Pratyush Kumar, Ph.D.

Curriculum Vitae

Dept. of Civil Engineering
IIT Kharagpur
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Google Scholar *Website* *ResearchGate* *Linkedin*



Research Area: Computational Mechanics, Experimental Mechanics, Non-contact Strain Measurement, Structural Engineering, Finite Element Analysis, Machine Learning, Physics Informed Neural Network, Earthquake Engineering, Fracture Mechanics

Education

2018–2023 **PhD, Structural Engineering Division**, *Department of Civil Engineering, Indian Institute of Technology*, Madras.
Title: Accurate measurement and quantification of non-uniform displacement gradient.
(CGPA 9.04/10).

2016–2018 **M.Tech, Civil & Infrastructure Engineering**, *Department of Civil and Environmental Engineering, Indian Institute of Technology*, Patna.
(CGPA 9.14/10).

2012–2016 **B.Tech, Civil Engineering**, *Cochin University of Science and Technology*, Kerala.
(CGPA 9.04/10, University Bronze Medal).

Work experience

Mar 2026– **Assistant Professor**, *Department of Civil Engineering, IIT Kharagpur*, India.

July, 2024–Mar 2026 **Post-doctoral researcher**, *Department of Mechanical Engineering, Texas A&M, & CAAAM-University of North Texas*, United States.

July, 2023–June 2024 **Post-doctoral researcher**, *Applied Mathematics, Department of Mathematical and Statistical Sciences, University of Galway*, Ireland.

Jan, 2023–July, 2023 **Post-doctoral equivalent fellow**, *Structural Engineering Division, Department of Civil Engineering, Indian Institute of Technology*, Madras.

Patent

2024 Saravanan. U. and **Kumar, P.**, A non-contact apparatus and method for measuring surface strain in a material, *Patent No:536878 (Granted)*.

Publications

Communicated Journal Article

2025 Hari S., **Kumar, P.,** Srinivasa, A., and Reddy, J. N, Efficient Layerwise Beam Decohesion Model for Delamination in T-Shaped Composite Structures, *AIAA, Journal* (Under Review).

Published Journal Articles

2025 Velayudhan, S.*, **Kumar, P.*,** Srinivasa, A., Thamburaja, P., Dahotre, N. B., and Reddy, J. N, A unified crystal plasticity model for predicting high-cycle fatigue life of nickel-based single crystal superalloys based on accumulated plastic dissipation, *International Journal of Fatigue, 109436* *https://doi.org/10.1016/j.ijfatigue.2025.109436*.

2025 Hasnain, M., Anand, N. K., Srinivasa, A., and **Kumar, P.** , A novel residual multilayer perceptron-based graph convolutional network for modeling heat transfer and fluid flow, *Physics of Fluids* *https://doi.org/10.1063/5.0292956*.

2025 **Kumar, P.** and Saravanan, U., An approach to quantify non-uniform strains in inhomogeneous bodies, *Proceedings of the Royal Society A, Mathematical, Physical and Engineering Sciences* *https://doi.org/10.1098/rspa.2024.0913*.

2025 Pratap, V.**, Kumar, P.,** Rao, C., Gilchrist, M., Tripathi, B., Modelling Fourth-Order Hyperelasticity in Soft Solids using Physics Informed Neural Networks without Labelled Data, *Brain Research Bulletin, 224, 111318, https://doi.org/10.1016/j.brainresbull.2025.111318* .

2025 **Kumar, P.**, Artificial neural network to characterize spatially varying quantity through random field approach, *Neural Computing and Applications, https://doi.org/10.1007/s00521-024-10955-z* .

2023 **Kumar, P.** and Saravanan, U., On accurate measurement of non-uniform displacement gradient, *Measurement, 206, 112279, https://doi.org/10.1016/j.measurement.2022.112279* .

2021 **Kumar, P.** and Saravanan, U., Feasibility on accurate measurement of non-uniform strain field through contact methods, *Applications in Engineering Science, 7, 100051, https://doi.org/10.1016/j.apples.2021.100051* .

2020 **Kumar, P.** and Samanta, A., Seismic fragility assessment of existing reinforced concrete buildings in Patna, India, *Structures, 27, 54-69, https://doi.org/10.1016/j.istruc.2020.05.036*.

