VARUN GUPTA

Professor, Operations and Information Systems
David Eccles School of Business
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RESEARCH INTERESTS

Stochastic modeling and optimization; applied probability; algorithm design and analysis; mechanism design with applications to:

- Learning and Control in Non-stationary environments
- Energy management/load balancing algorithms for cloud computing
- Spatial queueing and matching in transportation systems
- Operations of online platforms
- Influence propagation in social networks

EDUCATION

Ph.D. Computer Science, May 2011.
Carnegie Mellon University, Pittsburgh, PA, USA.
Thesis: *Stochastic Models and Analysis for Resource Management in Server Farms*
Advisor: Prof. Mor Harchol-Balter
Committee Members: David Andersen (CMU); Anupam Gupta (CMU); Alan Scheller-Wolf (Tepper School of Business, CMU); Devavrat Shah (EECS, LIDS and ORC, MIT); Don Towsley (UMass., Amherst)

B.Tech. Computer Science and Engineering, *President's Gold Medal winner*, August 2004.
Indian Institute of Technology, New Delhi, India.
Thesis: *Algorithms for Computational Biology: Sequence Analysis*
Advisor: Prof. S.N. Maheshwari

WORK EXPERIENCE

University of Utah, David Eccles School of Business — Salt Lake City, UT
Professor — July 2025– Present

Northwestern University, Computer Science Department — Evanston, IL
Visiting Associate Professor — September 2023– Present

University of Chicago, Booth School of Business — Chicago, IL
Associate Professor of Operations Management — July 2016– July 2023

University of Chicago, Booth School of Business — Chicago, IL
Assistant Professor of Operations Management — July 2012– June 2016

Google Inc. — New York, NY
PostDoctoral Researcher — August 2011– June 2012

Carnegie Mellon University — Pittsburgh, PA
Graduate Research Assistant — August 2004–May2011
Prof. Mor Harchol-Balter

Bell Laboratories, Alcatel-Lucent — Murray Hill, NJ
Research Intern — Summer 2008
Host: Sem Borst

Microsoft Research Ltd. — Cambridge, UK
Research Intern — Summer 2006
Host: Milan Vojnovic

PUBLICATIONS

Journal Publications

1. "Designing Service Menus for Bipartite Matching Queueing Systems." *To appear, Operations Research.* R. Caldentey, V. Gupta, and L. Hillas.
2. "Managing Resources for Shared Micromobility: Approximate Optimality in Large-Scale Systems." *To appear, Management Science.* T. Akturk, O. Candogan, and V. Gupta.
3. "Greedy Algorithm for Multiway Matching with Bounded Regret." *Operations Research. 2024.* Vol. 72, No. 3. V. Gupta.
4. "Dynamic Regret Minimization for Non-Stationary LQR Control." *Proceedings of the ACM on Measurement and Analysis of Computing Systems. 2022.* Vol. 6, No. 1. Y. Luo, V. Gupta, and M. Kolar.
5. "Diffusion Approximation and Optimal Control for State-dependent Limited Processor Sharing Queues." *Stochastic Systems. 2022.* Vol. 12, No. 2. V. Gupta, and J. Zhang.
6. "On the Optimal Design of Bipartite Matching Queueing System." *Operations Research. 2022.* Vo. 70, No. 1. P. Afeche, R. Caldentey, and V. Gupta.
7. "Interior-Point Based Online Stochastic Bin Packing." *Operations Research. 2020.* Vol. 68, No. 5. V. Gupta, and A. Radovanovic.
8. "Estimation of a Low-rank Topic-Based Model for Information Cascades. " *Journal of Machine Learning Research. 2020.* Vol. 21, No. 71. M. Yu, V. Gupta, and M. Kolar.
9. "Greed Works - Online Algorithms For Unrelated Machine Stochastic Scheduling." *Mathematics of OR. 2020.* Vol. 45, No. 2. V. Gupta, B. Moseley, M. Uetz, and Q. Xie.
10. "Load Balancing in the Non-Degenerate Slowdown Regime." *Operations Research. 2019.* Vol. 67, No. 1. V. Gupta, and N. Walton.
11. "Search among Queues under Quality Differentiation." *Management Science. 2019.* Vol. 65, No. 8. L. Yang, L. Debo, and V. Gupta.
12. "Trading Time in a Congested Environment." *Management Science. 2016.* Vol. 63, No. 7. L. Yang, L. Debo, and V. Gupta.

