Pursuing Honors in Computer Science & Engineering
Passionate about **Machine Learning, Reinforcement Learning, Deep Learning & Data Science**

AWARDS & ACHIEVEMENTS

- Bagged **Gold** Medal in **Bosch's Route Optimization** challenge at the 8th Inter IIT Tech Meet   *2019*
- Secured **2nd** position in Capture The Flag **cybersecurity challenge** at the 8th Inter IIT Tech Meet   *2019*
- Bagged **Gold** Medal at the 7th Inter IIT Tech Meet in **Star Cluster Identifier** competition   *2018*
- Secured AIR **340** in IIT-JEE Advanced | AIR **176** in JEE Main Paper-I | AIR **90** in JEE Main Paper-II   *2016*
- Amongst **Top 300** students in the country qualified for **INPhO** (for two straight years) and **INMO**   *2015,14*
- Achieved AIR **173** in KVPY Fellowship by IISc Bangalore | Recipient of NTSE Scholarship by NCERT   *2014,12*
- Secured AIR **12** in 43rd National Mathematics Olympiad by **AMTI** | State Rank **4** in 41st **APAMT**   *2013,12*

PROFESSIONAL EXPERIENCE

Amazon Development Centre India Pvt. Ltd   *May - July 2019*
Auto Trouble Ticket Manager | Guide: Archit Agrawal   *Hyderabad, India*
- Automated process of resolving **trouble tickets** raised on **amazon services** by developing java package
- Designed **runtime compilation** module using **Java Compiler API** to implement dynamic code execution by converting java snippet code from different source packages into a compiled java object
- Developed a **generic framework** to plug-in their models for information retrieval and auto-suggesting resolution

OYO - Oravel Stays Pvt. Ltd.   *May - July 2018*
Price Elasticity estimation | Guide: Rahul Gupta   *Gurugram, India*
- Designed a **prediction model** in **R** that predicts the likelihood of achieving certain profit from the current situation and gives the optimized path of **price movement** using probability-based analysis
- Implemented density-based clustering using **HDBSCAN density cluster model** to remove the outliers
- Implemented **two-stage least squares** instrumental variable model to remove biases in explanatory variables

Darwin Travel Tech   *December 2017*
Tour Package | Guide: Nikhil Kulkarni   *Mumbai, India*
- Developed **text classification** model using python based Natural Language Toolkit to extract information
- Developed **Java Spring** Platform to automate generation of itinerary for a tour package with minimum cost possible
- Reduced the time taken by API calls using **multi-threading** to get transport, hotels and activity details

RESEARCH EXPERIENCE

Modular Quantum Computer Design   *Ongoing*
Guide: Prof. Sai Vinjanampathy   *Master's Thesis Project, IIT Bombay*
- Designing protocols, basic set of instructions for general n-Qubit Gates to enable fault-tolerant quantum computation
- Implementing a modular RL framework for determining the optimal pulse sequence for any general quantum gate preparation using **Deep RL** through DQN, DDPG, Trust Region Policy Optimization, and **Actor-Critic** methods

Quantum Gate Optimization   *Autumn 2019*
Guide: Prof. Sai Vinjanampathy   *R&D Project, IIT Bombay*
- Implemented Subspace Selective Self-Adaptive **Differential Evolution (SUSSADE)** technique to generate the instructions for effectively determining the control parameters of the **quantum control scheme**
- Critically analyzed advantages of GrAPE with **Push-Pull optimization** and RL approaches like **Q-learning**, Deep-Deterministic **Policy gradient** methods and evolutionary RL for improving existing bounds for gate fidelity

Interactive Image Segmentation   *Ongoing*
Guide: Prof. Amit Sethi   *Bachelor's Thesis Project, IIT Bombay*
- Applying data augmentation strategies on medical images using Generative Adversarial Networks **(GANs)**
- Implementing interactive image segmentation in multi-tissue histopathology using **HoVer-net** on a synthetic dataset

Tangram Solver (Dissection Puzzles)   *Spring 2020*
Guide: Prof. Shivaram Kalyanakrishnan   *Bachelor's Thesis Project, IIT Bombay*
- Developed a UI to extract a puzzle from images using Harris Corner Detection and **Canny Edge** Detection algorithm
- Designed an end-to-end application to solve Tangrams, **NP-hard problem** using simulated annealing with **angle heuristic** and largest piece first placement order to decrease branching factor of the search problem

