

**RESEARCH INTERESTS:**

Design and analysis of approximation and online algorithms  
Stochastic optimization, decision theory, and approximate policy design  
Query optimization for emerging data management systems  
Data mining and computational biology

**EDUCATION:**

2003: **Ph.D.** (Computer Science), Stanford University  
*Advisor:* Serge A. Plotkin  
*Thesis:* Approximation algorithms for concave cost network flow problems  
2002: **M.S.** (Computer Science), Stanford University  
1998: **B.Tech.** (Computer Science & Engineering), Indian Institute of Technology, Bombay  
*Advisor:* Abhiram G. Ranade  
*Thesis:* External memory graph algorithms

**EMPLOYMENT:**

<b>August 2004 – present:</b>	<b>Assistant Professor</b> of Computer Science, Duke University
<b>Aug. 2008 – Dec. 2008:</b>	<b>Visiting Professor</b> , College of Computing, Georgia Tech
<b>April 2003 – June 2004:</b>	<b>Postdoctoral Scholar</b> , Dept. of Biochemistry, Stanford University
<b>Sept. 1998 – April 2003:</b>	<b>Research Assistant</b> , Computer Science Dept., Stanford University
<b>Jan. 2002 – May 2002:</b>	<b>Consultant</b> , Strand Genomics Pvt. Ltd., Bangalore, India
<b>June 2001 – Sept. 2001:</b>	<b>Intern</b> , Math Sciences Div., IBM T.J. Watson Research Center
<b>June 2000 – Sept. 2000:</b>	<b>Intern</b> , Math of Networks and Systems group, Lucent Bell Labs
<b>June 1999 – Sept. 1999:</b>	<b>Intern</b> , Math of Networks and Systems group, Lucent Bell Labs

**ACADEMIC HONORS AND AWARDS:**

- Alfred P. Sloan Foundation Research Fellowship, 2009-11.
- Best Paper Award, 18<sup>th</sup> Intl. World Wide Web Conference (WWW) held in Madrid, Spain, 2009.
- NSF CAREER Award, 2008.
- Ranked first in IIT-JEE-1994, the joint entrance examination for admission to the Indian Institutes of Technology (IIT).
- National Talent Search Scholarship, 1992. The Govt. of India awards this scholarship.

**RESEARCH GRANTS:**

1. **PI** on NSF award CCF-0745761. *CAREER: Lightweight near-optimal stochastic control policies for information acquisition and exploitation.*  
**Start:** 08/2008. **Amount:** \$400,000
2. **Co-PI** on NSF grant CNS-0540347. *DDDAS-TMRP: Dynamic sensor networks - Enabling the measurement, modeling, and prediction of biophysical change in a landscape.*  
**Start:** 01/2006. **Amount:** \$1,500,000 (shared by 6 investigators)

**PROFESSIONAL SERVICE (SELECTED):**

1. **Panelist** for NSF CISE Directorate, 2008.
2. **Program Committee Member (selected):**
  - a. ACM Conference on Electronic Commerce (EC), Cambridge, MA. 2010.
  - b. ACM Symposium on Theory of Computing (STOC), Bethesda, MD. 2009.
  - c. ACM Conference on Electronic Commerce (EC), Stanford, CA. 2009.
  - d. International Conference on Data Engineering (ICDE), Shanghai, China. 2009.
  - e. Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX), Boston, MA. 2008.
  - f. European Symposium on Algorithms, Eilat, Israel. 2007.
3. Referee for STOC, FOCS, SODA, ICALP, PODS, SIGMOD, VLDB, and ICDE conferences.

4. Reviewer for Journal of the ACM, SIAM Journal on Computing, ACM Transactions on Algorithms, Algorithmica, and Transactions on Knowledge and Data Engineering.

**TEACHING:****DUKE UNIVERSITY:**

1. Sequential Decision Theory, Fall '09
2. Approximation Algorithms, Fall '04
3. Advanced Algorithms, Fall 2006 -07
4. Graduate Computational Complexity, Spring '05
5. Algorithms for Computational Biology, Fall '05
6. Undergraduate Algorithm Design, Spring 2006 - 10

