Utkarsh Singhal

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About Me

Looking for **Research Scientist** roles starting **Jan 2026**. Work authorization: **visa sponsorship not required**.

Currently working on adding better physical dynamics into robotic world models.

More generally, my research explores test-time optimization to make NNs robust and adaptable like humans.

Education

University of California, Berkeley Dec 2025 (expected)
Ph.D., Electrical Engineering and Computer Science (EECS)
Thesis: ***Scalable Learning and Integration of Constraints into Neural Networks*** (with Prof. Stella Yu)

University of California, Berkeley May 2018
B.S., Electrical Engineering and Computer Science (EECS) GPA: 3.9/4.0
B.A., Applied Mathematics (dual degree)

Selected publications

(Ongoing) **Physically plausible world models by combining video diffusion and latent space models**
Utkarsh Singhal, Stella X. Yu
Description: Improve a latent space world model's physical dynamics using video diffusion priors and few-shot adaptation.

Test-time canonicalization by foundation models for robust perception: *ICML'25*
*Utkarsh Singhal**, Ryan Feng*, Atul Prakash, Stella X. Yu
Description: Test-time optimization using CLIP/SD priors fixes a longstanding limitation of traditional invariance methods.

How to guess a gradient: *OPT Workshop @ NeurIPS'23*
Utkarsh Singhal*, Brian Cheung*, Kartik Chandra, Jonathan Ragan-Kelley, Joshua Tenenbaum, Tomaso Poggio, Stella X. Yu
Description: Used NN structure to improve forward-mode gradients by 100×, explored training with second-order optimizers.

Learning to transform for generalizable instance-wise invariance: *ICCV'23*
Utkarsh Singhal, Carlos Esteves, Ameesh Makadia, Stella X. Yu

Multi-spectral image classification with ultra-lean complex-valued models: *HADR Workshop @ NeurIPS'22*
Utkarsh Singhal, Stella X. Yu, Zackery Steck, Scott Kangas, Aaron Reite

Fourier features let networks learn high-frequency functions in low-dimensional domains: *NeurIPS'20*
Matt Tancik, Pratul Srinivasan, Ben Mildenhall, Sara Fridovich-Keil, Nithin Raghavan, Utkarsh Singhal, Ravi Ramamoorthi, Jon Barron, Ren Ng

Wireless recording in the peripheral nervous system with ultrasonic neural dust: *Neuron, July 2016*
Dongjin Seo, Ryan M Neely, Konlin Shen, Utkarsh Singhal, Elad Alon, Jan M Rabaey, Jose M Carmena, Michel M Maharbiz

Previous experience

Research intern, Adobe (Host: Michael Gharbi, Connelly Barnes) May 2019 – Jan 2020
- Discovered an optimization for PatchMatch (a content-aware fill algorithm), accelerating it by **20**×. (Patent)
- Developed a *differentiable* PatchMatch and its custom memory-efficient autograd code in PyTorch.

Oz Vision Project, UC Berkeley (Prof. Ren Ng) August 2018 – May 2019
- Worked on a team building a millisecond-resolution system to track and stimulate retina with a laser. (Patent)
- Wrote low-latency networking code to synchronize rendering across machines at millisecond speed.

Skills

Signal processing, electronics, 3D printing and prototyping, control theory, reinforcement learning, convex optimization, PyTorch, SLURM, Lightning, Docker, W&B, Hydra, DDP/FSDP, LoRA, ONNX, computer vision.