

Pursuing **Minors in Applied Statistics and Informatics** from the Department of Mathematics, IIT Bombay

SCHOLASTIC ACHIEVEMENTS

- Secured **change of branch to Computer Science & Engineering** (16 out of 1300+ students) (2021)
- Achieved **All India Rank 269** in **JEE Advanced** out of 150 thousand eligible candidates (2020)
- Achieved **All India Rank 113** in **JEE Main** out of over 1 million candidates (2020)
- Secured **All India Rank 20** and awarded the Kishore Vaigyanik Protsahan Yojana (**KVPY**) Fellowship by **Department of Science and Technology, Government of India** (2019)
- Recipient of the National Talent Search Examination (**NTSE**) Scholarship awarded by the **NCERT** (2018)

COMPETITIONS AND OLYMPIADS

- Actively engaged in **Competitive programming** contests, currently ranked **Expert** on the online platform Codeforces with highest rating of **1764** (2022)
- Finished Google Kickstart 2022 Round A with **global rank 339** among 17000+ candidates (2022)
- Qualified for Round 2 of Facebook HackerCup 2021 and finished in the **top 7%** globally (2021)
- Among **top 27** students in Indian National Astronomy Examination **INAO**, eligible for the next stage of selection of the Indian team for the International Olympiad on Astronomy and Astrophysics (2020)
- Qualified for the Indian National Physics Olympiad (**INPhO**) and Indian National Chemistry Olympiad (**INChO**) among the top 416 and 685 students respectively (2020)

PROJECTS UNDERTAKEN

Matsya, Autonomous Underwater Vehicle (AUV)

January 2021 - Present

RoboSub, AUVSI & US Office of Naval Research

Guide: Prof. Leena Vachhani, Prof. Hemendra Arya

AUV-IITB is an **all-student team** working on the design and development of a state-of-the-art AUV, Matsya, capable of **self localization, way-point navigation & pneumatic actuation** to perform realistic **naval tasks**

- 2nd Place in Skill Video and 4th in Technical Paper out of 54 teams from 12 countries at RoboSub 2021
- Awarded Young Researcher Prize by IEEE-OES and University of Tokyo among 23 finalists of 18 countries

Software Subdivision Head

- Spearheading a 3 tier 10 member team while facilitating information transfer between subdivisions. Interviewed, recruited and mentored 5 freshmen out of a pool of 200+ applicants

Software Developer

- Designed and implemented a restricted controller with pose corrections enabling Matsya to perform **accurate motion without having sensor feedback** along certain degrees of freedom
- Implemented a pheromone based approach for **multiagent coordination** aimed at area coverage
- Revamped the vision module by upgrading from Darknet to **YoloV5**, greatly improving performance allowing inference to be done on CPU instead of GPU, thereby removing the need for a GPU in Matsya
- Created a pipeline for **custom dataset creation** and **transfer learning** on YOLOv5
- Worked on an Extended Kalman Filter (EKF) based localization system for State Estimation
- Designing a new **path planner** for Matsya based on Rapidly exploring Random Trees (**RRT**)
- Developed a functionality to allow Matsya to execute complicated motions which can aid in **scanning for tasks faster** by integrating the path follower module into the scan state of Matsya
- Co-authored the **Technical Design Report (TDR)** on the design of Matsya 6 for RoboSub 2021 and 2022

Social Media App

September - November 2021

Course Project | CS251 - Software Systems Lab

Guide: Prof. Amitabha Sanyal

- Worked in a team of 4 to develop the frontend and backend for a scalable social media Android app
- Developed backend API using **Django** with **PostgreSQL** as database, frontend using **Android Studio**
- Added features such as user authentication, profile view and update, CRUD operations on posts and comments, newsfeed of posts and a one on one chatting system

Concurrency in Java - Scotland Yard

October 2021

Course Project | CS251 - Software Systems Lab

Guide: Prof. Amitabha Sanyal

- Explored concepts of **concurrency and multithreading** in Java by means of the Scotland Yard game
- Simulated the Scotland Yard game using a **client-server model** with the players acting as the client node and the game running on the server
- Achieved **synchronisation** among different threads in Java by using locks and semaphores