**INDIAN INSTITUTE OF TECHNOLOGY, DELHI:**

7. Computational Biology, Summer '04

**INDIAN INSTITUTE OF SCIENCE, BANGALORE:**

8. Approximation Algorithms, Spring '02

**ADVISING AND THESIS COMMITTEES, DUKE UNIVERSITY:**

1. **2<sup>nd</sup> Year Project Advisee:**  
Sayan Bhattacharya (2008 - 10)
2. **M.S. Advisee:**  
Jen Burge (2005 - 07)
3. **Undergraduate Independent Study:**  
Peng Shi (2007 - 09)  
Kshipra Bhawalkar (2007)
4. **Ph.D. Thesis Committee:**  
Songyun Duan, Satish Govindarajan (2004), Christopher Painter-Wakefield, Jeff Phillips (2009), Sharath Raghavendra, Piyush Shivam (2007), Adam Silberstein (2007), Sudheer Sahu (2007), Bei Wang
5. **Masters Thesis Committee:**  
Jen Burge (2007), Sukhendu Chakraborty (2006), Herodotos Herodotou (2009), Madhuwanti Vaidya (2006)
6. **Research Initiation Project Committee:**  
Sukhendu Chakraborty (2004-05), Josh Letchford, Dmytro Korzhyk, Jeff Phillips (2004-05), Sharath Raghavendra (2007-08), Sam Slee (2005-06), Madhuwanti Vaidya (2004-05), Albert Yu (2007-08), Yi Zhang (2007-08)

**VISA STATUS:** Permanent Resident of the U.S.

PUBLICATIONS AND TALKS**Technical Reports available via the Computing Research Repository:**

1. S. Guha, K. Munagala, and S. Sarkar. *Information acquisition and exploitation in multi-channel wireless systems*. Computing Research Repository, arXiv:0804.1724, 2008.

**Publications accepted to refereed journals:**

2. S. Guha and K. Munagala. *Adaptive uncertainty resolution in Bayesian combinatorial optimization problems*. Accepted to ACM Transactions on Algorithms, 2010.
3. A. Goel, S. Guha, and K. Munagala. *How to probe for an extreme value*. Accepted to ACM Transactions on Algorithms, 2009.
4. S. Guha, A. Meyerson, and K. Munagala. *A constant-factor approximation to the single-sink edge installation problem*. SIAM Journal on Computing, **38**(6), 2009.
5. A. Meyerson, K. Munagala and S. Plotkin. *Cost-Distance: Two metric network design*. SIAM Journal on Computing, **38**(4), 2008.
6. V. Arya, N. Garg, R. Khandekar, A. Meyerson, K. Munagala, and V. Pandit. *Local search heuristics for  $k$ -median and facility location problems*. SIAM J. Comput, **33**(3): 544-562, 2004.
7. K. Munagala, R. Tibshirani, and P. O. Brown. *Cancer characterization and feature set extraction via discriminative margin clustering*. BMC Bioinformatics, **5**(21), March 2004.
8. S. Guha, A. Meyerson and K. Munagala. *A constant factor approximation algorithm for the fault-tolerant facility location problem*. Journal of Algorithms, **48**(2), 2003.
9. A. Goel, and K. Munagala. *Extending greedy multicast routing to delay sensitive applications*. Algorithmica, **33**(3), 2002.

**Publications accepted to highly refereed conferences:**

10. S. Bhattacharya, V. Conitzer, K. Munagala, and L. Xia. *Incentive compatible budget elicitation in multi-unit auctions*. Proc. 21<sup>st</sup> ACM-SIAM Symposium on Discrete Algorithms (SODA), 2010.
11. J. Letchford, V. Conitzer, and K. Munagala. *Learning and Approximating the Optimal Strategy to Commit To*. Proc. 2<sup>nd</sup> Symposium on Algorithmic Game Theory (SAGT), 2009.
12. S. Guha and K. Munagala. *Multi-armed bandits with metric switching costs*. Proc. 36<sup>th</sup> Intl. Colloq. on Automata, Languages and Programming (ICALP), 2009.
13. S. Guha and K. Munagala. *Exceeding expectations and clustering uncertain data*. Proc. 28<sup>th</sup> ACM Symposium on Principles of Database Systems (PODS), 2009.
14. A. Goel and K. Munagala, *Hybrid keyword-search auctions*. Proc. 18<sup>th</sup> Intl. World Wide Web Conf. (WWW), 2009. Full version at Computing Research Repository, arXiv:0807.2496.
15. S. Guha, K. Munagala, and P. Shi. *Approximation algorithms for restless bandit problems*. Proc. 20<sup>th</sup> ACM-SIAM Symposium on Discrete Algorithms (SODA), 2009. Full version available via the Computing Research Repository, arXiv:0711.3861.
16. S. Babu, S. Duan, and K. Munagala. *Fa: A system for automating failure diagnosis*. Proc. 25<sup>th</sup> Intl. Conf. on Data Engineering (ICDE), 2009.
17. K. Munagala and P. Shi. *The stochastic machine replenishment problem*. Proc. 13<sup>th</sup> Intl. Conf. on Integer Programming and Combinatorial Optimization (IPCO), 2008.
18. M. Ahmad, A. Abounaga, S. Babu, and K. Munagala. *Modeling and exploiting query interactions in database systems*. Proc. 17<sup>th</sup> ACM Conf. on Information and Knowledge Mgmt. (CIKM), 2008.
19. S. Guha and K. Munagala. *Approximation algorithms for partial-information based stochastic control with Markovian rewards*. Proc. 48<sup>th</sup> IEEE Symp. on Foundations of Computer Science (FOCS), 2007.
20. S. Guha and K. Munagala. *Approximation algorithms for budgeted learning problems*. Proc. 39<sup>th</sup> ACM Symposium on Theory of Computing (STOC), pages 104 – 113, 2007. Full version available via the Computing Research Repository, arXiv:0805.2630.
21. S. Guha and K. Munagala. *Model-driven optimization using adaptive probes*. Proc. 18<sup>th</sup> ACM-SIAM Symposium on Discrete Algorithms (SODA), 2007.
22. A. Silberstein, G. Puggioni, A. Gelfand, K. Munagala, and J. Yang. *Suppression and failures in a*