13. "Stability of the Bipartite Matching Model." *Advances in Applied Probability. 2013.* Vol. 45, No. 2. A. Busic, V. Gupta, and J. Mairesse.
14. "On Markov-Krein Characterization of the Mean Sojourn Time in $M/G/K$ and other Queueing Systems." *Queueing Systems. 2011.* Vol. 68, Issue 3. V. Gupta and T. Osogami.
15. "Optimality Analysis of Energy-Performance Trade-off for Server Farm Management." *Performance Evaluation. 2010.* Vol. 67, Issue 11. V. Gupta, A. Gandhi, M. Harchol-Balter, and M. Kozuch.
16. "Analysis of Scheduling Policies under Correlated Job Sizes." *Performance Evaluation. 2010.* Vol. 67, Issue 11. V. Gupta, M. Burroughs, and M. Harchol-Balter.
17. "On the inapproximability of $M/G/K$: Why two moments of job size distribution are not enough." *Queueing Systems. 2010.* Vol. 64, Issue 1. V. Gupta, J. Dai, M. Harchol-Balter, and B. Zwart.
18. "Sampling Strategies for Epidemic-style Information Dissemination." *IEEE Transactions on Networking. 2010.* Vol. 18, No. 4. M. Vojnovic, V. Gupta, T. Karagiannis, and C. Gkantsidis.
19. "Analysis of Join-the-Shortest-Queue Routing for Web Server Farms." *Performance Evaluation. 2007* Vol. 64, Issues 9-12. V. Gupta, M. Harchol-Balter, K. Sigman, and W. Whitt.

Working Papers

20. "Reneging and Balking in Resource Sharing Systems." *Available at SSRN.*
21. "Inducing Optimal Scheduling with Selfish Users." L. Debo, P. Enders, A. Gandhi, V. Gupta, M. Harchol-Balter, and A. Scheller-Wolf.

Work In Progress

22. "Dynamic Auctions for Truckload Marketplaces."
23. "Trade-offs in Preferential Access Auctions." N. Thakurele, and V. Gupta.
24. "Oracle Bounds for Forecasting in Time-Varying Environments." V. Gupta, and M. Molinaro.

Conference and Workshop publications

25. "Online Stabilization of Unknown Linear Time-Varying systems." *CDC 2023.* J. Yu, V. Gupta, and A. Wierman.
26. "Look Before, Before You Leap: Online Vector Load Balancing with Few Reassignments." *ITCS 2023.* V. Gupta, R. Krishnaswamy, S. Sandeep, and J. Sundaresan.
27. "Approximation Schemes for Multiperiod Binary Knapsack Problems." *International Computer Science Symposium in Russia 2021.* Z. Gao, J. Birge, and V. Gupta.
28. "Permutation Strikes Back: The Power of Rescource in Online Metric Matching." *APPROX 2020.* V. Gupta, R. Krishnaswamy, and S. Sandeep.
29. "Information Models: Creating and Preserving Value in Volatile Cloud Resources" *International Conf. on Cloud Engineering (IC2E) 2019.* C. Zhang, V. Gupta, and A. Chien.
30. "Learning Influence-Receptivity Network Structure with Guarantee" *AISTATS 2019.* M. Yu, V. Gupta, M. Kolar.

31. "Stochastic Online Scheduling on Unrelated Machines" *Integer Programming and Combinatorial Optimization (IPCO) 2017.* V. Gupta, B. Moseley, M. Uetz, and Q. Xie.
32. "An Influence-Receptivity Model for Topic based Information Cascades." *ICDM 2017.* M. Yu, V. Gupta, and M. Kolar.
33. "Statistical Inference for Pairwise Graphical Models Using Score Matching" *NIPS 2016.* M. Yu, V. Gupta, and M. Kolar.
34. "Lagrangian-Based Online Stochastic Bin Packing." *ACM SIGMETRICS 2015.* V. Gupta, and A. Radovanovic.
35. "Distributed Caching Algorithms for Content Distribution Networks." *IEEE INFOCOM 2010.* S. Borst, V. Gupta, and A. Walid.
36. "Robust and Flexible Power-proportional Storage." *Symposium on Cloud Computing (SOCC) 2010.* H. Amur, J. Cipar, V. Gupta, M. Kozuch, G. Ganger, and K. Schwan.
37. "Self-Adaptive Admission Control Policies for Resource-Sharing Systems." *ACM SIGMETRICS/Performance 2009.* V. Gupta and M. Harchol-Balter.
38. "Sampling Strategies for Epidemic-style Information Dissemination." *IEEE INFOCOM 2008.* M. Vojnovic, V. Gupta, T. Karagiannis, and C. Gkantsidis.
39. "Fundamental Characteristics of Queues with Fluctuating Load." *ACM SIGMETRICS/ Performance 2006.* V. Gupta, M. Harchol-Balter, A. Scheller-Wolf, and U. Yechiali.
40. "The Effect of Higher Moments of Job Size Distribution on the Performance of an $M/G/s$ queueing systems." *ACM SIGMETRICS Performance Evaluation Review.* Vol. 35 Issue 2. V. Gupta, J. Dai, M. Harchol-Balter, and B. Zwart.
41. "Fluid Level in a Reservoir with an On-Off Source." *ACM SIGMETRICS Performance Evaluation Review.* Vol. 36 Issue 2. V. Gupta and P. Harrison.
42. "Finding the Optimal Quantum Size: Sensitivity Analysis of the $M/G/1$ Round-Robin Queue." *ACM SIGMETRICS Performance Evaluation Review.* Vol. 36 Issue 2.V.Gupta

