

AKASH YADAV

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INTERESTS

Uncertainty Quantification, Scientific Machine Learning, Deep Learning, Digital Twins, System Identification

EDUCATION

Doctor of Philosophy in Civil Engineering (CGPA: 4.0/4.0) 08/2023 - 05/2027*

Thesis: Quantifying and Reducing Model-form Uncertainty using Stochastic Subspaces

University of Houston - Houston, USA

Master of Technology (Research) in Civil Engineering (CGPA: 8.3/10) 10/2020 - 06/2023

Thesis: SHM accounting for Thermal Variability and Damage using ABC

Indian Institute of Science - Bangalore, India

Bachelor of Technology in Civil Engineering (First Division, CGPA: 8.75/10) 07/2014 - 05/2018

Thesis: Design of Hydro Power Project

Indian Institute of Technology - Roorkee, India

SKILLS

Programming Languages & Packages

Python, MATLAB, Julia, TensorFlow, PyTorch

Computational Softwares

ABAQUS, LS-DYNA, Midas Civil, STAAD.Pro

ACADEMIC PROJECTS

UQ-aware Scientific Foundation Models - Mentor: Dr. Ruda Zhang 06/2025 - present

Developing methods for quantifying and reducing uncertainty in scientific foundation models using probabilistic low-rank adaptation techniques.

Correcting Model-form Uncertainty - Mentor: Dr. Ruda Zhang 06/2024 - present

Developing methods based on stochastic reduced-order modeling framework for correcting model-form uncertainty in computational mechanics and improving predictive performance.

Characterizing Model-form Uncertainty - Mentor: Dr. Ruda Zhang 08/2023 - 08/2025

Developed probabilistic frameworks for constructing stochastic subspaces using probabilistic principal component analysis (SS-PPCA) and the bootstrap method (SS-Bootstrap) to characterize model-form uncertainty in computational mechanics.

Bayesian Optimization under Uncertainty - Mentor: Dr. Ruda Zhang 07/2024 - 07/2025

Developed a Bayesian optimization under uncertainty framework to improve the training of a scale parameter in stochastic models, including SS-PPCA and SS-Bootstrap. The method reduced data requirements and accelerated hyperparameter training by a factor of 40.

Uncertainty Quantification in PINNs - Rice University 10/2024 - 12/2024

Explored a GAN-augmented Physics-Informed Neural Networks (PINNs) framework for uncertainty quantification, inspired by Yang et al. (2019).

Structural Health Monitoring using ABC - Mentor: Dr. Ananth Ramaswamy 07/2021 - 06/2023

Developed a method based on Approximate Bayesian Computation (ABC) for damage detection under varying temperature conditions, and extended it to capture damage-induced nonlinearity.

RESEARCH PUBLICATIONS

1. **Yadav, A.** & Zhang, R. (2025). “Stochastic subspace via probabilistic principal component analysis for characterizing model error”. Computational mechanics. doi:10.1007/s00466-025-02701-6.
2. **Yadav, A.** & Zhang, R. (2025). “Bayesian optimization under uncertainty for training a scale parameter in stochastic models”. arXiv preprint. doi:10.48550/arXiv.2510.06439

manuscript under preparation

1. **Yadav, A.** & Zhang, R. “Stochastic subspace via bootstrap for characterizing model error”.
2. **Yadav, A.** & Zhang, R. “Model error correction via stochastic reduced-order modeling framework”.

ACADEMIC PRESENTATIONS

SROM for model error characterization and correction 18 th United States National Congress on Computational Mechanics (USNCCM)	Chicago, IL, USA July 20-24, 2025
Stochastic subspace via bootstrap for model-form uncertainty International Conference on Applied AI & Scientific Machine Learning (CASML)	Bangalore, India December 14-18, 2024
Stochastic subspace via PPCA for model-form uncertainty 16 th World Congress on Computational Mechanics (WCCM)	Vancouver, Canada July 21-26, 2024
Structural health monitoring of steel truss bridges 8 th International Congress on Computational Mechanics & Simulation (ICCMS)	Indore, India December 9-11, 2022

RELEVANT WORK EXPERIENCE

Graduate Research Assistant - University of Houston Developing probabilistic and scientific machine learning methods to quantify and reduce model-form error in computational science and engineering.	08/2023 - present
Senior Project Engineer - Indian Oil Corporation Limited Oversaw the execution of an energy-efficient green building, a bridge over a green belt canal, and civil works for a new catalytic de-waxing unit.	07/2018 - 09/2020
Industrial Internship - Rites Limited Designed highway bridge components, including superstructures and substructures, and performed finite element analysis of box culverts using Midas Civil. Designed retaining walls using both working stress and limit state methods, and applied IRC codes for culvert design using STAAD.Pro.	Summer 2017, 2016

TEACHING EXPERIENCE

Reciter Mechanics-I Statics, University of Houston	08/2024 - 12/2024
Teaching assistant Mechanics-I Statics, University of Houston	08/2023 - 12/2023

RELEVANT COURSEWORK

A Practical Introduction to Deep Learning, Learning with Data, Data-Driven Engineering, Structural System Identification, Structural Dynamics, Numerical Methods, Optimization Methods, Finite Element Method

POSITION OF RESPONSIBILITY

Joint Secretary , Taekwondo, Institute Sports Council, IIT Roorkee	07/2016 - 05/2017
Secretary , Taekwondo, Institute Sports Council, IIT Roorkee	07/2017 - 05/2018
Organized and led training sessions for over 50 students, fostering discipline and teamwork, and coordinated participation in state and national-level competitions.	

HONORS AND AWARDS

Jimmie A. Schindewolf Academic Scholarship by University of Houston	<i>08/2024 - 05/2025</i>
Future Faculty Program , University of Houston	<i>08/2024 - 05/2025</i>
Presidential Fellowship by University of Houston	<i>08/2023 - 05/2025</i>
Finalist , UQ-TTA Student Paper Competition at WCCM/PANACM, Vancouver	<i>07/2024</i>
Cullen Fellowship Travel Grant for EMI/PMC by University of Houston	<i>05/2024</i>
Finalist , Grants in Aids of Research, SIGMA-XI	<i>03/2024</i>
Secured All India Rank in the top 0.35 % of 1.4 million IIT-JEE candidates	<i>06/2014</i>

EXTRA CURRICULAR

First Dan Black Belt in Taekwondo by World Taekwondo Federation	<i>08/2017</i>
Represented State Uttarakhand in National Taekwondo Championship	<i>12/2017</i>
Organiser and Instructor , Self Defense Camp, Unnat Bharat Abhiyaan	<i>03/2017</i>
Led a 5-day trek, Himalayan Explorer Club, IIT Roorkee	<i>11/2016</i>
Member, National Service Scheme, IIT Roorkee	<i>07/2014 - 05/2015</i>

ACADEMIC AND PROFESSIONAL AFFILIATIONS

United States Association for Computational Mechanics (USACM), Technical Thrust Area in Uncertainty Quantification and Probabilistic Modeling, Graduate Student Member.

Society for Industrial and Applied Mathematics (SIAM), Graduate Student Member.