

CURRICULUM VITAE

Gopal Pandurangan

Work:

Department of Computer Science
Purdue University
West Lafayette, IN 47907
Phone: (765) 494-0916
Email: gopal@cs.purdue.edu

Home:

3374 Putnam St.
West Lafayette, IN 47906
Phone: (765) 463-3614

URL: <http://www.cs.purdue.edu/homes/gopal>

1 Education

- **Ph.D.** in Computer Science (minor in Applied Mathematics), **Brown University**, Providence, RI, May 2002.
Advisor: Professor Eli Upfal.
Ph.D. Dissertation: *Stochastic Analyses of Dynamic Computer Processes*.
- **Sc.M.** in Computer Science, **Brown University**, Providence, RI, May 1999.
Advisor: Professor Eli Upfal.
M.S. Thesis: *Static and Dynamic Evaluation of QoS Properties*.
- **M.S.** in Computer Science, **State University of New York (SUNY) at Albany**, Albany, NY, May 1997.
Masters Project: *Connected Components Algorithms for IBM SP2 and Networks of Workstations*.
- **B.Tech.** in Computer Science, **Indian Institute of Technology (IIT) at Madras**, Chennai, India, June 1994.
Senior Thesis Advisor: Professor C. Pandu Rangan.
Senior Thesis: *Disjoint Paths in Permutation and Chordal Graphs*.

2 Professional Appointments

2.1 Academic Appointments

- Assistant Professor, Department of Computer Science, Purdue University, West Lafayette, IN, 47907, August 2002 – present.
- Visiting Scientist at DIMACS Center, Rutgers University, June – August 2002.
- Teaching and Research Assistant at Brown University, RI, September 1997 – May 2002.
- Teaching Assistant at State University of New York (SUNY), Albany, NY, August 1995 – May 1997.
- Junior Research Fellow at Institute of Mathematical Sciences, Madras, India, June 1994 – April 1995.

2.2 Industrial, Business and Governmental Positions

- Research Consultant, Microsoft Research, Mountain View, CA, July 2007.
- Research Consultant, Los Alamos National Laboratory, Los Alamos, NM, May — July, 2005.
- Summer Intern, Verity Inc., Sunnyvale, CA, June–September 2001.

3 Awards, Honors

- Senior Member, Association for Computing Machinery (ACM), 2009. (This award recognizes those ACM members who have demonstrated performance that sets them apart from their peers and who have satisfied Professional Membership and professional experience requirements.)
- Best Student Paper Award for a paper co-authored with Ph.D. student Maleq Khan, *20th International Symposium on Distributed Computing (DISC)*, Stockholm, Sweden, 2006. Listed as one of the outstanding papers in the DISC conference archives. One of the four invited papers selected by the DISC program committee that appeared in the special issue dedicated to DISC 20th anniversary.
- Invited papers to the following journals: *Distributed Computing* (2007), *Journal of Combinatorial Optimization* (2007, Declined), *Journal of Computational Biology* (2005), and *Journal of Computer and System Sciences* (2002).
- Outstanding Graduate Student in Computer Science, awarded by Sigma Xi, The Scientific Research Society, 2001.
- Elected to Full membership of Sigma Xi, The Scientific Research Society, 2001.
- Brown University Fellowship, 1997-1998.
- Junior Research Fellowship, Institute of Mathematical Sciences, Madras, India, 1994 - 1995.
- National Talent Search Scholarship of the Government of India, 1986-1994. (Awarded annually to only a few hundred students throughout India.)
- All India First in Mathematics in Class XII public examination of the Central Board of Secondary Education, India, 1988.
- Certificate of Merit for “outstanding academic performance and being among the top 0.01% of successful candidates” at the Class XII public examination, awarded by the Central Board of Secondary Education, India, 1988.

4 Research Interests

My research interests are in design and analysis of algorithms (in particular, randomized algorithms and probabilistic analysis of algorithms), distributed computing, communication networks, and energy-efficient computing. I am especially interested in the theory, modeling, design and analysis of large-scale distributed and dynamic networks.

