Siddarth Venkatraman

PhD Student, Mila – Université de Montréal

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Education

Mila, Université de Montréal

PhD in Computer Science, Co-Supervised by Glen Berseth and Nikolay Malkin. Sep. 2023 - Present

Carnegie Mellon University

MS in Robotics, GPA 4.19/4.0, Advisor: Dr. Jeff Schneider Aug. 2021 - Jun. 2023

Manipal Institute of Technology

BTech in Computer Science, GPA 8.91/10 Jun. 2017 - Jun. 2021

Experience

Research Intern → Collaborator, Lawrence Livermore National Laboratory *Livermore, CA*
Jun. 2024 - Present

- Developed RL methods for intractable posterior inference with diffusion and flow matching model priors, applied to gravitational lensing, continuous control, and text-to-image RLHF.
- Developed asynchronous off-policy RL methods for scalable LLM post-training, resulting in a NeurIPS 2025 publication.
- Scaling RL training and test-time scaling of foundation models for scientific discovery.

Research Intern, Mistral AI *(Upcoming)* *Paris, France*
May 2025 - Sep. 2025

- Reinforcement learning for improving reasoning capabilities of large language models.

Research Intern, Valence Labs (Recursion) *Montreal, QC*
Jun. 2025 - Sep. 2025

- Worked with the molecule sampling team on free energy estimation with Flow model bridges, advised by Emmanuel Bengio.

Research Intern, Caltech (Advised by Dr. Yisong Yue) *Pasadena, CA*
Dec. 2020 - Apr. 2021

- Trained an amortized MPC optimizer using an LSTM that leveraged gradients from a differentiable cost function to optimize control trajectories for a Segway robot in simulation.
- Achieved 3x reduction in optimization iterations compared to an OSQP solver, with a moderate trade-off in task success rate.

Research Intern, NASA Jet Propulsion Laboratory *Pasadena, CA*
May 2020 - Aug. 2020

- Designed a learned heuristic for predicting rover trajectories with high clearance failure probability, integrated with a tree-based planner in the ROS navigation stack.
- Achieved 4x reduction in planning cycle time, 8% reduction in path inefficiency, and 9% increase in mission success rate over the Perseverance rover's base navigation stack.
- Work published in IEEE Robotics and Automation Letters / ICRA 2022 and IEEE Aerospace Conference 2021.

Publications

[1] Vedant Shah, Johan Obando-Ceron, Vineet Jain, Brian R. Bartoldson, Bhavya Kailkhura, Sarthak Mittal, Glen Berseth, Pablo Samuel Castro, Yoshua Bengio, Nikolay Malkin, Moksh Jain, **Siddarth Venkatraman**, Aaron Courville. A Comedy of Estimators: On KL Regularization in RL Training of LLMs. **Preprint**

[2] **Siddarth Venkatraman***, Vineet Jain, Sarthak Mittal, Vedant Shah, Johan Obando-Ceron, Yoshua Bengio, Brian R. Bartoldson, Bhavya Kailkhura, Guillaume Lajoie, Glen Berseth, Nikolay Malkin. Recursive Self-Aggregation Unlocks Deep Thinking in Large Language Models. **Preprint, NeurIPS 2025 – Foundations of Reasoning in Language Models Workshop**

[3] Brian R. Bartoldson, **Siddarth Venkatraman**, James Diffenderfer, Moksh Jain, Tal Ben-Nun, Seanie Lee, Minsu Kim, Johan Obando-Ceron, Yoshua Bengio, Bhavya Kailkhura. Trajectory Balance with Asynchrony: Decoupling exploration and learning for fast, scalable, LLM post-training. **NeurIPS 2025**

[4] **Siddarth Venkatraman***, Mohsin Hasan*, Minsu Kim, Luca Scimeca, Marcin Sendera, Yoshua Bengio, Glen Berseth, Nikolay Malkin. Outsourced diffusion sampling: Efficient posterior inference in latent spaces of generative models. **ICML 2025**

[5] **Siddarth Venkatraman***, Moksh Jain*, Luca Scimeca*, Minsu Kim*, Marcin Sendera*, Mohsin Hasan, Luke Rowe, Sarthak Mittal, Pablo Lemos, Emmanuel Bengio, Alexandre Adam, Jarrid Rector-Brooks, Yashar Hezaveh, Laurence Perreault-Levasseur, Yoshua Bengio, Glen Berseth, Nikolay Malkin. Amortizing intractable inference in diffusion models for Bayesian inverse problems. **NeurIPS 2024 – ML and the Physical Sciences Workshop**

[6] **Siddarth Venkatraman***, Moksh Jain*, Luca Scimeca*, Minsu Kim*, Marcin Sendera*, Mohsin Hasan, Luke Rowe, Sarthak Mittal, Pablo Lemos, Emmanuel Bengio, Alexandre Adam, Jarrid Rector-Brooks, Yoshua Bengio, Glen Berseth, Nikolay Malkin. Amortizing intractable inference in diffusion models for vision, language, and control. **NeurIPS 2024**

[7] **Siddarth Venkatraman***, Shivesh Khaitan*, Ravi Tej Akella*, John Dolan, Jeff Schneider, Glen Berseth. Reasoning with Latent Diffusion in Offline Reinforcement Learning. **ICLR 2024**

[8] Benjamin Freed, **Siddarth Venkatraman**, Guillaume Adrien Sartoretti, Jeff Schneider, Howie Choset. Learning Temporally Abstract World Models without Online Experimentation. **ICML 2023**

[9] Conor Igoe, Swapnil Pande, **Siddarth Venkatraman**, Jeff Schneider. Multi-Alpha Soft Actor-Critic: Overcoming Stochastic Biases in Maximum Entropy Reinforcement Learning. **ICRA 2023**

[10] Shreyansh Daftry, Neil Abcouwer, Tyler Del Sesto, **Siddarth Venkatraman**, Jialin Song, Lucas Igel, Amos Byon, Ugo Rosolia, Yisong Yue, Masahiro Ono. MLNav: Learning to Safely Navigate on Martian Terrains. **IEEE RA-L** (2022), also presented at **ICRA 2022**.

[11] Neil Abcouwer, Shreyansh Daftry, **Siddarth Venkatraman**, Tyler Del Sesto, Olivier Toupet, Ravi Lanka, Jialin Song, Yisong Yue, Masahiro Ono. Machine Learning Based Path Planning for Improved Rover Navigation. **IEEE Aerospace Conference** (2021).