Pursuing a **Dual Minor** in **AI and Data Science** and **Computer Science and Engineering**

1. Course Projects

GANs for Classical Art generation ***IE683: Topics in Learning Algorithms, Spring 2021-22***

Prof. Nandyala Hemachandra - A topics course on surrogate learning, GANs, and multi-agent reinforcement learning

- A team project of 3 students aimed at generating Indian and Western classical **music** and Madhubani paintings
- Trained a modified (Deep Convolutional) **DC-GAN** that converts midi files to images as a preprocessing step
- Implemented a novel **GRU-GAN** consisting of a Gated Recurrent Unit(GRU) for both discriminator and generator networks that helped in accounting for long and short temporal connections in musical notes

EM Algorithms ***SC643: Stochastic and Networked Control, Autumn 2021-22***

Prof. Ankur Kulkarni - Theory of classical stochastic control, dynamic programming, PoMDPs, and LQG control

- A reading project aimed at surveying the problem of **Maximum Likelihood Estimation** and algorithms for the same, with a special focus on the class of algorithms known as **Expectation Maximisation** algorithms
- Presented the project with an in-detail **real-world** example of EM algorithm and then discussed an **abstract** mathematical model which is widely applicable for iteratively calculating the maximum likelihood estimate

Bitcoin Price Prediction ***DS203: Programming for Data Science, Autumn 2021-22***

Prof. Manjesh K. Hanawal and Prof. Amit Sethi - Programming course on various machine learning models

- A team project of 4 students aimed at predicting and analyzing Bitcoin prices over a short period of time
- Studied over **2 dozen** relevant research papers and made an 8-page project **report** following the IEEE format
- Implemented various ML algorithms ranging from traditional methods like **SVM** and Random Forest Regressor to deep neural networks like Long Short Term Neural Network(**LSTM**) and time series models like **ARIMA**

CoViD-19 Statistics of Indian States ***AE102: Data Analysis and Interpretation, Spring 2020-21***

Prof. Amuthan A. Ramabathiran and Prof. Prabhu Ramachandran- Programming course on Probability

- A team project of 5 students aimed at analyzing a data-rich topic using the techniques taught during the course
- Conducted exploratory data analysis with the help of a variety of packages like `seaborn` and `statsmodel.api`
- **Researched** papers aimed at current CoViD-19 analysis and estimated state-wise **recovery duration** of India's CoViD-19 patients with 95% **confidence intervals** of 15 different states using ordinary least squares **regression**

2. Scholastic Achievements

- One of the only **2** students to secure Branch Change to BS Mathematics on the basis of **CPI** *2021*
- Achieved **All India Rank 1495** in **JEE-Advanced** out of **1.5 lakh** candidates *2020*
- Secured **99.95** percentile in **JEE-Mains** with a **100** percentile in **Physics** out of **10.23 lakh** candidates *2020*
- Recipient of the prestigious **KVPY fellowship** with an All India Rank **670** *2019*
- Secured **99.89** percentile out of **1.5 lakh** candidates in Maharashtra's Common Entrance Exam *2020*
- Bagged **Rank 1** in **General-Science** in Class XI in **JaiHind College**, Mumbai *2019*

3. Technical Skills

Programming	Python, C++, ROS, ROS2 , Gazebo, Django, MATLAB, HTML, CSS
Office Tools	LaTeX, git, Docker, Bash, Excel
Software & Tools	Blender, Adobe Illustrator, AutoCAD, RviZ, PyTorch, matplotlib, Pandas

4. Experience

Autonomous Subsystem Head — IITB Mars Rover Team *Present*

A team of 40 + students which designs and fabricates Mars rover prototypes for international rover competitions

- Implemented a **way-point follower** pipeline for autonomous traversal consisting of a global planner working on the A* algorithm that works in coordination with a local planner which uses a dynamic window approach(**DWA**) and future trajectory estimation to rank trajectories and give optimal commands to the rover in **real-time**
- Integrated a Real-Time Appearance Based (RTAB) mapping algorithm with loop-closure detection for **3-D mapping** and localization along with an Extended Kalman Filter for **sensor-fusion** and odometry estimation
- Integrated **Moveit!** for autonomous arm execution of dexterous pick-and-place tasks in European Rover Challenge
- Implemented a responsive **Django-GUI** for base-station consisting of a general dashboard, a rover map, manual navigation controls, robotic arm controls, bio-assembly controls with the help of virtual joysticks and buttons

Image Processing Engineer — Miko Robotics *Summer, 2022*

Miko- an 'emotionally intelligent' robot that uses playful, conversational learning to educate, engage and entertain kids

- Implemented real-time custom hand and face **gesture** classification using holistic tracking module in Mediapipe
- Integrated real-time dominant color detection using **k-means** clustering in perceptually uniform **LAB** color space

5. Position of Responsibility

Web and Design Secretary, Dept. of Mathematics, IITB *Present*

- Responsible for management of the Department website and National-level Mathematics Olympiad website
- Responsible for creation of attractive posters for Department Events and National-level Mathematics Olympiad

Department Academic Mentor, Dept. of Mathematics, IITB *Present*

- Selected through interview and extensive peer reviews to support 4 sophomores in a developmental role
- Eased their transition into academics of the department-specific curriculum and provided guidance with course planning, internships, projects, time management, stress-management and extra-curricular endeavours

6. Online Courses

- **MATLAB courses** *Autumn, 2021*
  - Completed various introductory MATLAB courses offered including **Machine Learning** Onramp, Simulink Onramp, **Image Processing** Onramp, **Control Design** Onramp, **Deep learning**, and Simscape Onramp.
- **Learner's Space: Computer Vision** *Autumn 2021*
  - Created a digit recognizer that classifies images to numbers using a **convoluted neural network** built using **PyTorch** trained on a self-created **PIL** dataset that achieved above **99%** accuracy on the test dataset
  - Constructed a **sudoku solver** using backtracking algorithm and **reprojected** the solution found on the original image. Made a thorough **analysis** of all the steps with my mistakes and the scope for improvement

7. Key Courses Undertaken

Mathematics	Probability I*, Linear Algebra, Combinatorics, Multivariable Calculus, Introduction to Numerical Analysis, Complex Analysis, Basic Algebra, Differential equations
Data Science	Foundations of Intelligent and Learning Agents*, Topics in Learning Algorithms, Programming for Data Science, Stochastic and Networked Control
Computer Science	Speech and Natural Language Processing*, Design and Analysis of Algorithms*, Data Structures and Algorithms, Computer Programming and Utilisation

** to be completed by Dec' 2022*

8. Extra-Curriculars

- Mentored a group of 3 students for a technical project aimed at creating a gesture-controlled desktop *2022,ITSP*
- Mentored 3 groups of 4 members each for **WnCC**'s **CodeWars** - India's first Bot-Programming Contest *2021-22*
- Mentored 15 students for **fROSty Winters** by ERC - A 3-week long workshop on the basics of ROS, simulation and visualization tools like RViz, Gazebo, and image processing software - OpenCV, ArUco markers *2021-22*
- Elected as the **Class Representative** in **11th** standard(FYJC) in **JaiHind** college, Mumbai *2018-19*
- Completed a year-long **National Sports Organization** (NSO) programme in general Sports *2020-21*
- **Game Development Hackathon** (Team competition) *2021, WnCC, IITB*

  Completed making **graphics** for a game related to CoViD-19 in two days using **Unity** combined with **Blender**