

Shaurya Goyal

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Education

Indian Institute of Technology (IIT), Kharagpur

2020 - 2025

BS-MS in Economics Minors : Math, Biology, Artificial Intelligence

CGPA: 8.6

Grade 12 (HSC): 92% **Grade 10 (ICSE):** 95%

Awards and Scholarships

ISTern, IST Austria Summer Program and Oead Scholarship	2023
MITACS Globalink Summer Internship [Declined]	2023
Summer Research Award, Next Gen Scientists Foundation	2022
International Research Fellowship, IIT Kharagpur Foundation	2022
Selected for PhD-level inStem workshop on Stem Cells [and funded by Govt. of India]	2022
Selected for ICTP-ICTS PhD-level Winter School in Sensorimotor Control	2021
Selected for IIT Kharagpur Student Excellence Award [declined for MCM]	2021
Top 5% grade across batch of 1800 students in the institute at the end of 1st year	2021
Merit-Cum-Means (MCM) Scholarship, IIT Kharagpur [full tuition + stipend]	2020-Ongoing
Top 1% in JEE Advanced from 150,000 selected students across India	2020
Top 0.8% in JEE Mains from over 1 million students across India	2020
Selected as Times Scholar from 300,000+ students and felicitated by Vice-President of India	2019

Publication

Subbalakshmi, A.R., Sahoo, S., Manjunatha, P., **Goyal, S.**, et al. The ELF3 transcription factor is associated with an epithelial phenotype and represses epithelial-mesenchymal transition. J Biol Eng 17, 17 (2023). <https://doi.org/10.1186/s13036-023-00333-z>

Research Experience

Reactivation of goal locations

May 2022 – Ongoing

IST Austria — Prof Jozsef Csicsvari

In-Person

- Analyzing how CA1 reactivation events code for possible goals across contexts

Place Field Remapping and Memory Stabilization

October 2022 – Ongoing

University College London — Prof Dan Bendor

In-Person/Remote

- Developed a novel bayesian decoding model to study place field remapping in sleep
- Analyzing rat CA1 data during wake and sleep to study memory stabilization in novel environments
- Spike sorting and clustering using Kilosort, KlustaKwik and Phy

Neuro Inspired Reinforcement Learning

February – September 2022

Brown University — Prof Michael J Frank

Remote

- Developed an actor-critic deep reinforcement learning model motivated by striatum dopamine circuits
- Created a base deep learning architecture using CNNs and RNNs and implemented the model and A2C
- Compared performance with A2C on Atari games sparse rewards and varying reward statistics

White-Grey-Opaque Plasticity in Yeast

June 2022 – October 2022

Indian Institute of Science (IISc), Bangalore — Prof Mohit Kumar Jolly

Remote

- Constructed gene network controlling white-grey-opaque plasticity in Candida Albicans using literature
- Using non-linear differential equations and machine learning to identify critical links controlling grey state
- Analyzed switching dynamics and multistability using bifurcations and stochastic simulations

Epithelial-Mesenchymal (EMT) Plasticity in Cancer

November 2021 – June 2022

Indian Institute of Science (IISc), Bangalore — Prof Mohit Kumar Jolly

Remote

- Investigated the clinical outcome of ELF3 expression in ER+ breast cancer and tamoxifen resistance
- Found increased PD-L1 induced immune evasion that was driven by increasing ELF3 levels
- Used Gaussian Mixture Modelling, K-Means Clustering, UMAP, PCA, Regression etc

Phylogenetic Analysis of Eukaryote Evolution

April 2021 – May 2022

IIT Kharagpur — Prof Riddhiman Dhar

Remote

Graph Fourier Transform

July – October 2021

IIT Kharagpur — Prof Sanand Athalye

Remote

Skills

Programming: Python, MATLAB, Linux (Bash), HPC (SLURM), PyTorch

Wet Lab (Beginner): Cell Culturing, RT-PCR, Immunocytochemistry, Gel Electrophoresis

Relevant Coursework

Neuro: Computational Neuroscience¹, Computational Cognitive Neuroscience², General Psychology

CS: Machine Learning², Artificial Intelligence¹, Deep Learning², Signals and Systems², Algorithms^{1,2}

Math: Probability, Statistics, Non-Linear Dynamics², Numerical Analysis, Linear Algebra

Bio: Systems Biology¹, Molecular and Cell Biology, Cancer¹

Other: Econometrics 1 & 2, Data Analysis Lab, Linear Programming, Schizophrenia³

¹ PhD level course, ² Online from Stanford, MITOCW etc, ³ Coursera

Selected Projects

Simulation & Classification of Theta-Gamma Oscillations

2022

- Simulated LFP signals with multiple slow and fast components corresponding to theta-gamma frequencies
- Identified distinct phase - frequency coupled states using clustering and neural signal processing

Do bike lanes increase bike commuter rates ?

2022

- Used two-stage multivariate regression and error testing to investigate the causal impact of bike lanes

Computational Neuroscience Mini-Projects

2022

- Analyzed epilepsy - normal EEG data, Analyzed tuning curve of visual neurons, Estimated auditory receptive field, Perceptron classification, Dimensionality reduction and decoding activity, Simulated a LIF neuron

Reinforcement Learning to Play Pong

2021

- Built a reinforcement learning agent that uses deep Q-learning and learns from pixel data to play Pong

Workshops / Conferences Attended

Neuromatch Conference 5.0

2022

Computational Neuroscience - Neuromatch Academy

2022

Essential Stem Cell Lab Techniques - inStem and NCBS, Bangalore, India

2022

Sensorimotor Control - ICTP & ICTS

2021

Neuromatch Conference 4.0

2021

High Performance Computing and AI for Biology - IIT Kharagpur

2021

Leadership / Extracurricular

- 1st year Academic mentor 3 students (2023), 6 students (2022); english mentor 4 students (2022)
- National level debate tournaments as a member of the Debating Society, IIT Kharagpur
- Represented institute in the Inter-IIT Scrabble Tournament
- Silver Medal in National Taekwondo Championship (2017) and 1st Dan Black Belt

Other Interests: Guitar, Hiking, Cooking, Running, Star Wars, Museums, Ultimate Frisbee