

# Spandan Senapati

CS PH.D. STUDENT, UNIVERSITY OF SOUTHERN CALIFORNIA

Los Angeles, California, USA

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## Education

### University of Southern California

PH.D. IN COMPUTER SCIENCE, ADVISED BY PROF. HAIPENG LUO AND PROF. VATSAL SHARAN

- Research Interests: Statistical Learning Theory, Online Learning, Trustworthy Machine Learning, Generative Modeling

Los Angeles, California

Aug 2023 - Present

### Indian Institute of Technology Kanpur

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING

- Cumulative Performance Index (CPI): **9.1/10.0** (graduated with **Distinction**)
- Awarded **Proficiency Medal** at the 55th Convocation for the best undergraduate project done by a graduating student in the CSE department
- **Academic Excellence Award** (2018-19, 2019-20): Awarded for excellent academic performance in an academic year

Kanpur, Uttar Pradesh

July 2018 - May 2022

## Experience

### Indian Institute of Technology Kanpur

GRADUATE RESEARCH ASSISTANT, ADVISOR: PROF. KETAN RAJAWAT

SPIN Lab, IIT Kanpur

Aug 2022 - May 2023

- Project on Sharpened Lazy Incremental Quasi-Newton (SLIQN) method, the first algorithm with an  $\mathcal{O}(d^2)$  per-iteration complexity and an explicit non-asymptotic superlinear convergence rate
- Paper accepted to AISTATS 2024 (Valencia, Spain)

### Tata Institute of Fundamental Research

INTERNSHIP, ADVISOR: PROF. RAHUL VAZE

Remote

Aug 2022 - May 2023

- Project on Online Convex Optimization with Switching Cost and Delayed Gradients. Proposed an algorithm and a novel analysis technique to bound its competitive ratio for the OCO-S problem with delayed gradients. Derived nearly matching lower bounds for the problem
- Paper accepted to IFIP Performance 2023 (Chicago, USA)

### Related Search Team - Microsoft Bing

DATA SCIENTIST INTERN, RS STCI TEAM

Microsoft IDC, Hyderabad

May 2021 - July 2021

- Project on Topics in Organised Map of Suggestions (TOMS). Developed an efficient clustering algorithm and built an interface which automated the clustering process and allowed doing several large-scale experiments seamlessly
- Offered a Pre-Placement offer (PPO) for a full-time data scientist position

## Publications and Preprints

### Efficient Swap Multicalibration of Elicitable Properties

[Arxiv]

LUNJIA HU $^{\alpha-\beta}$ , HAIPENG LUO $^{\alpha-\beta}$ , SPANDAN SENAPATI $^{\alpha-\beta}$ , VATSAL SHARAN $^{\alpha-\beta}$

Nov 2025

Under submission

### Improved Bounds for Swap Multicalibration and Swap Omniprediction

[Arxiv]

HAIPENG LUO $^{\alpha-\beta}$ , SPANDAN SENAPATI $^{\alpha-\beta}$ , VATSAL SHARAN $^{\alpha-\beta}$

May 2025

Annual Conference on Neural Information Processing Systems (NeurIPS), 2025 (Spotlight presentation)

### Simultaneous Swap Regret Minimization via KL-Calibration

[Arxiv]

HAIPENG LUO $^{\alpha-\beta}$ , SPANDAN SENAPATI $^{\alpha-\beta}$ , VATSAL SHARAN $^{\alpha-\beta}$

Feb 2025

Annual Conference on Neural Information Processing Systems (NeurIPS), 2025 (Spotlight presentation)

### Optimal Multiclass U-Calibration Error and Beyond

[Arxiv][Openreview]

HAIPENG LUO $^{\alpha-\beta}$ , SPANDAN SENAPATI $^{\alpha-\beta}$ , VATSAL SHARAN $^{\alpha-\beta}$

Sep 2024

Annual Conference on Neural Information Processing Systems (NeurIPS), 2024

### Sharpened Lazy Incremental Quasi-Newton Method

[PMLR][Arxiv]

AAKASH LAHOTI\*, SPANDAN SENAPATI\*, KETAN RAJAWAT, ALEC KOPPEL

Jan 2024

International Conference on Artificial Intelligence and Statistics (AISTATS)