File Sharing Application

Course Project | CS252 - Computer Networks Lab

March - April 2022

Guide: Prof. Kameswari Chebrolu

- Designed and implemented a distributed P2P file sharing application in C++ using **socket programming** constructs
- Supported file transfer and file search between any two nodes in the network within a depth of 2

Website - Github Profiles

Course Project | CS251 - Software Systems Lab

August - September 2021

Guide: Prof. Amitabha Sanyal

- Designed a website using **Django** framework with PostgreSQL as database to **store, fetch and display** details about a user's github profile by calling the **Github API**
- Created **Django models** to model the relationship between the user and the user's repositories in the database
- Deployed the application on **Heroku**, using Heroku's Postgres addon as the database for the backend

Mandelbrot Zoom

Course Project | CS293 - Data Structures Lab

November 2021

Guide: Prof. Bhaskaran Raman

- Created an application to render the Mandelbrot set (a fractal pattern) using multiple colouring algorithms and to zoom in/out of a point using the SFML graphics library
- Achieved a **maximum zoom ratio of 10^{14}** while zooming in on the Mandelbrot set

RISC Processor Design

Course Project | CS230 - Digital Logic and Computer Architecture

March - April 2022

Guide: Prof. Virendra Singh

- Designed and implemented a 16-bit processor based on RISC in VHDL using both multicycle and pipelined architectures that supports arithmetic, logical, conditional and branching instructions

Constraint Satisfaction: Rush Hour Puzzle

Course Project | CS228 - Logic for CS

February 2022

Guide: Prof. Ashutosh Gupta

- Developed an application in Python to produce the optimal solution to any instance of the Rush Hour puzzle using the Z3-Solver by representing the puzzle mathematically as a constraint satisfaction problem

Face Mask Detection

Winter in Data Science | Analytics Club

December 2021 - January 2022

- Developed a **Convolutional Neural Network** using Tensorflow to classify images based on face masks by training on an augmented dataset consisting of images of people with and without a mask
- Integrated the model with a pre-trained neural network to draw bounding boxes on faces
- Deployed the model on a web interface using Flask

POSITION OF RESPONSIBILITY

Convener | Electronics and Robotics Club IIT Bombay

June 2021 - May 2022

- Part of a 17 member team that promotes Electronics and Robotics culture in IITB through various workshops, competitions, courses and events and cater to 5000+ electronics and robotics enthusiasts
- Lead organizer of Frosty Winter, a 4 week long course on ROS, Gazebo and related topics
- Contributed articles on SLAM and Sensor Fusion for the ERC Wiki
- Prepared questions and hosted a trivia quiz - Jhatka GC on various subfields of robotics

Mentor | Codewars

December 2021

- Mentored a group of 12 freshmen in Codewars, a bot programming contest conducted by WnCC to help introduce freshmen to programming in Python

TECHNICAL SKILLS

Programming	C++, Python, C, Java, Bash, Awk, CMake, MATLAB, VHDL, Assembly
Software	Git, Vim, LaTeX, ROS, Gazebo, OpenCV, Simulink
Development	HTML, CSS, Django, Android SDK
Machine Learning	Tensorflow, Pytorch, Numpy, Pandas, Matplotlib, Seaborn, Scikit-learn

KEY COURSES UNDERTAKEN

Computer Science	Data Structures and Algorithms, Discrete Structures, Data Analysis and Interpretation, Software Systems Lab, Design and Analysis of Algorithms, Digital Logic Design and Computer Architecture, Logic for Computer Science, Computer Networks, Operating Systems*, Automata Theory*, AI/ML*, Abstractions and Paradigms in Programming
Mathematics	Calculus, Differential Equations, Linear Algebra, Probability
Finance	Introduction to Derivative Pricing
Other Courses	Winter in Data Science (by Analytics Club, IITB), Natural Language Processing (Udemy)

**to be completed by November 2022*

EXTRACURRICULARS

- Completed one year of Sports under NSO during first year of college
- Secured **1st position** in Maths Bazinga conducted by MnP Club IITB
- Participated in **Line Follower Workshop** conducted by ERC IITB, and built a line following robot
- Secured **2nd Position** in Codewars conducted by PES University
- Completed 8 levels in **Abacus** under UCMAS