

# KARAN SINGH

## PERSONAL INFORMATION

Princeton University  
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## RESEARCH INTERESTS

Theoretical and applied Machine Learning, with a focus on Interactive Systems.  
Reinforcement Learning, Generative Models, Online Learning.  
Privacy and Fairness in Machine Learning.

## EDUCATION

2015-Present      Princeton University

*PhD Candidate in  
Computer Science*

GPA: 4.0 · *PhD Candidate* · Computer Science  
My research is focussed on algorithms for machine learning with provable guarantees on computational and statistical efficiency, with an attentive emphasis on **interactive learning algorithms**. Recent efforts have yielded rigorous methods for learning **Linear Dynamical Systems**, and algorithms for **Reinforcement Learning** with improved generalization performance.  
Advisor: Prof. Elad HAZAN

2011-2015      Indian Institute of Technology, Kanpur

*Bachelor of  
Technology,  
Computer Science*

GPA: 10.0 · *Bachelor of Technology* · Computer Science  
Following a rigorous introduction to computer systems and engineering, my coursework included 12 graduate-level courses on theoretical computer science, machine learning, and mathematics. My senior thesis details sketch-based algorithms for machine learning, and lower bounds in the streaming model.

*Ranked 1<sup>st</sup> (among  
820 students)*

Awarded the **President's Gold Medal** for the best academic performance in the graduating class among all disciplines.

## PUBLICATIONS ( $\alpha\beta$ ORDER)

*NIPS 2017  
Spotlight*

Elad Hazan, **Karan Singh** and Cyril Zhang. Online Learning of Linear Dynamical Systems. In the *Advances in Neural Information Processing Systems 30 (NIPS), 2017*.

*ICML 2017*

Naman Agarwal and **Karan Singh**. The Price of Differential Privacy for Online Learning. In the *Proceedings of the 34th International Conference on Machine Learning (ICML), 2017*. [PDF](#)

*ICML 2017*

Elad Hazan, **Karan Singh** and Cyril Zhang. Efficient Regret Minimization in Non-Convex Games. In the *Proceedings of the 34th International Conference on Machine Learning (ICML), 2017*. [PDF](#)

*DEML Workshop,  
ICML 2016*

Irineo Cabreros, **Karan Singh** and Angela Zhou. A Mixture Model for Crowdsourcing. A preliminary version appeared at the *ICML Workshop on Data Efficient Machine Learning, 2016*.

## EXPERIENCE

Summer 2014      Research Intern, MICROSOFT RESEARCH, REDMOND

*Microsoft Research  
Redmond*

Developed a Programming-by-Natural-Language framework to synthesize programs in targetted domain-specific languages given intents expressed as natural language prompts. The system supported multiple rounds of end-user interactions making it more robust than traditional NLP approaches. Concrete instantiations of the framework offer an interactive experience for repetitive data manipulation and summarization tasks.  
Host: Dr. Sumit GULWANI