Vahab S. Mirrokni

PERSONAL INFORMATION

Google Inc.
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RESEARCH INTERESTS

Algorithmic and Economic Aspects of the Internet
Algorithmic Game Theory and Computational Economics
Approximation Algorithms and Combinatorial Optimization
Social Network Analysis
Network Optimization: Mobile Computing and Network Management
Graph Theory and Combinatorics

APPOINTMENTS

Senior Research Scientist, Market Algorithms and Economics, Google Research, July08-Present.
Postdoctoral Researcher, Theory Group, Microsoft Research, July 2006-July 2008.
Postdoctoral Associate, Theory of Computation Group, MIT, November 2005-February 2006.
Research Scientist, Strategic Planning and Optimization Group, Amazon.com, June 2005-July 2006.
Research Assistant, Theory of Computation Group, MIT, 2001-2005.
Research Visitor, IBM T. J. Watson Research Center, August-September 2004.
Research Visitor, Microsoft Research, July-August 2004, January 2005.
Research Consultant/Intern, Bell Laboratories, June-August 2003, June 2004.

EDUCATION

Massachusetts Institute of Technology, Cambridge, Massachusetts, USA.

Ph.D. in Applied Mathematics (Theoretical Computer Science), (2001-2005)
Thesis Title: "Approximation Algorithms for Selfish and Distributed Agents"
Area of study: Algorithms. Adviser: Prof. Michel Goemans.

Sharif University of Technology, Tehran, Iran.

B.Sc. in Computer Engineering (1997–2001)
Thesis title: "Design and Implementation of Image Processing and Playing Algorithms of Middle-size Soccer Robot" Adviser: Prof. Mansur Jamzad

HONORS AND AWARDS

- ◇ Best Paper Award, ACM Conference on Ellectroic Commerce (**ACM EC**) 2008.
- ◇ Best Student Paper Award, ACM-SIAM Symposium on Discrete Algorithms (**SODA**) 2005.
- ◇ Presidential Fellowship, MIT (Sept. 2001-Sept. 2002).
- ◇ Best Engineering Challenge Paper Award, RoboCup 2001 (Seattle).
- ◇ 3rd place of the RoboCup2000 Middle Size Championship (Melbourne).
- ◇ Champion of the EuroCup2000 Middle Size Championship (Amsterdam).
- ◇ First place in the ACM Asia regional contest among 80 teams (Tehran, 1999).
- ◇ Gold Medal in the 6th Iranian Informatics Olympiad (1996).

WORKING PAPERS

- ❑ J. Lee, V. S. Mirrokni, V. Nagarajan, M. Sviridenko. *Maximizing a non-monotone Submodular Function under Multiple Matroid and Knapsack Constraints*.
- ❑ E. Even-dar, Y. Mansour, V. S. Mirrokni, S. Muthurishnan, U. Nadav, *Optimal Bidding for a Broad-Match Auction*.

- U. Feige, N. Immorlica, V.S.Mirrokni and H. Nazerzadeh, *Structural Approximations: A new approach for analyzing Heuristics*.
- V. S. Mirrokni, S. Roch, M. Sundararajan, *Revenue Maximization for Fixed-Priced Marketing over Social Networks*.
- V.S. Mirrokni, A. Skopalik, *On the Complexity of Nash Dynamics and Sink Equilibria*.
- R. Andersen, V. S. Mirrokni, *Overlapping Clustering for Distributed Computation*.

