Mainak Chakraborty

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Full-time PhD Student at IIT Delhi

Education

9.00/10.0 **PhD in Artificial Intelligence, SENSE (PMRF fellowship)**, *Indian Institute of Technology, Delhi* (QS Ranking 2024: 150(O)|45(S)) | New Delhi, India — *2021-Ongoing*

9.07/10.0 **MTech in Mechatronics and Robotics Engineering(GATE fellowship)**, *Indian Institute of Engineering Science and Technology, Shibpur* | Shibpur, India — *2019-21*

Teaching Assistantship: Machine Learning in Bengali (NPTEL-2024)- Prof. Adway Mitra (**Video Link**)| Machine Learning(NPTEL-2024)-Prof. Carl Gustaf Jansson (**Video Link**)| Statistical Inference(NPTEL-2023)-Prof. Niladri Chatterjee (**Video Link**)|
Achievements: IEEE SPS fellowship (2024)|PMRF fellowship(2021)|GATE fellowship(2019)
Courses: Machine Learning | Computational Perception and neuroscience | Embedded systems and application | Robotics |

Experience

Hindu College(Delhi University), *Course Instructor* | New Delhi — *Jan 2023 - Jan 2024*
- Course Instructor for Sensor-based Machine Learning Project.
- Guided a student team in developing and deploying a deep learning model on edge devices.

Jawaharlal Nehru University(JNU), *Guest Lecturer* | New Delhi — *March 2023 - Aug 2023*
- Taught and evaluated Introduction to Electrical and Electronics Engineering (EN-112), for 120 students.
- facilitating project-based assignments to enhance practical skills and critical thinking **Project Link**.

Etaaide, *Product Architect –Deep learning Engineer* | New Delhi, India — *Dec 2021 - Aug 2022*
- Led a 4 member team of IIT Delhi to built vibration sensor-based early warning system for predictive maintenance.
- Winner of TIDE 2.0 grant(12K USD), Incubated at IIT Mandi and IIM Bangaore.

RemoCare, *Research internship* | India — *May 2021 – October 2021*
- Led a team of two interns to develop a remote arrhythmia classification(ECG data) module using Bi-LSTM deployed on mobile.
- Detection of 8types of arrhythmia.

CSIR-Central Mechanical Engineering Research Institute, *Research Assistant(AI)* | India — *May 2020-May 2021*
- Investigated the possibility of human activity recognition using seismic data classification.
- Developed robust ensemble learning algorithms for various human activity detection using CNN,LSTM.

Publications

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- M. Chakraborty, Chandan, Anchal, S., Mukhopadhyay, B., Kar, S. (2025). “VibeGait: Enhancing structural-vibration based gait recognition using vision.” [Accepted in ICASSP, 2025]
- M. Chakraborty and S. Kar, “Enhancing Person Identification Through Data Augmentation of Footstep-Based Seismic Signals”, in IEEE Signal Processing Letters, vol. 30, pp. 1642-1646, 2023, doi: 10.1109/LSP.2023.3327650.
- M. Chakraborty, M. Das and S. Aruchamy, “Micro-Seismic Event Detection using statistical feature extraction and machine learning techniques”, 2022 IEEE 7th International conference for Convergence in Technology (I2CT), Mumbai, India, 2022, pp. 1-5, doi: 10.1109/I2CT54291.2022.9824819.
- M. Chakraborty, S. A, S. Reddy, S. Kumar Mandal and S. Bhaumik, “Human Action Classification using seismic sensor and machine learning techniques”, 2021 5th International Conference on Information Systems and Computer Networks (ISCON), Mathura, India, 2021, pp. 1-6, doi: 10.1109/ISCON52037.2021.9702317.
- Chandan, M. Chakraborty, S. Anchal, B. Mukhopadhyay and S. Kar, “GajGamini: Mitigating Man–Animal Conflict by Detecting Moving Elephants Using Ground Vibration-Based Seismic Sensor”, in IEEE Sensors Letters, vol. 8, no. 9, pp. 1-4, Sept. 2024, Art no. 6011504, doi: 10.1109/LSENS.2024.3442830.

