

Brett Evan Barkley

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Research Interests

Improving the reliability and scalability of synthetic data through structured augmentation, failure analysis, and generative model diagnostics for more effective learning in both online and supervised settings.

Education

The University of Texas at Austin , PhD <i>Computer Science</i>	2022 - Present GPA: 3.95
University of Maryland , M.S <i>Aerospace Engineering</i>	2015 - 2017 GPA: 3.97
University of Maryland , B.S <i>Aerospace Engineering (Honors Program)</i>	2010 - 2015 GPA: 4.00

Research Projects

Out-of-Distribution Detection via Score-Based Typicality in Generative Models Research Project with Profs. David Fridovich-Keil and Preston Culbertson	Austin, TX 2025 -
– Developing a lightweight framework for OOD detection using diffusion models and per-sample diagnostics. – Early experiments show strong separation between in- and out-of-distribution inputs across diverse benchmarks, including both proprioceptive reinforcement learning and supervised vision tasks, with no retraining required. – Designed for deployment with minimal inference cost and strong theoretical foundations.	
Stealing That Free Lunch: Exposing the Limits of Dyna-Style Model-Based Reinforcement Learning First-author ICML 2025 Paper with Prof. David Fridovich-Keil	Austin, TX 2024 - 2025
– Developed a JAX-based training pipeline yielding up to a 40× speedup in wall-clock time for MBPO. Code. – Showed that model-based RL algorithms like MBPO exhibit strong performance in OpenAI Gym but often fail in DeepMind Control Suite tasks when trained from scratch. – Investigated several potential explanations for this discrepancy, including model error and mitigation strategies; found that even modern techniques fail to close the gap.	
Time Symmetric Data for RL , Austin, TX First-Author 2024 L4DC Paper with Profs. David Fridovich-Keil and Amy Zhang	Austin, TX 2023 - 2024
– Demonstrated that TSDA can provide SOTA sample efficiency in time symmetric and asymmetric environments. – Investigated the utility of time reversal symmetry in reinforcement learning. Code. Paper. – Developed a data augmentation technique (TSDA) that leverages time symmetry across a range of RL problems.	

Professional Experience

Autonomy Aerospace Engineer , Johns Hopkins University Applied Physics Lab (JHU/APL)	2017 - 2022
– Efforts culminated in first ever combat tests between AI and human-piloted F-16s in 2023 – JHU/APL's Air Combat Evolution (ACE) deep reinforcement learning (DRL) lead for sub and full-scale aircraft – Guidance, control, and aerospace simulation subject matter expert (SME) for JHU/APL ADT and ACE teams	

Technical Skills

Languages: Python, C++, Cython, Bash, CUDA
Libraries/Software: JAX, Pytorch, Flax, Brax, Git, L^AT_EX

Selected Publications

1. [Stealing That Free Lunch: Exposing the Limits of Dyna-Style Reinforcement Learning](#)
Brett Barkley, David Fridovich-Keil | ICML 2025
2. [An Investigation of Time Reversal Symmetry in Reinforcement Learning](#)
Brett Barkley, Amy Zhang, David Fridovich-Keil | L4DC 2024