5 Publications

Electronic copies of my publications are available at <http://www.cs.purdue.edu/homes/gopal/papers-by-date.html>. My research statement includes a categorized listing of my publications, categorized by area.

Refereed Journal Papers

1. Yongwook Choi, Maleq Khan, V. S. Anil Kumar, and Gopal Pandurangan. Energy-Optimal Distributed Algorithms for Minimum Spanning Trees, **IEEE Journal on Selected Areas in Communications**, *Issue on Stochastic Geometry and Random Graphs in Wireless Networks*, 27(7), Sept. 2009.
2. Gopal Pandurangan and Wojciech Szpankowski. A Universal Online Caching Algorithm Based on Pattern Matching, **Algorithmica**, 2008 (12 pages). Published online first at journal website: <http://www.springerlink.com/content/f67286v228118484/fulltext.pdf>
3. Maleq Khan, Gopal Pandurangan, and V.S. Anil Kumar. Distributed Algorithms for Constructing Approximate Minimum Spanning Trees in Wireless Sensor Networks, **IEEE Transactions on Parallel and Distributed Systems**, 20(1), 2009, 124-139.
4. Fei Xiong, Gopal Pandurangan, and Chris Bailey-Kellogg. Contact Replacement for NMR Resonance Assignment, **Bioinformatics**, 24(13), 2008, i205-i213.
5. Alessandro Ferrante, Gopal Pandurangan, and Kihong Park. On the Hardness of Optimization in Power-Law Graphs, **Theoretical Computer Science**, 393, 2008, 220-230.
6. Maleq Khan and Gopal Pandurangan. A Fast Distributed Approximation Algorithm for Minimum Spanning Trees, **Distributed Computing**, 20, 2008, 391-402. One of the four **invited** papers selected by the DISC program committee that appeared in the special issue dedicated to DISC 20th anniversary. **Best student paper award** in *DISC 2006*.
7. Tomek Czajka and Gopal Pandurangan. Improved Random Graph Isomorphism, **Journal of Discrete Algorithms**, 6, 2008, 85-92.
8. Maleq Khan, Gopal Pandurangan, and V.S. Anil Kumar. A Simple Randomized Scheme for Constructing Low-Weight k -Connected Spanning Subgraphs with Applications to Distributed Algorithms, **Theoretical Computer Science**, 385(1-3), 2007, 101-114.
9. Gopal Pandurangan and Gahyun Park. Analysis of Randomized Protocols for Conflict-Free Distributed Access, **Algorithmica**, 49(2), 2007, 109-126.
10. Gopal Pandurangan and Eli Upfal. Entropy-based Bounds for Online Algorithms, **ACM Transactions on Algorithms**, 3(1), Feb., 2007. (19 pages)
11. Hetunandan Kamichetty, Chris Bailey-Kellogg, and Gopal Pandurangan. An Efficient Randomized Algorithm for Contact-Based NMR Backbone Resonance Assignment, **Bioinformatics**, 22(2), 2006, 172-180.
12. Jen-Yeu Chen, Gopal Pandurangan, and Dongyan Xu. Robust Computation of Aggregates in Wireless Sensor Networks: Distributed Randomized Algorithms and Analysis, **IEEE Transactions on Parallel and Distributed Systems**, 17(9), 2006, 987-1000.