PAPERS IN CONFERENCE PROCEEDINGS

- M. Goemans, N. Harvey, S. Iwata, V. S. Mirrokni, *Approximating submodular functions everywhere*. ACM-SIAM Symposium on Discrete Algorithms (**SODA**) 2009.
- C. Borgs, J. Chayes, N. Immorlica, A. Kalai, V. S. Mirrokni and C. Papadimitriou, *The Myth of the Folk Theorem*, Symposium of Theory of Computing (**STOC**), 2008.
- R. Khandekar, G. Kortsarz, V. S. Mirrokni, M. Salavatipour, *Robust Network Design with Exponential Scenarios*, Euorepean Simposium of Algorithms (**ESA**), 2008.
- H. Ackermann, P. Goldberg, V. S. Mirrokni, H. Roeglin, and B. Voecking, *Uncoordinated Two-sided Markets*, ACM Conference on Electronic Commerce (**ACM EC**), 2008. *Co-winner of the best paper award in ACM EC'08*
- B. Awerbuch, Y. Azar, and A. Epstein, V. S. Mirrokni, A. Skopalik, *Fast Convergence to Nearly Optimal Solutions in Potential Games*, ACM Conference on Electronic Commerce (**ACM EC**), 2008.
- V. S. Mirrokni, M. Schapira, J. Vondrak, *Tight Information-Theoretic Lower Bounds for Maximizing Social-Welfare in Combinatorial Auctions*, ACM Conference on Electronic Commerce (**ACM EC**), 2008.
- M. Ghodsi, M. Mahini, V. S. Mirrokni, and M. ZadiMoghaddam *Singleton Betting for Permutation Betting Markets*, ACM Conference on Electronic Commerce (**ACM EC**), 2008.
- J. Hartline, V. S. Mirrokni, and M. Sundararajan, *Marketing Strategies over Social Networks*, 17th international World Wide Web Conference(**WWW**), 2008.
- U. Feige, N. Immorlica, V.S. Mirrokni and H. Nazerzadeh, *Combinatorial Allocation Mechanisms with Penalties for Banner Advertisement*, 17th international World Wide Web Conference(**WWW**), 2008.
- R. Andersen, C. Borgs, J. Chayes, U. Feige, A. Flaxman, A. Kalai, V. S. Mirrokni, M. Tennenholtz, *Trust-based Recommendation Systems: An axiomatic Approach*, 17th international World Wide Web Conference (**WWW**), 2008.
- Y. Azar, K. Jain, V. S. Mirrokni, *Optimal Coordination Mechanisms for Unrelated Machine Scheduling*, ACM-SIAM Symposium on Discrete Algorithms (**SODA**) 2008.
- U. Feige, V. S. Mirrokni, J. Vondrak, *Maximizing Non-monotone Submodular Functions*, Foundations of Computer Science (**FOCS**) 2007.
- G. Kortsarz, V. S. Mirrokni, Z. Nutov, and E. Tsanko. *Improved Approximation Algorithms for Minimum Power Connectivity Problems.* 8th Latin American Theoretical Informatics **LATIN**, 2008.
- R. Andersen, C. Borgs, J. Chayes, K. Jain, J. Hopcroft, V. S. Mirrokni and S. Teng, *Robust PageRank and Locally Computable Link Spam Features*, WWW workshop on Adverserial Information Retreival on the Web, (**AirWeb**), 2008
- H. Ackermann, P. Goldberg, V. S. Mirrokni, H. Roeglin, and B. Voecking *A Unified Approach to Congestion Games and Two-sided Markets.* Workshop of Internet Economics **WINE**, 2007.
- R. Andersen, C. Borgs, J. Chayes, J. Hopcroft, V. S. Mirrokni and S. Teng, *Local Computation of PageRank Contributions*, Workshop On Algorithms And Models For The Web-Graph **WAW**, 2007.
- U. Feige, K. Jain, M. Mahdian, V. S. Mirrokni, *Robust Combinatorial Optimization*, Integer Programming and Combinatorial Optimization (**IPCO**) 2007.
- L. Fleischer, M. Goemans, V. S. Mirrokni, and M. Sviridenko, *Tight Approximation Algorithms for Maximum General Assignment Problems*, ACM-SIAM Symposium on Discrete Algorithms (**SODA**) 2006.
- D. Abraham, N. Chen, V. Kumar, and V. S. Mirrokni, *Assignment Problems in Rental Markets*, Workshop of Internet Economics, (**WINE**) 2006.

