Pursuing a Minor in **AI and Data Science** at Centre for Machine Intelligence and Data Science

Scholastic Achievements

- Secured All India Rank **817** in Joint Entrance Examination **(JEE Advanced)** amongst **150,000** candidates *(2020)*
- Acquired **Mitacs internship position**, among 13,000 applicants with an **acceptance rate** of **10%** *(2022)*
- Awarded the **KVPY Fellowship** with All India Rank **385** by Indian Institute of Science, Bangalore *(2020)*
- Selected as one of **45 students nationwide** for **IMOTC**; Qualified from a pool of **13k** participants *(2019)*
- Among **8** students selected **nationwide** to represent India at **European Girls' Mathematical Olympiad** *(2019)*
- Recipient of the **National Talent Search Examination (NTSE)** Scholarship conferred by NCERT *(2018)*

Professional Experiences

Business and Intelligence Unit | **Piramal Capital and Housing Finance Limited** *(May '23 - July '23)*

*Enhanced transaction categorization techniques thereby **improving credit risk model** development*

- Achieved **20.4% increment** in categorized data with three-stage pipeline: rule engine, company extractor, and LLM
- Web scraped **8L+** companies' domain information using parallel methods to **optimize cost** and enhance robustness
- Compared **5+** open-sourced large language models | Selected **LLaMA-7b** for compatibility with Indian data

Quantitative Analyst | **FinIQ Consulting** *(December '22)*

- Designed an optimized pricer for **Target Redemption Forward** (TaRF) structured products for financial markets
- Implemented the **Black-Scholes** method for option pricing using **geometric Monte Carlo** simulations
- Implemented a **neural network** based **BackSolve** of derivative pricing to maximize payoff in FCN products

Major Projects

Algorithmic construction of Lyapunov functions | *Summer Undergraduate Research Project* *(June '22 - Present)*

Prof. Debasish Chatterjee *https://arxiv.org/abs/2307.12661*

- **Authored** a **research paper** submitted to SICE Journal of Control, Measurements, and System Integration
- Devised a novel method to **reformulate Lyapunov stability** as a convex Semi-Infinite Programming (**SIP**) problem
- **Outperformed** the SOTA **Sum of Squares** method in handling non-polynomial vector fields with arbitrary basis

Radio-frequency identification | *Electronic Design Lab* *(January '23 - April '23)*

Prof. Siddharth Tallur *Course Project*

- Developed a precise 125kHz wave-generating RFID detector prototype utilizing ATtiny85 for data retrieval from tags
- Designed **impedance matching circuit** to **maximize power transfer** between reader IC (HTRC110) and antenna
- **Programmed** HTRC110 IC to facilitate communication between a custom designed **antenna** and **microcontroller**

Electrical Subdivision | *AUV-IITB* *(January '21 - July '22)*

Prof. Leena Vacchani *RoboNation*

- AUV-IITB is a multi-disciplinary, all-student team working on the development of an unmanned Underwater Vehicle, Matsya, capable of performing realistic naval missions, competing annually at AUVSI, **RoboSub, San Diego**
- Ranked **2nd** in Video Presentation and **4th** in TDR out of **54 International teams** in **Robosub'21**
- Winner of the **Young Researcher Prize** awarded by the **IEEE OES** at **Underwater Technology** 2021

Simultaneous Localization and Mapping (SLAM) | *AUV-IITB* *(January '21 - July '22)*

- Implemented 2-d **SLAM** to map uncharted areas and concurrently track the **vehicle's position** and **attitude**
- Employed **quaternions** to determine the orientation of the vehicle in order to avoid **Gimbal Lock**

Academic Projects

Cocktail Party Problem | *Introduction to Machine Learning* *(April '22)*

Guide: Prof. Abir De *Course Project*

- Utilized **Deep Clustering** for achieving speaker-independent **speech separation** with LibriMix dataset
- Employed **STFT (Short Time Fourier Transform)** to process raw signals and generate spectrograms
- Employed **Deep Neural Networks** to learn embeddings for source separation, integrated with a model architecture featuring two BLSTM (**Bidirectional Long Short-Term Memory**) layers for audio source separation