Patents

2024 **System and method for elephant detection by a one-dimensional architecture CNN-S Kar, M Chakraborty, Chandan, B Mukhopadhyay, S Anchal**, Patent Filed: 202411060463 — *India*

2023 **Person identification through data augmentation of footstep-based seismic signals-S Kar, M. Chakraborty**, Patent Filed:202311045408 — *India*

2022 **An early micro-seismic event detection. Patent Application Number- M. Chakraborty**, Patent Filed: 202231028771 — *India*

Projects

Wild Elephant Detection using non-invasive sensors *March 2024-August 2024*

Personal Project

- We proposed Gaj-Gamini, a seismic sensor-based solution for detecting elephants through ground vibrations aimed at mitigating human-animal conflicts
- **Links: IEEE Xplore**

Illustrated Notes on Selected Lectures of MIT 6.034 Artificial Intelligence, Fall 2010 by Late Prof. Patrick Winston *Jan 2024-April 2024*

Personal Project

- A workshop based on the notes on the AI lectures by Prof. Winston.
- **Links: Lecture Notes**,**Youtube Video**

Cognitive Load Estimation *Dec 2022 - April 2023*

Personal Project

- A detailed review of Cognitive load estimation has been studied across domains for the last three decades.
- Three types of modalities has been investigated: **smart wearables, eye-tracking and EEG**
- An open-source EEG dataset is considered for experimenting. p-value metrics is used for feature selection. 10-fold cross validation is implemented over the dataset 97.47%.
- **Links: Github**,**Medium**,**Research Gate**

Safety Monitoring of Warehouse Staff *Jan 2021- May 2021*

Wobot.ai

- Integrated **YOLOv5** with custom object detection (mask or no-mask) in real-time video feed of a warehouse.
- Collected custom data, built and deployed model over triton server.
- **Links: Github**

Multi-Modal Human Activity Recognition Using vision and vibration sensor *May 2020 - Dec 2020*

IEEE International Conference on Information Systems and Computer Networks[ISCON] (Paper Published)

- In this work, we propose a novel method that can be used for passive human activity classification using camera and geophones, signal processing and ensemble learning techniques.
- **Links: IEEE Xplore**

Skills

Programming Python, C/C++, C#, embedded C,CUDA, Matlab, Git, Scripting (Bash), LaTeX, HTML

Software Linux, Tensorflow, Pytorch, Docker, OpenCV, OpenSim,AnyBody Technology,SCONE, Unity Engine

Certifications Tensorfow Developer Certificate [ID:87883013](2023) | Associate Member of the Institution of Engineers(AMIE) [ID: AM3115693]–(2023)| Deeplearning.ai Tensorflow Developer(2021)|

Volunnteering

2020	**IIEST Covid-19 Volunteering team**,	*Kolkata*
2021	**Proxmaq**, Computer Vision Engineer	*Remote*
2023	**Hindu College**, Deep Learning Workshop(AtoZ) for Delhi University Students	*New Delhi*
2024	**Youth Ideathon 2024**, Mentor at India's largest high school-level competition of ideas	*Remote*

Achievements and Events

2015	**ASDC Scholarship**, within top 1% among batch	*India*
2019	**GATE fellowship**, within top 6% among 167376 candidates	*India*
2022	**PMRF Scholarship**, within top 0.5% of candidates among 2,12,568 candidates	*India*
2023	**TensorFlow Developer Certificate**, Credential ID:87883013	*Remote*
2024	**ETH Zurich+Universitätsklinik Balgrist**, Machine Learning Summer School	*Zurich*
2024	**University of Genoa, Italy**, Workshop on Applied Harmonics and Machine Learning	*Genoa*
2024	**IEEE SPS Scholarship**, 2024 IEEE Signal Processing Society Scholarship recipient	*USA*