# Nikhil Garg

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**Research overview.** I advance computational understanding of and data-driven decision-making within societal systems – especially urban systems and online platforms, emphasizing efficiency and equity. Methodologically, my work spans computer science, operations research, data science, and their intersection with economics and policymaking. I work with practitioners to improve real systems, including several city government agencies, non-profits, and companies – with applications including education, public reporting systems, and transportation. I further work on recommendation and rating systems in high-stakes settings, and for example diversity in recommendations and how they induce strategic behavior.

## ACADEMIC EMPLOYMENT

**Assistant Professor, Operations Research and Information Engineering**  Fall 2021-Present
Jacobs Technion-Cornell Institute
Cornell Tech and Technion - IIT
Field member in ORIE, CS, and IS, Cornell University

**Postdoctoral Associate**  2020-2021
University of California, Berkeley
Department of Electrical Engineering and Computer Sciences
Advisors: Christian Borgs, Jennifer Chayes, & Mike Jordan

## EDUCATION

**Stanford University**
*PhD, Electrical Engineering*  2020
*MS, Electrical Engineering*  2017
Thesis: *Designing Marketplaces and Civic Engagement Platforms: Learning, Incentives, and Pricing*
National Science Foundation Graduate Research Fellowship
Crowdsourced Democracy Team and Society & Algorithms Lab

**University of Texas at Austin**
*BS, Electrical and Computer Engineering, Highest and Special Honors*  2015
*BA, Plan II Honors (Liberal Arts)*  2015

## SELECTED AWARDS

- Forbes 30 under 30 for Science, 2022
- INFORMS George Dantzig Dissertation Award, 2020
- ACM SIGecom Dissertation Award (Honorable Mention), 2021
- **Paper awards:** INFORMS Junior Faculty Interest Group (Finalist), 2023; M&SOM Student (2nd place), 2020; INFORMS DEI Student, 2022; ACM EAAMO Student, 2021; ML4H Best Findings (Honorable Mention), 2023
- National Science Foundation Graduate Research Fellowship, 2015-2020
- Stanford McCoy Center for Ethics in Society Graduate Fellow, 2017-2018

## PUBLICATIONS

**Working Papers**

8. "Monoculture in Matching Markets." Kenny Peng and **NG**.

7. "Choosing the Right Weights: Balancing Value, Strategy, and Noise in Recommender Systems." Smitha Milli, Emma Pierson, and **NG**.

6. "Balancing Producer Fairness and Efficiency via Bayesian Rating System Design." Thomas Ma, Michael Bernstein, Ramesh Johari, and **NG**.

5. "Large language models shape and are shaped by society: A survey of arXiv publication patterns" Rajiv Movva, Sidhika Balachandar, Kenny Peng, Gabriel Agostini, **NG**, and Emma Pierson.

4. "Detecting Disparities in Capacity-constrained Allocations." Benjamin Laufer, Emma Pierson, and **NG**.

3. "Redesigning Service Level Agreements: Equity and Efficiency in City Government Operations" Zhi Liu and **NG**.

2. "Combatting Gerrymandering with Social Choice: the Design of Multi-member Districts." **NG**, Wes Gurnee, David Rothschild, and David Shmoys.

> Media: *Cornell Chronicle*

1. "Dropping Standardized Testing for Admissions Trades Off Information and Access." **NG**, Hannah Li, and Faidra Monachou. *Major Revision, Management Science.*

**Journal Articles**

6. "Quantifying Spatial Under-reporting Disparities in Resident Crowdsourcing" (2023) Zhi Liu, Uma Bhandaram, and **NG**. *Nature Computational Science.*

> INFORMS Junior Faculty Interest Group Paper Award (Finalist), 2023

5. "Driver Surge Pricing" (2021). **NG** and Hamid Nazerzadeh. *Management Science* (*MS*).

4. "Markets for Public Decision-making" (2020). **NG**, Ashish Goel, and Ben Plaut. *Social Choice and Welfare*.

3. "Designing Informative Rating Systems: Evidence from an Online Labor Market" (2020). **NG** and Ramesh Johari. *Manufacturing & Service Operations Management* (*M&SOM*).

> M&SOM Student Paper Award (2nd place), 2020
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> Media: *New York Times*, *Stanford Engineering Magazine*

2. "Iterative Local Voting for Collective Decision-making in Continuous Spaces" (2019). **NG**, Vijay Kamble, Ashish Goel, David Marn, and Kamesh Munagala. *Journal of Artificial Intelligence Research* (*JAIR*).

1. "Word Embeddings Quantify 100 Years of Gender and Ethnic Stereotypes" (2018). **NG**, Londa Schiebinger, Dan Jurafsky, and James Zou. *Proceedings of the National Academy of Sciences* (*PNAS*).

