Vishrant Dave
Third Year Undergraduate, Material Science Engineering
Double Major in Aerospace Engineering
Indian Institute of Technology, Kanpur, India

Email : vishrant@iitk.ac.in
Mobile : +91-9987986515
Linkedin : vishrant-dave
Website : Vishrant-Dave

EDUCATION

Year	Degree/ Certificate	Institute	CPI/ %
2024	B.Tech and Double Major	Indian Institute of Technology, Kanpur	**8.4**/10.0
2019	Higher Secondary Certificate (CBSE XII)	Ryan International School, Mumbai	**95.8**%
2017	Secondary School Certificate (CBSE X)	Ryan International School, Mumbai	**96.6**%

RESEARCH INTERNSHIP

- **Numerical Analysis of Latent Heat Thermal Energy Storage Systems**   June 2021 - Aug 2021
  SURGE Research Program, Prof. Ashoke De, AE, IIT Kanpur
  - Solved 1-dimensional convection/diffusion Stefan's problem using enthalpy-porosity fixed grid technique.
  - Developed a Finite Volume Method based algorithm using buoyantPimpleFoam solver in **OpenFOAM** to simulate multiphase behaviour of melting of Phase Change materials
  - Created a database of Numerical Methods used to simulate the melting and solidification property of **Phase Change Materials** used in latent heat based Thermal Energy Storage Devices

PROJECTS

- **Hypersonic Shock Behavior of ZrB_2 based UHTCs**   Aug 2021 - Ongoing
  Undergraduate Project, Prof. Kantesh Balani, MSE, IIT Kanpur
  - Designing algorithm using Object Oriented Finite Element Method (OOF2) software to simulate the thermal shock conditions obtained during orbital reentry.
  - Material behavior of ZrB_2 based Ultra High Temperature Ceramics for Spacecraft applications is investigated
  - Studying the oxidation behaviour of diboride based heat shields during **atmospheric reentry**
  - Working alongside a Ph.D. group to use Free Piston Shock Tunnel (FPST) to create hypersonic test conditions, and test ZrB_2's thermal shock and oxidation resistance properties

- **Two Wheel Self Balanced Robot**   May 2021 - July 2021
  Robotics Club, IIT Kanpur
  - **Designed** a complete discrete digital control system with state space model to provide dynamic stability
  - Implemented closed loop control system using **LQR** algorithm to inverted pendulum test case using MATLAB
  - Applied **Kalman Filter** to above algorithm to account for system instabilities and external uncertainties

- **Thermal Stability of Perovskite Solar Cells**   June 2021 - Aug 2021
  MSE681A: Solar Energy Technology, Prof. Kanwar Nalwa, MSE, IIT Kanpur   *Grade: A**
  - Presented the fundamental reasons for intrinsic thermal instability and breakdown of HTL and ETL layers
  - Analyzed existing solutions to prevent intrinsic thermal degradation by using **Caesium doped PSC**
  - Proposed an innovative way to solve the thermal stability issue by using **PCM** as heat-absorber layer

- **Fuel Gauging in Microgravity using ECVT Sensor**   Jan 2021 - May 2021
  AE251A: Experiments in Aerospace Engineering I, Prof. Sudhir Kamle, AE, IIT Kanpur   *Grade: A*
  - Studied the potential of Electrical Capacitance Volume Tomography (ECVT) sensor to be used as Fuel Gauge in Microgravity conditions onboard spacecrafts. Essential utility in developing **propellant depots** in orbit.
  - Analysed conventional methods of fuel gauging sensors based on gravity and differential pressure mechanisms
  - Learnt **operating principle and design** of ECVT sensor for collecting experimental data of multi-phase flows

(A*: Exceptional Performance, A: Excellent Performance)

INITIATIVES

- **IITK Rocketry Team**   December 2021 - Present
  Founder
  - Brought together and formed a 6 member team to establish a **high-power Model Rocketry Club** at IITK
  - Designed a rocket to reach an altitude of **200 m** using OpenRocket and MATLAB based softwares
  - Manufactured our first solid rocket motor using Al 6061 and AISI 1018 steel with **ZnS** as base propellant
  - Building the **operation cycle** of manufacturing - assembly - testing, so that the team can work efficiently

Scholastic Achievements

2021	Received **SURGE-IITK** scholarship to pursue funded Summer Research Internship at IIT Kanpur, India
2019	Secured All India Rank **4495** in **JEE Advanced** among **2,00,000** selected candidates
2019	Secured All India Rank **3122** in **JEE Mains** (top **0.1%** Percentile) among **1 Million** candidates

Relevant Coursework

Fluid Mechanics and Rate Processes	Mechanics of Solids	Linear Algebra
Incompressible Aerodynamics	Partial Differential Equations	Dynamics
Solar Energy Technologies and Materials	Rate Processes	Quantum Physics

Skills

- **Tools:** OpenFOAM, Git, MatPlotLib, NumPy, LaTeX, OpenRocket
- **Software:** Fusion 360, MATLAB and Simulink, LabView, Autodesk Inventor and AutoCAD
- **Languages:** Python, C, C++, HTML, CSS, JavaScript
- **Web Development:** VS Code IDE, jQuery, SCSS

Teaching Internship

CAMPK12: AI and Machine Learning Instructor June 2020 - Aug 2020
Tech Leaders Internship Programme

- Gained **90+ hours** of experience teaching JAVA/Python based courses to students of diverse age group
- Contributed in developing a curriculum that helps students connect with real life problems based on ML
- Added 8 projects to the company repository, that helps student better understand the concept

Positions of Responsibility

Academic Department Mentor August 2021 - Present
Material Science and Engineering Department, IITK

- Responsible to mentor and guide **250+ undergraduate students** regarding Material Science and Engineering Bachelors program, Departmental courses and Undergraduate Research Projects
- Organized meetings and talk sessions to make students more cognizant of their curriculum and academics

Secretary, International Relations Wing May 2020 - April 2021
Academics and Career Council, IITK

- Led development of GRAD: **Graduate Research Application Directory**. A go-to guide about application procedure for postgraduate studies. The initiative witnessed a massive reach of over **8,500 students**
- Interviewed IITK alumni to understand their experience and journey in postgraduate application, information was later transcribed and used to draft GRAD
- Spread awareness about International Opportunities through **RISE** Research Internship and Semester Exchange Blog Series reaching **3500+ students** via facebook handle.

Junior Executive Aug 2019 - May 2020
Entrepreneurship Cell, IITK

- Organized 19th edition of Startup Master Class with Alumni Association having **1000+** participants
- Managed Entrepreneurial Lecture Series **Startup101**, an yearlong series of talks by renowned Entrepreneurs
- Conducted Business Model discussion to promote Entrepreneurship within campus

Extra Curriculars

- Aeromodelling Club Competitions, IITK:
  - Won 2nd prize in Glider Competition
  - Won 3rd prize in Ornithopter Competition
- Developing Personal Website using HTML, CSS, JS
- Served as an NCC Cadet at 2-UP-CTR division
- Language: English, Hindi and Gujarati