



**Pranav Rao**  
**Computer Science & Engineering**  
**Indian Institute of Technology Bombay**

**160100021**  
**UG Third Year (B.Tech.)**  
**Male**  
**DOB: 05/10/1998**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2019	9.61
Intermediate/+2	HSC	VG Vaze College	2016	93.54
Matriculation	CBSE	VPM's BR TOL High School	2014	10.00

Pursuing Honors in Computer Science and Engineering and a Minor Degree in Mathematics

## INTERESTS

Data Structures and Algorithms, Complexity Analysis, Statistics and Data analysis, Machine Learning and Logic

## SCHOLASTIC ACHIEVEMENTS

- Currently **Department rank 5** among 121 students in CSE batch of 2020 (2018)
- Secured **All India Rank of 26** in JEE Advanced among top 0.2 million JEE Mains Rankers (2016)
- Bagged **All India Rank 35** in **JEE Main** among 1.2 million candidates (2016)
- Qualified for the national Olympiads **INChO** in 2015-16 and **INMO** in 2014-2015
- Among the **top 1 %** students in each of the National Standard Examinations in Physics and Chemistry (2015)
- Awarded the **KVPY Fellowship** by Government of India with All India Rank 118 (2015)
- Recipient of the **National Talent Search Examination** Scholarship awarded by Govt. of India (2012)

## KEY PROJECTS

**VQA system** May '18 - July '18  
Guide: Prof. Ganesh Ramakrishnan, CSE Dept IIT Bombay

- Worked on **Visual Question Answering problem** of generating the answer in natural language given an image and a related question also in natural language
- Studied research papers based on deep learning techniques like feature representation and attention networks
- Implemented a deep learning model based on **VGG19** network, **LSTM network** and image attention network

**Matsya, Autonomous Underwater Vehicle (AUV)** Oct '16 - Mar '18  
RoboSub, AUVSI & US Office of Naval Research IIT Bombay

- AUV-IITB is an all student team working on the design and development of AUV(s) under guidance of Prof. Leena Vachhani and Prof. Hemendra Arya
- **Software Sub-Division Trainee** 2016-17
  - Assisted in Digital **Signal Processing** for the Acoustic localization of the AUV
  - Contributed to the localization and State interface for Matsya
  - Implemented **PID Controller** for controlling all six degrees of freedom
- **Software Sub-Division Chief Designer** 2017-18
  - Implemented **Kalman filter** for localization of the AUV using multiple sensor inputs
  - Contributed to and improved the algorithms used for Signal Processing, Control and Navigation
  - Worked on various object detection algorithms using **OpenCV library** in C++

**Ballerina** June '17 - July '17  
Institute Technical Summer Project, STAB IIT Bombay

- Designed a self-balancing 2-D plate, with recovery angle of 6 degree using inverted pendulum mechanism
- Integrated IMU to measure the deviation angle from mean and PID controller for movement of Inertia wheel
- Implemented **I2C communication protocol** for the communication of MPU with Arduino

## COURSE PROJECTS

**AI Based GO Player** Mar '18 - April '18  
Guide: Prof. Amitabh Sanyal, CSE Dept IIT Bombay

- Adopted **Monte Carlo Tree Search with UCT** selection to decide next move given a board configuration
- Designed a **DFS-based algorithm** for territory counting while the player was able to make simple captures
- Used foreign function interface to import move validation functions from GNU-GO (C++) into scheme

## Railway Signal Controller

Mar '18 - April '18

Guide: Prof. Supratik Chakraborty, CSE Dept

IIT Bombay

- Automated a real-life Railway network using **VHDL** based **FPGA boards** as Railway Signal Controllers
- Used FPGA Link library for encrypted communication with the central computer (C based) via USB cable
- Implemented **UART communication** among adjacent controllers in the network

## Network Protocol Simulation and Socket Programming

Mar '18 - April '18

Guide: Prof. Bhaskaran Raman, CSE Dept

IIT Bombay

- Simulated the **Spanning Tree protocol** and the link layer forwarding in Ethernet in C++
- Designed a C++ application to transfer and receive multiple files simultaneously using TCP sockets

## Interactive Academics

Sept '17 - Nov '17

Guide: Prof. Kavi Arya, CSE Dept

IIT Bombay

- Designed a Q/A forum for university courses using **PHP - MySQL** back-end and Javascript front-end
- Implemented an **tagger** for questions using **Naive Bayes algorithm** and trained it on StackOverflow questions
- Integrated a real time chat application for direct communication among the students

## RSA cryptography

Sept '16 - Nov '16

Guide: Prof. Bernard L. Menezes, CSE Dept

IIT Bombay

- Implemented modulo arithmetic operations like addition, multiplication, inverse and modular exponentiation
- Developed a C++ program to encrypt and decrypt messages using **RSA Cryptography**

## TECHNICAL SKILLS

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<b>Programming</b>	C++, Java, Python, Prolog, Answer Set Prolog, Racket, VHDL
<b>Web Development</b>	HTML, CSS, Bootstrap, Javascript, PHP, MySQL
<b>Software</b>	GNU Octave, MATLAB, Git, L <sup>A</sup> T <sub>E</sub> X, Xilinx ISE, Arduino, ROS

## POSITIONS OF RESPONSIBILITY

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### Teaching Assistant

July '17 - Feb '18

MA 105 (calculus) and MA 106 (linear algebra) - First year UG courses

- Mentored 49 first year students under Prof. Ravi Raghunathan (Maths Department IIT Bombay) for MA 105
- Conducted help sessions for first year students under Prof. H. Ananthnarayan for MA 106
- Responsible for teaching and evaluating them, providing feedback to the Instructor-in-charge

### Chief Software Engineer

July '17 - Mar '18

AUV-IITB Team

- Recruited first year students to software sub-division and mentored and guided them
- Represented the team in Tech & RnD Exposition held at IIT Bombay and Techfest tech exhibition

## KEY COURSES UNDERTAKEN

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<b>Computer Science</b>	Artificial Intelligence**, Automata Theory**, Implementation of Programming Languages**, Computer Architecture*, Database and Information Systems*, Operating Systems*, Computational Complexity*, Logic for Computer Science, Digital Logic Design, Computer Networks, Data Structures and Algorithms, Discrete Structures, Data Analysis and Interpretation, Design and Analysis of Algorithms, Machine Learning †, Natural Language Processing†
<b>Other</b>	Calculus, Linear Algebra, Differential Equations, Basic Algebra (Groups, rings and fields), Real Analysis*, Numerical Analysis**

\* to be completed by November 2018

\*\* to be completed by April 2019

† from Coursera

## EXTRACURRICULAR

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- Completed a reading project on the topic Introduction to Topology as an activity of Summer of Science
- Taught students from 3rd to 10th grade as a volunteer at NGO as a part of NSS and was awarded with certificate for completing **80 hrs of social work**
- Successfully attended the **Vijyoshi Camp-2015** held for the KVPY fellow students at IISc Bangalore
- Bagged **11th rank** in advanced and **9th rank** in intermediate level International French Language Olympiad