

Soban Nasir Lone

Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India (110016)

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EDUCATION

Indian Institute of Technology, Delhi, India

Master's by Research in Applied Mechanics

Aug 2022 - Sep 2024

Cumulative GPA: 8.706/10

National Institute of Technology, Srinagar, India

Bachelor's of Technology in Civil Engineering

Aug 2017 - July 2021

Cumulative GPA: 8.435/10

PUBLICATIONS

ArXiv Pre-print

(Submitted to Journal of Computational Physics)

- **Soban Nasir Lone**, Subhayan De, Rajdip Nayek, α -VI DeepONet: A prior-robust variational Bayesian approach for enhancing DeepONets with uncertainty quantification, arXiv preprint arXiv:2408.00681 (2024), arxiv.org/abs/2408.00681

ACADEMIC EXPERIENCE

Indian Institute of Technology, Delhi

Aug 2022 - Present

Student Researcher - System Monitoring, Identification, and Control Research (SMICR) Group

Supervisor: *Dr. Rajdip Nayek*

Thesis: **Applying Generalised Variational Inference for Robust Uncertainty Quantification in Bayesian DeepONets and Soil Constitutive Modelling**

Projects:

Bayesian neural networks (BNNs) for constitutive modelling

Oct 2023 - Present

- Researched, analysed, and gained expertise in BNNs for uncertainty quantification in deep learning.
- Applied BNNs for constitutive modelling of soil trained on time-series stress-strain data.

Physics Informed Neural Networks (PINNs)

Mar 2023 - May 2023

- Modelled the deformation of a 2D bar subjected to in-plane loading and compared effects of using different forces.
- Implemented codes for forward and inverse problems of a structural dynamical system using PINNs in TensorFlow.

Bayesian Physics Informed Neural Networks (B-PINNs)

Dec 2023 - Jan 2024

- Extended the deterministic PINN architecture to include a Bayesian neural network for uncertainty quantification.
- Incorporated a methodology that remedies prior-misspecification for Bayesian neural networks and thus improved predictive performance.

Parameter Estimation of Dynamical Systems

Jul 2023 - Oct 2023

- Developed a state-space model to estimate parameters and quantify uncertainty in a structural dynamical system using Markov chain Monte Carlo (MCMC), Kalman Filter and Variational Inference.
- Analyzed advantages, limitations, and computation times of the algorithms for accuracy, convergence, and efficiency.

National Institute of Technology, Srinagar

Undergraduate Research, Department of Civil Engineering

Dec 2020 - Jun 2021

Supervisor: *Prof. F.A. Mir*

Final year project: **Site-Specific Landslide Analysis and Correction**

- Collected data, including soil samples and site geography, as part of a comprehensive project on Landslide Analysis.
- Conducted in-depth soil data analysis, utilizing experimental methods and simulations (GeoStudio-GeoSlope) to gain insights into properties and characteristics of the site and propose possible corrections.

Indian Institute of Technology, Delhi

Jul 2020

Research Intern, Department of Civil Engineering

Project: **Microtremor and multichannel analysis of seismic waves for microzonation of an earthquake prone region**

- Microtremor and multichannel analysis of seismic waves for microzonation of an earthquake prone region

RESEARCH INTERESTS

- Non-linear system identification using Bayesian methods and Machine Learning.
- Bayesian Neural Networks for Uncertainty Quantification using Variational Inference.
- Operator Learning frameworks for solving ODEs and PDEs.
- Scientific Machine Learning applications in Civil Engineering.

SELECTED COURSES

Master's Courses

- Deep Learning for Mechanics
- Introduction to Machine Learning
- Decision Theory and Design Optimisation
- Engineering Mathematics and Computation
- Dynamics

Bachelor's Courses

- Computer Programming (C Programming)
- Mathematics (Linear Algebra, Statistics and Probability, Calculus)
- Structural Analysis I, II, III
- Strength of Materials

AWARDS AND ACHIEVEMENTS

- Secured a percentile of 98.5 (out of 100,043 candidates) in the **Graduate Aptitude Test in Engineering (GATE)** (Civil Engineering) 2022 for admission to graduate level programmes to the IIT's and IISc.
- Obtained a percentile of 97 (out of 124,000 candidates) in JEE MAINS 2017 for admission to undergraduate level programmes to the IIT's, NIT's and IIIT's.
- **COLOURS (Football)** by Board of Sports Activities (BSA), IIT Delhi (2022-23) for outstanding achievements in sports.
- Post Graduate Scholarship by the Ministry of Human Resource Development (MHRD), Govt. of India for Academic years 2022 to 2024.

TEACHING EXPERIENCE

Indian Institute of Technology, Delhi

- Teaching Assistant for the course Engineering Mechanics (APL100). Fall 2022
- Teaching Assistant for the course Finite Element Methods (AML706). Spring 2023
- Teaching Assistant for the course Applied Mathematics for Engineers (APL101). Fall 2023
- Teaching Assistant for the course Machine Learning for Mechanics (APL405). Spring 2024

SKILLS

- **Programming:** Python, R, C Programming, MATLAB
- **Frameworks:** TensorFlow, TensorFlow Probability, PyTorch, PyMC3
- **Others:** GitHub, L^AT_EX, Matplotlib, Scipy

EXTRACURRICULARS

- Represented Indian Institute of Technology, Delhi at the Inter-IIT Sports Meet (the annual Olympic-style sports tournament of the 23 Indian Institutes of Technology) in 2022 and 2023 as a part of the institute football team, securing 3rd and 4th positions in the overall standings respectively.
- Participated in Udghosh (the Annual Sports Festival of IIT, Kanpur) in 2022 and 2023, winning Gold (Football) in 2023.
- Captained my Hostel team to a podium finish in the Inter-Hostel football tournament (2023) organised by IIT Delhi.
- Participated in the Inter-NIT Football tournament held at National Institute of Technology, Rourkela in 2020.
- Explored AI Safety concepts as a fellow at the AI Safety Careers Fellowship by FAR AI, Inc. at IIT, Delhi in 2023.

REFERENCES

Dr. Radjip Nayek

Assistant Professor, Department of Applied Mechanics, Indian Institute of Technology, Delhi, India

E-mail: rajdipn@am.iitd.ac.in

Scholar Profiles: [Group \(SMICR\)](#) — [Google Scholar](#) — [LinkedIn](#)

Dr. Souvik Chakraborty

Assistant Professor, Department of Applied Mechanics, Indian Institute of Technology, Delhi, India

E-mail: souvik@am.iitd.ac.in

Scholar Profiles: [Group \(CSCCM\)](#) — [Google Scholar](#) — [LinkedIn](#)