

# Sagalpreet Singh

Pre-Doctoral Researcher, Google DeepMind

📧 Sagalpreet Singh | 🌐 sagalpreet | 🌐 Webpage

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## Education

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[E1] **Indian Institute of Technology Ropar** 🌐 2019-2023  
B.Tech. in Computer Science and Engineering 9.31/10.0  
Concentration in Artificial Intelligence 10.0/10.0

## Experience

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[X1] **Google DeepMind** 🌐 Aug 2024 - Present  
Pre-Doctoral Researcher - Agents

[X2] **Oracle** 🌐 Jun 2023 - Aug 2024  
Member of Technical Staff - AI Services (Speech)

[X3] **Guvi** 🌐 Apr 2023 - Aug 2024  
Teaching Consultant - AI/ML & Python

[X4] **Learning Affect and Semantic Image Analysis Group** 🌐 Jan 2023 - Apr 2023  
Undergraduate Researcher - IIT Ropar

[X5] **Game Theory & ML Lab** 🌐 Mar 2022 - Oct 2022  
Undergraduate Researcher - IIT Ropar

[X6] **Oracle** 🌐 Jun 2022 - Jul 2022  
Software Engineering Intern - Oracle Integrations Cloud

[X7] **Image Processing, Security and Analytics Lab** 🌐 Jan 2022 - May 2022  
Undergraduate Engineer - IIT Ropar

## Publications

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C=Conference, S=Submitted

[S1] **Dense and Diverse Goal Coverage in Reinforcement Learning**  
*Sagalpreet Singh, Rishi Saket, Aravindan Raghuvver* Google Deepmind Booth @ NeurIPS 2025  
AISTATS 2026 (Under Review) 📄

[C1] **Learning from Label Proportions and Covariate-shifted Instances**  
*Sagalpreet Singh, Navodita Sharma, Shreyas Havaldar, Rishi Saket, Aravindan Raghuvver* UAI 2025 📄

[C2] **On Subset Selection of Multiple Humans to Improve Human-AI Team Accuracy**  
*Sagalpreet Singh, Shweta Jain, Shashi Shekhar Jha* AAMAS 2023 (Oral) 📄

## Awards

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#=Declined-by-me

[A1] **Google Research (USD 2k) and Microsoft Research# (INR 120k) travel grants, AAMAS 2023**

[A2] Selected for **Amazon ML Summer School** and offered **Applied Scientist internship#**

[A5] **Institute Merit Scholarship** at IIT Ropar for exceptional academic performance

[A3] **Best Poster Presentation Award** at IIT Ropar on Research Scholar's Day 2023

[A4] **Best B.Tech. Project Award** at IIT Ropar on National Technology Day 2022

[A6] **NTSE Scholarship** by the Government of India, awarded to top 1000 students nationwide

**Retrieval for Tool Aware Planning**

Oct 2025 - Present

*Advisors: Dr. Aravindan Raghuvier, Dr. Satinder Baveja*

[X1]

Here we ask a simple question - can an agent have an external memory that can be easily updated without having to update the model weights (or not drastically at least)? This line of work is heavily inspired from tool use in LLMs and Hierarchical Reinforcement Learning. Specifically, I am working on developing a tool retrieval agent which can efficiently fetch tools from a large tool library that can be used to plan and solve the task at hand.

**Verifiable Problem Discovery<sup>§</sup>**

Oct 2025 - Present

*Advisors: Dr. Aravindan Raghuvier, Dr. Rahul Madhavan*

[X1]

This is an extension of Unsaturating Benchmarks where we are trying to autonomously generate verifiable problems in Mathematics and Computer Science domains by using rejection sampling rather than RL. The outcome of this project is data which improves the performance of Gemini models across the board on various benchmarks. This work is on its path to be incorporated into Gemini post-training.

**Dense and Diverse Goal Coverage in RL** 📄

Jun 2025 - Oct 2025

*Advisors: Dr. Rishi Saket, Dr. Aravindan Raghuvier*

[X1, S1]

To prevent mode collapse in reinforcement learning on multi-goal environments, we proposed a novel optimization objective, and an algorithm with convergence guarantees. We also show improvements in diversity of goal states reached by our algorithm in comparison to SAC and other baselines. The paper is under review and a provisional patent has been filed.

**Unsaturating Benchmarks**

Jan 2025 - May 2025

*Advisors: Dr. Rishi Saket, Dr. Aravindan Raghuvier, Dr. Satinder Baveja*

[X1]

With continuous self-improvement in mind, we came up with a novel problem generation framework to autonomously generate verifiable problems for LLMs to solve, specifically for planning in PDDL. We observed 60%-points improvement in problem generation efficiency by guiding the problem generation using RL with verifiable rewards to mimic the distribution of problems that the domain specific agent cannot solve.

