Saral Mittal
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UG Fourth Year (B.Tech.)
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Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	
Intermediate/+2	CBSE	JVP International School	2017	91.60
Matriculation	CBSE	CBSE, Central Academy Sr. Sec. School	2015	10.00

SCHOLASTIC ACHIEVEMENTS

- Honoured with **SICI-MITACS Programme Award** to pursue research internship at Canada ['20]
- Secured **AIR 351** in Joint Entrance Examination-Mains amongst 1.2 million candidates ['17]
- Ranked **681** amongst 0.2 million students in Joint Entrance Examination-Advanced ['17]
- Awarded with prestigious **Kishore Vaigyanik Protsahan Yojana (KVPY)** fellowship ['17]
- Amongst National **Top 1%** in National Standard Exam in Physics out of 45,000+ candidates ['17]
- Consistently improved academic record in last 4 semesters with SPI: **8.8, 9.25, 9.38, & 9.36** ['19-'21]
- Pursuing **Honours** in Mechanical Engineering under Prof. Amit Singh ['21]

RESEARCH PROJECTS

Dynamic Failure of Materials | Mitacs Research Internship [Apr'20-Present]

Guided by Prof. James D. Hogan, ***University of Alberta*** *| Collaborative project with* ***US Army Research Laboratory***

3-D reconstruction using XCT	• tiff files→ 3D Point Cloud: Stacked & binarized grayscale images in **MATLAB** by thresholding • 3D Point Cloud→ Iso-surface Model: Implemented **Marching Cubes** Algorithm in MATLAB • Surface Model→ Solid Model: Watertightened mesh & constructed B-rep model in **Fusion 360** • Solid model FEA: Performed static simulation in **ABAQUS** to validate model against test data
Polymeric foam Modelling	• Modelling structures based on microstructural characteristics and porosity observed in XCT • Performing compressive simulations in **Ansys** to validate the models against test data • Improved the accuracy in 'Critical Stress' to **83%** through design iterations in **SolidWorks** • Testing various hyper-elasticity models for PU to improve the accuracy in critical strain value
Boron Carbide Failure Analysis	• Digital Image Correlation: Analyzed high speed images for dynamic testing of Boron Carbide • Crack Speed: traced trajectory and speed of dominant cracks across specimen using **ImageJ** • Fragment density: proposed metric to analyze fragmentation by tracking motion of fragments

Atomistic Modelling of fracture in Twisted Bilayer Graphene [Jun'19-Present]

Guided by Prof. Amit Singh, IIT Bombay | Awarded with open ***Letter of Recommendation***

Elastic & fracture Properties	• Developed Python code for creating t-Bilayer graphene at orientations showing **Moiré pattern** • Performed **MD simulations** to compute elastic modulus, poission's ratio & surface energy • Obtained **86%** accuracy for Fracture toughness as compared to theoretical results from LEFM
Crack Speed	• Analyzed variation in the crack speed with initial crack length, strain rate and temperature • Reviewing Slepyan lattice model to analytically find crack speed in graphene at atomistic level

KEY PROJECTS

Clean Energy	**HFC Buses and g-Hydrogen supply chain** | Partners: BEST, AL & Hyundai [Aug'20-Nov'20] • Performed market research for subassemblies: Electrolyzer, Fuel Cell, and Hydrogen Tanks • Modelled the subassemblies, layout of Hydrogen production centre and Bus refilling station • Designed the retrofitment assembly for the Viking buses to store low-pressure hydrogen fuel • Identification of the most suitable renewable energy power stations for producing green-H2 **Hydrogen-based power backup systems** | Partners: Thermax & CECRI [Feb'21-May'21] • Designed and modelled layout for Hydrogen power backup of 5 kW for residential buildings • Performed economic feasibility analysis to compare Hydrogen UPS with traditional GenSets

