Pursuing **Minor** in **Systems & Controls**

Scholastic Achievements

- Secured **All India Rank 208** in *IIT-JEE Advanced* 2022 among **1.5L+** candidates *(2022)*
- Secured **All India Rank 544** in *IIT-JEE Mains* 2022 among **1M+** candidates *(2022)*
- Awarded **KVPY** fellowship by Department of Science & Technology, Government of India *(2021)*
- Attained **99.976 percentile** in *MHT-CET PCM* among **2.8L+** candidates *(2022)*

Technical Activities

Mars Rover Team IIT Bombay *(Jan 2023 - Present)*

Advisor: Prof. PJ Guruprasad, Dept. of Aerospace Engineering
A student-led team aiming to build rovers that are capable of performing extra-terrestrial robotics, autonomous traversal and perform onboard tests to detect extinct and extant lives

Junior Design Engineer | *Subsystem: Electronics & Controls* *(Apr 2023 - Present)*

- Implementing **Inverse Kinematics** algorithms to enhance the Robotic Arm's performance, thus ensuring smoother operation and more precise control over a wide range of tasks and operations
- Revamped the **navigation system** by incorporating a cutting-edge GPS module, enabling **Real-Time Kinematics (RTK)** functionality and seamless integration with ROS for enhanced precision
- Contributed to the assembly of the new electrical enclosure, which houses essential rover components, including microcontrollers, motor drivers, and batteries

Trainee | *Induction Project* | *Division: Electronics & Software* *(Jan-Apr 2023)*

- Developed *Python* code for **autonomous navigation** of a small robot using *ROS Noetic*
- Orchestrated the **wireless communication** between a *Raspberry Pi v4* onboard the robot and a remote computer, enabling **real-time direction commands** through overhead camera feed analysis
- Applied advanced computer vision techniques with OpenCV to **detect ArUco markers**, calculate distance and orientation, and wirelessly transmit directional commands for effective robot guidance.
- Utilized Python and OpenCV to implement **real-time edge detection**, employing the *Canny* Edge Detection technique.

Robotics Club | *ScienceKidz* | *Member* *(2016-2019)*

- Completed **3 years of STEAM training** in a timed and monitored environment
- Achieved the title of **winner** at the **National Junior Robocon 2018** organised by MIT VGS
- Learned essential skills like **soldering**, 3D printing, coding in Arduino IDE and debugging.
- Worked with different sensors like Ultrasonic, IR, LDR, **Bluetooth**, **RFID**, temperature sensor, humidity sensor and **NFC**

Technical Projects

Digital Logic Design in VHDL | *Course Lab Experiments* *(Aug 2023 - Present)*
Guide: Prof. Siddharth Tallur, Dept. of Electrical Engineering

- Developed VHDL code for several circuit designs including Encoders, 4-Bit Adder Subtractor, **Prime Number Detector**, Multiplier and **Universal Shifter** using **structural modelling**
- Developed VHDL code for an **ALU**(Arithmetic Logic Unit) using **behavioral-dataflow** modelling and for an FSM-based **sequence generator** using **structural-dataflow** modelling

- Implemented the above-mentioned designs on a custom-built **Intel MAX 10 FPGA** board using UrJTAG and ScanChain

e-Yantra Robotics Competition | *e-Yantra Lab* | *IIT Bombay* *(Sep 2023 - Present)*

- Targeting to make an *AstroTinker bot* that can drag-drop essential electronic components, utilizing an **FPGA** as its powerhouse to create a sophisticated **CPU architecture** using **Verilog HDL**
- Developed Verilog HDL designs for **Ripple Carry Adder** and FSM-based **Sequence Detector**
- Designing a C-based **path-planning** algorithm to calculate a valid route between two given points

Tinkering Bootcamp | *Tinkerer's Lab* | *IIT Bombay* *(Jul 2023 - Present)*

- Targeting to make a real-life single-player chessboard implementing machine learning algorithms
- Gained proficiency in TinkerCAD, microcontrollers and SolidWorks

Line Following Bot | *Course Project* | *Makerspace lab* *(Jan-Feb 2023)*

- Created a bot entirely using CAD software Fusion 360 and fabricated it through a combination of 3D printing and laser cutting
- Developed a line-following algorithm tailored for the Arduino Uno microcontroller, employing IR sensors and an L293D motor driver
- Enhanced bot functionality by incorporating an LDR sensor for gripper control

Trapped in Neural Nets | *Analytics Club* *(Dec 2022 - Jan 2023)*
Winter in Data Science (WiDS), IIT Bombay

- Gained proficiency in both supervised and unsupervised machine learning algorithms and explored the **architecture of neural networks** while delving into their practical implementation in code
- Constructed an **OCR** program designed to **recognize digits** through a classification neural network trained on the **MNIST dataset**.

Technical Skills

Languages	C/C++, Python, Java, Bash, VHDL, Verilog HDL
Softwares	Git, LaTeX, ROS, Gazebo, Arduino IDE, MATLAB, Fusion 360, SolidWorks, Quartus, ModelSim Altera
Python Libraries	NumPy, Matplotlib, OpenCV, pandas, SciPy, scikit-learn, TensorFlow
Hardware	Soldering, Debugging, Micro-controller programming

Key Courses Undertaken

Electrical Engineering	Introduction to Electrical Engineering, Power Engineering I, Digital Systems*, Analog Systems*, Probability & Random Processes*, Signal Processing-I*, Digital Circuits Lab*
Systems & Controls	Mathematical Structures for Control*
Computer Science	Computer Programming & Utilization
Math	Calculus I, Calculus II, Linear Algebra, Differential Equations
HASMED	Economics*, Introduction to Psychology, Introduction to Management
Miscellaneous	Makerspace

**Courses to be completed by Nov 2023*

Extracurricular Activities

- Participated in a 2-day long **Drones Workshop** organized by ERTS lab, IIT Bombay
- Participated in the International Children's Festival of Performing Arts **(ICFPA)** in 2013 & 2016
- Completed year-long intensive military training program in **National Cadet Corps** at IIT Bombay