

Pursuing Honors in **Computer Science** and Minors in **Industrial Engineering and Operations Research**

## SCHOLASTIC ACHIEVEMENTS

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- Received **Institute Academic Prize** (top **25** students) for exceptional academic performance (2020)
- Secured **5 AP** (Advance Performer) grades for exceptional performance in Abstractions and Paradigms for Programming, Calculus, Quantum Physics and Application, Organic Inorganic Chemistry and Physical Chemistry (2019-20)
- Achieved All India Rank **28** in JEE-Advanced out of 2,00,000 candidates (2019)
- Secured All India Rank **76** in JEE Mains out of 1.2 million candidates (2019)
- Received the prestigious **KVPY** fellowship with All India Rank **26** (2018)
- Awarded National Talent Search Examination **NTSE** scholarship by NCERT, Govt. of India (2017)

## OLYMPIADS

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- Among India's **top 40** students in Indian National **Chemistry** Olympiad (INChO) to attend the Orientation cum Selection Camp for the International Chemistry Olympiad (ICHO) (2019)
- Among India's **top 40** students in Indian National **Physics** Olympiad (INPhO) to attend the Orientation cum Selection Camp for the International Physics Olympiad (IPHO) (2019)
- Among India's **top 35** students in Indian National Olympiad in **Informatics** (INOI) to attend the International Olympiad in Informatics Training Camp (IOITC) (2017)
- Received Honorable Mention in Indian National Olympiad in **Informatics** and participated in Asia Pacific Informatics Olympiad (APIO) (2016)
- Ranked among National **Top 1%** in **NSEP** (National Standard Exam, **Physics**), **NSEC** (National Standard Exam, **Chemistry**) and **NSEA** (National Standard Exam, **Astronomy**) conducted by IAPT (2018, 2019)
- **Received Honourable Mention at ACM ICPC World Finals, Portugal** (2019)
- Amongst the top **35** students in Indian National Olympiad in Informatics (**INOI**) (2016)
- Secured Team rank **4** among 250+ teams in **ACM ICPC** Amritapuri onsite regionals (2017-18)
- Secured Team rank **13** among 120+ teams in **ACM ICPC** Kolkata-Kanpur onsite regionals (2018)
- Active on **Codechef** : Rating: **2301 (Orange)** and **Codeforces** : Rating: **1958 (Purple)** (2019)

## KEY PROJECTS

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### Sokoban AI Agent

Guide: Prof. Amitabha Sanyal | Course Project

Spring 2019

IIT Bombay

- Developed Japanese puzzle game Sokoban where given a 2D grid(warehouse) with obstacles and some crates, the AI(robot) finds minimal moves to get the crates to their storage locations
- Implemented **deadlock detection**, **Breadth First Search**, **Depth First Search** algorithms in Racket language incorporating **higher order functions**, **abstractions** and **Functional programming** paradigms
- Experimented with various **heuristics** to quickly discard futile lines of play, and recognize patterns and subgoals, drastically **cutting down** on the amount of search required to reach the solution
- Developed **interactive** single player, two player and AI solver mode using Racket Graphical Toolkit

### Proof Reading Rewriter

Guide: Prof. Amitabha Sanyal | Ongoing Course Project : Software and Systems Lab

Autumn 2019

IIT Bombay

- Developing web app for a proofreading rewriter using **Django** backend which uses **Natural Language Processing** to correct spellings and grammatical errors and suggest synonyms for words using **NLTK** package
- Checking grammar using **POS tagging** and by equating the sentence structure with predefined grammar rules
- Integrating spell check using levenshtein distance between two strings

- Implemented **Neural Networks** for **hand written digit recognition** in Python
- Developed random Sudoku generator and **Sudoku Solver** in Python
- Detected Sudoku instant from an image using image manipulation (processing and alignment) and **hand written digit recognition**, and then applied the solver on it to find the solution