- ❑ M. Goemans, V. S. Mirrokni, and A. Vetta, *Sink Equilibria and Convergence*, IEEE Symposium on Foundations of Computer Science(**FOCS**) 2005.
- ❑ C. Christodoulou, V. S. Mirrokni, and A. Sidiropolous *Convergence and Approximation in Potential Games*, Symposium on Theoretical Aspects in Computer Science (**STACS**) 2006.
- ❑ M. Hajiaghayi, L. Li, V. S. Mirrokni, and M. Thottan, *Bandwidth Sharing VPN Network Design for Multi-class Traffic*, Annual Conference on Computer Communications (**INFOCOM**) 2006.
- ❑ N. Immorlica, L. Li, V. S. Mirrokni and A. Schulz, *Coordination Mechanisms for Selfish Scheduling*, Workshop on Internet and Network Economics (**WINE**) 2005, Invited for publication in **Theoretical Computer Science Journal**.
- ❑ V. S. Mirrokni and A. Vetta, *Convergence Issues in Competitive Games*, International Workshop on. Approximation Algorithms for Combinatorial Optimization Problems (**APPROX**) 2004.
- ❑ M. Halldorson, J. Halpern, L. Li, and V. S. Mirrokni, *On Spectrum Sharing Games*, ACM Symposium on Principles of Distributed Computing (**PODC**) 2004.
- ❑ N. Immorlica, M. Mahdian, and V. S. Mirrokni *Cycle Cover with Short Cycles*, Symposium on Theoretical Aspects in Computer Science (**STACS**) 2005.
- ❑ N. Immorlica, D. Karger, M. Minkoff, and V. S. Mirrokni, *On the Costs and Benefits of Procrastination: Approximation Algorithms for Stochastic Combinatorial Optimization Problems*, ACM-SIAM Symposium on Discrete Algorithms (**SODA**) 2004.
- ❑ M. Datar, N. Immorlica, P. Indyk, and V.S.Mirrokni, *Locality-Sensitive Hashing Scheme Based on p-Stable Distributions*, ACM Symposium on Computational Geometry(**SoCG**) 2004.
- ❑ V. S.Mirrokni, M. Thottan, H. Uzunaliglu, and S. Paul, *A Simple Polynomial Time Framework To Reduced Path Decomposition in Multi-Path Routing*, Annual Conference on Computer Communications (**INFOCOM**) 2004.
- ❑ L. Li, M. Thottan, B. Yao, V.S. Mirrokni, and S. Paul, *Scalable Network Monitoring for Evolving IP Networks*, International Conference on Distributed Computing Systems (**ICDCS**) 2004 (Journal version submitted).

JOURNAL PUBLICATIONS

- N. Immorlica, M. Mahdian, and V. S. Mirrokni, *On the Limitations of the Cross-monotone Cost Sharings*, ACM-SIAM Symposium on Discrete Algorithms (**SODA**) 2005 (*Winner of the best student paper award in SODA'05*), ACM Transactions of Algorithms **ACM TALG**.
- M. Hajiaghayi, N. Immorlica, and V. S. Mirrokni, *Power Optimization in Fault Tolerant Topology Control Algorithms for Wireless Multi-hop Networks*, Conference on Mobile Computing and Networking (**MOBICOM**) 2003, To appear in IEEE Transactions of Networking **IEEE ToN**.
- L. Li, M. Mahdian, and V. S. Mirrokni, *Secure Overlay Network Design: A combinatorial approach*, Algorithmic Aspects in Information and Management, (**AAIM**) 2006, To appear in **Algorithmica**.
- J. Feigenbaum, D. Karger, V. S. Mirrokni and R. Sami, *Subjective Cost Policy Routing*, Workshop on Internet and Network Economics (**WINE**) 2005, Invited and Accepted for publication in **Theoretical Computer Science Journal**.
- R. Bhatia, N. Immorlica, T. Kimbrel, V. S. Mirrokni, S. Naor, and B. Schieber *Confluent Flow Augmentation for Data Traffic Engineering*, ACM Symposium on Parallel Algorithms and Architectures (**SPAA**) 2005, Invited and Accepted for publication in **Theoretical Computer Science Journal**.
- M. Hajiaghayi, G. Kortsarz, V. S. Mirrokni, and Z. Nutov, *Power Optimization for Connectivity Problems*, Invited and Accepted to **Mathematical Programming, Ser. B** 2007, The conference version appeared in Integer Programming and Combinatorial Optimization ((**IPCO**)) 2005.
- V. Bahl, M. Hajiaghayi, K. Jain, V. S. Mirrokni, L. Qiu, A. Saberi, *Efficient Cell-Breathing in Wireless LAN*, Accepted to **IEEE Transactions on Mobile Computing**, to appear. The conference version was accepted and withdrawn from ACM Electronic Commerce (**EC**) 2006.
- M. Goemans, L. Li, V. S. Mirrokni, and M. Thottan, *Market Sharing games applied to Con-*