> Media: *Science Magazine*, *Smithsonian Magazine*, *Stanford News*

**Peer Reviewed Conference Proceedings**

25. "Reconciling the accuracy-diversity trade-off in recommendations" Kenny Peng, Manish Raghavan, Emma Pierson, Jon Kleinberg, and **NG**. *ACM Web Conference* (*WWW'24*)

24. "Domain constraints improve risk prediction when outcome data is missing." Sidhika Balachandar, **NG**, and Emma Pierson. *Twelfth International Conference on Learning Representations* (*ICLR'24*)

23. "A Bayesian Spatial Model to Correct Under-Reporting in Urban Crowdsourcing." Gabriel Agostini, Emma Pierson, and **NG**. *AAAI Conference on Artificial Intelligence* (*AAAI'24*)

22. "Identifying and Addressing Disparities in Public Libraries with Bayesian Latent Variable Modeling: Evidence from the New York Public Library" Zhi Liu, Sarah Rankin, and **NG**. *AAAI Conference on Artificial Intelligence* (*AAAI'24*)

21. "Supply-Side Equilibria in Recommender Systems." Meena Jagadeesan, **NG**, and Jacob Steinhardt. *Thirty-seventh Conference on Neural Information Processing Systems* (*NeurIPS '23*)

20. "Faster Information for Effective LTC Discharge, A Field Study in Adult Foster Care." Vince Bartle, Nicola Dell and **NG**. *ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization* (*EAAMO '23*)

19. "Interface Design to Mitigate Inflation in Recommender Systems." Rana Shahout, Yehonatan Peisakhovsky, Sasha Stoikov, and **NG**. *ACM Conference on Recommender Systems* (*RecSys '23*)

18. "Coarse race data conceals disparities in clinical risk score performance." Rajiv Movva, Divya Shanmugam, Kaihua Hou, Priya Pathak, John Guttag, **NG**, and Emma Pierson. *Machine Learning for Healthcare* (*MLHC '23*)

> ML4H Best Findings Paper (Honorable Mention), 2023

17. "Equity in Resident Crowdsourcing: Measuring Under-reporting without Ground Truth Data." Zhi Liu and **NG**. *ACM Conference on Economics and Computation* (*EC '22*).

16. "Combatting Gerrymandering with Social Choice: the Design of Multi-member Districts." **NG**, Wes Gurnee, David Rothschild, and David Shmoys. *ACM Conference on Economics and Computation* (*EC '22*).

15. "Trucks Don't Mean Trump: Diagnosing Human Error in Image Analysis." J.D. Zamfirescu-Pereira, Jerry Chen, Emily Wen, Allison Koenecke, **NG**, and Emma Pierson. *ACM Conference on Fairness, Accountability, and Transparency* (*FAccT '22*)

14. "Fair Ranking: a Critical Review, Challenges, and Future Directions." Gourab K Patro, Lorenzo Porcaro, Laura Mitchell, Qiuyue Zhang, Meike Zehlike, and **NG**. *ACM Conference on Fairness, Accountability, and Transparency* (*FAccT '22*)

13. "Strategic Ranking." Lydia Liu, **NG**, and Christian Borgs. *International Conference on Artificial Intelligence and Statistics* (*AISTATS '22*)

12. "Test-optional Policies: Overcoming Strategic Behavior and Informational Gaps." Zhi Liu and **NG**. *ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization* (*EAAMO '21*)

11. "The Stereotyping Problem in Collaboratively Filtered Recommender Systems." Wenshuo Guo, Karl Krauth, Michael I. Jordan, and **NG**. *ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization* (*EAAMO '21*)

10. "Standardized Tests and Affirmative Action: The Role of Bias and Variance." (2021) **NG**, Hannah Li, and Faidra Monachou. *ACM Conference on Fairness, Accountability, and Transparency* (*FAccT '21*). Also accepted to the *ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization* (*EAAMO '21*).

    ACM EAAMO Student Paper Award, 2021

    INFORMS DEI Best Student Paper Award, 2022

9. "Driver Surge Pricing" (2020). **NG** and Hamid Nazerzadeh. *ACM Conference on Economics and Computation* (*EC '20*).

8. "Designing Informative Rating Systems: Evidence from an Online Labor Market" (2020). **NG** and Ramesh Johari. *ACM Conference on Economics and Computation* (*EC '20*).

7. "Fair Allocation through Selective Information Acquisition" (2020). William Cai, Johann Gaebler, **NG**, and Sharad Goel. *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society* (*AIES '20*).

