SHREYAS PADHY

PhD Candidate | Machine Learning Group | University of Cambridge

⟨sp2058@cam.ac.uk⟩ | ⟨shreyaspadhy.github.io⟩

EDUCATION

University of Cambridge   **October 2021 - September 2025 (expected)**
PhD in Engineering
Supervised by Dr. Jośe Miguel Hernández-Lobato

Johns Hopkins University   **August 2017 - May 2019**
MSE in Biomedical Engineering
Overall GPA: 4.0

Indian Institute of Technology Delhi   **July 2013 - May 2017**
B.Tech in Engineering Physics
Overall GPA: 8.871/10 (Department Rank 4)

EMPLOYMENT

Research Scientist Intern, Meta Reality Labs   **June 2024 - current**
Under mentorship of Michael Paskett and Allen Yin (Burlingame, CA)

· Working on generative models for improved data efficiency in training and personalization of wrist-wearables.

Research Intern, Microsoft Research   **May 2023 - August 2023**
Under mentorship of James Hensman and John Winn (Cambridge, UK)

· Developed time-series Gaussian Process models for sparse, discrete count data using negative binomial likelihoods.
· Developed temporal models of source information for large-scale, distributed knowledge graph databases using INFER.net and Bayesian linear models.

AI Resident, Google Brain   **August 2019 - August 2021**
Under mentorship of Balaji Lakshminarayanan and Jasper Snoek (Cambridge, MA)

· Published research in *NeurIPS 2020* and *JMLR 2023* on Spectral-normalized Neural Gaussian Process (SNGP), a competitive single-model approach on prediction, calibration and out-of-domain detection.
· Core contributor for the Uncertainty Baselines open-source library in Python, Jax, and Tensorflow.
· Published multiple topics of research in *ICML Workshops* on one-vs-all losses, Mahalanobis distance for OOD detection, and batch normalisation for improved predictive uncertainty.

SELECTED PUBLICATIONS

CONFERENCES

· **Stochastic Gradient Descent for Gaussian Processes Done Right**.
Shreyas Padhy*, Jihao Andreas Lin*, Javier Antoran*, Austin Tripp, Alexander Terenin, Csaba Szepesvari, José Miguel Hernández-Lobato, David Janz. *(ICLR 2024)* `arXiv`.

· **Transport Meets Variational Inference: Controlled Monte Carlo Diffusions**.
Shreyas Padhy*, Francisco Vargas*, Denis Blessing, Nikolas Nüsken. *(ICLR 2024)* `arXiv`.

· **Sampling from Gaussian Process Posteriors using Stochastic Gradient Descent**
Shreyas Padhy*, Jihao Andreas Lin*, Javier Antoran*, David Janz, José Miguel Hernández-Lobato, Alexander Terenin. *(NeurIPS 2023 (Oral))* `arXiv`.

· **Sampling-based inference for large linear models, with application to linearised Laplace**.
Shreyas Padhy*, Javier Antoran*, Riccardo Barbano, Eric Nalisnick, David Janz, and José Miguel Hernández-Lobato. *(ICLR 2023)*. `arXiv` 📄

· **Simple & principled uncertainty estimation with deterministic deep learning via distance awareness**.
Jeremiah Zhe Liu, Zi Lin, Shreyas Padhy, Dustin Tran, Tania Bedrax-Weiss, and Balaji Lakshminarayanan.
(NeurIPS 2020) 📄

PREPRINTS

· **DEFT: Efficient Finetuning of Conditional Diffusion Models by Learning the Generalised h-transform.**
Shreyas Padhy*, Alexander Denker*, Francisco Vargas*, Kieran Didi*, Simon Mathis* et al. `arXiv`.

· **Improving Linear System Solvers for Hyperparameter Optimisation in Iterative Gaussian Processes.**
Jihao Andreas Lin, Shreyas Padhy, Bruno Mlodozeniec, Javier Antorán, José Miguel Hernández-Lobato. `arXiv`.

· **A Generative Model of Symmetry Transformations.**
James Allingham, Bruno Mlodozeniec, Shreyas Padhy, Javier Antorán, David Krueger, Richard E. Turner, Eric Nalisnick, José Miguel Hernández-Lobato. `arXiv`.

· **Kernel Regression with Infinite-Width Neural Networks on Millions of Examples.**
Ben Adlam, Jaehoon Lee, Shreyas Padhy, Zachary Nado, Jasper Snoek. `arXiv`.

