

Mahindra Rautela

 [github](#)  [website](#)  [linkedin](#)  [scholar](#)  [RG](#)

Educational Background

- 2022–2023 Visiting PhD Student – Purdue University, USA, *Mechanical Engineering*.
Advisor: Prof. Shirley Dyke
- 2019–2023 PhD Student – Indian Institute of Science, *Faculty of Engineering*.
Advisor: Prof. S. Gopalakrishnan
- 2016–2018 Masters – Indian Institute of Space Science and Technology, *Structures & Design*,
CGPA = 8.91/10.
Advisor: Dr. Bijudas CR
- 2011–2015 Bachelors (Hons.) – AKTU (formerly UPTU), *Mechanical Engineering (Hons.)*,
CGPA = 8.65/10 (81.24%).

Research Experience

- July.'23– Present Postdoctoral Research Associate – Los Alamos National Laboratory, USA.
Scientific machine learning and applications to particle accelerators.
- Aug.2018– Project Engineer – Indian Institute of Technology, Kanpur, India.
- Dec.2018 Project Title: Pipe Health Monitoring Robot (PHMR) to monitor the pipelines to ensure safety and high performance.

Publications

Summary [Peer-review - 13](#), Non peer-reviewed - 5, Talks and posters - 4, Invited talks - 1.
[Citations \(Google scholar\) - 346](#), H-index (Google scholar) - 9

Peer-reviewed articles

- [1] **Rautela, M.**, A. Williams, A. Scheinker (2024), *A conditional latent autoregressive recurrent model for generation and forecasting of beam dynamics in particle accelerators*, Nature Computational Science (Under Review).
[Citations: 0](#)
- [2] **Rautela, M.**, Gopalakrishnan, S., Senthinath, J., (2024), *Bayesian optimized physics-informed neural network for estimating wave propagation velocities*, IEEE conference on AI 2024 (Under review), [arxiv/2312.14064](#).
[Citations: 0](#)

- [3] Monaco, E., **Rautela, M.**, Gopalakrishnan, S., Ricci, F., (2024), *Machine learning algorithms for delamination detection on composites panels by wave propagation signals analysis*, Progress in Aerospace Sciences, Vol. 146, 100994, [10.1016/j.paerosci.2024.100994](https://doi.org/10.1016/j.paerosci.2024.100994).
Citations: 0
- [4] **Rautela, M.**, Mirfarah, M., Silva, C.E., Dyke, S., Maghareh, A. and Gopalakrishnan, S., (2023), *Real-time rapid leakage estimation for deep space habitats using exponentially-weighted adaptively-refined search*, Acta Astronautica, 203, pp.385-391, [10.1016/j.actaastro.2022.12.003](https://doi.org/10.1016/j.actaastro.2022.12.003).
Citations: 2
- [5] **Rautela, M.**, Senthilnath, J., Huber, A. and Gopalakrishnan, S., (2022), *Towards deep generation of guided wave representations for composite materials*, IEEE Transactions on Artificial Intelligence, [10.1109/TAI.2022.3229653](https://doi.org/10.1109/TAI.2022.3229653).
Citations: 2
- [6] **Rautela, M.**, Huber, A., Senthilnath, J. and Gopalakrishnan, S., (2022), *Inverse characterization of composites using guided waves and convolutional neural networks with dual-branch feature fusion*, Mechanics of Advanced Materials and Structures, 29(27), pp.6595-6611, [10.1080/15376494.2021.1982090](https://doi.org/10.1080/15376494.2021.1982090).
Citations: 13
- [7] **Rautela, M.**, Senthilnath, J., Monaco, E. and Gopalakrishnan, S., (2022), *Delamination prediction in composite panels using unsupervised-feature learning methods with wavelet-enhanced guided wave representations*, Composite Structures, 291, p.115579, [10.1016/j.compstruct.2022.115579](https://doi.org/10.1016/j.compstruct.2022.115579).
Citations: 28
- [8] **Rautela, M.**, Maghareh, A., Dyke, S. and Gopalakrishnan, S., (2022), *Deep generative models for unsupervised delamination detection using guided waves*, In Proceedings of 8th World Conference on Structural Control and Monitoring (Accepted/In Press), [arxiv/2308.05350](https://arxiv.org/abs/2308.05350).
Citations: 1
- [9] **Rautela, M.**, Senthilnath, J., Moll, J. and Gopalakrishnan, S., (2021), *Combined two-level damage identification strategy using ultrasonic guided waves and physical knowledge assisted machine learning.*, Ultrasonics, 115, p.106451, [10.1016/j.ultras.2021.106451](https://doi.org/10.1016/j.ultras.2021.106451).
Citations: 82
- [10] **Rautela, M.** and Gopalakrishnan, S., (2021), *Ultrasonic guided wave based structural damage detection and localization using model assisted convolutional and recurrent neural networks.*, Expert Systems with Applications, 167, p.114189, [10.1016/j.eswa.2020.114189](https://doi.org/10.1016/j.eswa.2020.114189).
Citations: 125
- [11] Gopalakrishnan, K., **Rautela, M.**, and Deng, Y., (2020), *Deep learning based identification of elastic properties using ultrasonic guided waves.*, In EWSHM Special Collection of 2020 Papers-Volume 2, pp. 77-90, Springer International Publishing., [10.1007/978-3-030-64908-1_8](https://doi.org/10.1007/978-3-030-64908-1_8).
Citations: 12

- [12] **Rautela, M.**, Gopalakrishnan, S., Gopalakrishnan, K. and Deng, Y., (2020), *Ultra-sonic guided waves based identification of elastic properties using 1d-convolutional neural networks.*, In 2020 IEEE International Conference on Prognostics and Health Management (ICPHM), pp. 1-7, IEEE., [10.1109/ICPHM49022.2020.9187057](https://doi.org/10.1109/ICPHM49022.2020.9187057).