## OTHER PROJECTS

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### Decoding Monoalphabetic Substitution

Guide: Amitabha Sanyal | Course Project

Spring 2019

IIT Bombay

- Text encryption done by Monoalphabetic Substitution based on a secret word key
- Applied **ETAI**, **Dictionary Closure** and **Secret Word Enumeration** Strategies to decrypt the ciphertext

### Decision Trees

Guide: Amitabha Sanyal | Course Project

Spring 2019

IIT Bombay

- Found information gain achieved (entropy difference) by applying a categorising function to the data
- Built a Decision Tree Model by choosing functions that reduce entropy of the data the most

### Image Compression and Noise Reduction

Guide: Amitabha Sanyal | Course Project

Autumn 2019

IIT Bombay

- Replaced all color vectors in an Image with their **K Cluster Centroids** using **KMeans Algorithm**
- Reconstructed Image from given (possibly overlapping) patches while minimising the **salt and pepper noise**

## TECHNICAL SKILLS

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### Programming

C, C++, Java, Python, Bash, Make, CMake, Prolog, Racket, HTML, Javascript, CSS

### Tools and Software

MATLAB, Pytorch, Keras, AutoCad, SolidWorks, Git,  $\text{\LaTeX}$ , Pandas, Matplotlib

## POSITIONS OF RESPONSIBILITY

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### Teaching Assistant, MA-105, Calculus

July 2019 - Present

- Conducting regular **tutorial sessions** for a batch of **45** students in association with Prof. Sudhir Ghorpade

### Teaching Assistant

September 2019 - Present

MOOCs : *Programming Basics*(CS101x), *Data Structures*(CS213x),  $\text{\LaTeX}$

- Handling **Algorithmic**, **Programming basics** and  **$\text{\LaTeX}$**  modules having more than 25000 students enrolled across the globe by **creating** new material and **reviewing** old ones
- **Monitoring** and **stimulating** discussions on **edX** and **IITBombayX** platforms.

### Volunteer, Web and Coding Club, IIT Bombay

April 2019 - Present

- Organised **Coding GC** across all hostels and conducted **sessions** on **Algorithms**, **Data Structures** and **STL** with the aim of expanding and strengthening the coding community at IIT Bombay
- Guided **100+** students in making their first app using **Scratch** and conducted hands-on **workshops** on **Git/Github** to introduce them to Open-Source

Trained **50 students** from different colleges for ICPC in association with *Codechef, India*

(June 2019)

## COURSES UNDERTAKEN

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- **Mathematics:** Calculus, Linear Algebra, Differential Equations, Introduction to Probability Theory\*
- **Computer Science:** Computer Programming and Utilisation, Abstractions and Paradigms for Programming, Data Structures and Algorithms\*, Data Analysis and Interpretation\*, Software Systems Lab\*, Discrete Structures\*, Computer Networks\*\*, Digital Logic Design\*\*, Design and Analysis of Algorithms\*\*, Logic for Computer Science\*\*
- **Misc:** Electricity and Magnetism, Quantum Physics, Chemistry, Biology, Introduction to Electronic Circuits\*

\* To be completed by November 2019 \*\* To be completed by April 2020

## EXTRACURRICULAR

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- **Institute Technical Freshman of the Year Award** : Awarded to the students who, in their first year, have excelled in the technical activities and made a significant contribution to the same (2018-2019)
- Associated with **National Service Scheme** , IIT Bombay under **Green Campus** program (2018-19)
- Awarded **first** position in **CoDecode** (coding competition) organized by **Techfest, IIT Bombay** (2018)
- Placed **first** in **Bazinga** (maths competition) organized by **Maths and Physics Club, IIT Bombay** (2018)
- Ranked **2<sup>nd</sup>** in **Game of Codes** (coding competition) organized by KJSIT, Mumbai (2019)
- Represented hostel 6 in **Coding General Championship** and achieved **3rd** position overall (2018)