Technology (B.Tech) | Electronics and Communication Engineering *Kolkata, India*
CGPA: **8.83/10**

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: **95.00%**

RESEARCH EXPERIENCE

Indian Statistical Institute **June 2023 – Aug 2023**
Summer Research Intern | Guide: Prof. Sankar Kumar Pal *Kolkata, India*

- Working on the development of a novel architecture - **Granulated Mask-RCNN**, which incorporates the principles of granulation in Deep Learning models.
- Future Direction -We aim to apply this architecture on real-time videos for tracking of objects.

Carnegie Mellon University **Feb 2023 – Present**
Remote Research Intern | Guide: Prof. Min Xu *Pittsburgh, United States*

- Currently working on the **visualization** and **analysis** of **RNAscope images**, in collaboration with **Centre for Neuroscience**, **University of Pittsburgh**.
- Performed manual annotation for **semantic segmentation** of cell nuclei on a **novel dataset** and subsequently fine tuned the **UNet** model trained on **S-BSST265 dataset** against our annotated data.

Centre for Development of Advanced Computing [Certificate] **Jan 2023 – June 2023**
Research Intern | Guide: Dr. Anil Kumar Gupta *Pune, India*

- Co-authored two book chapters by analytically reviewing the importance of **Knowledge Graphs** and **Federated Learning** and their application in Smart Healthcare.

University of Calcutta [Certificate] **Oct 2022 – Ongoing**
Undergraduate Researcher | Guide: Prof. Anisha Haldar Roy *Kolkata, India*

- Developed **hybrid deep learning classifiers** for human activities based on acquired **EEG, ECG and PPG** signals.
- Implemented diverse **handcrafted** and **automated feature extraction** techniques on **EEG and EMG data**.
- Designed a **hardware architecture** for data acquisition and processing through wireless sensors.

PUBLICATIONS

JOURNALS:

- **S. De** and A. H. Roy, **IntelliNet: EEG-Based IQ Classification Using Stacked Sparse Autoencoders and Attention-enhanced Modified TLSTM Neural Network** [UNDER REVIEW], **Computer Methods in Biomechanics and Biomedical Engineering**

CONFERENCES:

- D. Konar, **S. De**, P. Mukherjee, and A. H. Roy, **A Novel Human Stress Level Detection Technique Using EEG** [ACCEPTED], **IEEE NMITCON 2023** [Paper]
- **S. De**, P. Mukherjee, and A. H. Roy, **A Novel Deep Learning-Based Approach for Hypertension Level Detection Using PPG** [ACCEPTED], **IEEE SILCON 2023**
- **S. De**, P. Mukherjee, and A. H. Roy, **A Hybrid Pain Assessment Approach with Stacked Autoencoders and Attention-Based CP-LSTM** [ACCEPTED], **IEEE AIKIIE 2023**

- **S. De**, P. Mukherjee, and A. H. Roy, **EEG-Based Intelligence Quotient Assessment Using 1D Convolutional Neural Network** [ACCEPTED], **IEEE CODEC 2023**
- **S. De**, **ResNet-152 Based Squeeze and Excitation Neural Network for Alzheimer's Disease Classification** [UNDER REVIEW], **IEEE CAI 2024**
- **S. De**, P. Mukherjee, D. Konar, and A. H. Roy, **AromaNet: Integrating Attention Mechanism with Convolutional Neural Network for Olfactory Perception Classification Using EEG signals** [ACCEPTED], **IEEE C2I6 2023**
- **S. De**, P. Mukherjee, D. Konar, and A. H. Roy, **EEG-Based Taste Perception Classification Using PCA enhanced Attention-TLSTM Neural Network** [ACCEPTED], **IEEE C2I6 2023**
- **S. De**, P. Mukherjee, D. Biswas, and A. H. Roy, **A Fusion of CNN and Grey Wolf Optimization-enhanced BiGRU for Epileptic Seizure Detection Using EEG Signals** [UNDER REVIEW], **IEEE ICMNWC 2023**

BOOK CHAPTERS:

- **Sagnik De**, Soumit Ghosh and Anil Kumar Gupta, ***Powering Digital Healthcare with Knowledge Graphs and Federated Learning***, [ACCEPTED] for Book titled **Federated Learning for Digital Healthcare Systems, Elsevier**
- **Sagnik De**, Soumit Ghosh, Ananya Aggarwal, and Anil Kumar Gupta, ***Federated Learning Powered Healthcare Informatics for Digital Healthcare Systems***, [UNDER REVIEW] for Book titled **Federated Learning for Digital Healthcare Systems, Elsevier**

KEY PROJECTS

Application of Brain-Computer Interface in Gaming Addiction Analysis **2023**

- Developed and implemented a novel architecture, **Stacked Autoencoder-ATTN-BiLSTM** for predicting four distinct stages of **gaming addiction** based on acquired **EEG signals** and examined the impact of light music on urges to play in gaming addicts.
- Observed **brain activity patterns** with the identified **stages of gaming** to gain insights into the emotional experiences during gameplay.

Alzheimer's Disease Prediction **2023**

- Developed and implemented a novel framework, **SE-ResNet-152** for predicting four distinct stages of **Alzheimer's Disease** dementia in humans.
- Implemented **Squeeze-and-Excitation Networks (CVPR 2018)** in **Residual Network** architecture after in-depth analysis.

Human Activity Recognition **2022-2023**

- Developed a novel **hybrid deep learning** algorithm, **CNN-TLSTM** for human activity recognition.
- The experiment was conducted on **UCI HAR dataset**, which produced **better results** than the traditional approach.

AWARDS & ACHIEVEMENTS

Won the First Prize in **Research Work Presentation Competition 2023** organized by **IEEE Photonics Society Kolkata Chapter, IEEE APS Kolkata Chapter & IEEE Calcutta University Student Branch.** [Certificate]

Won the First Prize in **Cognitech 2023** organized by **AI & Robotics Club** in collaboration with **IEEE Calcutta University Student Branch.** [Certificate]

POSITIONS OF RESPONSIBILITY

Secretary, IEEE Calcutta University Student Branch **Nov 2023 – Present**
Asst. Secretary, AI & Robotics Club, IEEE Calcutta University Student Branch **May 2023 – Present**
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

TECHNICAL SKILLS

Programming: Python, Java, C, Javascript, MATLAB
Frameworks/APIs: PyTorch, Tensorflow, Keras
Libraries/Modules: Matplotlib, Sklearn, OpenCV