

SABYASACHI SAHOO

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Ph.D. candidate with industry experience working on reasoning, generalization, robustness & efficiency.

EDUCATION

- Mila, Inria, Université Laval** Aug 2021 - Present
Ph.D. in Machine Learning. Advisors: [Christian Gagné](#) & [Frédéric Precioso](#). (GPA: 4/4) (Expected: Apr 2027)
Keywords: *reasoning, generalization, robustness, efficiency, LLMs, VLMs, finetuning*.
- Indian Institute of Science (IISc) - Bangalore** 2014 - 2016
Masters in Computational and Data Science. Advisor: [Sathish Vadhiyar](#). (Top 5 in class)
- National Institute of Technology (NIT) - Surat** 2010 - 2014
Bachelors in Mechanical Engineering.

WORK EXPERIENCE

- ServiceNow - Research Intern** Jan 2026 - Present
 \circ **Multi-agent systems:** VLM finetuning for collaborative visual grounding & task-specific steering for web agents.
- Amazon - Research Intern** Jun 2025 - Oct 2025
 \circ **LLM finetuning [12]:** Improved LoRA finetuning by conditioning on CoT reasoning chains for entailment/math.
- NVIDIA - System Engineer II** Aug 2016 - May 2018
 \circ **Self-Driving Car Display:** Implemented new features, reducing bugs (60%) and improving user experience.
 \circ **Resource Management:** Designed modular device tree framework, cutting cross-team development time (30%).
 \circ **Xavier Chip's Launch:** Implemented critical modules for successful launch & performance boost (25%).
- Donut Research Labs (Walmart) - NLP Engineer** May 2018 - Feb 2019
 \circ **Text Generation:** Improved product brand name extraction accuracy (40%) using a Seq2Seq model, pretrained on product descriptions, fine-tuned on noisy annotations, and top-k sampling with beam search.
 \circ **Extreme Text Classification:** Class-imbalance-aware LSTM improved accuracy (25%) & sped inference (10%).
 \circ **Product Specs Extraction/OCR:** Single Shot Detector based information extraction, improving perf (35%).
 \circ **Dataset Building:** for text generation & OCR projects (collection, annotation, cleaning).
- IISc Bangalore (Ati Motors, Tata Motors) - Research Associate** Feb 2019 - Aug 2020
 \circ **Image Generation [10, 18, 26]:** Enhanced LiDAR generation, high-res image generation & scene-flow prediction.
 \circ **Robotics [6, 9, 28]:** Differentiable SLAM framework for LiDAR & cost-effective driver assistance system (ADAS).
- IISc Bangalore (Niramai) - Research Associate** Aug 2020 - Aug 2021
 \circ **Multi-Task Generalization [5, 25]:** Improved domain adaptation and explainability for smartphone-transmitted X-rays using Multi-Task Learning and deployed it as a text-based reporting tool during the COVID-19 pandemic.
 \circ **Model Explainability [15, 16, 27]:** Aligned concept extraction with human understanding, improved it using non-negative matrix factorization, and exposed adversarial vulnerabilities in popular explainability methods.

ACADEMIC EXPERIENCE

- Mila, Université Laval - Student Researcher** Aug 2021 - Present
 \circ **Test-time Finetuning [1, 11]:** Enhanced adaptation to distribution shifts using optimal layer selection for test-time adaptation and self-distillation of CLIP for zero-shot image classification.
 \circ **OOD Generalization [8, 14]:** Improved generalization to distribution shifts using out-of-distribution methods and denoising incorrect predictions using diffusion models.
 \circ **Adversarial Robustness [2, 4, 13]:** Enhanced adversarial defense by using softmax predictions to detect vulnerable samples cheaply and using test-time adaptation.
 \circ **Out-of-Distribution (OOD) [3, 17]:** Improved OOD detection using gradients from OOD prototype and optimized microservice partitioning by reformulating it into a reinforcement learning (RL) problem.
 \circ **Continual Learning [7, 24]:** Reduced forgetting in continual learning through hessian-aware low-rank approximation and showed that simple ensembling (bagging/dropout) can outperform complex strategies.
- Computational and Data Science, IISc Bangalore - Student Researcher** Aug 2015 - Aug 2016
 \circ **Visual Semantic Search [19]:** Extracted hierarchical relationships between visually similar classes in CNNs.
 \circ **Parallel Computing [20, 22]:** Scaled scientific applications on supercomputers/GPU using MPI & CUDA.