13. Gopal Pandurangan, Prabhakar Raghavan, and Eli Upfal. Using PageRank to Characterize Web Structure, **Internet Mathematics**, 3(1), 2006, 1-20.
14. Chris Bailey-Kellogg, Sheetal Chainraj, and Gopal Pandurangan. A Random Graph Approach to NMR Sequential Assignment, **Journal of Computational Biology**, 12(6-7), 2005, 569-583. **Invited Paper**.
15. Gopal Pandurangan. On a Simple Randomized Algorithm for Finding a 2-Factor in Sparse Graphs, **Information Processing Letters**, 95(1), 2005, 321-327.
16. P. Chaitanya Das, G. Srinivasa Murthy, Gopal Pandurangan, and P.C. Deshmukh. The Real Effects of Pseudo-forces, **Resonance**, 9(6), 2004, 74-85.
17. Gopal Pandurangan, Prabhakar Raghavan, and Eli Upfal. Building Low-Diameter Peer-to-Peer Networks, **IEEE Journal on Selected Areas in Communications**, *Issue on Internet and WWW Measurement, Mapping, and Modeling*, 21(6), 2003, 995-1002.
18. Gopal Pandurangan and Hariharan Ramesh. The Restriction Mapping Problem Revisited, **Journal of Computer and System Sciences**, 65, 2002, 526-544. **Invited paper** for a special issue in computational biology.
19. Gopal Pandurangan and Eli Upfal. Static and Dynamic Evaluation of QoS Properties, **Journal of Interconnection Networks**, 1(2), 2000, 135-150.
20. Gopal Pandurangan and C. P. Rangan. Edge-Disjoint Paths in Permutation Graphs, **Discussiones Mathematicae – Graph Theory**, 15(1), 1995, 59-72.
21. Gopal Pandurangan, C. R. Satyan, and C.P. Rangan. Efficient Algorithms for Minimal Disjoint Path Problems on Chordal Graphs, **Discussiones Mathematicae – Graph Theory**, 15(2), 1995, 119-145.
22. Gopal Pandurangan and C.P. Rangan. A Linear Time Algorithm for the Two Paths Problem on Permutation Graphs, **Discussiones Mathematicae – Graph Theory**, 15(2), 1995, 147-166.

Refereed Journal Papers Under Submission

23. M. Khan, V.S. Anil Kumar, M. Marathe, G. Pandurangan, and S.S. Ravi. Topology Control in Unreliable Ad hoc Networks: Obtaining Near Optimal Power Efficiency and Low Interference, **IEEE Journal on Selected Areas in Communications**, 2009.
24. Jen-Yeu Chen, Gopal Pandurangan, and Jianghai Hu. Locality-Based Aggregate Computation in Wireless Sensor Networks, **IEEE Journal on Selected Areas in Communications**, 2009.
25. Maleq Khan, Fabian Kuhn, Dahlia Malkhi, Gopal Pandurangan, and Kunal Talwar. Efficient Distributed Approximation Algorithms via Probabilistic Tree Embeddings, **SIAM Journal on Computing**, 2009.
26. S. Muthukrishnan and Gopal Pandurangan. Engineering Sensor Networks via Thresholding Random Geometric Graphs, **Journal of Computer and System Sciences**, 2008.