tent Distribution in Ad-Hoc Networks, To appear in **IEEE Journal on Selected Areas in Communications**. The conference version of this paper appeared in ACM International Symposium on Mobile Ad Hoc Networking and Computing (MOBIHOC, 2004).

- S. Akbari, V. S. Mirrokni, B. S. Sadjad, *Some Relations between Choosability and Uniquely List Colorability*, Technical Report IPM-2001-337, To appear in **Journal of Combinatorial Theory, Ser. B**.
- M. Bahramgiri, M. Hajiaghayi, and V. S. Mirrokni, *Fault-tolerant and 3-Dimensional Distributed Topology Control Algorithms in Wireless Multi-hop Networks*, **ACM/Kluwer Wireless Networks**, To appear.
- M. Hajiaghayi, M. Mahdian, and V. S. Mirrokni, *The Facility location problem with general cost functions*, **Networks**, 42(1), pp. 42–47, August 2003.
- Sharif CE RoboCup members, *RoboCup-2001 -The Fifth Robotic Soccer World Championships*, **AI magazine**, Vol. 23, No. 1, pp. 55-68, 2002.
- M. Ghodsi, M. T. Hajiaghayi, M. Mahdian, V. S. Mirrokni, *Path Matching Problems with length constraints*, **Networks**, Vol 39/4(2002). pp 210-215.
- S. Akbari, V. S. Mirrokni, and B. S. Sadjad, *Uniquely Vertex Colorable Graphs with Minimum Possible Edges*, **Journal of Combinatorial Theory Ser. B**, 82 (2001) no.2, 316–318.
- M. Hajiaghaee, E. Mahmoodian, V. S. Mirrokni, A. Saberi, and R. Tusserkani, *On Simultaneous Edge Coloring of Graphs*, **Discrete Mathematics**, 216(2000), pp267-272.

CONFERENCES IN ROBOTICS AND IMAGE PROCESSING

- ◇ A. Hadjkhodaabakhshi, M. Jamzad, and V. S. Mirrokni, *An omnidirectional vision system for localization and object detection in middle size RoboCup*, IASTED International Conference: Modeling and Simulation, Cambridge, USA, Sept. 2002 (journal version submitted).
- ◇ Sharif CE RoboCup members, *A Fast Vision System for Middle Size Robots in RoboCup*, Lecture Notes in Computer Science 2377: RoboCup2001, Robot Soccer World Cup V (Winner of the best engineering challenge paper in RoboCup'01).
- ◇ Sharif CE RoboCup members, *Basic Requirements for a Teamwork in Middle Size RoboCup*, Lecture Notes in Computer Science 2377: RoboCup2001, Robot Soccer World Cup V.
- ◇ SharifCE RoboCup members, *A Goal Keeper for Middle-Size RoboCup*, Lecture Notes in Computer Science 2019: RoboCup2000, Robot Soccer World Cup IV.

BOOK

- A book chapter *Content Distribution and Two-sided Markets*, in Encyclopedia of Algorithms.
- A book chapter *"Nearest Neighbor Methods in Learning and Vision"*, (with A. Andoni, M. Datar, N. Immorlica, and P. Indyk).
- A book titled *"Informatics Olympiad Problems"*, (with M. Hajiaghayi, Y. Ahmadi), YSC Pub. Co., Tehran, Iran, June 2001 (in Persian).