Bandit Optimization | *Optimization in Machine Learning* *(April '23)*

Prof Ganesh Ramakrishnan *Course Project*

- Utilized **7 bandit algorithms** to optimize discrete black box non-linear functions using **4 sampling strategies**
- Studied and Implemented **Hierarchical Optimistic Optimization** and **Simultaneous Optimistic Optimization** for multi-dimension functions and benchmarked their performance in terms of time and accuracy

Analyzing SURE as an estimator for MSE | *Advanced Topics in Signal Processing* *(April '23)*

Guide: Prof. Satish Mulleti *Course Project*

- Implemented **SURE** as a robust mean squared error estimator for **4** denoising algorithms with unknown true signals
- Devised **SURE** implementation techniques for **non-differential denoising algorithms**, including median blurring
- Implemented **3 efficient divergence calculation methods** to enhance computation speed and effectiveness

Positions of Responsibility

Department Placement Coordinator | **Institute Placement Team** *(July '23 - Present)*

*Elected student representative for **100+** B.Tech. Electrical Engineering students to advocate for their interests during placements*

- Facilitated dissemination of crucial information to **200+** students for institute and department-level activities
- Responsible for **conducting** preparatory **mock tests** for **5+ profiles** aligning with the students' interests
- Accountable for verifying resumes of the batch ensuring accuracy, integrity and adherence to the institute guidelines

Subgroup Head, Experiences | **Department Academic Mentorship Program** *(June '22 - Present)*

- Leading a team of **23 mentors** in acquiring resources for internship blogs by engaging with **over 20 students**
- Leveraging institute resources to **provide guidance** to a student under **academic rehabilitation**
- **Guided 7 sophomores** in their **academic** and **extracurricular** pursuits through personalized mentorship

Institute Student Mentor | **Student Mentorship Program** *(June '23 - Present)*

- Part of **148 member** team, chosen after a rigorous procedure involving peer reviews and interview
- Responsible for **mentoring 12 freshmen** in **academic**, **extracurricular** and **personal development**

Technical Skills

Programming: *Python, MATLAB, C/C++*
Embedded: *VHDL, ARM, Arduino, AVR*
Software: *MATLAB, AutoCAD, LaTeX, Git*
Frameworks: *Keras, Numpy, OpenCV, Pandas, PyTorch, SciPy, Scikit-learn, Tensorflow*

Key Courses Undertaken

Computer Science: *Computer Programming and Utilization, Foundations of Learning and Intelligent Agents, Fundamentals of Digital Image Processing*, Markov Chains and Queuing Systems, Online Learning and Optimisation, Game Theory and Algorithmic Mechanism Design**

Machine Learning: *Probability and Random Processes, Programming for Data Science, Intro to Machine Learning, Optimization in Machine Learning, Advanced Topics in Signal Processing*

Math & Statistics: *Calculus, Differential Equations, Linear Algebra, Complex Analysis*

**to be completed by November '23*

Extracurriculars

- Performed in **Annual Insync Dance Show** with **1500+ audience** by Insync Club, IIT Bombay *(2022, 2023)*
- Secured **2nd** position in **Institute Hockey League** among 8 teams by Hockey Club, IIT Bombay *(2023)*
- Guided **8 freshmen** in XLR8, the flagship event of Electronic and Robotics Club, IIT Bombay *(2022, 2023)*
- Completed one year long **NCC** training at the NCC Unit of 2 Maharashtra Engineers Regiment *(2020-2021)*
- Mentored **over 120** freshmen for **Calculus** and **Differential Equations - I & II** courses *(2022-2023)*
- Editor of department newsletter Background Hum serving **1000+ students** and **100+ faculty** *(2022-2023)*
- **Interests and Hobbies:** Solving jigsaw puzzles, tennis, reading fiction, adventure sports & horse riding