- sensor network: A Bayesian approach. Proc. 33<sup>rd</sup> Intl. Conf. Very Large Databases (VLDB), 2007.
23. K. Munagala, U. Srivastava, and J. Widom. *Optimization of continuous queries with shared expensive filters*. Proc. 26<sup>th</sup> ACM Symposium on Principles of Database Systems (PODS), pages 215 – 224, 2007.
  24. A. Silberstein, A., G. Filpus, K. Munagala, and J. Yang. *Data-driven processing in sensor networks*. Proc. 3<sup>rd</sup> Biennial Conf. on Innovative Data Systems Research (CIDR), p 10 – 21, 2007.
  25. U. Srivastava, K. Munagala, J. Widom, and R. Motwani. *Query optimization over web services*. Proc. 32<sup>nd</sup> Intl. Conf. Very Large Databases (VLDB), pages 355 – 366, 2006.
  26. A. Goel, S. Guha, and K. Munagala. *Asking the right questions: Model-driven optimization using probes*. Proc. 25<sup>th</sup> ACM Conf. on Principles of Database Systems (PODS), pages 203 – 212, 2006
  27. A. Silberstein, K. Munagala, and J. Yang. *Energy efficient monitoring of extreme values in sensor networks*. Proc. ACM SIGMOD Conference on Management of Data, pages 169 – 180, 2006.
  28. S. Guha, K. Munagala, and S. Sarkar. *Optimizing transmission rate in wireless channels using adaptive probes. (Short paper)* ACM SIGMETRICS/Performance Conference, p 381-82, 2006.
  29. A. Silberstein, R. Braynard, C. Ellis, K. Munagala, and J. Yang. *A sampling based approach to optimizing top-k queries in sensor networks*. Proc. 22<sup>nd</sup> Intl. Conf. on Database Engineering (ICDE). 2006.
  30. K. Munagala, J. Yang, and H. Yu. *Online view maintenance under a response-time constraint*. Proc. 13<sup>th</sup> European Symposium on Algorithms (ESA), pages 677 – 688, 2005.
  31. U. Srivastava, K. Munagala, and J. Widom. *Operator placement for in-network stream query processing*. Proc. 24<sup>th</sup> ACM Symp. on Principles of Database Systems (PODS), p 250-58, 2005.
  32. K. Munagala, S. Babu, R. Motwani and J. Widom. *The pipelined set cover problem*. Proc. 10<sup>th</sup> Intl. Conf. on Database Theory (ICDT), pages 83 – 98, 2005.
  33. S. Babu, K. Munagala, R. Motwani and J. Widom. *Adaptive caching for continuous queries*. Proc. 21<sup>st</sup> Intl. Conf. on Database Engineering (ICDE), pages 118 – 129, 2005.
  34. S. Babu, R. Motwani, K. Munagala, I. Nishizawa, and J. Widom. *Adaptive ordering of pipelined stream filters*. Proc. ACM SIGMOD Conference on Management of Data, pages 407 – 418, 2004.
  35. S. Guha, S. Krishnan, K. Munagala, and S. Venkatasubramanian: *Application of the two-sided depth test to CSG rendering*. Proc. ACM SIGGRAPH Symp. on Interactive 3D Graphics (SI3D), pages 177 – 180, 2003.
  36. S. Guha and K. Munagala. *Generalized clustering problems*. Proc. 13<sup>th</sup> Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 484 – 485, 2002.
  37. S. Guha and K. Munagala. *Improved algorithms for the data placement problem*. Proc. 13<sup>th</sup> Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 106 – 107, 2002.
  38. A. Meyerson, K. Munagala, and S. Plotkin. *Designing networks incrementally*. Proc. 42<sup>nd</sup> IEEE Symposium on Foundations of Computer Science (FOCS), pages 406 – 415, 2001.
  39. S. Guha, A. Meyerson, and K. Munagala. *Constant-factor approximation for the single-sink edge installation problem*. Proc. 33<sup>rd</sup> ACM Symp. on Theory of Computing (STOC), p 383–88, 2001.
  40. V. Arya, N. Garg, R. Khandekar, A. Meyerson, K. Munagala, and V. Pandit. *Local search heuristics for k-median and facility location problems*. Proc. 33<sup>rd</sup> ACM Symposium on Theory of Computing (STOC), pages 21 – 29, 2001.
  41. A. Meyerson, K. Munagala, and S. Plotkin. *Web Caching using Access Statistics*. Proc. 12<sup>th</sup> Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 354 – 363, 2001.
  42. S. Guha, A. Meyerson and K. Munagala. *Improved algorithms for the fault-tolerant facility location problem*. Proc. 12<sup>th</sup> Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 636 - 641, 2001.
  43. S. Guha, A. Meyerson, and K. Munagala. *Hierarchical placement and network design problems*. Proc. 41<sup>st</sup> IEEE Symp. on Foundations of Computer Science (FOCS), pages 603 – 612, 2000.
  44. A. Meyerson, K. Munagala, and S. Plotkin. *Cost-Distance: Two metric network design*. Proc. 41<sup>st</sup> IEEE Symposium on Foundations of Computer Science (FOCS), pages 624 – 630, 2000.
  45. M. Andrews and K. Munagala. *Online algorithms for caching multimedia streams*. Proc. 8<sup>th</sup> European Symposium on Algorithms (ESA), pages 64 – 75, 2000.
  46. A. Goel and K. Munagala. *Balancing Steiner trees and shortest path trees online*. Proc. 11<sup>th</sup> Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 562 – 563, 2000.
  47. K. Munagala and A. G. Ranade. *I/O Complexity of graph algorithms*. Proc. 10<sup>th</sup> ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 687 – 694, 1999.