PROFESSIONAL EXPERIENCES

Postdoctoral Researcher, Theory Group, Microsoft Research, July 2006-Present. Results include "Optimal Coordination Mechanisms for Selfish Scheduling" (SODA 2008), "Maximizing non-monotone Submodular Functions" (FOCS 2007), "Local Computation of PageRank Contributions and Link Spam Detection" (WAW 2007), "Marketing Strategies over Social Networks" (WWW 2008), "Combinatorial Algorithms for Banner Advertisement" (WWW 2008) "Functional Approximation: A new approach for Approximation Algorithms" (Submitted), "Uncoordinated Two-sided Markets" (ACM EC 2008) , "Fast Convergence to Nearly Optimal Solutions in Potential Games" (ACM EC 2008), "An Axiomatic Approach to Trust-based Recommendation Systems" (WWW 2008), and "The Myth of the Folk Theorem" (STOC 2008), "Permutation Betting Markets" (ACM EC 2008), "Information-Theoretic Lower bound for Combinatorial Acutions" (ACM EC 2008).

Postdoctoral Associate, MIT, November 2005- February 2006. Working under Supervision of

Prof. Michel Goemans. Results include "Learning Submodular Functions" (joint with Goemans, Harvey, and Kleinberg), "Convergence and Approximation in Potential Games" (joint with G. Chrisdoulou and A. Sidiropoulous, STACS 2006).

Research Scientist, Strategic Planning and Optimization Group, Amazon.com, June 2005-June 2006. Results include "Assignment Problems in Rental Markets" (joint with David Abraham, Ning Chen, and Vijay Kumar) and "Truckload Packing" (joint with Ning Chen and Vijay Kumar).

Research Visitor, IBM Watson Research Lab, September 2004.
Worked with L. Fleischer, B. Schieber, and M. Sviridenko. Work resulted in papers on assignment problems and distributed caching (joint with Fleischer, Goemans, Sviridenko).

Research Visitor, Microsoft Research Redmond, July-August 2004.
Worked with K. Jain, M. Mahdian, and A. Saberi in the theory of computation group and L. Qiu and V. Bahl in the networking group. Work resulted on a paper on efficient cell-breathing via LP-duality (with V. Bahl, M. Hajiaghayi, K. Jain, L.Qiu, and A. Saberi), and a paper on robust combinatorial optimization with exponential number of scenarios (with U. Feige, K. Jain, and M. Mahdian).

Research Consultant, Bell Laboratories, Lucent Technologies, June, 2004.
Worked with L. Li and M. Thottan on geometric market sharing games (joint with Goemans, Li, Thottan) and QoS bandwidth sharing (joint with Hajiaghayi, Li, Thottan).

Research Intern, Bell Laboratories, Lucent Technologies, Summer 2003.
Worked under mentorship of M. Thottan and S. Paul in networking center and visited fundamental math. department under B. Shepherd. Worked on problems related to multicommodity reduced-path decomposition (joint with S. Paul and M. Thottan, appeared in INFOCOM'04), market sharing games applied to content distribution in Ad-hoc networks (joint with M. Goemans, L. Li, and M. Thottan, appeared in MOBIHOC'04), spectrum sharing games (joint with L. Li, J. Halpern, M. Halldorson, appeared in PODC'04), overlay secure network design (joint with L. Li and M. Mahdian, submitted), convergence issues in competitive games (joint with A. Vetta, appeared in RANDOM-APPROX 2004), and confluent flow augmentation on trees (joint with Bhatia, Immorlica, Kimbrel, Naor, and Schieber, submitted).

Research Assistant, MIT, 2002 - 2005.
Under research assistantship from Prof. Goemans and Prof. Karger. Researched in the areas of algorithmic game theory and approximation algorithms.

Research Assistant and Software Engineer, Middle-size RoboCup, Sharif University of Technology, Sep. 1999 – Sep. 2001.
Responsibilities included designing and implementing several algorithms for real-time and omnidirectional image processing and team-work of middle-size mobile soccer robot and managing the software group. The software consists of interface with hardware, real-time and omnidirectional image processing algorithms, localization algorithms, individual skills, and teamwork. Developed around 15000 lines of code in c++. See publications and awards for the results.

Research Assistant, Sharif University of Technology, Summers of 2000 and 2001. Researched in graph theory and combinatorics under supervision of Prof. Mahmoodian and Prof. Akbari.

