Pursuing **Honors** in Computer Science and Engineering

Academic Achievements

- Secured All India Rank 304 in IIT JEE Mains 2018 *2018*
- Secured All India Rank 665 in IIT JEE Advanced 2018 *2018*
- Awarded the esteemed Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship (twice) *2016 & 2017*
- Recipient of the prestigious National Talent Search Examination (NTSE) scholarship *2016*
- Cleared the National Standard Examination in Chemistry (NSEC) by being in the top 1% *2018*

Internships

Bing Ads classification using Multimodal Learning *Summer 2021*
Microsoft India R&D *Data Science Internship*

- Worked with **vision-language** models, looking for gains on Microsoft's Bing ads classification module
- Experimented with recent multimodal models, **Oscar** and **VinVL**, which work on the principle of generating **regions of interest** from images which are fed, along with text, to a **transformer** network
- Compared with a **baseline** involving a modified **XLM-R** as the text model and **BiT** as the image model

Analysis of Vector Addition Systems *Summer 2020*
Prof. Alain Finkel, ENS Paris-Saclay *Research Internship*

- Studied Vector Addition Systems by building an understanding of **Karp-Miller Graphs**
- Read literature about the Petri Nets' **Minimal Coverability Set** problem, notably MinCov and QCover
- Worked on the non-trivial problem of devising an algorithm to construct the **semi-linear bases** for projections of reachability sets of Vector Addition Systems, elucidating definitions and **formal proofs**

Key Projects

Self-supervised learning of Multimodal Representations *Ongoing*
Prof. Preethi Jyothi, Prof. Ganesh Ramakrishnan *B.Tech Project*

- Exploring novel **intermediate pretraining** strategies to learn joint **audio-video-text** embeddings
- Experimenting with cross-modal **contrastive** losses, extending them to three modalities using **mixup**

Microarchitectural Enhancements for High Performance I/O *Ongoing*
Prof. Mythili Vutukuru, Prof. Biswabandan Panda *R&D Project*

- Augmenting an existing microarchitecture simulator, Qsim, with I/O tracing functionality
- Exploring microarchitectural optimizations to improve latency under the regime of high speed I/O

Foreshadow (L1TF) Attack *Autumn 2020*
Prof. Bernard Menezes | Computer Architecture *Course Project*

- Explored and imitated Foreshadow, a **speculative execution attack** on Intel's processors which allows attackers to steal sensitive information from personal computers or third-party clouds
- Studied precursor attacks like **Meltdown** and **Spectre** which exploit transient out-of-order execution
- Presented a proof-of-concept by simulating SGX's **abort page semantics** to showcase an attack

Hospital Management System *Spring 2021*
Prof. Umesh Bellur | Database and Information Systems *Course Project*

- Developed a patient-centric hospital management system as a **Flask** web app providing functionalities such as book/cancel appointments and tests, buy medicines, pay bills, add prescription, etc.
- Added **secure** access to patients' details and history as well as an interface to view disease **analytics**

Image Segmentation using Recurrent Residual U-Net *Spring 2020*
Prof. Suyash Awate | *Medical Image Computing* *Course Project*

- Performed segmentation on **medical images** using a deep neural network developed by augmenting a U-Net with **residual** connections and recurrence, achieving fine results on the **dice coefficient** metric

Sketch-based Modeling *Spring 2021*
Prof. Parag Chaudhuri *R&D Project*

- Studied various approaches of generating **3D models** from user-drawn sketches, attempting to devise a novel method which would generate a set of smoothly-connected **Bézier patches** to fit the sketch

Other Projects

FMX Modeling and Animation | *Computer Graphics* *Course Project, Autumn 2020*

- Modeled a bike, a rider, and a track in **OpenGL** and rendered it using shading and texturing
- Animated the above scene to create a **short movie** of an FMX rider performing stunts

Reinforcement Learning | *Foundations of Intelligent and Learning Agents* *Course Project, Autumn 2020*

- Implemented and compared **Q-learning**, **SARSA**, and Expected SARSA on the **windy gridworld** problem

Compiler for a C-like Language | *Implementation of Programming Languages* *Course Project, Spring 2021*

- Built a compiler for a **subset of C** incorporating expressions, control structures, functions, and scoping
- Performed scanning (using Lex), parsing (using Yacc), and AST construction, yielding assembly code

A Simple Container From Scratch | *Virtualization and Cloud Computing* *Course Project, Spring 2021*

- Understood and built a simple container from scratch using **Linux namespaces** and **cgroups**

Proofreading Rewriter | *Software Systems Lab* *Course Project, Autumn 2019*

- Developed a Python-based tool which detects and **corrects** spelling and grammar mistakes, and suggests **alternative** words and phrases using statistics from online APIs like datamuse and phrasefinder

Interests

Machine Learning	Computer Systems	Natural Language Processing
Mystery Novels	Swimming	Carnatic Classical Music

Technical Skills

Programming	C/C++, Python, MATLAB, HTML/CSS, Javascript, Java, MIPS, Racket, VHDL, Bash
Tools & Libraries	PyTorch, Tensorflow, Keras, Pandas, scikit-learn, OpenGL, Django, PostgreSQL, Flask, NodeJS, Git, LaTeX, QEMU/KVM, libvirt, Wireshark, AutoCAD

Key Courses Undertaken

Automatic Speech Recognition**, Learning With Graphs*, Foundations of Intelligent and Learning Agents, Fairness and Explainability in ML*, Medical Image Computing, Computer Graphics, Virtualization and Cloud Computing, Operating Systems, Computer Networks, Databases, Computer Architecture

* by Dec 2021, ** by Apr 2022

Positions of Responsibility

- **Teaching Assistant** | Operating Systems (CS333, CS347) | Prof. Mythili Vutukuru *Ongoing*
- **Teaching Assistant** | *Calculus (MA109)* | Prof. Ravi Raghunathan, Prof. Manoj Keshari *Winter 2020*
- **Teaching Assistant** | *Logic for CS (CS228M)* | *Prof. S Krishna* *Autumn 2020*
- **Teaching Assistant** | *English Language Improvement Training (ELIT)* *Summer 2019, Spring 2020*
- **Editorial Head** | *CSE Research Website* *Ongoing*
  Co-leading the Editorial team of the CSE Research Website, a repository of dept's research activities
- **Lectures Coordinator** | *Techfest 2019-20* *Winter 2019*
  Helped execute the **Lecture Series** of Techfest which was graced by many eminent personalities

Extracurricular Activities

- Represented IIT Bombay at the 34th **Inter IIT Aquatics Meet**, held at IIT Guwahati *2018*
- Swam continuously for **12 hours** covering **17** kms at **Swimathon**, IITB's swim marathon *2019*
- Hosted Mood Indigo's spell bee competition as the **quiz master** for two years *2018 & 2019*
- Attended **Vijyoshi**, an annual national science camp, as a KVPY scholar *2017*
- Bagged trophies in **mridangam** competitions at various fine arts societies in Mumbai *2016-2018*
- Represented Mumbai Region at KVS **National Swim Meets** for 3 consecutive years *2013-2015*