Refereed Conference Papers

27. Atish Das Sharma, Danupon Nanongkai, Gopal Pandurangan, and Prasad Tetali. How Fast Can You Walk in a Distributed Network ?, submitted to *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2009.
28. Jen-Yeu Chen and Gopal Pandurangan. Almost-Optimal Gossip-Based Aggregate Computation, submitted to *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2009.
29. Atish Das Sharma, Danupon Nanongkai, and Gopal Pandurangan. Fast Distributed Random Walks, *Proceedings of the 28th ACM Symposium on Principles of Distributed Computing (PODC)*, 2009 (accepted for publication).
30. J. Chen, G. Pandurangan, and J. Hu. Locality-based Aggregate Computation in Wireless Sensor Networks, *Proceedings of the ACM Symposium on Principles of Distributed Computing (PODC)*, 2009, Brief Announcement, accepted for publication.
31. Maleq Khan, V.S. Anil Kumar, Madhav Marathe, Gopal Pandurangan, and S.S. Ravi. Bi-criteria Approximation Algorithms for Power-Efficient and Low-Interference Topology Control in Unreliable Ad hoc Networks, to appear in *Proceedings of the 28th IEEE Conference on Computer Communications (INFOCOM)*, 2009 (accepted for publication).
32. Maleq Khan, Fabian Kuhn, Dahlia Malkhi, Gopal Pandurangan, and Kunal Talwar. Efficient Distributed Approximation Algorithms via Probabilistic Tree Embeddings, *Proceedings of the 27th Annual ACM Symposium on Principles of Distributed Computing (PODC)*, 2008, 263-272.
33. Yongwook Choi, Maleq Khan, V. S. Anil Kumar, and Gopal Pandurangan. Energy-Optimal Distributed Algorithms for Minimum Spanning Trees, *Proceedings of the 20th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, 2008, 188-190.
34. Fei Xiong, Gopal Pandurangan, and Chris Bailey-Kellogg. Contact Replacement for NMR Resonance Assignment, *Proceedings of the 16th Annual International Conference on Intelligent Systems for Molecular Biology (ISMB)*, 2008, 205-213.
35. Alessandro Ferrante, Gopal Pandurangan, and Kihong Park. On the Hardness of Optimization in Power-Law Graphs, *Proceedings of the 13th Annual International Computing and Combinatorics Conference (COCOON)*, Banff, Canada, LNCS 4598, Springer-Verlag, 2007, 417-427.
36. Maleq Khan and Gopal Pandurangan. A Fast Distributed Approximation Algorithm for Minimum Spanning Trees, *Proceedings of the 20th International Symposium on Distributed Computing (DISC)*, LNCS 4167, Springer-Verlag, 2006, 355-369. **Best Student Paper Award.**
37. Suresh Jagannathan, Gopal Pandurangan, and Sriram Srinivasan. Query Protocols for Highly Resilient Peer-to-Peer Networks, *19th ISCA International Conference on Parallel and Distributed Computing Systems (PDCS)*, 2006, 247-252.
38. Petros Drineas, A. Javed, Malik-Magdon Ismail, Gopal Pandurangan, Reino Virrankoski, and Andreas Savvides. Distance Matrix Reconstruction from Incomplete Information for Sensor Network Localization, *Third Annual IEEE Conference on Sensor, Mesh, and Ad Hoc Communications and Networks (SECON)*, 2006, 536-544.

39. S. Muthukrishnan and Gopal Pandurangan. The Bin-Covering Technique for Thresholding Random Geometric Graph Properties, *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2005, 989-998.
40. Gopal Pandurangan and Gahyun Park. Analysis of a Randomized Contention-Resolution Protocol for Distributed Access, *Proceedings of the 24th Annual ACM Symposium on Principles of Distributed Computing (PODC)*, 2005, 274.
41. Jen-Yeu Chen, Gopal Pandurangan, and Dongyan Xu. Robust Computation of Aggregates in Wireless Sensor Networks: Distributed Randomized Algorithms and Analysis, *Proceedings of the Fourth International Conference on Information Processing in Sensor Networks (IPSN)*, 2005, 348-355.
42. Gopal Pandurangan and Wojciech Szpankowski. A Universal Online Caching Algorithm Based on Pattern Matching, *Proceedings of the IEEE International Symposium on Information Theory (ISIT)*, 2005, 1151-1155.
43. Mohamed Fouad, Sonia Fahmy, and Gopal Pandurangan. Latency-Sensitive Power Control for Wireless Ad Hoc Networks, *Proceedings of the 1st ACM International Workshop on QoS and Security for Wireless and Mobile Networks (Q2SWinet)*, 2005, 31-38.
44. Chris Bailey-Kellog, Sheetal Chainraj, and Gopal Pandurangan. A Random Graph Approach to NMR Sequential Assignment, *Proceedings of the 8th Annual International Conference on Research in Computational Molecular Biology (RECOMB)*, 2004, 58-67.
45. Gopal Pandurangan. Entropy-based Bounds for Online Algorithms, *38th Annual Conference on Information Sciences and Systems (CISS)*, Princeton University, 2004. (5 pages)
46. Gopal Pandurangan, Prabhakar Raghavan, and Eli Upfal. Using PageRank to Characterize Web Structure, *Proceedings of the 8th Annual International Conference on Combinatorics and Computing (COCOON)*, Singapore, Springer-Verlag, Lecture Notes in Computer Science (LNCS) 2387, 2002, 330-339.
47. Gopal Pandurangan, Prabhakar Raghavan, and Eli Upfal. Building Low-Diameter Peer-to-Peer Networks, *Proceedings of the 42nd Annual IEEE Symposium on the Foundations of Computer Science (FOCS)*, 2001, 492-499.
48. Gopal Pandurangan and Eli Upfal. Can Entropy Characterize Performance of Online Algorithms?, *Proceedings of the 12th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)* 2001, 727-734.
49. Milos Hauskrecht, Gopal Pandurangan, and Eli Upfal. Computing Near-Optimal Strategies for Stochastic Investment Planning Problems, *Proceedings of the 16th International Joint Conference on Artificial Intelligence (IJCAI)*, Stockholm, 1999, 1310-1315.
50. Gopal Pandurangan and Eli Upfal. Static and Dynamic Evaluation of QoS Properties, *Proceedings of the 31st ACM Symposium on Theory of Computing (STOC)*, Atlanta, 1999, 566-573.
51. Gopal Pandurangan and C.P. Rangan. Edge-Disjoint Paths in Permutation Graphs, *Proceedings of the 5th International Symposium on Algorithms and Computation (ISAAC)*, Beijing, Springer-Verlag Lecture Notes in Computer Science (LNCS) **834**, 1994, 208-216.