BOOK CHAPTERS

43. "Risk-Aware Demand Management of Aggregators Participating in Energy Programs with Utilities" (S. Meyn et al., eds. *Energy Markets and Responsive Grids: Modeling, Control, and Optimization. Vol. 162. Springer, 2018.* W. Heavlin, V. Gupta, A. Radovanovic, S. You

CONFERENCE TALKS

1. "Analysis of Scheduling Policies under Correlated Job Sizes." *Performance 2010.* November 17, 2010.
2. "Self-Adaptive Admission Control Policies for Resource Sharing Systems." *ACM SIGMETRICS 2009.* June 18, 2009.
3. "Finding the Optimal Quantum Size: Sensitivity Analysis of the M/G/1 Round-Robin Queue." *MAMA 2008.* June 2, 2008.
4. "Fluid Level in Tandem Queues with an ON/OFF Source." *MAMA 2008.* June 2, 2008.
5. "Analysis of the Join-the-Shortest-Queue Policy for web server farms." *Performance 2007.* October 4, 2007.
6. "Fundamental Characteristics of Queues with Fluctuating Load." *ACM SIGMETRICS 2006.* June 29, 2006.

INVITED TALKS

1. "Non-stationary LQR – Stochastic and Robust Perspectives" *UIUC ISE Seminar, USC SEEDS conference, INFORMS Annual Meeting.* 2023-2024.
2. "Greedy Algorithm for Multiway Matching with Bounded Regret" *INFORMS RMP conference 2022, UIC IDS seminar series, UFL ISE seminar series, TUe SPOR (Statistics, Probability, and Operations Research) seminar series. Northwestern Theory Seminar. Toulouse Workshop on Online Stochastic Matching.* 2022-2024.
3. "Time series models for variable capacity resources" *UChicago-Paris Workshop on Scheduling Variable Capacity Resources for Sustainability.* 2023
4. "Designing Service Menus for Bipartite Queueing Systems" *Stochastic Networks Conference, Carnegie Mellon (Tepper), Northwestern (IEMS), Tata Institute of Fundamental Research, UIUC (ISE).* 2021-2022.
5. "Online Control Under Non-Stationarity: Dynamic Regret Minimization for the LQR System." *SNAPP Online Seminar series.* 2021.
6. "Designing Load Balancing and Admission Control Policies – Lessons From NDS Regime." *Young European Queueing Theorists Workshop (YEQT IX), Purdue, Stanford, Duke.* 2015-2017.
7. "Online Stochastic Bin Packing." *NYU Stern, IBM Research, Kellogg, Cornell ORIE. INFORMS Applied Probability Society Conference. Mostly OM (Tsinghua).* 2011-2016.
8. "Robust Moments-based Bounds for Queueing Systems." *Eurandom Workshop on Robust Optimization in Applied Probability.* 2015.
9. "Energy-efficient Dynamic Capacity Provisioning in Server Farms." *INFORMS 2010.* November 8, 2010.
10. "Optimal Routing Policies for Heterogeneous Server Farms." *INFORMS 2010.* November 9, 2010.
11. "Self-Adaptive Admission Control Policies for Resource Sharing Systems." *INFORMS APS 2009.* July 13, 2009.
12. "Optimizing Resource Sharing Systems." *University of Washington.* June 12, 2009.
13. "The Effect of Higher Moments of Job Size Distribution on the Performance of an $M/G/k$ Queueing System." *INFORMS APS 2007.* July 9, 2007.
14. "Fundamental Characteristics of Queues with Fluctuating Load." *INFORMS 2006.* November 7, 2006.