6. "Who is in Your Top Three? Optimal Learning in Elections with Many Candidates" (2019). **NG**, Lodewijk Gelauff, Sukolsak Sakshuwong, and Ashish Goel. *AAAI Conference on Human Computation and Crowdsourcing* (*HCOMP '19*).

5. "Analyzing Polarization in Social Media: Method and Application to Tweets on 21 Mass Shootings" (2019). Dora Demszky, **NG**, Rob Voigt, James Zou, Jesse Shapiro, Matthew Gentzkow, and Dan Jurafsky. *North American Chapter of the Association for Computational Linguistics* (*NAACL '19*).

    Media: *Washington Post*, *Stanford News*

4. "Designing Optimal Binary Rating Systems" (2019). **NG** and Ramesh Johari. *International Conference on Artificial Intelligence and Statistics* (*AISTATS '19*).

3. "Markets for Public Decision-making" (2018). **NG**, Ashish Goel, and Ben Plaut. *Web and Internet Economics* (*WINE '18*).

2. "Collaborative Optimization for Collective Decision-making in Continuous Spaces" (2017). **NG**, Vijay Kamble, Ashish Goel, David Marn, and Kamesh Munagala. *International Conference on World Wide Web* (*WWW '17*).

1. "Impact of Dual Slope Path Loss on User Association in HetNets" (2015). **NG**, Sarabjot Singh, and Jeffrey Andrews. *IEEE Globecom Workshops* (*GC Wkshps '15*).

**Theses**

2. "Designing Marketplaces and Civic Engagement Platforms: Learning, Incentives, and Pricing" (2020). **NG**. *PhD Dissertation*, Stanford University.

> INFORMS George Dantzig Dissertation Award, 2020

> ACM SIGecom Dissertation Award (Honorable Mention), 2021

1. "Downlink and Uplink User Association in Dense Next-Generation Wireless Networks" (2015). **NG**. *Bachelors Thesis*, University of Texas at Austin, Austin, TX.

## INVITED TALKS & SELECTED PRESENTATIONS

*Recommendations in High-stakes Settings*
— Columbia Workshop on Fairness in Operations and AI                                   2023-2024

*Efficiency and Equity in Resident Crowdsourcing*
— Institute for Pure and Applied Mathematics                                              2024
— MIT, Michigan, UT Austin, Cornell SCAN, NYC Open Data, Data Driven Urban Tech, Impact Labs       2023
— UIUC C3.ai, Harvard CRCS, INFORMS, Columbia DRO/IEOR, NYU                          Fall 2022
— Google, INFORMS AI/OR workshop                                                 Summer 2022
— U. Pittsburgh, IIM Ahmedabad, C3.ai, U. Maryland Social Impact Analytics Workshop      Spring 2022
   NYC Open Data Week, Columbia DSI, NBER Decentralization Conference, TOC4Fairness

*Combatting Gerrymandering with Social Choice: the Design of Multi-member Districts*
— Public Choice Society, JMM - Institute for Mathematics and Democracy                 2022 & 2023
— Duke, ETH Zurich, USC, INFORMS                                                     2021

*Dropping Standardized Testing for Admissions: Differential Variance and Access*
— NYU, Yale, Sharif                                                                 2021

*Political Data Science and Operations for the 2020 Elections*
— Springboard Rise, Cornell Tech                                                  Fall 2020

*Driver Surge Pricing*
— EC                                                                             July 2020
— Berkeley Haas, NYU Stern, UCLA Anderson, USC Marshall, Cornell Tech, Cornell ORIE    Spring 2020
— UT Austin McCombs, Minnesota ISyE, MIT Sloan, Georgetown McDonough, Virginia Darden   Fall 2019
   Cornell ORIE Young Researchers Workshop, INFORMS Annual Meeting
— Market Design workshop at EC, Revenue Management and Pricing Conference            June 2019

*Designing Informative Rating Systems: Evidence from an Online Labor Market*
— EC                                                                             July 2020
— INFORMS Annual Meeting 2019                                                   October 2019
— Uber research seminar                                                          July 2018
— Market Design workshop at EC                                                   June 2018
— Stanford SOAL seminar                                                         April 2018
— INFORMS Annual Meeting 2017                                                  October 2017
— Marketplace Innovation Workshop                                               June 2017

*Word Embeddings Quantify 100 Years of Gender and Ethnic Stereotypes*
— USF Data Institute                                                            June 2019
— Stanford Symbolic Systems Symposium                                         January 2019

*Who is in Your Top Three? Optimal Learning in Elections with Many Candidates*
— AAAI Conference on Human Computation and Crowdsourcing                      October 2019

