

ACADEMIC

**Massachusetts Institute of Technology**, Cambridge MA

PhD (Sept. 2011 - Sept. 2017), SM (Sept. 2011 - Sept. 2013)  
Computer Science and Artificial Intelligence Laboratory

- GPA 5.0/5.0
- PhD Thesis: Automatically Learning Optimal Formula Simplifiers and Database Entity Matching Rules
- Master's Thesis: Synthesizing a Synthesis tool
- Research Interests: Machine Learning, Probabilistic Programming, Bayesian Modeling, Programming Languages, Program Synthesis,
- Skills: ML Modeling (Tensorflow, Pytorch, Scikit-learn, Pyro) — Software Engineering (Python, C++, Scala, SQL, OCaml) — Product Management (Agile, Tableau, Machine Learning/AI, Online Ads)

**Indian Institute of Technology Bombay**, Mumbai INDIA

B.Tech.(Honors) (July 2007 - April 2011)  
Department of Computer Science and Engineering

- CPI(Core) 9.93/10 and CPI(Overall) 9.87/10
- *Ranked 1<sup>st</sup>* (550) with highest CPI(Overall) and *2<sup>nd</sup>* (550) based on CPI(Core)
- Bachelor Thesis: Termination of Linear Programs

**Gold Medal** at the **38th International Physics Olympiad, 2007** held in Isfahan, Iran representing India among 76 countries from all over the world

Secured rank 47 in **IIT-Joint Entrance Examination 2007** and rank 3 in **All India Engineering Entrance Examination 2007**

WORK  
EXPERIENCE

*Global Quantitative Strategies*

**Citadel, Chicago, IL**

**Quantitative Researcher**

**July 2021 - Present**

Working with financial data and machine learning to build performant trading algorithms.

*Ads Ranking, Ads Delivery Intelligence*

**Facebook Inc., Menlo Park, CA**

**Staff Research Scientist, Machine Learning**

**Feb 2021 - June 2021**

Leading ML modeling and productionization efforts towards Ad creative (image/video) performance optimization with collection of targeting constraints, usage of those constraints as signals in Ads ranking and generating insights and guidance towards performant creatives.

**Senior Research Scientist, Machine Learning**

**Feb 2019 - Jan 2021**

Led a team of over 5 engineers to enable high-impact applications of incorporating targeting constraints as signals in the end-to-end delivery system (affecting retrieval, targeting, ranking models, bidding and auctions) resulting into significant revenue gains from increased audience liquidity and ranking efficiency.

*Uber AI Labs, Connections team*      **Uber Technologies Inc., San Francisco, CA**

**Research Scientist, Applied Machine Learning**      **Sept 2017 - Feb 2019**

Applied AI research techniques (including Deep learning and Bayesian modeling) across product teams at Uber. Included collaboration with engineers and data-scientists on feature engineering, model iteration, model analysis and productionizing Deep neural network-based models.

- \* Spatio-temporal time-series prediction for modeling demand with Deep neural networks (Autoencoders, CNNs and feed-forward networks / MLPs)
- \* Built a deep and probabilistic semi-supervised learning toolkit in Uber's open-sourced probabilistic programming language (Pyro), and employed it for applications in GPS-based-fraud detection using sensor-based data.
- \* Deep Bayesian modeling for cost of a shared ride to Uber for better pricing models. Learned a deep kernel embedding (using sequential route features) over a scalable and sparse Gaussian Process regression model.

*Business Product Management (Ads team)*      **Yelp Inc., San Francisco, CA**

**Product Manager Intern**      **June-Aug 2014**

Worked on features related to Ads infrastructure and Machine Learning-based Ad targeting: revamping reporting tools and interfaces, consumer-facing ad-design experiments, reducing real-time ML model bias by showing and learning from potentially "bad ads", and building analytics monitoring systems with Tableau.

*YouTube Ads*      **Google Inc., Mountain View, CA**

**Software Engineering Intern**      **June-Aug 2012**

Worked on improving YouTube's video classification for identifying indecent content ahead of time with Google brain (a distributed deep learning framework).

*Automatic Synthesis of Algebra problems*, **Microsoft Research, Bangalore, India**

**Research Intern**      **June-July, 2011**

Devised an AI methodology to generate new problems in multiple domains of high school math. Enabled students to manipulate solve problems on a mobile interface faster than the traditional methods.

*Quantitative Synthesis*      **Institute of Science and Technology (IST), Austria**

**Research Intern**      **May-July, 2010**

Designed and published a novel algorithm for automatic program synthesis of synchronization (lock /unlock) constructs for concurrent data-structures using their translation to games with imperfect information.

*Models & Theory of Computation*      **Ecole Polytechnique (EPFL), Switzerland**

**Research Intern**      **May-July, 2009**

Built and published a framework of quantitative synthesis of reactive systems (request /response model e.g. elevator controllers) using game-theoretic measures incorporating probabilistic behavior of the environment.