**Hybrid LLP** 📄 🔄

Aug 2024 - Dec 2024

*Advisors: Dr. Rishi Saket, Dr. Aravindan Raghuvier*

[X1, C1]

Inspired from ad-conversion modeling, the project focused on a scenario where the source domain provided fully supervised data, while the target domain offered weakly supervised data, characterized by an aggregate label for a collection of instances. With the idea of learning domain invariant representations, we proposed a novel loss function with theoretical guarantees that led to SOTA results on real-world datasets. The paper was accepted at UAI 2025 and the work is projected to have a revenue impact in the order of millions of dollars.

**Natural Text-to-Speech** 🗣️

Feb 2024 - Aug 2024

*Mentors: Mr. Ankit Tyagi, Mr. Phanindra Mankale*

[X2]

Built Oracle's flagship natural text-to-speech system from scratch, achieving naturalness across several speech datasets. The system is capable of generating high-quality speech in real-time on CPU, and supports voice cloning with just 5 seconds of reference audio. The system also supports SSML tags for fine-grained control over prosody, pitch and speed of generated speech.

**Diffusion Models for Audios** 📄

Jan 2023 - Apr 2023

*Advisors: Dr. Abhinav Dhall*

[E1, X4]

We proposed two inference-time procedures for domain adaptation in diffusion models - (i) cross-diffusion: for conditional generation of audio on target instrument given the source instrument audio, and (ii) double-diffusion: to produce an unconditional paired set of instrumental audios for chorus generation from models trained on datasets of individual audios.

**Human-AI Team** 📄 🔄

Mar 2022 - Oct 2022

*Advisors: Dr. Shweta Jain, Dr. Shashi Shekhar Jha*

[E1, X5, C2, A3]

Developed an algorithm to intelligently combine multiple human labels with logit outputs from AI models, significantly improving classification accuracy over naïve methods. We particularly look at classification setting in this work. Our algorithm (which approximates failure modes for each human and represents those via a confusion matrix) is a direct outcome of optimizing for the lower bound on accuracy of the combined model. The paper was accepted for oral presentation at AAMAS 2023.

**Bring your own Email Server** 🗣️

Jun 2022 - Jul 2022

*Mentor: Mr. Renukaradhya Dakshinamurthy*

[X6]

Designed & implemented circuit breaker for email notification service of Oracle Integrations Cloud to allow increasing the number of emails that customers can send in a rolling 24-hour window by using their own customer tenancy instead of the default infra-tenancy, thereby opening up a monetization opportunity.

## SAMPAN Android App 📱 🎧 🖱️ 🎯

Advisors: Dr. Puneet Goyal

Jan 2022 - May 2022

[E1, X7, A4]

Co-developed an android app that is used by Anganwadi workers, Child Development Project Officers and other field level implementers to record and analyse data related to children malnourishment. The app has over 1k Play Store downloads and our work was featured in The Tribune. This project was also recognized with the Best B.Tech. project award at IIT Ropar on National Technology Day 2023.

## Competitions

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### India Top 20

Oppo Inspiration Cup

### Rank 84

Codegoda (Agoda)

### Rank 84

Newton's Grand Contest

### Top 1% (National)

NSEP (IAPT)

### Rank 7

AMEXpert Smartathon

### Rank 198 (18<sup>th</sup> India)

Google Hash Code

### Rank 10

Inter-IIT CP (IIT-BBS)

### Top 1% (State)

NSEJS (IAPT)

### India Top 50

NK Securities ML Hackathon

### Rank 238

Google Kickstart

### Rank 1108 / ~1M

JEE Advanced

### Top 0.1% (National)

Senior Secondary Physics Exam

## Technical Skills

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### Language Proficiency

English (TOEFL - 113/120), Hindi (Native), Punjabi (Native)

### Programming Languages

Python, C/C++, Bash, RISC-V Assembly, SQL, L<sup>A</sup>T<sub>E</sub>X

### Development Frameworks

Jax, PyTorch, Tensorflow, FastAPI, JupyterLab, Triton

### DevOps Tools

Git, Docker, Kubernetes

## Volunteering & Positions of Responsibility

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### Reviewing

AISTATS 2026, ACL ARR - May 2025

### Academic Council Representative

IIT Ropar CSE 2019-23 Batch

### Problem Setter

Competitive Programming, TechFest, IIT Ropar

### Volunteer

AAMAS 2023

### Representative

IIT Ropar Coding Club

### Event Organizer

Fury Road, Robotics Club, IIT Ropar

## References

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Dr. Rishi Saket, Staff Research Scientist, Google Deepmind



Dr. Aravindan Raghuvver, Principal Researcher, Google Deepmind



Dr. Shashi Shekhar Jha, Associate Professor, Indian Institute of Technology Ropar



Dr. Shweta Jain, Assistant Professor, Indian Institute of Technology Ropar



Dr. Abhinav Dhall, Associate Professor, Monash University



Mr. Phanindra Mankale, Director, Oracle



Mr. Ankit Tyagi, Staff Engineer, Oracle