JOURNALS

· **A Simple Approach to Improve Single-Model Deep Uncertainty via Distance-Awareness.**
Jeremiah Liu*, Shreyas Padhy*, Jie Ren*, Zi Lin, Yeming Wen, Ghassen Jerfel, Zack Nado, Jasper Snoek, Dustin Tran, and Balaji Lakshminarayanan. *(JMLR 2023)*.`arXiv`

WORKSHOPS

· **Warm Start Marginal Likelihood Optimisation for Iterative Gaussian Processes**.
Jihao Andreas Lin, Shreyas Padhy, Bruno Mlodozeniec, José Miguel Hernández-Lobato. *Approximate Advances in Bayesian Inference, 2024.* `arXiv`

· **Learning Generative Models with Invariance to Symmetries**.
James Allingham, Javier Antoran, Shreyas Padhy, Eric Nalisnick, and José Miguel Hernández-Lobato. *NeurReps Workshop at* **NeurIPS 2022**.

· **A Simple Fix to Mahalanobis Distance for Improving Near-OOD Detection.**
Jie Ren, Stanislav Fort, Jeremiah Liu, Abhijit Guha Roy, Shreyas Padhy, and Balaji Lakshminarayanan. **ICML 2021** *Workshop on Uncertainty and Robustness in Deep Learning.*

· **Evaluating prediction-time batch normalization for robustness under covariate shift.**
Zachary Nado, Shreyas Padhy, D. Sculley, Alexander D'Amour, Balaji Lakshminarayanan, and Jasper Snoek. **ICML 2020** *Workshop on Uncertainty and Robustness in Deep Learning.*

· **Revisiting One-vs-All Classifiers for Predictive Uncertainty and OOD Detection in Neural Networks.**
Shreyas Padhy, Zachary Nado, Jie Ren, Jeremiah Liu, Jasper Snoek, and Balaji Lakshminarayanan. **ICML 2020** *Workshop on Uncertainty and Robustness in Deep Learning.*

· **Uncertainty Baselines: Benchmarks for Uncertainty & Robustness in Deep Learning**.
Zachary Nado et. al., *Bayesian Deep Learning Workshop, 2021.* `arXiv`

AWARDS AND ACHIEVEMENTS

Outstanding Reviewer Award at ICML 2024.
Qualcomm Innovation Fellowship 2023: Among 11 finalists invited for the online finals.
Outstanding Reviewer Award at ICML 2022.
Qualcomm Innovation Fellowship 2022: Among 12 finalists invited to Amsterdam.
Trinity-Henry Barlow Scholarship 2021: Awarded by Trinity College, University of Cambridge.
Harding Distinguished Postgraduate Scholars Programme (HDPSP) 2021: Awarded full overseas funding for the duration of the PhD Program at the University of Cambridge.
Summer Undergraduate Research Award 2015: For undergraduate research in microwave imaging.
Top 7% GPA Merit Scholarship: In 2013, 2014, 2015, and 2016 Fall Semesters for exceptional performance at the Indian Institute of Technology Delhi.

PROFESSIONAL ENGAGEMENTS

Talks

- Invited Talk on **Stochastic Gradient Descent for Bayesian ML** at SIAM UQ, Trieste, *March 2024* 📄.
- Guest Lecture on **Conditioning in SDEs**, Advanced Machine Learning course, Cambridge *February 2024* 📄.
- Invited Talk on **Stochastic Gradient Descent for GPs** at Atinary, Lausanne, *February 2024* 📄.
- Invited Talk on **Stochastic Gradient Descent for GPs** at NeurIPS@Cambridge, *December 2023*.
- Invited Talk on **Stochastic Gradient Descent for GPs** at Microsoft Research Cambridge, *October 2023*.
- **SDEs and Schrodinger Bridges**, presented at the Cambridge MLG Reading Group, *July 2023*.
- Invited Talk on **Sampling-Based Inference**, at NeurIPS @ Cambridge, *December 2022*.
- **Out-of-Distribution Generalisation**, presented at the Cambridge MLG Reading Group, *October 2022*.
- **Optimal Transport Metrics**, presented at the Cambridge MLG Reading Group, *February 2022*. ▶️

Reviewing

- Reviewer for NeurIPS (2023, 2022, 2021), ICML (2024, 2023, 2022), ICLR (2023), AISTATS (2023), AAAI (2024, 2023).

TEACHING

Machine Learning for Signal Processing, Fall 2018 : *Graduate Course, by Dr. Najim Dehak, JHU*
Developing weekly assignments and homeworks, and grading for 50+ students.
Intro. to Computational Medicine, Fall 2018 : *Graduate Course, by Dr. Michael Miller, JHU*
Developing homeworks and course notes, extended codebase to Python, and grading for 60+ students.
Gateway Computing: Python, Spring 2019 : *Undergraduate Course, by Dr. Kwame Kutten, JHU*
Developing homeworks, weekly assignments and programming assignments in Python.

TECHNICAL STRENGTHS

DL Frameworks	Jax (Flax, Optax, Haiku, Numpyro, Blackjax), Tensorflow, PyTorch (Pyro), Keras
Computer Languages	Python, C++, Verilog
Medical Imaging	TOAST++, FSL, SPM, Freesurfer