Shivam Raj | **190050113**
Computer Science & Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 8/1/2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	CBSE	Disha Delphi Public School	2019	95.80%
Matriculation	CBSE	Ramakrishna Mission Vidyapith	2017	10

Pursuing **Minor** in **Applied Statistics and Informatics**

Scholastic Achievements

- Secured **All India Rank 101** in **JEE Advanced** 2019 among **250 thousand** candidates across India *(2019)*
- Achieved **All India Rank 180** in **JEE Main** 2019 among more than **1 million** aspirants across India *(2019)*
- Recipient of prestigious **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship by **Govt. of India** *(2018)*
- Awarded Certificate of Merit for being among the **national top 1%** in **NSEC** conducted by **IAPT** *(2018)*
- Bagged state rank **3** and international rank **97** in International Science Olympiad by Silverzone Foundation *(2016)*
- Awarded Certificate of Merit for **zonal rank 5** in International Mathematics Olympiad by SOF *(2015)*
- Secured **57th international rank** in International Olympiad of Mathematics by Silverzone Foundations *(2014)*

Internships

Generative Design Tool | UltraTech Cement *Summer 2021*
- Reviewed literature of existing **research papers** on **AI in architecture** to develop a Generative Design Tool which **automatically prepare floorplan** for any plot based on user provided constraints using **Deep Learning**
- Leveraged graphs to provide constraints and process it using **Graph Neural Network** and **Message Passing Network**
- Implementing **House-GAN research paper** which uses GAN to generate realistic layouts based on the input graph

Machine Learning | Chainflux (Wandx Solutions) *Winter 2020*
- Developed a **Machine Learning model** to identify Pills & Medicines and another one to identify a set of Jewellery
- Deployed and hosted the Machine Learning model on **AWS** with backend in **Django** and an android app as frontend

Key Projects

IITB RACING - Design Engineer | IIT Bombay Racing Team *July 2020 - Present*
*A 3-tier cross-functional team of 70+ students to build an electric vehicle for **Formula Student UK** conducted by **IMechE**. Our team stood **1st** in engineering design and **4th** overall out of 73 international teams in **FSUK 2020***
- Modified the **YOLO-architecture** for **real-time** detection of obstacles and their distance with an accuracy of **94.08%**
- Programming the modified **YOLO** in **Tensorflow 2.0** and **OpenCV** from scratch and training it on custom dataset
- Working on **Rektnet Model** for 2D image **depth estimation** using key point detections for precise distance calculation
- Using **ROS** for running simulation to collect and compare outputs with actual data to further optimize the model

ReCurrency - ERC20 Token to trade in Real Estate | *WeGyan Ventures* *June 2021-Present*
- Ideated upon a platform to facilitate **investing in real estate** with minimal capital and trading background
- Developing an **ERC-20 token** to deploy it on **Ethereum**, which will be the medium of exchange to reduce legal procedures
- Creating an end to end platform in **react** with **nodejs** backend and linking it with ERC-20 Token wallet using **Metamask**

Online Competing & Development Environment | Course Project *Autumn 2020*
Guide: Prof. Amitabh Sanyal
- Designed an **online Integrated Development Environment** in Angular with support for multiple programming languages
- Created a backend in **NodeJs** for compilation of code in **Isolated Environment** using **Docker** to ensure security
- Used **Google API** for secure user authentication and **Django** with **MySQL** for easy storage and retrieval of files

Algorithms: Quadtree & Permutation | Course Project *Autumn 2020*
Guide: Prof. A.A. Diwan
- **QuadTree**: Implemented a **tree-based** efficient data structure for **image compression** and added feature to set and get pixels, **overlap** or **intersect** images, extract a portion of image or **resize** image to increase or decrease the size
- **Permutation**: Implemented an algorithm to find square root, power and log in linear time complexity of a permutation using **Cyclic Graph Structure**, **Chinese Remainder Theorem**, and **Extended Euclidian Algorithm**

Zero Risk Crypto Trading | Self Project *Spring 2021*
- Identified the **arbitrarge** in the values of crptocurrencies across different platforms especially **Binance** and **WazirX**
- Developed an algorithm to find cryptocurrencies with assured profits **(0.5% to 5%)** instantaneously using realtime data
- Used parallel processing and **frozenset** to reduce the realtime data collection and processing time of **300+** cyptocurrencies

Other Projects

String Morphisms | *Course Project* *Autumn 2020*
Guide: Prof. Ajit A. Diwan *IIT Bombay*
- Studied research paper to find properties of unique morphisms like **Fibonacci morphism** & **Thue-Morse morphism**
- Implemented an **algorithm** that calculates the **string size** for multiple string substitution in **logarithmic time**
- Integrated a **sub-strings** and **sub-sequences** search for any given word in an **infinitely-long** string morphism