Book Chapters and Other Articles

52. Gopal Pandurangan and Maleq Khan. Theory of Communication Networks, **Algorithms and Theory of Computation Handbook**, Second Edition, Edited by M.J. Atallah and M. Blanton, CRC Press, 2009.
53. Vasil Denchev and Gopal Pandurangan. Distributed Quantum Computing: A New Frontier in Distributed Systems or Science Fiction?, **ACM SIGACT News**, 39(3), September 2008, 77-95.

Invited Conference and Workshop Presentations

54. Alessandro Ferrante, Gopal Pandurangan, and Kihong Park. Complexity of Combinatorial Optimization in Power-Law Graphs, *SIAM Conference on Discrete Mathematics*, Victoria, B.C., Canada, 2006.
55. Gopal Pandurangan. A Random Graph Approach to Protein Structure Determination, *DIMACS Workshop on Biomolecular Networks*, DIMACS Center, Rutgers University, NJ, 2005.
56. Gopal Pandurangan. Random Graphs in Peer-to-Peer Networks, *2nd Bertinoro Workshop on Random(ized) Graphs and Algorithms*, Bertinoro, Italy, 2003.
57. Gopal Pandurangan. Random Graphs in Peer-to-Peer Networks, *9th Seminar on the Analysis of Algorithms*, San Miniato-Pisa, Italy, 2003.
58. Gopal Pandurangan. Protocols for Building Low-Diameter P2P Networks, *DIMACS Workshop on Internet and WWW Measurement, Mapping and Modeling*, Rutgers University, NJ, 2002.
59. Thomas Dean, J. Hasic, Thomas Hofmann, Gopal Pandurangan, Prabhakar Raghavan, and Eli Upfal. Dynamics, Information, and the Web Environment, *DARPA TASK Proceedings*, Santa Fe, NM, April 2001.

6 Research Grants Awarded

1. **Algorithmic Problems in Protein Structure Studies.** PI: Gopal Pandurangan, co-PI: Chris Bailey-Kellogg (Dartmouth). National Science Foundation (NSF), August 2009 — July 2012. Amount awarded: \$450,000.
2. **Distributed Approximation Algorithms.** PIs: Gopal Pandurangan and David Peleg (Weizmann Institute of Science). US-Israeli Binational Science Foundation, August 2009 — July 2013. Amount awarded: \$104,000.
3. **Efficient Distributed Approximation Algorithms.** PI: Gopal Pandurangan. National Science Foundation (NSF), Theoretical Foundations (TF) program, August 2008 — July 2011. Amount awarded: \$100,000
4. **Random Graph Approach to Protein Structure Determination.** PI: Gopal Pandurangan. Purdue Research Foundation Award; Aug. 1, 2006 - July, 2007. Amount awarded: \$15,292