TEACHING

Instructor 2013-2024
BUS 36106: Managerial Decision Modeling. (MBA Course)
University of Chicago

Instructor Spring 2024
OPNS 435: Operations Management. (MBAi Course) Kellogg School of Management

Instructor Spring 2017-2022
BUS 40902: Online Optimization and Decision Making under Uncertainty. (PhD Course)
University of Chicago

Instructor Winter 2014
BUS 40901/CMSC 34901: Stochastic Performance Modeling. (PhD Course)
University of Chicago

Teaching Assistant Fall 2010
15-359: Probability and Computing. (Undergraduate Course)
Instructor: Prof. Avrim Blum and Prof. Venkat Guruswami
Carnegie Mellon University

Teaching Assistant Fall 2006
15-451: Algorithm Design and Analysis. (Undergraduate Course)
Instructor: Prof. Avrim Blum and Prof. Manuel Blum
Carnegie Mellon University

Teaching Assistant Spring 2005
15-849: Performance Modeling. (Graduate Course)
Instructor: Prof. Mor Harchol-Balter
Carnegie Mellon University

PROFESSIONAL SERVICE

- Program Committee Chair: ACM Sigmetrics 2027
- Associate Editor: Operations Research (Area: Stochastic Models) 2020-present
- General chair: IFIP Performance 2023
- Chair: Rising Star Award Committee, ACM SIGMETRICS 2023
- INFORMS Junior Faculty Interest Group Paper Competition Committee 2022
- INFORMS Applied Probability Society Student Paper Competition Committee 2020-2021
- Co-chair: Manufacturing and Service Operations Management (MSOM) 2016 – SIG on Service Management
- Program Committee member : ACM SIGMETRICS (2012, 2013, 2015, 2018, 2022, 2023)
- Program Committee member : IFIP Performance (2014, 2015)
- Student activities chair: ACM SIGMETRICS (2014)
- *Refereeing*: Operations Research; Management Science; M&SOM; POMS; Queueing Systems; IEEE Transactions on Parallel and Distributed Systems; IEEE Transactions on Automatic Control; IEEE Transactions on Computers; Performance Evaluation; Annals of Operations Research; INFORMS Journal on Computing; European Journal of Operations Research; IEEE Transactions on Multimedia.

AWARDS & HONORS

- 2022 INFOCOM Test of Time award for the paper *Distributed Caching Algorithms for Content Distribution Networks.*
- 2020 Best paper award for Service Management SIG of the Manufacturing and Service Operations Management (MSOM) Society for the paper *Trading Time in a Congested Environment.*
- 2016 Simons Institute Research Fellow, Special Semester on *Algorithms and Uncertainty*
- Intel Research Fellow for Summer 2010.

- Awarded the President's Gold Medal for the highest CGPA at the end of undergraduate studies, Indian Institute of Technology, New Delhi, 2004.
- Awarded the R. Vibhakar Memorial Award for the best student of third year during the 2002-03 session, Indian Institute of Technology, Delhi.
- Secured All India Rank 22 at the Indian Institute of Technology Joint Entrance Examination (IITJEE 2000) and All India Rank 10 at Roorkee Entrance Test 2000 (now IIT Roorkee).
- Secured 2nd rank (senior level) in Delhi region at the Regional Mathematics Olympiad 1997 organised by National Board for Higher Mathematics (NBHM). Consequently, I was selected for the Nurture Program to receive training for Indian National Mathematics Olympiad (INMO).

REFERENCES

Prof. Amy Ward
Rothman Family Professor
of Operations Management
Booth School of Business
The University of Chicago.
773.834.4864
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Prof. Alan Scheller-Wolf
Richard M. Cyert Professor
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Prof. Itai Gurvich
Professor of Operations
Kellogg School of Management
Northwestern University.
224.830.3055
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Prof. Rene Caldentey
Eli B. and Harriet B. Williams Professor
of Operations Management
Booth School of Business
University of Chicago.
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Prof. Mor Harchol-Balter
Dr. Bruce J. Nelson Professor of Computer Science
Computer Science Department
Carnegie Mellon University.
412.268.7893
harchol@cs.cmu.edu

Prof. Jim Dai
Leon C. Welch Professor of Engineering
School of Operations Research
and Industrial Engineering
Cornell University.
607.255.4223
jim.dai@cornell.edu