**Pyro: Deep Universal Probabilistic Programming.**

*Eli Bingham, Jonathan P. Chen, Martin Jankowiak, Neeraj Pradhan, Theofanis Karaletsos, Rohit Singh, Paul Szerlip, Paul Horsfall, Noah D. Goodman*

The Journal of Machine Learning Research 20 (1), 973-978, (JMLR 2019)

**Transpiling Stan Models to Pyro.**

*Jonathan P. Chen, Rohit Singh, Eli Bingham, Noah D. Goodman*

The International Conference on Probabilistic Programming (PROBPROG 2018)

**Applying SVGD to Bayesian Neural Networks for Time-Series Prediction and Inference.**

*Xinyu Hu, Paul Szerlip, Theofanis Karaletsos, Rohit Singh*

Bayesian Deep Learning, NeurIPS 2018 Workshop

**Synthesizing Entity Matching Rules by Examples**

*Rohit Singh, Vamsi Meduri, Ahmed Elmagarmid, Samuel Madden, Paolo Papotti, Jorge-Arnulfo Quiané-Ruiz, Armando Solar-Lezama, Nan Tang*

International Conference on Very Large Data Bases (VLDB 2018)

**Generating Concise Entity Matching Rules**

*Rohit Singh, Vamsi Meduri, Ahmed Elmagarmid, Samuel Madden, Paolo Papotti, Jorge-Arnulfo Quiané-Ruiz, Armando Solar-Lezama, Nan Tang*

ACM Special Interest Group on Management of Data (SIGMOD 2017 Demo)

**SWAPPER: A Framework for Automatic Generation of Formula Simplifiers based on Conditional Rewrite Rules**

*Rohit Singh, Armando Solar-Lezama*

Formal Methods in Computer-Aided Design (FMCAD 2016)

**Deriving Divide-and-Conquer Dynamic Programming Algorithms using Solver-Aided Transformations**

*Shachar Itzhaky, Rohit Singh, Rezaul Chowdhury, Kuat Yessenov, Yongquan Lu, Charles Leiserson, Armando Solar-Lezama*

International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA 2016)

**Synthesis of Domain Specific CNF Encoders for Bit-Vector Solvers**

*Jeevana Priya Inala, Rohit Singh, Armando Solar-Lezama*

International Conference on Theory and Applications of Satisfiability Testing (SAT 2016)

**Measuring and Synthesizing Systems in Probabilistic Environments**

*Krishnendu Chatterjee, Thomas Henzinger, Barbara Jobstmann, Rohit Singh*

Journal of the ACM, Volume 62, (JACM 2015)

And, International Conference on Computer Aided Verification (CAV 2010)

**Modular Synthesis of Sketches using Models**

*Rohit Singh, Rishabh Singh, Zhilei Xu, Rebecca Krosnick and Armando Solar-Lezama*

International Conference on Verification, Model Checking and Abstract Interpretation (VMCAI 2014)

**Automatically Generating Algebra Problems**

*Rohit Singh, Sumit Gulwani, Sriram Rajamani*

Conference on Artificial Intelligence (AAAI-12)

### **Quantitative Synthesis for Concurrent Programs**

*Pavol Cerny, Krishnendu Chatterjee, Thomas Henzinger, Arjun R., Rohit Singh*  
International Conference on Computer Aided Verification (CAV 2011)

### **On Memoryless Quantitative Objectives**

*Krishnendu Chatterjee, Laurent Doyen, Rohit Singh*  
International Symposium on Fundamentals of Computation Theory (FCT 2011)

### **Quasy : Quantitative Synthesis Tool**

*Krishnendu Chatterjee, Thomas Henzinger, Barbara Jobstmann, Rohit Singh*  
International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2011)

## ENTREPRENEURSHIP

### **Co-Founder and Tech Lead, Thyme Labs** *2013-2014*

Co-founded *Thyme Labs*, a startup aimed at helping users find time for things that matter. Our first product, Thyme.io mobile app streamlined the way people plan and schedule their meetings. The core backend API uses state of the art constraint solving research to solve both hard and soft constraints coming from the users and being learned over time.

### **Co-Founder and Chief Technology Officer (CTO), Avanti Fellows** *2009-11*

Co-founded a student run Non-profit organization working towards uplifting of underprivileged students.

## POSITIONS OF RESPONSIBILITY

### **Lead-Organizer, Panelist, MIT Global Startup Workshop** *2012-2015*

Lead Organizer for MIT GSW 2015 held in Guatemala City, Guatemala  
Organized Panels at GSW 2013 (Estonia) and GSW 2014 (Morocco)  
Panelist on "Organizing BPCs" Panel at GSW 2012 in Istanbul, Turkey

### **Director (YouPitch), Marketing and Mentorship Team Member**

#### **MIT 100K Entrepreneurship Competition** *2011-2012*

Directed YouPitch competition (marketing, logistics, judging and sponsorship)

### **Co-founder, Web and Coding Club (WnCC), IIT Bombay** *2009-10*

Co-founded and managed WnCC at IIT Bombay which is currently an active community of over 600 students interested in web development and programming

## ACHIEVEMENTS AND AWARDS

**Siebel Scholar**, Class of 2013 awarded annually for academic excellence and demonstrated leadership to 85 top students from the worlds leading graduate schools

Member of **The Summit Dublin's** 2014 class of 100 Student Scholars & Future Global Leaders in Tech.

Member of 2013 class of MIT's **Global Founder's Skills Accelerator** as a co-founder of Thyme Labs, an MIT startup.

Won the **MIT IDEAS Global Challenge 2012** community choice award as a co-founder of *Indian Raga*

## EXTRA-CURRICIS

Completed all tiers of MIT Conflict Management course (Coaching, Negotiation, Mediation)

Intermediate proficiency in Russian and Spanish languages.

Awarded fellowship to participate in the MIT MISTI Russia winter school 2012 on "Innovation and Entrepreneurship in Networks" held at Yandex HQ, Moscow.

Secured 2<sup>nd</sup> position in online **ACM International Collegiate Programming Contest** and 8<sup>th</sup> position in onsite Regionals '08. Selected for the onsite regionals in '07 & '09

Designed and managed three web-based treasure hunts as *Segreta* for Techfest '09, IIT Bombay which saw participation of over 2000 college students from all over India