5. **Engineering Sensor Networks via Random Graph Theory.** PI: Gopal Pandurangan. Purdue Research Foundation; Summer Faculty Research Award, 2006. Amount awarded: \$7,000
6. **Random Graph Approach to Protein Structure Determination.** PI: Gopal Pandurangan. Purdue Research Foundation Award; Aug., 2005 - July, 2006. Amount awarded: \$14,912

7 Professional Service / Recognition

Program Committees

1. The 24th IEEE International Parallel and Distributed Processing Symposium (**IPDPS**), 2010, Atlanta, GA, USA. (PC Member of Algorithms Track).
2. The 11th International Conference on Distributed Computing and Networking (**ICDCN**), 2010, Kolkata, India. (Tutorial Co-chair and PC member of Distributed Computing track.)
3. The 5th International Conference on Mobile Ad-hoc and Sensor Networks (**MSN**), 2009, China.
4. The 11th International Symposium on Stabilization, Safety, and Security of Distributed Systems (**SSS**), Cloud Computing Track, 2009, Lyon, France.
5. The IEEE 22nd Annual Computer Communications Workshop (**CCW**), 2008, Steamboat Springs, CO. Organized a panel on “Energy-Efficient Distributed Algorithms for Wireless Ad hoc Networks”.
6. The 10th International Conference on Distributed Computing and Networking (**ICDCN**), 2009, Hyderabad, India.
7. The 9th ACM International Symposium on Mobile Ad Hoc Networking and Computing (**MOBIHOC**), 2008, Hong Kong, China.
8. The 4th International Conference on Mobile Ad-hoc and Sensor Networks (**MSN**), 2008, Wuhan, China.
9. International Workshop on Algorithms and Mobile Ad hoc Networks (**WAMAN**) 2008 (in conjunction with Notere’ 2008), Lyon, France.
10. Data Processing in Ubiquitous Information Systems Workshop, in conjunction with 2007 IEEE 23rd International Conference on Data Engineering (**ICDE**), Istanbul, Turkey.
11. International Conference on Computational and Systems Biology (**CASB**), 2006, Dallas, Texas.

7.1 Invited Talks

7.1.1 National and International Meetings

1. “Energy-Efficient Distributed Algorithms for Wireless Ad hoc Networks”, The IEEE 22nd Annual Computer Communications Workshop (CCW), 2008, Steamboat Springs, CO, October, 2008.

2. "Complexity of Combinatorial Optimization in Power-Law Graphs", *SIAM Conference on Discrete Mathematics*, University of Victoria, Victoria, B.C., Canada, June 2006.
3. "A Random Graph Approach to Protein Structure Determination", *DIMACS Workshop on Biomolecular Networks*, DIMACS Center, Rutgers University, NJ, May 2005.
4. "Random Graphs in Peer-to-Peer Networks", *2nd Bertinoro Workshop on Random(ized) Graphs and Algorithms*, Bertinoro, Italy, June 2003.
5. "Random Graphs in Peer-to-Peer Networks", *9th Seminar on the Analysis of Algorithms*, San Miniato-Pisa, Italy, June 2003.
6. "Protocols for Building Low-Diameter P2P Networks", *DIMACS Workshop on Internet and WWW Measurement, Mapping and Modeling*, Rutgers University, NJ, Feb., 2002.

