Kunal Jha

Website | Google Scholar | Github | LinkedIn | Email

Education

University of Washington, Seattle, WA June 2029
PhD Candidate in Computer Science and Engineering | Advisor: **Natasha Jaques** & **Max Kleiman-Weiner**
- Researching multi-agent reinforcement learning, machine theory-of-mind, and computational cognitive science

Dartmouth College, Hanover, NH June 2024
Bachelor of Arts, Major in Computer Science and Philosophy | Advisor: **Alberto Quattrini Li** & **Jeremy Manning**
- Coursework: Deep Learning, Multi-Robot Systems, Artificial Intelligence, Reinforcement Learning

Publications

- *Cross-Environment Cooperation Enables Zero-shot Multi-agent Coordination*
  (Spotlight Paper ICML 2025, Abstract CogSci 2025)
  Kunal Jha, Wilka Carvalho, Yancheng Liang, Simon S. Du, Max Kleiman-Weiner, Natasha Jaques
- *GOMA: Proactive Embodied Cooperative Communication via Goal-Oriented Mental Alignment*
  (IROS 2024)
  Lance Ying, Kunal Jha, Shivam Aarya, Joshua B. Tenenbaum, Antonio Torralba, Tianmin Shu
- *RIPL: Recursive Inference for Policy Learning*
  (Undergrad Thesis 2024)
  Kunal Jha, Jeremy Manning, Alberto Quattrini Li
- *Neural Amortized Inference for Nested Multi-agent Reasoning*
  (AAAI 2024, Oral Presentation @ AAAI Summer Symposium 2024)
  Kunal Jha, Tuan Anh Le, Chuanyang Jin, Yen-Ling Kuo, Joshua B. Tenenbaum, Tianmin Shu
- *Exploring high-order network dynamics in brains and stock markets*
  (Wetterhahn Symposium 2023)
  Kunal Jha, Daniel Carstensen, Ansh Patel, Jeremy Manning

Research Experience

Social Reinforcement Learning Lab, University of Washington, Seattle, WA June 2024 - Present
Advised by Natasha Jaques and Max Kleiman-Weiner
- Researching how AI can coordinate with novel partners on novel problems through procedural environment generation and self-play in Jax. Built accessible tool for human-AI and human-human evaluation on arbitrary MARL benchmarks.
- Using program synthesis and LLMs to support scalable multi-agent model-based planning.

Reality and Robotics Lab, Dartmouth College, Hanover, NH June 2022 - June 2024
Advised by Alberto Quattrini Li
- Conducting honors thesis on simultaneous probabilistic reasoning and heterogenous policy learning in large-scale environments. Leveraging graph neural networks and Bayes' rule to design an algorithm 2x faster than prior work.
- Created energy-based reward prediction model for stream-based active learning and state uncertainty estimation in Atari agents. Research was the capstone project for independent study on reinforcement learning.

Computational Cognitive Science Lab, MIT, Cambridge, MA March 2022 - June 2024
Research Assistant to Joshua Tenenbaum
- Utilized Deep Learning, Importance Sampling, and Monte Carlo methods to emulate human nested social inference capabilities in autonomous-driving and construction domains. Responsible for the entire codebase.
- Collaborated with researchers at **Google** to innovate online particle inference and amortized tree search algorithm for multi-agent interaction that is more accurate and 16x faster than existing benchmarks.
- Incorporating MCTS and a divergence-based approach for effective communication by LLM-backed agents looking to collaborate with humans on the VirtualHome and Overcooked benchmarks.

Contextual Dynamics Lab, Dartmouth College, Hanover, NH January 2021 - June 2024

Research Assistant to Jeremy Manning

- Applied correlation-based kernel filtering process for next-time prediction of fMRI and stock data that is robust to lower-order network activity spikes, resulting in error reductions exceeding 13%.
- Adopted scrum methodology to manage 6+ undergraduate students on a fintech project, meeting with the P.I and hosting weekly code reviews + pair programming sessions to accomplish sprints and coordinate upcoming project deliverables.
- Created an experiment to understand the neuronal processes behind conceptualization during and after educational lectures. Implemented topic model to quantify patterns between stimuli and treatment questions. Extracted sentence embeddings from video transcripts to semantically map fMRI trial data.

Teaching

- Deep Learning Teaching assistant (35 students) spr' 2024
- Foundations of Applied Computer Science Teaching assistant (70+ students) wint' 2023
- Problem Solving via Object Oriented Programming Teaching assistant (80+ students) aut' 2022

Industry Experience

Amazon Web Services, Arlington, VA June 2024 - September 2024
Software Development Engineer Intern

- Automated the differential testing pipeline for the Verified Permissions team by developing AWS Lambda and Java wrappers to execute and analyze Rust code of Cedar policy management language.

Amazon Web Services, Arlington, VA June 2023 - September 2023
Software Development Engineer Intern

- Built end-to-end pipeline for alerting users about server-side health events impairing their workflows and recommending solutions to their issues, simultaneously developing back-end API and front-end widget.
- Adapted sampling-cost solutions to the optimal stopping problem to efficiently provide recommendations while increasing case deflections by 0.5%, exceeding the team's annual goal of a 9.3% deflection rate two quarters early.

Ought, San Francisco, CA August 2021 - November 2021
Software Engineer Intern

- Fine-tuned GPT-3 to perform scalable semantic search and summarization through few-shot learning. Helped automate research workflow by creating "decomposition" and "method generation" tasks.

National Aeronautics and Space Administration (NASA), Cape Canaveral, FL December 2020 - April 2021
Financial Data Science Intern

- Constructed the MUREP program's first holistic financial dataset by parsing 20 years of textual data, then implemented a Deep Learning agent that recommended a $35 million research budget redistribution.
- Performed sentiment analysis on grant recipient reports and used results to retrain the recommendation model (to proxy for MUREP's qualitative objectives), improving struggling institution success rates by 14%.

Awards

- Cooperative AI Early Career Grant Recipient 2025
- Sony Focused Research Award Recipient 2025
- CSERF Fellowship 2024
- ARCS Scholar 2024
- High Honors in Computer Science at Dartmouth College 2024
- Citation for Academic Excellence in Philosophy and Computers spr' 2024
- Dean's Honor List 2023
- Citation for Academic Excellence in Deep Learning, Robustness, and Generalization spr' 2023
- Citation for Academic Excellence in Computer Vision wint' 2023

- Citation for Academic Excellence in Multi-robot Systems aut' 2022
- Lovelace Computing Scholar (for novel approaches to computational research) - $1200 spr' 2022
- SELF Grant Recipient (for experiential learning and interuniversity research) - $5000 spr' 2022
- 5x URAD Scholar (for promising research amongst sophomores and juniors) - $6000 2021, 2022
- Great Issues Scholar (for first-years looking to engage with international issues) 2021
- National Merit Scholar Finalist 2020

Skills

Machine social intelligence, Human-robot interaction, **artificial intelligence**, embodied cognition, computational cognitive science, machine learning, **reinforcement learning**, deep learning, **probabilistic programming**, Bayesian modeling and inference, Monte Carlo methods, Python, Pytorch, Jax, Java, C, fMRI trained, project management, public speaking, outreach, **mentorship**

Languages

- English (Native)
- Hindi (Fluent)
- German (Conversational)