Pursuing a **minor degree** in the Department of **Industrial Engineering** and **Operations Research (IEOR)**

Scholastic Achievements

- Secured **99.96** percentile in **JEE Mains** and **99.18** percentile in the **JEE Advanced** Examination ['19]
- Recipient of the prestigious **KVPY Fellowship** program by Dept. of Science and Technology, Govt. of India ['18]
- Acheived an **All India Rank** of **80** in the **National Engineering Olympiad 3.0** ['20]

Professional Experience

SPACE x VIEW Pte. Ltd, SINGAPORE | Research & Development Internship [Jun-Jul'21]

- Worked with a team of **5** co-interns to create the **first working prototype** of a system of controllable buoys capable of oceanic data collection and transmission for building real-time models that help the **Japanese Fishing Industry**
- Tasked with the design of the **Power Management System** for the buoy to make it operational for **3+ hrs**
- Integrated the **PH, Temperature, TDS and GPS** sensors along with the **Solar Panels** on the final prototype

Key Technical Projects

TEAM AEROVE | UMIC, IIT Bombay [Sep'20-Present]
Senior Engineer | *Guide: Prof. Dhwanil Shukla, Dept. of Aerospace Engineering IIT Bombay*

Motion Planning	• Working on **3-D Mapping & Motion Planning** problems for aerial vehicles in unknown environments • Implemented and validated the use of algorithms like **A*, RRT* & DWA** for indoor drone systems • Critiqued various mapping frameworks like **Octomaps** & **Skimaps** for real-time probabilistic mapping • Implemented **Dynamic Obstacle Avoidance** algorithms for robust, high-speed local planning
Controls	• Developed **Minimum Snap Trajectories** for the drone using jointly optimized polynomial segments • Worked with varied drone hardware, and validated basic flight strategies using **MAVROS** scripts • Achieved a stable **Position Hold** with an accuracy of **5cm** using PID control using flight controllers • Integrated an RGDB Camera to work with **ORB-SLAM2** for pose estimation with upto **4cm** accuracy

INTERNATIONAL AERIAL ROBOTICS COMPETITION 2021 | UMIC, IIT Bombay [Sep'20-Feb'21]
Developed a system of Autonomous Multicopters for the World's Longest Running Aerial Robotics Competition

- Declared **WORLD CHAMPIONS** of the Mission 9 Simulation Challenge, hosted by **AUVSI** across **5 continents**
- **Junior Engineer** in the **Controls and Motion Planning** subsystem of the team, worked closely with **20** members
- Implemented dynamic **Waypoint Navigation** in the **GAZEBO** simulation for a mother-daughter system of drones
- Developed an algorithm to **localize** points in the UAV environment using only the feed of a **monocular camera**
- Formulated and implemented a **Finite-State-Machine** structure acting as the central **Autopilot** for the drones

EXTENDED MASK R-CNN | Course Project [Oct-Nov'20]
Prof. Biplab Banerjee | Machine Learning for Remote Sensing

- Constructed a two step approach for **multi-label classification** of **7** different Yoga Poses on a custom dataset
- Used the Mask R-CNN trained on the **COCO** dataset as the backbone network for human **instance segmentation**
- Developed a **neural network** for classifying the extracted instances to achieve an accuracy of **95.6%** on the test data

ASME - STUDENT DESIGN CHALLENGE 2021 | UMIC, IIT Bombay [Dec'20-Apr'21]
An International Mechatronics competition organised by the American Society Of Mechanical Engineers

- Reached the **World Finals** of the competition after going through several knockout rounds | **GLOBAL RANK 4**
- Led the **electrical subsystem** of the team to build a bot capable of carrying **5** Kgs powered by a single AAA battery
- Designed and created a stack of **Boost Converters** on **customized PCBs** for maximising the battery performance
- Constructed a custom **differential drive** for the robot using **SPDT Relays, ATTINY IC & Bluetooth module**
- Strategised game-play tactics during the competition's knockout tournament to maximize reward points for the team

BIG DATA ANALYTICS | Course Project [July-Aug'20]
Prof. Prabhu Ramachandran, Department of Aerospace Engineering IIT Bombay

- Extracted the data set of **COVID−19** active cases worldwide and used statistical models for analyzing the pandemic
- Used various python libraries (like **NumPy, SciPy, Pandas**) for Data cleaning, processing and modelling
- Validated various statistical theories like the **CLT** relating to hypothesis testing for different types of distributions

