Saurav Dutta

Contact Information

Vizuara AI Labs
Pune, India

d-saurav.github.io
sauravdutta2145@gmail.com

Research Interests

Architected Solids, Inverse Design, Geometric Computing, Machine Learning, Nonlinear Dynamics.

Educational Qualifications

National Institute of Technology Silchar, India *(June '19 - June'23)*
Bachelor of Technology (B.Tech.) Civil Engineering
CGPA : **9.03/10**

Publications (Peer-reviewed)

1. Kanhaiya Lal Chaurasiya, **Saurav Dutta**, Siddhant Kumar, Akshay Joshi,"Hetero-EUCLID : Interpretable model discovery for heterogeneous hyperelastic materials using stress-unsupervised learning," *arXiv preprint*, arXiv :2509.11784 [cs.CE], 2025. [Online]. Available : https://doi.org/10.48550/arXiv.2509.11784. (Under review at *Computer Methods in Applied Mechanics and Engineering*).
2. Harshit Kumar Sandhu, **Saurav Dutta**, Rajesh Chaunsali, "Wave propagation in an elastic lattice with non-reciprocal stiffness and engineered damping," (Accepted with minor revision at the *Journal of the Acoustical Society of America*), Available : https://doi.org/10.48550/arXiv.2507.23761.
3. Srishti Singh, Manish Kumar, **Saurav Dutta**, Vishwajit Anand, "Identification of critical ground motion features for seismic fragility studies considering soil-structure interaction," *Soil Dynamics & Earthquake Eng.* (under last stage of review).

Book Chapters/ Conferences

1. Akshay Joshi, **Saurav Dutta**, Siddhant Kumar, "Hetero–EUCLID : Simultaneously segmenting and discovering hyperelastic constitutive models of all components of a heterogeneous hyperelastic material using EUCLID". *In : European Solid Mechanics Conference (ESMC 2025).* Conference presentation. Lyon, France. url : https://esmc2025.sciencesconf.org/593157.
2. **Saurav Dutta**, Vishwajit Anand, "Framework for Ground Motion Characterization," *In Seismic Hazard Analyses, Wave Propagation and Site Characterization, Springer Nature Singapore, pp. 355–366.* https://doi.org/10.1007/978-981-96-1352-6_30.

Scholastic Achievements

- **Invited talk** : Guest Lecturer, *Wave Propagation in Designed Materials*, IISc
- **AA** grade in Bachelor's Thesis I and II
- **AA** grade in **17** out of **27** department courses
- Selected for Undergraduate Research Council Funded Project, NIT Silchar
- Achieved **2nd** rank institute-wide and in the department in **4th** semester with **9.93/10** GPA
- Top **5 percentile** in IIT-JEE 2023, honored by Glorius NGO
- Cleared Pre-Regional Mathematical Olympiad and Regional Mathematical Olympiad

International Collaboration

Study of Mechanics of Granular Architected Solids using LS-DEM *(July '25 - Present)*
Collaborator : Prof. Konstantinos Kerapiperis, EPFL-ENAC, **École Polytechnique Fédérale de Lausanne, Switzerland**

- Conducted an extensive literature survey on architected granular materials, atomic crystals, and lattice structures to identify knowledge gaps in mechanical modeling.
- Developing a Python-based automated pipeline to generate large libraries of lattice structures via periodic tessellation for computational testing.

Professional Experience

Vizuara AI Labs Private Limited – Pune, India *(Sept '25 – Present)*
Researcher cum Graduate Mentor

- Responsible for critically reviewing and providing feedback on technical documents prepared by clients for applications, ensuring clarity, technical rigor, and alignment with research themes.
- Engaged in research on Scientific Machine Learning (SciML) and Physics-informed AI, with applications to real-world industrial and academic problems.
- Guiding students and junior researchers on projects involving AI for scientific discovery.

Indian Institute of Science, Bengaluru *(June '23 - July '25)*

Research Associate | Mechanical Engineering | Advisor : Prof. Akshay Joshi

- Extended the Bayesian-EUCLID framework to enable unsupervised segmentation and data-driven model discovery in multi-phase hyperelastic materials, facilitating automated identification of distinct constitutive behaviors.
- Developed a Python-based probabilistic growth algorithm that leverages interpretable priors to detect and track material interfaces, achieving robust and automated boundary recognition in complex heterogeneous geometries.

Research Assistant | Aerospace Engineering | Advisor : Prof. Rajesh Chaunsali

- Designed and simulated a novel non-reciprocal lattice model in MATLAB by incorporating non-reciprocal springs and dampers ; analytically derived the dispersion relations and carried out finite-chain simulations to investigate asymmetric wave propagation, band structure, and stability characteristics.
- Independently developed a programmable one-degree-of-freedom pendulum system with tunable time-periodic stiffness, integrating Dynamixel motors with a custom Python-based control architecture ; experimentally realized and analyzed discrete-time crystal dynamics to validate theoretical predictions.

Indian Institute of Technology BHU, Varanasi *(May '22 - July '22)*

Summer Research Intern | Civil Engineering | Advisor : Prof. Vishwajit Anand

- Developed advanced MATLAB scripts to process seismic wave records and extract more than 30 seismic intensity measures, including response spectra, Fourier spectra, and peak ground parameters, enabling detailed characterization of ground motions.
- Adapted and extended the OpenSeismoMatlab framework by incorporating additional ground motion metrics and customized analysis routines, enhancing its applicability for seismic fragility assessment and structural vulnerability studies.

Final year Project

Thermo-Mechanical Static and Dynamic Analysis of Laminated Composite Plates using Finite Element Analysis *(Jan '23 - May '23)*

Advisor : Prof. Atanu Sahu, Dept. of Civil Engineering, **NIT Silchar**

- Conducted static and dynamic finite element analysis (FEA) of laminated composite plates subjected to thermal loading, evaluating deformation, stress distribution, and natural frequencies under varying boundary conditions in ABAQUS.
- Implemented material anisotropy and lamination sequences in the FE model to investigate thermo-mechanical coupling effects, providing insights into structural stability and vibration response.

Design and Analysis of G+4 Residential Structure *(Aug '22 - Dec '22)*

Advisor : Prof. Subhrajit Dutta, Dept. of Civil Engineering, **NIT Silchar**

- Performed structural design and analysis of a G+4 residential building using relevant IS codes, considering dead, live, seismic, and wind loads to ensure stability, safety, and serviceability.
- Developed detailed structural models (beams, columns, slabs, and foundations) and validated results through software-based analysis, optimizing material usage while maintaining compliance with building standards.

Computer Skills

Programming Languages	:	C, C++, Python
Scientific Softwares	:	MATLAB, ABAQUS, AutoCAD, COMSOL, Mathematica
Hardwares	:	Motor Control, Arduino, Sensors, U2D2, LDV, 3D Printing

Leadership Activities

Social

- Head, **Razzmatazz – Incandescence**, NIT Silchar [2023]
- Head, **School Genius – Tecnoesis**, NIT Silchar [2022]