Samik Mukhopadhyay

Ph.D. Candidate, Mechanics of Solids

samik_mukhopadhyay@brown.edu | www.samikmukhopadhyay.com | samikmukhopadhyay

Education

Brown University School of Engineering **Aug 2024 – PRESENT**

Ph.D. in Mechanics of Solids

Advisor: Miguel A. Bessa

Indian Institute of Technology (IIT) Kharagpur **Aug 2019 – May 2024**

Bachelor of Technology (Hons.) in Civil Engineering & *CGPA: 8.73/10*

Master of Technology in Structural Engineering

Research Interests

Data-Driven Approaches in Computational Mechanics | Topology Optimization | Finite Element Methods

Research Experience

Flow Map Learning for Unknown Dynamical Systems **Aug 2023 – Apr 2024**

Supervisor: Dr. Puneet Kumar Patra | MTech Project *Indian Institute of Technology, Kharagpur*

- Designed an Artificial Neural Network (ANN) model to predict the state variables of a dynamical system that evolve according to a system of unknown governing equations.
- Aiming to tune the model to predict more accurately, with the help of **Physics-Informed Neural Networks** by using the Hamiltonian of the system in the model to calculate the loss function.

Analysis of Bird Collision Impact on Composite Materials **May – Jul 2023**

Supervisor: Dr. Puneet Kumar Patra | Summer Internship *Indian Institute of Technology, Kharagpur*

- Simulated delamination tests on composites of various numbers of layers using the Finite Element Software **ABAQUS**.
- Examined Force-Displacement characteristic curves for different specimens, including **Double Cantilever Beams**, using Traction-Separation Law.
- Modeled the bird projectile impacting the composite laminate with **Smooth Particle Hydrodynamics** and verified the deflection and deformation with existing literature.

Modelling of Oceano-Dynamical properties in Estuarine Area **May – Jul 2022**

Supervisor: Dr. Jun Sasaki | Summer Internship *University of Tokyo, Japan*

- Modified a model to simulate the estuarine area using **Unstructured Grid Finite Volume Community Ocean Model** (FVCOM) and modified the model according to the physical parameters of Tokyo Bay.
- Resolved various issues in the code of the model and contributed to the documentation effort.
- Plotted the output **netCDF** data using PyFVCOM and explored other approaches to visualise the data.

Presentations

Differential Gradient-based r-adaptivity for 2-D Linear Elasticity **May 2026**

[Poster] Brown University National Labs Day 2026

Open-Source Contributions

Annotated Example 3 | *MFEM – Finite Element Library* **2025**

- Co-authored an annotated walkthrough of the definite Maxwell problem example for the official MFEM documentation, covering Nédélec finite elements and electromagnetic diffusion.

Technical Skills

- Programming Languages & Libraries: Python (PyTorch, JAX, Equinox), C, MATLAB, GNU Octave
- Engineering & Scientific Software: ABAQUS, OpenMP, LAMMPS, VMD, Ovito, STAAD.Pro, AutoCAD, Revit
- Development & Design Tools: Ubuntu, Git, LaTeX, MS Excel (Macros), Adobe Photoshop

Awards and Achievements

- Received the prestigious **E. Paul Sorensen Graduate Endowment Fellowship (2025)** at Brown University.
- Selected for the **University of Tokyo Summer Internship Program (UTSIP 2022)** in Japan, with **only 15 participants** chosen worldwide.
- Received the **Guru Krupa Foundation (GKF) Scholarship**, a merit-cum-means scholarship for international internships, awarded to **only 7 students** institute-wide. *[news article]*
- Recipient of Jagadish Bose National Science Talent Search (JBNSTS) Senior (2019) and Junior (2017) Scholarship funded by the **Government of India**.
- Ranked 4472^{nd} in JEE Advanced and 4231^{st} in JEE Mains among 1.2 million students nationwide (**99.66 percentile**).
- Secured 30^{th} rank in West Bengal Joint Entrance Examination (WBJEE) among 90,000 participants (**99.96 percentile**).

Teaching Experience

Data-Driven Design & Analysis of Structures & Materials | *Dr. Miguel Bessa* **Sep – Dec 2025**

- Assisted in preparing course materials, grading weekly assignments and exams, and conducting office hours for this graduate-level course.

Concrete Laboratory | *Dr. Puneet Kumar Patra and Dr. Aritra Chatterjee* **Aug – Nov 2023**

- Helped professors organize weekly lab sessions, graded the lab reports, and assisted students in conducting experiments.

Structural Analysis | *Dr. Puneet Kumar Patra* **Jan – Apr 2024**

- Prepared lesson plans, presented course material, and arranged doubt-clearing sessions for students.

Extracurricular Activities

- Led the student organization **Technology Environment Society**, IIT Kharagpur, which aims at creating a more sustainable socio-ecological space within the campus for the tenure of Academic Year 2022-23.
- Worked and contributed as a V-Force volunteer under the **UNV-India** (United Nations Volunteers) for one month (August 2021) on the theme of **"Transforming Food Systems: Youth Innovation for Human and Planetary Health"**.
- **Founder**, **Author**, and **Co-Editor** of a student-run Online Bilingual (Bengali and English) Science Magazine, **Tiyas**, with an aim to make school and college students more attracted towards pursuing science.