Academic Projects

Gomoku RL Playing Agent | Fundamentals of Intelligent agents · *Autumn 2020*
- Created Gomuku playing AI agents using **Monte Carlo Tree Search (MCTS)** algorithm in C++
- Implemented efficient guided search using various heuristics to create different learning AI agents using **reward shaping**, setting up intelligent priors and utilized **multi-threading** to carryout rollouts in parallel

Depth Map Prediction From Single Image | Computer Vision · *Spring 2019*
- Built two-stack CNN-Residual Network model to estimate depth map from a single RGB image
- Implemented **transfer learning** using pre-trained **ResNet-50 network** to enhance the performance

Compiler for C-like language | Implementation of Programming Languages · *Spring 2019*
- Developed a compiler and evaluator for a subset of C supporting functions, scope levels, and control sequences
- Utilized **Lex** for **tokenizing, Yacc** for **parsing** and constructed **AST** to generate **MIPS** assembly code

Features of XV6 | Operating Systems · *Autumn 2018*
- Examined xv6 source code and implemented process scheduling algorithms like round robin and priority-based.
- Implemented Memory management techniques like **lazy page allocation** and applications of **pthreads**

Fake News Detection by Crowdsourcing | Database and Information Systems · *Autumn 2018*
- Developed web and android App for crowdsourcing the verification of spurious news articles.
- Designed a database schema for users, volunteers and admins providing tools to review, appoint and approve
- Implemented **routing algorithms** to distribute tasks among volunteers based on domain-specific knowledge

Microarchitectural Attacks | Computer Architecture · *Autumn 2018*
- Implemented FLUSH+RELOAD attack to extract the private key from the **GnuPG** implementation of **RSA**
- Implemented **Cache Template Attack** to profile and exploit cache-based information leakage of programs
- Proposed automated DRAMA Template attack by reverse engineering **DRAM** addressing and template attack

3D Modelling and Animation | Computer Graphics · *Autumn 2018*
- Designed 3D graphical models through hierarchical modeling in C++ OpenGL with textures, shading, and lighting
- Implemented framework to create dynamic **Bezier** curves through clicked control points for camera motion

Socializing - Social Networking Platform | Software Systems Lab · *Autumn 2017*
- Developed Django based web application which serves as a social platform to interact through posts and messages
- Implemented real-time chatbox using **Django channels** with the help of websockets

Technical Skills

Programming	C/C++, Python, Java, R, Racket(Scheme), SWI-Prolog, Bash, VHDL
Software Skills	Git, LaTeX, MATLAB, OpenCV, GNU Make, Android Studio, Django
Deep Learning	PyTorch, TensorFlow, Keras, TensorFlow Quantum

Positions of Responsibility

Department General Secretary | CSE Department, IIT Bombay · *April 2019 - July 2020*
- Elected student representative in department policy formulation committees to ensure student involvement
- Re-instantiated and managed Cyber-Security Club, organized CTF events to increase awareness about cybersecurity
- Spearheaded a 3-tier team of 12 members in designing and development of the content for articles pertaining to research groups, the scope of career in core and non-core sectors and semester exchange experience

Department Academic Mentor | CSE Department, IIT Bombay · *June 2020 - Present*
- Mentoring 4 sophomores for their academic and general concerns, and helping them cope with the curriculum
- Mentor to additional 2 students in an academic rehabilitation program (ARP) & guiding them back on track

Others
- **Teaching Assistant** | Programming Lab, Prof. Sai Vinjanampathy · *August 2020 - Present*
- **Mentor** | Quantum Computing, Computer Vision: Maths and Physics Club · *April - June 2020*
- **Joint Secretary, Sports Secretary** | CSEA, IIT Bombay · *April 2017 - March 2019*
- **Convener** | Krittika - The Astronomy Club · *April 2017 - March 2018*

Key Courses Undertaken

AI & ML	Foundations of Intelligent and Learning Agents, Web Mining & Information Retrieval*, Advanced Machine Learning, Computer Graphics, Computer Vision
Computer Science	Data Structures & Algorithms, Computer Networks, Blockchain Technology*, Compilers, Operating Systems, Database Systems, Architecture, Automata Theory, Virtualization

* courses to be completed by November 2020

Extracurriculars

- Part of the Inter IIT contingent securing **Runner's Up Position** at Inter IIT Tech Meet held at IIT Bombay *2018*
- Awarded **Hostel Player of GC (Carrom)** for best performance in Inter Hostel Sports, IIT Bombay *2016*
- Completed a year-long course in **Athletics** offered by National Sports Organization **(NSO)**, IIT Bombay *2016*
- Attended **Vijyoshi Science Camp** organized by Indian Institute of Science **(IISc)**, Bengaluru, India *2015*