MULTI AGENT COLLISION AVOIDANCE | Research Project [Jan-Jul'21]
Guide : Prof. Leena Vachhani, Systems & Controls Department, IIT Bombay

- Worked on the simulating **obstacle avoidance** for a system of mobile robots using **Interval Analysis** techniques.
- Formulated a **new mathematical model** for the intervals approach and prooof tested it in the **GAZEBO** simulation
- Studied the hardware expandability of the approach for **parallel & embedded** applications for robotic systems

PROJECT ETH | UMIC, IIT Bombay [July-Aug'20]
Autumn of Automation

- Created a real-time simulation of a robot performing a series of Automated tasks to solve the given problem statement
- Extracted and manipulated the **Point Cloud** data to localize the interest points making use of **TF Trees** in **ROS**
- Formulated **Inverse Kinematics** on a 3-Degree Of Freedom **robotic arm** system to be used by the robot

NONLINEAR DYNAMICS | Guided Study [Jun-July'20]
Summer of Science | Maths & Physics Club, IIT Bombay

- Studied **Linear Algebra** and **Differential Equations** in the context of Nonlinear System Dynamics
- Learned about **bifurcations** and generated **phase portraits** of famous 2-D nonlinear problems using **Python**
- Compared the accuracy of different **numerical methods** for solving differential equations in the 2-D pendulum problem

Position of Responsibility

COORDINATOR, TEAM AEROVE | UMIC, IIT Bombay [May'19-Jul'20]
The Innovation Cell aims to facilitate technical start-ups and foster an atmosphere of innovation and entrepreneurship

- Member of the team in charge of **planning, organizing** & **publicizing events** under the Innovation Cell
- Drafted a budget proposal of **INR 1.5 M** to the Student Technical Project Committee targeting **IARC 2022**
- Conducted the recruitment drive and took interviews to shortlist **30** students from a pool of **100+** freshmen

ACADEMIC MENTOR | Department of Aerospace, IIT Bombay [May'21-Present]
Department Academic Mentorship Program

- Part of a team of **23** mentors selected based on interviews & peer-reviews, closely mentoring **7 sophomores** .
- Helping mentees, strike a balance between **academics & extracurriculars**, and manage time efficiently
- Contributed in the **Department Video Initiative**, aimed as an introduction to the department labs & facilities

SPORTS SECRETARY | Hostel 2, IIT Bombay [Sep'20-Mar'21]

- Member of a 3-tier hostel council made up of **28** members selected after rigorous groundworks & interviews
- Responsible for ideating and organising all sports related activities and promoting a healthy sports culture
- Conducted several **E-Sports Tournaments** amidst online semester to sustain sports culture in the hostel
- Successfully organised an online **resume making session** in **LaTeX** to help sophomores draft their resumes

Technical Skills

Coding	C++, ROS, Python, R, OpenCV, MATLAB, Tensorflow, Keras, PyTorch
Softwares	SolidWorks, AutoCAD, GAZEBO, QGroundControl, Arduino IDE, Git, MiniZinc, LaTeX

Key Courses Undertaken

Core	Spaceflight Mechanics, Control Theory, Propulsion, Fluid Mechanics, Aerospace Structures
Maths and Computing	Simulation Modeling and Analysis, Data Analysis and Interpretation, Numerical Analysis, Linear Algebra, Differential Equations, Computer programming and Utilization
AI	Machine Learning for Remote Sensing, Deep Learning*, Intelligent & Learning Agents*

** to be completed by Dec 2021*

Extracurriculars

Social	• *Mentored **25+** middle school students towards building a solar lamp with the **SoULS** Organization* ['19] • *Created 2+ hrs of educational **YouTube** content for underprivileged children with **NSS**, IITBombay* ['19]
Sports	• *Received 1 yr of professional training in **Football** under the **National Sports Organization*** ['19-'20] • *Received **Bronze** in the Dehradun district during the **Ranger's U-17 Cup** with the **BBA*** ['16]
Cultural	• *Stood **First** among all the freshmen in the Inter Hostel **Music Video Making Competition*** ['19] • *Performed a group **hip-hop** dance in front of a crowd of **500+** people at **Salsa Night*** ['19]