**Publications in workshops and un-refereed conferences:**

48. P. G. Flikkema, P.K. Agarwal, J. S. Clark, C. S. Ellis, A. Gelfand, K. Munagala, and J. Yang. *From Data Reverence to Data Relevance: Model-Mediated Wireless Sensing of the Physical Environment*. Proc. Intl. Conf. on Computational Science (1), pp 988-994, 2007.
49. P. G. Flikkema, P.K. Agarwal, J. S. Clark, C. S. Ellis, A. Gelfand, K. Munagala, and J. Yang. *Model-driven dynamic control of embedded wireless sensor networks*. Proc. Intl. Conf. on Computer Science (3), pages 409 – 416, 2006.
50. S. Guha, K. Munagala, and S. Sarkar. *Jointly optimal transmission and probing strategies for multichannel wireless systems*. Proc. 40<sup>th</sup> Conf. on Information Sciences and Systems, 2006.

**Book chapters:**

51. K. Munagala. *Local search heuristics for k-median and facility location problems*. In Encyclopedia of Algorithms, M-Y. Kao (ed.), Springer-Verlag, 2008 (to appear).
52. J. Yang, K. Munagala, and A. Silberstein. *Data aggregation in sensor networks*. In Encyclopedia of Database Systems, L. Liu and T. Ozsu (ed.), Springer-Verlag, 2008 (to appear).

**INVITED TALKS:**

1. Theory Seminar, Northwestern University. October 2009.
2. Theory Seminar, CS Department, University of Wisconsin Madison. September 2009.
3. Invited Speaker, International Symposium on Math Programming (ISMP), Chicago 2009.
4. **Tutorial** "Large-scale uncertainty management systems: Learning and exploiting your data" presented at SIGMOD-PODS Conference, 2009.
5. Invited Speaker, Market Algorithms and Optimization Day, Google NY. January 2009.
6. Theory Seminar, University of Maryland, College Park. November 2008.
7. Computer Science Colloquium, University of Utah. October 2008.
8. ARC Colloquium, College of Computing, Georgia Tech. September 2008.
9. Algorithms Seminar, Computer Science Department, Stanford. March 2008.
10. Theory Seminar, School of Computer Science, CMU. February 2008.
11. LIDS Colloquium, EECS Department, MIT. February 2008.
12. Decision Sciences Seminar, Fuqua School of Business, Duke University. September 2007.
13. Algorithms Seminar, Computer Science Department, Princeton University. August 2007.
14. Operations Research Seminar, MS&E Department, Stanford University. June 2007.
15. Hewlett Packard Research Labs, Palo Alto, CA, April 2004.
16. Computer Science and Engineering Department, IIT Bombay, November 2003.
17. IBM T.J. Watson Research Center, Yorktown Heights, NY. August 2001.