ONGOING WORKS

- S. Sahoo *et al.* **Multi-Agent VLM Finetuning for Web Agents.**
- S. Sahoo *et al.* **Adaptive Data Filtering for Improving Generalization.**
- L. Caccia, S. Sahoo *et al.* **Dataset Distillation from LoRA Task Vectors.**
- S. Menon, S. Sahoo *et al.* **Learnable Layer Selection for Test-Time Finetuning.**
- M. Guerrier, S. Sahoo *et al.* **Safe and Robust Robot Navigation.**

SELECTED PUBLICATIONS

- [1] S. Sahoo, M. ElAraby, J. Ngnawe, Y. Pequignot, F. Precioso, and C. Gagné. **A Layer Selection Approach to Test Time Adaptation.** In: Association for the Advancement of Artificial Intelligence Conference. [\[link\]](#). AAAI. 2025.
- [2] J. Ngnawe, S. Sahoo, Y. Pequignot, F. Precioso, and C. Gagné. **Robust Fine-Tuning from Non-Robust Pretrained Models.** In: [\[link\]](#). NeurIPS Workshop. 2025.
- [3] M. ElAraby, S. Sahoo, Y. Pequignot, P. Novello, and L. Paull. **GROOD: GRadient-aware Out-Of-Distribution detection in interpolated manifolds.** In: *Transactions on Machine Learning Research*. [\[link\]](#) TMLR. 2025.
- [4] J. Ngnawe, S. Sahoo, Y. Pequignot, F. Precioso, and C. Gagné. **Detecting Brittle Decisions for Free: Leveraging Margin Consistency in Deep Robust Classifiers.** In: Advances in Neural Information Processing Systems. [\[link\]](#). NeurIPS. 2024.
- [5] M. Antony, S. T. Kakileti, R. Shah, S. Sahoo, C. Bhattacharyya, and G. Manjunath. **Challenges of AI driven diagnosis of chest X-rays transmitted through smart phones: a case study in COVID-19.** In: Scientific Reports Journal. [\[link\]](#). Nature. 2023.
- [6] P. Kumar, D. Vattikonda, V. B. S. Nadkarni, E. Dong, and S. Sahoo. **Differentiable SLAM Helps Deep Learning-based LiDAR Perception Tasks.** In: British Machine Vision Conference. [\[link\]](#). BMVC. 2023.
- [7] J. Li, R. Wang, Y. Lai, C. Shui, S. Sahoo, C. X. Ling, S. Yang, B. Wang, C. Gagné, and F. Zhou. **Hessian Aware Low-Rank Weight Perturbation for Continual Learning.** In: *Transactions on Knowledge and Data Engineering Journal*. [\[link\]](#). TKDE. 2023.
- [8] S. Sahoo, F. Zhou, Y. Pequignot, J. Ngnawe, F. Precioso, and C. Gagné. **Domain Generalization by Minimizing Out-of-Distribution Detection.** In: Montreal AI Symposium. [\[link\]](#). MAIS. 2022.
- [9] F. Aryan, D. Vattikonda, E. Dong, and S. Sahoo. **Grad-lidar-SLAM: Fully differentiable global SLAM for lidar with pose-graph optimization.** In: IROS Workshop on Probabilistic Robotics in the Age of Deep Learning. [\[link\]](#). IROS Workshop. 2022.
- [10] S. Sahoo, P. Kumar, V. Shah, V. Kondameedi, A. Jain, A. Verma, C. Bhattacharyya, and V. Vishwanath. **Dynamic to static lidar scan reconstruction using adversarially trained auto encoder.** In: Association for the Advancement of Artificial Intelligence Conference. [\[link\]](#). AAAI. 2021.
- [11] M. Sandhu, Y. Pequignot, S. Nashed, S. Sahoo, and L. Paull. **CLIP-Enhance: Improving CLIP Zero-Shot Classification via von Mises-Fisher Clustering.** In: [\[link\]](#). Under review. 2026.
- [12] S. Sahoo, N. Pappas, D. Manousakas, D. Bessalov, and G. Vietri. **Explicitly Conditioning on Reasoning for Scalable and Architecture-Agnostic LLM Adaptation.** In: [\[link\]](#). Under review. 2026.