Book Chapter

2021 **Kumar, P.** and Samanta, A., Seismic fragility assessment of existing 9 storey reinforced concrete (RC) buildings in Patna, India, *Seismic Hazards and Risk, 119-134, https://doi.org/10.1007/978-981-15-9976-7-12*.

Grant and proposal

2025 **NSF**, multimodal fatigue life estimation by integrating physics-based models of microplasticity with a novel Message Passing Graph Neural Network..
Contributor: J. N. Reddy, Arun Srinivasa, Pratyush Kumar

2024 **US-White paper (ERDC-US Army)**, A computationally efficient framework for the dynamic modeling of large-scale civil structures using Graph Neural Network. (BAA-W912HZ-24-BAA-01).

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Conference

2025 Sreenu Hari**, Pratyush Kumar,** Arun Srinivasa, and J.N. Reddy, Layerwise Decohesion Model: A computationally efficient model based on plate theory for delamination in composite structures, *AIAA, SCITECH Forum, Orlando, Florida, USA (Accepted)*.

2024 Saravanan, U.**, and Kumar, P. (2024)**, A markers tracking technique to measure spatially varying strain and its quantification through extreme value statistics, *International Conference on Experimental Mechanics (ICEM), IIT Madras, India (Oct 2024)*..

2023 Mallick, T**, Kumar, P.** and Saravanan, U., Characterization of spatially varying quantity through random field approach employing Savitzky-Golay detrending algorithm, *ICCMS 2023, 9^{th} International Congress on Computational Mechanics and Simulations, 2023, India, (Dec, 2023)*.

2022 **Kumar, P.** and Saravanan, U., On the measurement of non-uniform displacement gradient in a mechanical body, *ESMC 2022, European Solid Mechanics Conference, 2022, Ireland*.

2021 **Kumar, P.** and Samanta, A., Seismic fragility assessment of existing reinforced concrete (RC) buildings in Patna, India, *ICRAGEE-7, 2021, India*.

2020 **Kumar, P.** and Saravanan, U., Optimum gauge length for measuring non-uniform axial strain field, *ICRACEM 2020, 1st Online International Conference on Recent Advances in Computational and Experimental Mechanics, 2020, India*.

Research Experience

Texas A&M and UNT

July, 2024 – Present ***Post-doctoral researcher***.
Project-1: Crystal plasticity-based framework for high-cycle fatigue life prediction.
Project-2: Modeling delamination in composites (Application to aircraft wings.)
Project-3: Experimental and numerical simulation of 3D printed metals.

Advisors : **Prof. J. N. Reddy**, *Professor, Department of Mechanical Engineering*, Texas A&M
Prof. Narendra Dahotre, *Professor, CAAAM*, UNT
Prof. Arun Srinivasa, *Professor, Texas A&M*

University of Galway, Ireland

July, 2023 – June 2024 ***Post-doctoral researcher***.
Physics-informed neural network (PINNs) for real-time assessment of concussion in contact sports.

Advisors : **Dr. Bharat Tripathi**, *Assistant Professor, Department of Mathematical and Statistical Sciences*, University of Galway, Ireland

Indian Institute of Technology, Madras

Jan, 2023 – July, 2023 ***Post-doctoral equivalent fellow***.
Advisor: **Dr. U. Saravanan**, *Professor, Department of Civil Engineering*, IIT Madras

Fellowships & Awards

2025 ***Society of Engineering Science Travel Award*** SES, Atlanta, Georgia Tech, 2025 (Supported by National Science Foundation).

2025 ***Research Collaboration award (2025) from TEES TARC:*** *Received funding for project* A2Map-AI-AR Framework for In-Situ Melt Pool Prediction and Visualization in Additive manufacturing.

2023 ***Post doctoral equivalent Fellowship*** from IIT, Madras (Jan, 2023–June 2023).

2022 ***Institute financial assistance*** to attend conference ***ESMC, 2022*** at NUI Galway, Ireland.

2016 University ***Bronze medal*** in B.Tech from Cochin University of science and Technology (CUSAT).

2014-2016 Awarded ***University fellowship*** from CUSAT in B.Tech for securing highest marks in institute.

Computer skills

Software Matlab®, Abaqus®, Python®, Fortran®, Maple®, SAP2000®, ETABS®, STAAD®, AutoCAD®,

Place: Kharagpur, India
Date: March, 12 2026 *Pratyush Kumar*