Priyam Gupta

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Research Summary

I am a PhD researcher specializing in **interpretable, physics-informed machine learning** for complex, non-linear systems. I develop **data driven predictive models** (strongly grounded in statistical physics) and integrate them into high performance **model predictive control (MPC)** and **reinforcement learning (RL)** frameworks for adaptive, real-time control. I am actively looking for full-time opportunities in AI/ML research and engineering roles.

Education

Imperial College London: PhD, Department of Aeronautics — 11/2022–10/2026
Topic: Machine learning for modeling and control of non-linear dynamical systems — London, UK

Imperial College London: MSc, Aeronautics (Advanced Computational Methods), — 10/2021–09/2022
Result: **Distinction**

Delhi Technological University (formerly DCE): B.Tech., Mechanical Engineering, — 2017–2021
CGPA: 8.78/10 (Distinction) — New Delhi, India

Experience

Imperial College London, *PhD Researcher* — **Nov 2022 - Oct 2026**
Supervisors: Dr Georgios Rigas, Dr Denis Sipp, Dr Taraneh Sayadi, Dr Peter J. Schmid

- Developing an adaptive control scheme for efficient control of non-linear dynamics using interpretable (non-blackbox) machine learning and model predictive control.
- Designed recurrent state space models for nonlinear time-series prediction, achieving interpretable and computationally efficient forecasting of non-linear dynamics (published in Proc. Royal Soc. A).
- Implemented ensemble and probabilistic model-based reinforcement learning for control of chaotic systems, improving policy stability and convergence speed by regularizing the value function.

Imperial College London, *Graduate Teaching Assistant* — **Jan 2023 - Dec 2023**

- Conducted tutorials on machine learning and turbulence.

Magri Lab - Imperial College London, *MSc Research Project* — **May 2022 - Aug 2022**
Supervisor: Dr Luca Magri

- Developed physics-constrained non-linear autoencoders using **convolutional neural networks** for chaotic dynamical systems.

Monolith AI - London, *Research Intern* — **Jun 2020 - Sep 2020**

- Designed custom loss functions for neural networks to emphasize important engineering design regions in the domain of interest.
- Built machine learning models for 2D airfoil, 3D wind-turbine flow fields, and predicting Mars rover re-entry surface temperature/flowfield.
- Improved machine learning workflow for scalar metric prediction in engineering applications using chain models. Curated a 2D airfoil flowfield dataset with **OpenFOAM**.

Delhi Technological University, *Research Assistant* — **Jul 2018 - Jul 2021**
Supervisor: Prof. Raj Kumar Singh

- Developed a data-driven inverse airfoil framework using deep convolutional GANs.
- Conducted a quantitative comparison of ML regressors for pressure reconstruction (PIV).
- Developed a slat-airfoil shape optimisation framework using invasive-weed-inspired genetic algorithm.

Selected Publications

- **Gupta, P.**, Schmid P., Sipp D., Sayadi T., Rigas G., *"Mori–Zwanzig Latent-Space Koopman Closure for Non-Linear Autoencoders," Proceedings of the Royal Society A*, (2025). doi.org/10.1098/rspa.2024.0259
- **Gupta, P.**, Tyagi, P., Singh, R. K. *Analysis of Generative Adversarial Networks for Data-Driven Inverse Airfoil Design.* Lecture Notes in Networks and Systems, Springer. (2022) doi.org/10.1007/978-981-16-7618-522

Technical Skills

Programming: Python, MATLAB, C++, CUDA
ML frameworks: NumPy, SciPy, Pandas, PyTorch, Hydra, Weights & Bias
Core Areas: Deep Learning, Model Predictive Control, Reinforcement Learning, Reduced-Order Modeling