

Yashaswini

Indian Institute of Technology Kharagpur

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Education

Program	Institution	CGPA	Year
Bachelor of Technology in Electrical Engineering (Major)	IIT Kharagpur	8.53/10	2020-25
Bachelor of Technology in Computer Science & Engineering (Minor)	IIT Kharagpur	8.78/10	2020-25
Master of Technology in Signal Processing & Machine Learning	IIT Kharagpur	9.24/10	2020-25
NeuroAI Summer School, Deep Learning Summer School	Neuromatch Academy		2024,2022

Research Experience

M.Tech. Project [Link] IndiaAI Fellowship Award
Supervisor: Prof. Sanjay Ghosh IIT Kharagpur
August 2024 - present

- Developed a machine learning solution for **Brain Fingerprinting** i.e, identifying individuals based on their **functional connectomes** using **Convolutional Autoencoder** and **Sparse Dictionary learning**
- Model was trained on resting-state fMRI data and tested on various task fMRI data from the **HCP dataset**

Research Intern [Link] NeurAI Lab
Supervisors: Prof. Bahram Zonooz, Prof. Elahe Arani, and Fahad Sarfaraz TU Eindhoven
May 2024 - present

- Explored **associative memory-based replay** similar to the neocortex-hippocampus interactions, for continual learning
- Employed the **Universal Hopfield Network** framework to model associative memory.

B.Tech Project [Link] Information Processing Lab
Supervisor: Prof. Sharba Bandyopadhyay IIT Kharagpur
August 2023 - present

- Developed a computational framework that models the emergence of **auditory receptive fields** through synaptic adaptation driven by **surprise** across multiple timescales, and **efficient coding** principles
- Demonstrated that a single-layer network, updated by a surprise-driven unsupervised learning approach, achieves biologically plausible auditory tuning characteristics, aligning with known neurophysiological data of auditory neurons.

Deep Learning Research Intern [Link] Griffith Sciences Group
Supervisor: Prof. Belinda Schwerin Griffith University
May 2022 - July 2022

- Developed a solution for continuous monitoring of fetal well-being using Residual Convolutional Autoencoder
- Applied Wavelet Transform for removing baseline wander and Pan-Tompkins algorithm for R-peak detection

Conference Submission

- Yashaswini, Sharba Bandyopadhyay. Emergence of Auditory Receptive Fields Based on Surprise at Multiple Timescales** (Submitted and under review at Computational and Systems Neuroscience (**COSYNE**) Conference, 2025.)

Achievements

- Awarded the **IndiaAI Fellowship** by the Government of India to advance AI research and innovation
- Awarded **Generation Google Scholarship** 2021 for Women in Computer Science: **70 students** from **25 countries** were selected in the Asia Pacific region
- Awarded **full scholarship** at the Chennai Mathematical Institute: B.Sc. Mathematics & Computer Science
- Ranked among the **top 0.5%** of the candidates (in a pool of 1.2 million) in IIT-JEE 2020

Selected Coursework/Personal Projects

1. Reinforcement Learning-based Grid World Survival Agent

Reinforcement Learning: Python

IIT Kharagpur

- Developed a $N \times N$ **grid world** simulation where a runner evades **K taggers**, including the design of the environment class with observation/action spaces and a reward structure.
- Implemented **Value Iteration** and **Temporal Difference** Learning algorithms, compared their performance, visualized results using Python and matplotlib, and analyzed scalability of the learning algorithms.

2. Exploring capabilities of Hebbian Learning for MNIST Classification

Hebbian Deep Learning: PyTorch

NeuroAI Neuromatch

- Implemented **Hebbian** and **Soft-Hebbian** learning rules for MNIST 2-class classification
- Observed the **effect of various hyperparameters** on the stability and accuracy of the Hebbian learning algorithms. Tanh activation function and Normal weight initialization with a standard deviation of 0.1 gave the best results
- Combined **Hebbian learning with Tanh activation in the hidden layer** and **Soft-Hebbian learning in the output layer** to get the best results

3. Audio Classification using Deep Learning

Audio Deep Learning: PyTorch, TorchAudio, nnAudio

Github

- Developed a model for **environmental sound classification** using **CNN** on **UrbanSounds dataset**.
- Evaluated model performance by training it on both **log-mel spectrograms** and **gammatonegrams**, which are more biologically plausible representations of audio.

4. Neural Encoding and Decoding of Spike Statistics

Computational Neuroscience: Prof. Sharba Bandhopadhyay

IIT Kharagpur

- Analysed **spike times of 4 neurons** in an **auditory area of the brain**, in response to a white noise stimulus.
- Identified the **features of the stimulus encoded** by each neuron, by analysing their spike-triggered average.

Teaching Experience

- Teaching Assistant for **Computational Neuroscience** online course offered by IIT Kharagpur on National Programme on Technology Enhanced Learning (NPTEL)
- Teaching Assistant for **Electrical Technology** course at IIT Kharagpur (ongoing)
- Taught at Golden Ratio Association of Mathematics: [Combinatorics problem solving series on YouTube](#)
- Taught **English** and **Mental ability** to underprivileged students of class 5 at **Gopali Youth Welfare Society**

Initiatives

- Co-Founder of [brAI'n - Neuroscience reading group](#) at IIT Kharagpur to spread awareness about Neuroscience related fields among Engineering students
- Wrote blogs to help NeuroAI students: [Optimization in Deep Learning](#), [Single Neuron Models](#)
- Attended the **From Molecules to Mind** 2024 symposium by the Centre for High Impact Neuroscience and Translational Applications (CHINTA) [Certificate](#)

Relevant Coursework and Skills

- IIT Kharagpur** : Computational Neuroscience, Neuronal Coding of Sensory Information, Statistical Signal Processing, Probability and Random Processes for Signals and Systems, Convex Optimization
- IIT Kharagpur** : Linear Algebra, Numerical and Complex Analysis, Probability and Statistics, Advanced Calculus, Real Analysis, Information Theory and Coding, Algorithmic Game Theory
- IIT Kharagpur** : Artificial Intelligence Foundations and Applications, Deep Learning Foundations and Applications, Reinforcement Learning (ongoing), Information Retrieval, Natural Language Processing (ongoing)
- Online Courses** : Introduction to Generative AI, Create Machine Learning Models in Microsoft Azure, Convolutional Neural Networks in TensorFlow, Machine Learning Explainability, Neural Networks in Deep Learning
- Skills** : C/C++, MATLAB, Python, PyTorch, Torchvision, TorchAudio, TensorFlow, scikit-learn, OpenCV, Arduino