InFi-Interest Finder | Institute Technical Summer Project *Summer 2020*
- Developed an android application in a team of 3 which connects people with similar **interests and hobbies**
- Used **Neighbour Based Collaborative Filtering** to give recommendations based on users' interest and activity
- Deployed frontend in **Android(Java)** and **XML** and backend in **Firebase** and used **Google API** for location

Sentiment Analysis | Institute Technical Summer Project *Summer 2020*
- Developed a **Recurrent Neural Network** in **Tensorflow** & **Keras** to detect sentiment of **multi-domain** English sentences
- Trained neural network model using **Convolutions** and **Bidirectional LSTM** layers to increase accuracy to **78.1%**
- Performed preprocessing steps like **lemmatization** and **stemming** using NLTK Libraries for better training

Game of Fifteen | Course Project *Spring 2020*
Guide: Prof. Rushikesh K. Joshi
- Implemented 4×4 puzzle using Object-Oriented programming to properly **encapsulate** and **optimize** the code
- Programmed an algorithmn using **inversion count** to randomize the board at its initial state into a **solvable** puzzle
- Integrated the game with an interactive graphical interface using **FLTK Libraries** to make the puzzle user friendly

Image Recognition & Processing | Self Project *Summer 2020*
- Used **Transfer Learning** on **VGG-16** and **Alexnet** to differentiate much harder dataset of bees and ants
- Using results of a paper on Texture Synthesis, implemented **Style Transfer** using feature extraction layers of **VGG-19**
- Built a particle size analyser using OpenCV to calculate the distribution of particle size and represented it grphically

Mastermind Game | Course Project *Spring 2021*
Guide: Prof. Ashutosh Gupta
- Created a Mastermind Player **tolerant** to unreliable second player to guess sequence of k colors from n colors using **SAT solver**
- Solved this problem using Davis-Putnam-Logemann-Loveland **(DPLL) algorithm** in python Z3-solver library

Technical Skills

Programming	Solidity | C++ | C | Python (Numpy, Pytorch, Tensorflow) | Bash | Java | CUDA
Web Development	Django | HTML5 | CSS | Bootstrap | JavaScript | Angular | React | MongoDb
Data Science	MATLAB | Octave | Pandas | Scipy | OpenCV | Matplotlib | Scikit
Software Skills	Android Studio | Git | LaTeX| Google Firebase | AutoCAD | Wireshark

Positions of Responsibility

Teaching Assistant | *Prof. Dipendra Prasad* *Mar 2021 - April 2021*
- Mentored a batch of **43 students** in **Linear Algebra** course by conducting weekly tutorial and problem solving sessions

Teaching Assistant | *Prof. Arindam Chowdhury* *Jan 2020 - Feb 2021*
- Guided a batch of **20 students** in **Physical Chemistry** course and helped them overcome language difficulties

Web & Tech Coordinator | Mood Indigo | *Asia's Largest College Fest* | *100k+ viewership* *May 2020 - Dec 2020*
- Participated in **ideation** of hosting **Mood Indigo in online mode** and developed an **optimized app** for same

Key Courses Undertaken

Computer Architecture + Lab*	**Operating Systems + Lab***	**AI & Machine Learning + Lab***
Software System Lab	Design Analysis of Algorithms	Linear Algebra
Computer Networks + Lab	Automata Theory**	Abstractions & Paradigms of Programming
Discrete Structures	Data Analysis and Interpretation	**Probability Theory**
Blockchain and Smart Contracts*	**Data Structures & Algorithms**	Digital Image Processing*

** To be completed by November 2021 ** To be completed by April 2022*

Extracurriculars

- Selected for **AUA** Overseas Program by **Nazarbayev University** on Data Science and Artificial Intelligence *(2021)*
- Received prestigious **Black Belt** in **Karate** arts under *Seigo Kai Karate-do Association of India* *(2017)*
- Secured **first rank** in **PlutoX Hackathon** Organised by *Drona Aviation* among 6000+ students of IITB *(2019)*
- Secured **sixth rank** out of 150+ teams in a bluetooth-controlled bot building competition organized by ERC *(2019)*
- Successfully completed year-long training in **Atheletics** under **National Sports Organization**, IITB *(2019)*
- Awarded **Certificate of Honour** for excellent performance as a drummer in *Ramakrishna Mission Vidyapith* *(2017)*