Pursuing a Minor degree in the Department of Aerospace Engineering

Scholastic Achievements

- Ranked **4** in the Department of Mechanical Engineering among **140+** students *(2021)*
- Obtained All India Rank **196** (99.89 percentile) among 1.7 lakh students in JEE Advanced *(2019)*
- Obtained All India Rank 1820 among **11.5 lakh** students in JEE Mains Paper I *(2019)*
- Held the highest score in 12th CBSE board examination among 100+ students in school *(2019)*
- Obtained All India Rank 22 and state rank 1 among **1.4 lakh** students in JEE Mains Paper II *(2019)*

Technical Projects

Topology Optimization | Research Project *(Sep '20 – Present)*

Guide: Prof. Amuthan A. Ramabathiran - Department of Aerospace Engineering

- Studied numerical methods to optimize functionals and find solutions to differential equations
- Implemented **FreeFEM++** code to mesh and solve 2D and 3D, linear and non-linear, partial differential equations and exported results to **Paraview** for post-processing and visualisation
- Applied the **adjoint method** with appropriate Lagrangian to optimise finite and infinite DOF systems
- Performed **topology optimization** under various boundary conditions for linear elastic materials
- Working on a solution for optimizing the structure of a wall under the effect of fluid flow which involves applying topology optimization on linear elastic and **Navier-Stokes equations**

Introduction to CFD | Research Project *(June '21 – July '21)*

Guide: Prof. V. R. Kowsik Bodi - Department of Aerospace Engineering

- Used **Python** to solve 2D advection, convection and Burger's equations using finite differences
- Examined CFL stability criteria and diffusion and dispersion error analysis of a numerical scheme through its modified differential equation and Fourier series expansion
- Performed **pressure-velocity coupling** by implementing the incompressible continuity equation as a kinematic constraint to successfully solve the unsteady Navier-Stokes equations

IIT Bombay Rocket Team | Junior Propulsion Engineer *(June '21 – Present)*

Faculty Advisors: Prof. Nagendra Kumar and Prof. Sudharshan Kumar - Department of Aerospace Engineering, Prof. Neeraj Kumbhakarna - Department of Mechanical Engineering

*IN-SPACe recognised team currently involved in developing a **solid motor propelled rocket**, with an apogee of 10,000 ft., with plans to participate in the Spaceport America Cup held annually in the USA*

- Responsible for designing, simulating, manufacturing and assembling SRM hardware while achieving optimal safety factors
- Studied supersonic **nozzle theory** and combustion as applied to solid rocket motors
- Explored NASA's CEA (Chemical Equilibrium with Applications) software's rocket simulation aspects

Remote-Controlled Plane Competition *(Oct '19)*

Aeromodelling Club, IIT Bombay

- Led a team of 4 to build a remote-controlled aeroplane while ensuring **roll and pitch stability**
- Installed electrical components (BLDC motor, control surface servos, Lithium-ion battery, ESC, receiver) on a depron fuselage and wings while achieving optimal position of COM and accessibility
- Ensured wings and fuselage had sufficient strength to survive two crashes during test flights

SMED in lean manufacturing | Course Project *(Jan '21 – May '21)*

Guide: Prof. Rakesh G. Mote - Department of Mechanical Engineering

- Conducted a detailed analysis on practical implementations of **lean manufacturing** and SMED
- Performed a **heat transfer** study in FreeFEM++ that quantified the time saved by die preheating

Bluetooth Controlled Bot | XLR8 *(Aug '19)*

Electronics and Robotics Club, IIT Bombay

- Built a wheeled Bluetooth controlled bot using HC-05, ATtiny and L293D with differential steering
- Explored innovative design ideas that allowed the bot to run even when flipped over

Technical Skills

Proficient in:

Programming Languages:	C++, Python, FreeFEM++, C#, Java
Software:	SolidWorks, Paraview, Blender, Unity

Familiar with:

Programming Languages:	MATLAB, JavaScript, HTML, CSS
Software:	AutoCAD, Fusion 360, NASA's CEA

Key Courses Undertaken

- **Department Courses** — Strength of Materials, Thermodynamics, Fluid Mechanics, Solid Mechanics, Heat Transfer*, Magnetohydrodynamics and its engineering applications*
- **Mathematics Courses** — Numerical Analysis, Calculus, Linear Algebra
- **Other Courses** — Introduction to Flight, Aircraft Propulsion, Computer Programming and Utilization, Modelling and Simulation*, Continuum Mechanics*

*being pursued in current semester (Autumn 2021)

Extra-Curricular Activities

- Underwent year-long rigorous **Swimming** training under National Sports Organisation (NSO)
- **Trekked** to Roopkund Lake, Hemkund Sahib, Valley of Flowers, Tunganath and Karkotak as a hobby, and successfully completed departmental trek to Visapur
- Completed 9 levels of mental arithmetic and abacus training at an early age provided by UCMAS, an organisation for the advancement of mental mathematics
- Explored PC **Game Development** using Unity and Blender