*Markets for Public Decision-making*
— INFORMS Annual Meeting 2018                                                 November 2018

*Collaborative Optimization for Collective Decision-making in Continuous Spaces*
— International Conference on World Wide Web April 2017

## INDUSTRY & POLICY EXPERIENCE

**PredictWise**
*Principal Data Scientist* 2020
*Senior Scientific Advisor* 2020-Present
Elections analytics for registration, turnout, and persuasion

**Uber** Summer 2018
*Data Science Intern, Marketplace*
Algorithmic pricing and driver payments

**IEEE-USA** Summer 2015
*Technology Policy Associate*
Wireless spectrum regulation

**Microsoft** Summer 2014
*Software Development Engineering Intern, Bing Ads*
Streaming data pipeline for ad analytics

**Texas Senate** Fall 2013
*Legislative Intern, State Senator Davis's Legislative Office*
Bill research and constituent communications

**NASA** Summer 2013
*Research Associate, Glenn Research Center*
Multi-modal signal processing to measure attentive cognitive state

**Collaboration/consulting**: PredictWise, Clipboard Health, Ocurate, Upwork, Jet Blue Technology Ventures, SNCF, DAS Worldwide

## TEACHING

**Cornell Tech** (All as primary instructor/course designer)
— ORIE 5138/CS 5854 (Master's). Networks and Markets Spring 2024
— ORIE 5355/INFO 5370 (Master's). Applied Data Science: Decision-making beyond Prediction Fall 2023
— ORIE 6217/CS 6384 (PhD). Applied Bayesian Data Analysis for Research Spring 2023
— ORIE 5355/INFO 5370 (Master's). Applied Data Science: Decision-making beyond Prediction Fall 2022
— Break Through Tech AI program (Faculty lead), undergraduates Summer 2022
— ORIE 6170 (PhD). Engineering Societal Systems Spring 2022
— ORIE 5355/INFO 5370 (Master's). Data, People, and Systems Fall 2021

**Stanford University**
— MS&E 226. Fundamentals of Data Science, *Teaching Assistant* Fall 2018, 2019
— MS&E Exec Ed. Data Science: An Introduction to Prediction, *Course Design Assistant* 2018-2019
— OIT 521. Data Science for Online Marketplaces, *Teaching Assistant* Spring 2018

**AddisCoder**
— Introduction to Computer Science, *Teaching Assistant* Summer 2019

**University of Texas at Austin**
— EE 306. Introduction to Computing, *Teaching Assistant* Fall 2013
— M408C. Integral Calculus, *Teaching Assistant* Spring 2012

## PROFESSIONAL & ACADEMIC ACTIVITIES

**Reviewing and Organization**

**Organizer** Open Data Week 2023 event on Academia and Government Collaboration; 2023 NSF TRIPODS+X ML and UrbanTech Workshop; EC21 Operations of People-Centric Systems Workshop; Open Data

Week 2022 session

**Area Chair** FAccT24, EAAMO22, EAAMO21

**PC Member/Reviewer** WWW23, EC23, FAccT23, WSDM23, EAAMO23, FAccT22, FAccTRec22, EC22, WWW21, WINE21, EC21, MD4SG20 Workshop, NeurIPS20 CDMDE Workshop, Global Challenges in EC20, WWW18 Big Web Track, European Symposium on Algorithms, AAAI Human Computing, ICWSM

**Reviewer (journals)** Nature Machine Intelligence, Nature Human Behavior, Management Science, Operations Research, M&SOM, POMS, Political Science Research and Methods, Autonomous Agents and Multi-Agent Systems, INFORMS Journal on Optimization, Information Systems, Behavior Research Methods, M&SOM student paper competition

## Service and Outreach

- Academic Integrity Committee, Cornell Tech, 2023-2024
- PhD Life Committee, Cornell Tech, 2022-2023
- Break Through Tech AI program faculty lead, Cornell Tech, 2022
- DEI Strategic Planning Committee, Cornell Tech, 2021-2022
- Co-lead for working groups, Mechanism Design for Social Good (MD4SG), 2020-2023
- SWAG to College (Houston non-profit) Computer Science Career Guide, 2018
- Organizer, Stanford Society & Algorithms (SOAL) Seminar, 2017-2018
- Organizer, Stanford Research on Algorithms, Incentives, and Networks (RAIN) Seminar, 2016-2017

## Other Academic Positions

- Wireless Networks and Communications Group (under Jeffrey Andrews), UT Austin, 2014-2015
- Mobile and Pervasive Computing Group (under Christine Julien), UT Austin, 2012-2013
- Autonomous Vehicles Lab Freshman Research Initiative, UT Austin, 2012