TEACHING EXPERIENCES

Instructor, University of Washington, Spring 2007. Co-taught a graduate course on "Algo-

rithmic and Economics aspects of Networking Systems" (with A. Flaxman). Topics covered in this course include: models of network formation and network formation games, convergence and approximation in games, coordination mechanisms, combinatorial and spectral clustering, axiomatic approach for ranking, local partitioning and PageRank, market equilbria and load balancing in wireless networks, rank aggregation, and two-sided markets.
Webpage: http://www.cs.washington.edu/education/courses/cse599m/07sp/

Teaching Assistant, MIT, Fall 2002, Spring-Fall 2003.
Teaching assistant for courses: 1) Principles of Applied Mathematics, 2) Numerical Analysis, and 3) Mathematics for Engineers.

Mentor, Research Science Institute (RSI), MIT, Summer 2002.
Mentored two high school students, both of whom (J. Bass and A. Chao) where semifinalists in the Intel Science Talent Research competition.

Instructor, Iranian Computing Olympiad camps. 1997-2000.
Taught two semester-long courses: 1) Introduction to Graph Theory, and 2) Computational Geometry.

Teaching Assistant, Sharif University, Fall-Spring 1998, Fall 1999.
Teaching assistant for courses: 1) Data Structure and Algorithms, and 2) Foundations of Computer Science.

COMMUNITY INVOLVEMENT

- **Program Committee Member**:
  International Symposium on Theoretical Aspects of Computer Science **STACS** 2008,
  Workshop of Approximation Algorithms for Combinatorial Optimization **APPROX** 2008,
  International Workshop on Computational Social Choice **COMSOC** 2008.
- **Organize/Chair a Session**:
  INFORMS annual meeting in Seattle 2007,
  INFORMS annual meeting in Washington DC 2008.
- **Served as a referee** for several conferences and journals including Journal of the ACM (JACM), SIAM Journal of Computing, Algorithmica, ACM Transactions of Algorithms, Mathematics of Operations Research (MOR), IEEE Journal on Selected Areas in Communications, Foundations of Computer Science(FOCS), IEEE Transaction of Parallel and Distributed Systems, Discrete Applied Mathematics, Journal of Scheduling, ACM Symposium of Theory of Computing (STOC), ACM-SIAM Symposium on Discrete Algorithms (SODA), ACM conference on Electronic Commerce(EC), International Coluquium on Automata, Languages and Programming (ICALP), ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM), and AAAI, ESA, AAIM, LATIN, ACM PODC.
- **Member of the Scientific Committee of Iranian National Computer Olympiad**, 1997-2001. Responsibilities included designing problems and organizing national competitions, teaching and organizing training camps.
- **Editor-in-chief**, Olympiad Quarterly (1998-2000) and Computer Journal of Department of Computer Engineering of Sharif University of Technology (2000-2001).

PATENTS

- J. Hartline, V. Mirrokni and M. Sundararajan. Optimal Marketing Strategies over Social Networks. Patent filed, 2007.
- R. Andersen, C. Borgs, J. Chayes, K. Jain, and V. Mirrokni, Monetizing a Social Network Platform, U.S. Patent filed, 2007.
- R. Andersen, C. Borgs, J. Chayes, U. Feige, A. Flaxman, V. S. Mirrokni, A. Kalai, M. Tennenholtz, Trust-based Recommendation Systems, U.S. Patent filed, 2007.
- R. Andersen, C. Borgs, J. Chayes, K. Jain, J. Hopcroft, V. S. Mirrokni, S. Teng, Robust PageR-

ank and Locally computable SPAM detection features, U.S. Patent filed, 2007.

