

GURUSHA JUNEJA

✉ gurusha@ucsb.edu
🌐 github.com/gurusha01

🌐 gurusha01.github.io
in linkedin.com/gurusha

RESEARCH INTERESTS

My research interests span two areas of reinforcement learning. First, curiosity-driven and intrinsically motivated exploration, where an agent learns from interaction with an environment in the absence of an explicit task objective. Second, multi-agent reinforcement learning, focusing on credit assignment, long-horizon decision making, and learning under non-stationarity induced by other agents.

EDUCATION

Ph.D.	University of California (UCSB) Computer Science; Advisor: Prof. William Wang	2024-Ongoing 4.0/4.0
B.Tech.	Indian Institute of Technology (IIT-D) Electrical Engineering minor in CS; Advisor: Prof. Tanmoy Chakraborty	2019-2023 9.4/10

SELECTED PUBLICATIONS

- **Adversarial Training for Process Reward Models*** [Oct'24]
Gurusha Juneja, Deepak Nathani, William Yang Wang
The Fourteenth International Conference on Learning Representations (ICLR)
 - **MAGPIE: A benchmark for Multi-AGENT contextual Privacy Evaluation*** [June'24]
Gurusha Juneja, Jayanth Pasupulati, Alon Albalak, Wenyue Hua, William Yang Wang
The European Chapter of the Association for Computational Linguistics (EACL)
 - **LM2: A Simple Society of Language Models Solves Complex Reasoning** [Sep'24]
Gurusha Juneja, Subhabrata Dutta, Tanmoy Chakraborty
The 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP)
 - **Task Facet Learning: A Structured Approach to Prompt Optimization** [Jun'25]
Gurusha Juneja, Nagarajan Natarajan, Hua Li, Jian Jiao, Amit Sharma
The 63rd Annual Meeting of the Association for Computational Linguistics (ACL)
 - **A Reliable Hand-Object-Interaction Data Generation Framework** [Dec'23]
Gurusha Juneja, Sukrit Kumar
38th Annual AAAI Conference
🏆 Oral (top 5%) Workshop on digital human
 - **Language Models Separately Tuned for Decomposition and Solution Improve Complex Reasoning** [Oct'23]
Gurusha Juneja, Subhabrata Dutta, Soumen Chakrabarti, Sunny Manchanda, Tanmoy Chakraborty
The 2023 Conference on Empirical Methods in Natural Language Processing (EMNLP)
- *=under review

WORK EXPERIENCE

- **Google Deepmind, Mountain View** (June'25-Sep'25)
Student Researcher
Manager: Shubham Phal, Advisor: Dorsa Sadigh
RL for non-verifiable problems, proposed an Elo based reward function that provides noise robustness and better convergence compared to rubric and single comparison based methods.
- **Microsoft Research, India** (July'23-Aug'24)
Pre-Doctoral Research Fellow
Manager: Amit Sharma, Nagarajan Natarajan
Worked on directional optimization of textual prompts inspired by the submodular nature of the facets of prompts

RESEARCH EXPERIENCE

- **University of California, Santa Barbara** (October'24-Ongoing)
Advisor: William Wang, Xin Eric Wang; **Role:** Graduate Student Researcher
 - *Adaptive Process Supervision via Multi-Agent Competition*
 - * Proposed an **adversarial training framework** for step-level **reward modeling** that replaces manual annotations with automatically generated negative reasoning traces, to enable learning under severe data scarcity.
 - * Instantiated this framework as a generator-verifier game trained via alternating PPO, showing that competitive multi-agent optimization produces **progressively harder** reasoning errors and yields up to 12.5% accuracy improvements on math reasoning benchmarks.
 - *Multi-Agent Collaboration*

- * Studied information flow and the effect of design choices like topology, agent definition, communication protocol and task distribution strategy on the performance of **Multi-Agent Society**.
- * Studied the problem of information redundancy and privacy leakage in multi-agent systems. Proposed a **novel real-world benchmark** to evaluate multi-agent systems.
- *Theory of Mind reasoning in Multi-Agent Embodied tasks* (ongoing)
 - * Developing a dynamic benchmark that requires theory-of-mind to solve multi-agent collaboration tasks in embodied settings.
- *Discovery Algorithms for AI Scientists* (ongoing)
 - * Developing learning algorithms that enable agents to **discover and refine** machine learning systems **through interaction**, experimentation, and feedback.
 - * Exploring **reward modeling and reinforcement learning** formulations where the agents proposes modifications to the code and learns from the performance of the modification on downstream ML task.
- **Indian Institute of Sciences, Bengaluru** (September'24-Ongoing)