Product Development	**HVAC subsystem design for Hyperloop pod** [Aug'20-Nov'20] • Designed 2-stage compression system with intercoolers to provide NTP conditions in the pod • Modelled Shell & Tube heat exchanger in Fusion 360 based on design constraints of subsystem **Mil-Jhul: The social app for elderly** [Aug'20-Nov'20] • Recognized 7 C's of innovation design to develop mutual support system for elderly & youth • Designed a wireframe model for the app in Figma based on the insights from elderly people **Pinthouse: Solution to rising accommodation challenges** [Aug'18-Nov'18] • Charted Business Model for multi-utility bed within a capsule for short-term accommodations • Conducted over 100 surveys and interviews for the customer validation of the capsule model
Simulation of Machines	**Slicing Mechanism: for slicing food items** [Jan'21-May'21] • Modelled and simulated the food-slicing kinematic mechanism in Solidworks Motion • Analyzed motion of the output component; performed sensitivity and joint clearance analysis • Performed dynamic analysis of the mechanism by providing sinusoidal torque at input shaft
Laboratory projects	**Glass Micromachining by Electro-chemical Discharge Machining** [Aug'19-Nov'19] • Investigated the effect of varying feed rate and input pulse frequency during ECDM process • Operated Alicona Optical Surface Profilometer to analyze depth and width of micro-channels **Relationship between Toughness and Hardness** [Jan'19-May'19] • Performed Rockwell hardness tests and Charpy impact tests on metallic alloys and polymers • Discovered a cubic relationship between the parameters by applying regularization technique
Hackathon	**Waste energy recovery from Locomotive engine | Wabtec Corporation** [Nov'19-Dec'19] • Achieved a heat recovery of 100 kW conceptually with minimal changes to existing design • Proposed installation of Organic Rankine Cycle and refurbished heat exchanger in locomotive

SOFTWARE SKILLS

Programming : C/C++ | Python | Matlab | PyTorch | JupyterLab | Gnuplot | Plotly | LaTeX

Software: Ansys | Abaqus | Fusion 360 | SolidWorks | ADAMS | LAMMPS | GIMP | ImageJ

KEY COURSES UNDERTAKEN

Product Development	Structural Mechanics	Other Courses
• Innovation by Design • Machine Design • Design Optimization • Rapid Manufacturing	• Fracture Mechanics • Stress Analysis • Strength of Materials • Solid Mechanics	• Microprocessors & Controls • Simulation of Machines • Molecular Simulations • Cellular Engineering

POSITIONS OF RESPONSIBILITY

Core-Team Member | Data Analytics and Visualization Team [Aug'19-Apr'20]

- Responsible for the ideation and execution of **Grading Statistics Report** to analyze grading disparity across batches
- Developed algorithms for extracting and analyzing the data for **10+** departments, **16+** programs, and **9000+** students
- Generated illuminating visualizations using **Plotly** library to analyze the trends in the grading data over past 3 years
- Coordinated with professors to scrutinize course feedback data and perform stress-tests on **Teaching award** models

Teaching Assistant | IIT Bombay [Jan'21-May'21]

- **Strength of Materials**: Responsible for evaluation and academic assistance of 120+ sophomore students
- **Engineering Mechanics**: Conducted 3 tutorial sessions in online mode to mentor a batch of 70+ students

EXTRA-CURRICULAR ACTIVITIES

Culturals	• Awarded the prestigious **Cultural Roll of Honour** by hostel-5 (2021) • Achieved **1st position** in Performing Arts Festival, **two years** in a row 2k18 & 2k19 • Bagged the prestigious award for **Best Editing** in Sophomore Film GC (2018)
Robotics	• Designed a Bluetooth controlled differential driving **obstacle manoeuvring bot** (2017) • Developed a **remote-controlled plane**; among the **top 10%** which took a flight (2017)
Sports	• Won **Gold medal** in Sophomore Hockey GC and Raftaar (2018) among **10+** hostels • Secured **Bronze medal** in Institute Hockey League (2018) among **8+** institute teams