- R. Andersen, C. Borgs, J. Chayes, J. Hopcroft, V. S. Mirrokni, S. Teng, Local Computation of PageRank Contributions, U.S. Patent filed, 2007.
- C. Borgs, J. Chayes, C. Gade, J. Hopcroft, V. S. Mirrokni, A. Prakash, T. Tao, Score Propagation and Web SPAM Detection. U.S. Patent filed, 2007.
- C. Borgs, J. Chayes, C. Gade, J. Hopcroft, V. S. Mirrokni, A. Prakash, T. Tao, Local Partitioning and Web SPAM Detection, U.S. Patent filed, 2007.
- C. Borgs, J. Chayes, C. Gade, J. Hopcroft, V. S. Mirrokni, A. Prakash, T. Tao, Graph Structures and Web SPAM Detection, U.S. Patent filed, 2007.
- Y. Azar, K. Jain, and V. S. Mirrokni, Optimal policies for distributed and strategic load balancing, U.S. patent filed 2007.
- C. Borgs, J. Chayes, K. Jain, N. Immorlica, V. S. Mirrokni, A Unified Approach to Secure Transactions and Reputation Systems, U.S. patent filed, 2006.
- P. Bahl, M. Hajiaghayi, K. Jain, V. Mirrokni, L. Qiu, A. Saberi. Wireless LAN Cell-Breathing, U.S. Patent filed, 2006.
- R. Bhatia, N.Immorlica, T.Kimbrel, V. S. Mirrokni, S.Naor, and B.Schieber, Confluent Flow Augmentation for Data Traffic Engineering, U.S. Patent filed, 2006.

INVITED TALKS

- ◇ "Submodular Maximization with Applications"
  August 2008, IBM Yorktown Research Center,
  September 2008, New York University,
  October 2008, University of Maryland.
- ◇ "Optimal Marketing over Social Networks", October 2008, INFORMS annual meeting, Washington DC.
- ◇ "Robust Network Design with Exponential Scenarios", October 2008, INFORMS annual meeting, Washington DC.
- ◇ "Optimal Banner Ad Allocation with Guaranteed Delivery", October 2008, INFORMS annual meeting, Washington DC.
- ◇ "Submodular Maximization and Online Advertisement"
  January 2008, Duke University.
  March 2008, Harvard University, University of California at SantaBarbara, Yahoo Research, Google, University of Waterloo.
  April 2008, University of Massachusetts, University of British Columbia, CWI, Microsoft Research Asia.
- ◇ "Maximizing non-monotone submodular functions"
  November 2007, University of Washington.
  December 2007, Massachusetts Institute of Technology.
- ◇ "Market Equilibria and Distributed Load Balancing in Wireless Networks", November 2007, INFORMS annual meeting, Seattle.
- ◇ "Convergence and Approximation in Games"
  June 2007, University of Toronto and University of Waterloo.
  February 2007, University of Aachen, Germany and Cornell University.
- ◇ Assignment Problems: Approximation and Game Theoretic Questions, January 2007, Simon-Fraser University, Canada.
- ◇ "Two-Stage Robust Optimization with Exponential Number of Scenarios", October 2006, Workshop of Flexible Network Design, Bertinoro, Italy.
- ◇ "Price of Anarchy and Convergence in Selfish Routing Games", September 2006, International Symposium of Mathematical Programming, Rio, Brazil.
- ◇ "Convergence in Potential Games", August 2006, Workshop on Optimization and Algorithmic

Game Theory, Montreal, Canada.

- ◇ "Power Optimization for Connectivity Problems", November 2005, Network Optimization Session, INFORMS annual meeting, San Francisco.
- ◇ "Tight Approximation Algorithms for Assignment Problems"
  October 2005, Theory of Computation Seminar, University of Washington, Seattle.
  January 2005, CS Principles and Methodologies Group, IBM Alamaden Research Center
- ◇ "Sink Equilibria and Convergence", July 2005, Workshop in CS in Festival of Game Theory, Stony Brook University, NewYork.
  April 2005, DIMACS Workshop in Large-scale Games, NorthWestern University, Chicago.
  February 2005, Computer Science Seminar, Yale University, New Haven.
- ◇ "Convergence Issues in Competitive Games"
  February 2005, DIMACS Workshop in Bounded-Rationality, Rutgers University, Picasaway.
  October 2004, Network Optimization Session, INFORMS annual meeting, Denver.
  July 2004, Algorithms Seminar, Microsoft Research, Redmond.
- ◇ "Market Sharing Games applied to Content Distribution in Cellular Networks", June 2004, International Workshop on Theoretical and practical aspects of Wireless Networks, Illinois Institute of Technology, Chicago.

SKILLS Computer Languages: C++, C#, PERL, Java, AMPL/CPLEX, Matlab.