Advisor: Danish Pruthi; **Role:** Research Collaborator

 - *AI generated content detection*
 - * Studied the **ethical use of AI** for scientific community, specifically in context of scientific peer reviewing. Curated a dataset of AI generated reviews with varying levels of human input; benchmarked current machine-text generation techniques and proposed a model to identify acceptable use of AI.
- **Microsoft Research, India** (July'23-August'24)

Advisor: Amit Sharma, Nagarajan Natrajan; **Role:** Research Fellow

 - *Universal Prompt Generator: [Code](#) and [Demo](#)*
 - * Developed an algorithm for **directional optimization** in large search space of textual prompts inspired by the **submodular nature** of facets in a prompt; Uniprompt generates optimized sectioned prompts outperforming human-optimized prompts.
- **Laboratory for Computational Social Systems, IIT Delhi** (March'23-June'23)

Advisor: Tanmoy Chakraborty; **Role:** Undergraduate Student Researcher

 - *Multi-Step Reasoning of Language Models: [Code](#) and [Demo](#)*
 - * Identified current shortcomings of LLMs while performing multi-step reasoning; Trained a question decomposition model using **reinforcement learning**, to assist the solver. Improved the performance of GPT-3.5 to the level of GPT - 4.
- **Microsoft India (R & D) Pvt. Ltd., Bengaluru** (June'22 - Jul'22)

Team: Azure Cloud; **Role:** Software Engineer Intern

 - *Azure Cloud - Limitless Storage*
 - * Worked on cluster management Tool to manage resource groups and provide limitless storage; Provided robustness to azure cloud cluster management system by fetching migration statistics and emitting to a database.

SCHOLASTIC ACHIEVEMENTS

- **Academic Excellence Fellowship award, UC Santa Barbara [2024]:** Awarded to top Ph.D. applicants in CS department
- **IIT Delhi Endowment Merit Scholarship [2022]:** Awarded to **top 15** female and male students for scholastic excellence
- **Travel Grants and volunteering:** Microsoft Research - EMNLP 2023, Volunteer - AAAI 2024, Volunteer - EMNLP 2024
- **Google Research Week [2023]:** Selected among **top 50** applicants to attend Research Week organized by Google Research
- **Summer Undergraduate Research Award (SURA) [2022]:** Conferred grant, shortlisted for the SURA Award awarded to only 34 projects in IITD by the Ministry of Human Resource Development for Animal Habitat Corridor Planning project
- **Joint Entrance Examination (JEE) Advanced [2019]:** Secured all India rank of **1061** from a pool of 1.6 lakh students
- **Kishore Vaigyanik Protsahan Yojana [2017] :** Received AIR **625** in KVPY-SA category among 1,00,000 candidates

RELEVANT COURSES

Computer Vision, Natural Language Processing, Information Retrieval, Deep Learning, Linear Algebra and Differential Equations, Calculus, Probability and Stochastic Processes, Data Structures And Algorithms, Algorithm Design, Computer Architecture, Mathematical Foundation for Machine Learning, Cognitive Perception, Discrete Mathematical Structures

PROFESSIONAL SERVICE

- *Reviewing:* ARR (since 2023), ICAPS 2025
- *Mentorship:* Naveeja Sajeewan (IISc Masters), Anika Basu (highschool intern), Jayanth Naga Sai Pasupulati (Senior Undergrad), Yash Chanchani (Fresher Undergraduate)
- *Teaching Assistant:*
 - Data Science lab at IIT Delhi- Conducted lectures and interactive sessions on Decision Trees, data visualization etc
 - Teaching Assistant for Natural Language Processing, Graduate level course at IIT Delhi with over 80 students

REFERENCES

Prof. William Wang

Email: william@cs.ucsb.edu

Prof. Xin Eric Wang

Email: ericxwang@ucsb.edu

Prof. Tanmoy Chakraborty

Email: tanchak@iitd.ac.in

Prof. Danish Pruthi

Email: danish037@gmail.com

Dr. Amit Sharma

Email: amshar@microsoft.com

Dr. Nagarajan Natarajan

Email: Nagarajan.Natarajan@microsoft.com

Shubham Phal

Email: shubhamphal@google.com

Ph.D. Advisor

University of California, Santa Barbara (UCSB)

Ph.D. Advisor

University of California, Santa Barbara (UCSB)

B.Tech. Thesis Advisor

Indian Institute of Technology, Delhi (IITD)

Indian Institute of Sciences (IISc)

Research Fellowship Advisor

Microsoft Research, India (MSR)

Research Fellowship Advisor

Microsoft Research, India (MSR)

Internship Advisor

Google Deepmind