PREPRINTS

- [13] K. Samanta, S. Sahoo, and C. Gagné. **Test Time Adaptation as an Adversarial Defense Strategy.** Internship Report. [\[link\]](#). 2023.
- [14] A. Verma, S. Sahoo, and C. Gagné. **Diffusion based Pseudolabeling under Distribution Shifts.** Internship Report. [\[link\]](#). 2023.
- [15] D. Tiwari, R. Shah, S. Sahoo, and C. Bhattacharyya. **Enhancing Explainability in Medical Images using Global Methods.** Masters Thesis. [\[link\]](#). 2022.
- [16] G. Parashar, S. Sahoo, and C. Bhattacharyya. **Adversarial Robustness for Local Interpretable Methods.** Masters Thesis. [\[link\]](#). 2021.
- [17] S. Sahoo and K. Sellami. **Automated Microservice Extraction using Reinforcement Learning.** [\[link\]](#). 2021.
- [18] D. Shanbag, S. Sahoo, C. Bhattacharyya, and V. V. **An Approach For Accurate Sceneflow Prediction for LiDAR-based Sensors.** Masters Thesis. [\[link\]](#). 2020.

- [19] S. Sahoo and V. Kondameedi. *Establishing Semantic relationships among Object Classes using Deep Networks for Image Classification*. [\[link\]](#). 2015.
- [20] S. Sahoo and V. Kondameedi. *Hybrid Execution of Travelling Salesman Problem*. [\[link\]](#). 2015.

THESES

- [21] S. Sahoo, F. Precioso, and C. Gagné. “*Test-time Out-of-Distribution Generalization*”. PhD Proposal. [\[link\]](#). Mila/Université Laval, 2022.
- [22] S. Sahoo and S. S. Vadhiyar. “*Hierarchical Task Mapping on Dragonfly topology for Scaling Molecular Dynamics*”. Masters Thesis. [\[link\]](#). IISc Bangalore, 2016.
- [23] S. Sahoo, M. N. Yadav, V. Savalia, R. Soni, R. Agarwal, N. Lomash, and H. B. Naik. “*Thermoacoustic Energy Conversion Using Piezoelectric Diaphragm/Bi-Morph*”. Bachelors Thesis. [\[link\]](#). SVNIT Surat, 2014.

PROJECTS

- [24] S. Sahoo, S. Karami, A. Safarnejadian, and A. Tupper. *Deep Ensemble Methods for Vehicle Classification*. [\[link\]](#). Université Laval. 2021.
- [25] S. Sahoo, R. Shah, S. T. Kakileti, C. Bhattacharyya, and G. Manjunath. *A new AI-driven platform will facilitate early-COVID interventions over Whatsapp*. [\[link\]](#). Department of Science and Technology, Government of India. 2021.
- [26] T. Varshney, S. Sahoo, V. Kondameedi, and C. Bhattacharyya. *DCT-VAE: Capturing Low-level and High-level Features for Image Generation*. [\[link\]](#). IISc Bangalore. 2021.
- [27] S. Sahoo, A. Jain, R. Shah, and C. Bhattacharyya. *Improving Automatic Concept Extraction for Global Model Explainability*. [\[link\]](#). Niramai Health Analytix. 2021.
- [28] V. Kondameedi, S. Shet, A. Verma, S. Sahoo, P. Kumar, C. Bhattacharyya, and S. Biswas. *Frugal Advanced Driver Assistance System (ADAS) for Indian Roads*. [\[link\]](#). TATA Motors. 2020.
- [29] S. Sahoo, P. Kumar, C. Bhattacharyya, and V. V. *Proximal Pose Search for Adapting SLAM in Dynamic Environments on Slow Moving UGVs*. [\[link\]](#). Ati Motors. 2019.

TEACHING AND LEADERSHIP ROLES

- **Teaching Assistant**, Machine Learning course, Université Laval (2022/2023/2024): Involved with designing and grading quizzes/homeworks, and conducting tutorial sessions.
- **Student Mentor**, [SHARE Research Labs](#) (2020-21): Teaching and mentoring students for working towards a research paper for top-tier conferences.
- **Organizer** of various reading groups on topics like Machine Learning (2022-23), Out-of-Distribution (2022-25), and Autonomous Navigation (2019-20).
- **Placement Coordinator**, IISc (2015-16): Invited, organized, and coordinated on-campus placement for numerous industries and startups.

HONORS AND AWARDS

- Awarded [IID Excellence scholarship 2022](#).
- Secured research funding from [DEEL](#) (2021-Present).
- Secured research funding from [Ati Motors](#) (2019-21), and [ARTPARK](#) (2021).
- Awarded distinction for my master’s thesis.
- Won various competitions: 1st place in [NeurIPS 2017 Challenge](#), top finalist in [NVIDIA Reinforcement Learning Competition 2018](#), 3rd place in [SO1 Product Recommendation Competition 2018](#).