Citations: 22

- [13] **Rautela, M.** and Bijudas, C.R., (2019), *Electromechanical admittance based integrated health monitoring of adhesive bonded beams using surface bonded piezoelectric transducers.*, International Journal of Adhesion and Adhesives, 94, pp.84-98, [10.1016/j.ijadhadh.2019.05.002](https://doi.org/10.1016/j.ijadhadh.2019.05.002).

Citations: 22

Non peer-reviewed articles

- [1] Monaco, E., Boffa, N.D., Ricci, F., **Rautela, M.**, Passato, D. and Cinque, M., (2021), *Simulation of waves propagation into composites thin shells by FEM methodologies for training of deep neural networks aimed at damage reconstruction.*, In Health Monitoring of Structural and Biological Systems XV, Vol. 11593, pp. 302-315, SPIE, [10.1117/12.2583572](https://doi.org/10.1117/12.2583572).

Citations: 2

- [2] **Rautela, M.**, Monaco, E. and Gopalakrishnan, S., (2021), *Delamination detection in aerospace composite panels using convolutional autoencoders*, In Health Monitoring of Structural and Biological Systems XV, Vol. 11593, pp. 292-301, SPIE, [10.1117/12.2582993](https://doi.org/10.1117/12.2582993).

Citations: 5

- [3] **Rautela, M.**, Jayavelu, S., Moll, J. and Gopalakrishnan, S., (2021), *Temperature compensation for guided waves using convolutional denoising autoencoders.*, In Health Monitoring of Structural and Biological Systems XV, Vol. 11593, pp. 316-326, SPIE, [10.1117/12.2582986](https://doi.org/10.1117/12.2582986).

Citations: 9

- [4] **Rautela, M.**, Raut, M., and Gopalakrishnan, S., (2021), *Simulation of guided waves for structural health monitoring using physics-informed neural networks.*, In Proceedings of 13th International Workshop on Structural Health Monitoring, [10.12783/shm2021/36297](https://doi.org/10.12783/shm2021/36297).

Citations: 4

- [5] **Rautela, M.**, and Gopalakrishnan, S., (2019), *Deep learning frameworks for wave propagation-based damage detection in 1d-waveguides.*, In Proceedings of 11th International Symposium on NDT in Aerospace, e-Journal of Nondestructive Testing, Vol. 2, pp. 1-11, [ndt.net/25046](https://doi.org/10.1117/12.25046).

Citations: 16

Talks and Poster presentations

- [1] Poster on "Atmospheric leakage identification for deep space habitats: challenges & opportunities", In *First International Workshop On Interdisciplinary Paradigms for Semi-autonomous deep space habitations*, October 2022, University of Texas, San Antonio, USA.

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- [2] Poster on "Leakage identification Technology for Resilient Extra-Terrestrial Habitats", *In RETHi's NASA Annual Review Meeting, June 2022*, West Lafayette Purdue University.
- [3] Poster on "Electromechanical impedance based SHM and artificial neural networks for disbond type and severity", *In ASET conference, LPSC (ISRO), Thiruvananthapuram, May 2018*.
- [4] Talk on "Influence of piezoelectric transducer damage and disbonds on structural damage signatures using E/M method", *In Engineering Mechanics Institute (EMI) Conference, American Society of Civil Engineers (ASCE), May 2018*, Massachusetts Institute of Technology (MIT), Cambridge, Boston, USA.

Invited Talks

- [1] Deep generative modeling approach for composite materials: An accelerated solution of prediction, discovery and design problems, *In Workshop-6 on "Generative Artificial Intelligence: From Algorithm to Scientific Discovery*, Distributed AI (DAI) conference 2023, NTU Singapore, [Link](#).

Competitive honors or awards

- 2024 Gold Medal - Best Thesis Award, *Dept. of Aerospace Engineering, Indian Institute of Science, Bangalore*.
- 2022 Recipient of Overseas Visiting Doctoral Fellowship (OVDF) from SERB-DST, Government of India, *Merit based competitive fellowship to attend visiting doctoral program at Purdue University*.
- 2016-2021 Recipient of Masters and Doctoral fellowship from Ministry of Education, Government of India, *Based of Graduate Aptitude Test in Engineering (GATE) qualifications*.
- 2018 Second best poster presentation award for conference paper "Electromechanical impedance-based SHM and artificial neural networks for disbond type and severity", *Liquid Propulsion System Center (ISRO) & Aeronautical Society of India*.
- 2015 Silver Medal for Excellance in Academics, *Undergrad degree*.

Relevant extracurricular activities

Reviewer for scientific journals

Structural Health Monitoring, Smart Materials and Structures, Mechanical Systems and Signal Processing, Measurement Science and Technology.

Declaration

I hereby declare that the above mentioned information is correct up to my knowledge and I bear the responsibility for the correctness of the above mentioned particular.

Date: March 20, 2024

Place: Los Alamos, New Mexico, USA

Mahindra Singh Rautela

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