Vaibhav Bamnote

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Nationality: Indian

Work Experience

Fraunhofer ENAS -Instituts für Elektronische Nanosysteme - Chemnitz
10/2025 – present Research Assistant - **Part-time**

- Automating **electro-thermo-mechanical FEM simulation** workflows for Power electronics assemblies in ANSYS & Python for reliability analysis.

Technische Universität Chemnitz - Dept. of Advanced Powertrain - Chemnitz
05/2025 – present Research Assistant - **Part-time**

- Developed a Python algorithm to automate Multiphase Fuel Cell simulation workflows in OpenFOAM (meshing, solver configuration, etc.), reducing case preparation time.

Hörmann Vehicle Engineering GmbH - Chemnitz
11/2024 – 09/2025 Working Student (Project Concluded)
08/2024 – 10/2024 System Simulation Intern - **Full-time**

- Designed a Thermal management system for a Fuel Cell powered Agricultural vehicle's 11 Primary and Auxiliary Components, using a **Simulink-based digital twin**
- Validated the final design by simulating its performance against 3 peak-load Drive cycles (e.g. Transport, Mower) to guarantee system reliability

Technische Universität Chemnitz - Dept. of Lightweight Structures - Chemnitz
11/2024 – 05/2025 Research Assistant (Contract based) - **Part-time**

- Quantified the dynamic damping characteristics of 6 composite structures through vibration tests to identify structure with high damping behavior.
- Developed custom Python scripts to automate the processing and spectrogram analysis of End-of-Line **Acoustic Testing** data to identify faulty components from 5000 Samples.

Fraunhofer IWU -Institut für Werkzeugmaschinen und Umformtechnik - Chemnitz
10/2024 – 03/2025 Research Assistant (Contract based)

- Modelled a digital twin of a high-dynamic robotic gripper in MATLAB/Simulink, optimizing the actuator's mass-spring-damper model to reduce vibrations and increase PCB assembly speed by over 20% .

Bajaj Auto Ltd., India
05/2022 – 09/2023 Assistant Manager, Commercial Vehicles Exports Division - **Full-time**
09/2021 – 05/2022 Graduate Engineer - **Full-time**

- Standardized Export-Assembly Process for 3 Dispatch modes through 73% Packaging Parts Variety reduction.
- Led a cross-functional team from the Quality, Facility and Safety departments on a variety of projects.

Hyperloop India, Birla Institute of Technology, India
09/2020 – 09/2021 Mechanical Subsystem Mentor - **Part-time**

- Designed a multi-modular Braking system(I-Rail, Sub-track & Wheel) for SpaceX Hyperloop Competition.
- Reduced System weight by 27% using **Thermomechanical FEM** Simulations and topology optimization.
- Collaborated with Aerodynamics and Propulsion sub-systems to improve the design.

Baja SAE Team, Team Black Mamba Racing, Rourkela, India
06/2018 – 06/2020 Braking Team Member - **Part-time**

- Led the complete design lifecycle of the braking system, through calculations, **thermomechanical FEM simulations, topological optimization** and field tests to ensure maximum performance and continuous Improvement.
- Secured 9th place in the endurance race at BajaSAE India 2019, among 85 Teams across India

Education

Master of Science in Advanced Manufacturing
10/2023 – present Technische Universität Chemnitz, Deutschland • Grade: 1,9

- Key Subjects: Applied Modelling and Simulation (Linear and Non-Linear FEM)
- Thesis: Development of parameterizable meshing algorithms for Fuel Cell Simulation with OpenFOAM

Bachelor of Technology in Mechanical Engineering
07/2017 – 07/2021 National Institute of Technology Rourkela, India • Grade: 2,0 (7.9/10)

- Thesis: Band-gap enhancement of Mechanical Metamaterial for low-frequency vibration attenuation
- Key Subjects: Structural Analysis, Thermodynamics, Finite Element Method (FEM)

Projects

Design and CFD Analysis of Centrifugal Compressor in ANSYS CFX • Mini-Project 08/2025

- Performed 3D Steady-state analysis on Compressor rotor to evaluate performance characteristics such as mass flow rate, pressure ratio etc.
- Post-processed to visualize Mach number contours, and validate the converged performance

Band-gap enhancement of Mechanical Meta-materials for low-frequency vibration attenuation
NIT Rourkela, India 06/2020 – 05/2021

- Designed 3 novel metamaterial unit-cell structures based on a comprehensive frequency band-gap analysis to target low-frequency vibration damping
- Optimized unit-cell arrays to achieve 75% vibration damping within the targeted low-frequency range.

Skills

Softwares: ANSYS Structural, OpenFOAM, COMSOL Multiphysics, Hyperworks, Catia, Solidworks, Microsoft Office
Programming Languages: Python, MATLAB, C++
Skills: FEM, CFD, VOF (Volume of Fluid), ETFM (Eulerian Thin Film Model), MultiBody Dynamics, CAD
Soft Skills: Adaptability, Time-Management, Teamwork, Leadership, Problem Solving

Languages

- Deutsch - C1
- English - C2
- Marathi - Mother tongue
- Hindi - Mother tongue

Certifications

- **Engineering Simulations (FEM/CFD) – Cornell Universität/EdX**
- **Multi-body Dynamics in Hyperworks – Skill-Lync/India**
- **Machine Dynamics with MATLAB – RWTH Aachen/EdX**
- **SolidWorks Associate- Mechanical Design – Dassault Systèmes**
- **Multiphase Flow: OpenFOAM – FlowThermoLab** • Ongoing
- **Machine Learning for Fluid Dynamics – Training Series by Dr. Riccardo Vinuesa**
- **Uncertainty Quantification – Johns Hopkins University/Coursera** • Ongoing

Achievements

- 1st Prize - Bajaj Auto Ltd. at CII National Kaizen Competition 2022 (Cost Category)
- Rank 1 Cluster - Bajaj Auto Ltd. CVD Division - Annual Performance Rating **2023**
- Rank 1 Cluster - Bajaj Auto Ltd. CVD Division - Annual Performance Rating **2022**
- Rank 9 - BAJA SAE India 2019 (Endurance Race)

Voluntary Activities

Member in Filmclub Mittendrin - TU Chemnitz, Germany 05/2024 – present
Student Mentor , Student Buddy Program - TU Chemnitz, Germany 10/2024 – present

Publications

"Evolution of V2X with the onset of 6G: Technologies, Challenges, and Opportunities" 27 June 2024
Conference Proceedings of the Advanced Manufacturing Student Conference, 2024
DOI: `https://doi.org/10.51382/2748-9337_i04`