### Online Convex Optimization with Switching Cost and Delayed Gradients

[PER][PEVA][Arxiv]

SPANDAN SENAPATI, RAHUL VAZE

Aug 2023

IFIP Performance 2023. Full paper: Elsevier Performance Evaluation (PEVA), Extended abstract: ACM SIGMETRICS Performance Evaluation Review (PER)

Note:  $\alpha - \beta$  denotes alphabetical ordering, which is custom in theoretical computer science research; \* denotes equal contribution

## Report

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Fall'23 Failure Cases of Empirical Risk Minimization (ERM) and Structural Risk Minimization (SRM), CSCI 699

[Report]

## Honors & Awards

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2022	<b>Proficiency Medal</b> , Best undergraduate project done by a graduating student from the CSE department	IIT Kanpur, India
2018, 19	<b>Academic Excellence Award</b> , For excellent academic performance in an academic year	IIT Kanpur, India
2018	<b>All India Rank 161</b> , Joint Entrance Examination Main, among 1.5 Million Candidates	India
2018	<b>All India Rank 191</b> , Joint Entrance Examination Advanced, among 200000 Candidates	India
2017	<b>All India Rank 24</b> , KVPY Scholarship, Indian Institute of Science and Government of India	Bangalore, India
2016	<b>NTSE Scholar</b> , Awarded to the top 1000 students in the nation by the Government of India	India
2016	<b>IJSO OCSC</b> , Selected for the team selection camp of the International Junior Science Olympiad(top 35 India)	Mumbai, India
2017, 18	<b>National Top 1%</b> , National Standard Examination in Physics(NSEP) among 200000 Candidates	India
2018	<b>National Top 1%</b> , National Standard Examination in Chemistry(NSEC) among 200000 Candidates	India
2017, 18	<b>State Top 1%</b> , National Standard Examination in Astronomy(NSEA)	India
2017	<b>3rd in State</b> , Represented Odisha State in the Indian National Maths Olympiad(INMO)	India
2016	<b>State Top 35</b> , Represented Odisha State in the Indian National Maths Olympiad (INMO)	India

## Travel Grants

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- 2024 **GSG Professional Development Fund**, Issued by USC  
2023 **National Science Foundation (NSF) Student Travel Award**, Issued by IFIP Performance 2023

## Talks

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- 2023 **IFIP Performance 2023**, Online Convex Optimization with Switching Cost and Delayed Gradients Chicago, USA  
2024 **USC Theory Lunch**, Optimal Multiclass U-Calibration Error and Beyond Los Angeles, USA

## Teaching

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Fall'24 **Teaching Assistant**, Theoretical Machine Learning (CSCI 678)

USC

## Skills

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<b>Programming</b>	C, C++, Python
<b>Machine Learning Framework</b>	Pytorch

## Reviewing

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- Machine Learning** Annual Conference on Neural Information Processing Systems (NeurIPS) 2024, 2025 (**Top Reviewer**)  
**Theoretical Computer Science** Annual Symposium on Foundations of Computer Science (FOCS) 2025 (External Reviewer)

## Service

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### SHINE Mentor

USC SUMMER HIGH SCHOOL INTENSIVE IN NEXT GENERATION ENGINEERING (SHINE)

June 2024 - July 2024

- Mentored a high school student in building an online learning-based program that can beat a human user repeatedly in a game of rock-paper-scissors

### Coordinator

SPECIAL INTEREST GROUP IN MACHINE LEARNING(SIGML)

IIT Kanpur

- Responsible for the smooth conduction of talks in different active areas of research in Machine Learning

May 2021 - Nov 2021

## **Student Guide**

COUNSELLING SERVICE

- Responsible for the guidance and mentorship at a personal level of 5 freshman undergraduates and the smooth conduction of various events in the Orientation Session for the incoming Batch of Y1

IIT Kanpur

July, 2019 - July 2020

## **Project Mentor**

ASSOCIATION OF COMPUTING ACTIVITIES (ACA)

- Introduced Inference algorithms in Bayesian ML to a group of freshman undergraduates, and prepared assignments to track progress

IIT Kanpur

Jan 2020 - Jun 2020