7.1.2 Universities and Other Institutions

7. "Efficient Distributed Approximation Algorithms", Alcatel-Lucent Bell Laboratories, Murray Hill, NJ, June 2009.
8. "Efficient Distributed Approximation Algorithms", Department of Computer Science, University of Illinois at Urbana-Champaign, October 2008.
9. "Efficient Distributed Approximation Algorithms", Microsoft Research, Bangalore, India, July 2008.
10. "Algorithms for Protein Structure Determination", Strand Life Sciences, Bangalore, India, July 2008.
11. "Efficient Distributed Approximation Algorithms", Department of Computer Science and Automation, Indian Institute of Science, Bangalore, India, July 2008.
12. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Departments of CSE and ECE, Ohio State University, Feb., 2008.
13. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer and Information Science, Indiana University Purdue University, Indianapolis Sept. 2007.
14. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer Science, Dartmouth College, May 2007.
15. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Algorithms, Combinatorics and Optimization Colloquium, Carnegie Mellon University, PA, May 2007.
16. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer Science, Harvard University, MA, Mar. 2007.
17. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer Science, Brown University, RI, Mar. 2007.
18. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer Science, SUNY, Albany, NY, Mar. 2007.

19. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Microsoft Research, Mountain View, CA, Feb. 2007.
20. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Microsoft Research, India, Jan. 2007.
21. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Bell-Labs Research, India, Jan. 2007.
22. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer Science and Automation, Indian Institute of Science, India, Jan. 2007.
23. "Efficient Distributed Approximation Algorithms for Minimum Spanning Trees", Department of Computer Science and Engineering, Indian Institute of Technology, Chennai, India, Jan. 2007.
24. "Complexity of Combinatorial Optimization on Power Law Graphs", Los Alamos National Laboratory, Los Alamos, New Mexico, Aug., 2005.
25. "Nearest Neighbor Trees and their Algorithmic Applications", DIMACS Center, Rutgers University, Feb. 2005.
26. "The Bin-Covering Technique for Thresholding Random Geometric Graphs", Department of Computer Science, Dartmouth College, Jan. 2005.
27. "The Bin-Covering Technique for Thresholding Random Geometric Graphs", Los Alamos National Laboratory, Los Alamos, New Mexico, June 2004.
28. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science and Engineering, University of Florida, 2002.
29. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, University of Minnesota, 2002.
30. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, University of Rochester, 2002.
31. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, Northeastern University, 2002.
32. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, University of Texas at Dallas, 2002.
33. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, SUNY at Buffalo, 2002.
34. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, Purdue University, 2002.
35. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, University of Illinois at Chicago, 2002.
36. "Stochastic Analyses of Dynamic Computer Processes", Department of Computer Science, University of California at Los Angeles, 2002.

37. “Stochastic Analyses of Dynamic Computer Processes”, Department of Computer Science, University of California at Riverside, 2002.
38. “Building Low Diameter Peer-to-Peer Networks”, Verity, Inc., Sunnyvale, CA, June 2001.
39. “Static and Dynamic Evaluation of QoS Properties”, Department of Computer Science and Automation, Indian Institute of Science, Bangalore, India, 2000.
40. “Optimal Strategies for Investment Problems”, Goldman Sachs Inc., NY, 1999.

7.2 Other Talks

41. “Complexity of Combinatorial Optimization in Power-Law Graphs”, *Midwest Theory Conference*, Indiana University, Bloomington, May, 2006.
42. “How to Model the Web”, *Midwest Theory Conference*, DePaul University, Chicago, Dec. 2002.
43. “Efficient Distributed Approximation Algorithms for Minimum Spanning Trees”, Center for Wireless Systems and Applications (CWSA), Seminar series, Purdue University, March 20, 2007.
44. “Robust Computation of Aggregates in Wireless Sensor Networks: Distributed Randomized Algorithms and Analysis”, Center for Wireless Systems and Applications (CWSA) Workshop, Purdue University, November 2005.

7.3 Panels, Proposal Reviews

1. Invited to participate in the NSF sponsored Workshop on the Science of Power Management, April 9-10, 2009.
2. Served on a National Science Foundation (NSF) panel, February 2009.
3. Served on a National Science Foundation (NSF) panel, November 2008.
4. Reviewed a proposal for the Army Research Office, July 2008.
5. Invited to review a proposal for the Dutch National Science Foundation, 2008.
6. Invited to serve as a reviewer for the Qatar National Research Fund, 2008.
7. Served on a National Science Foundation (NSF) Panel, March 2005.

7.4 Refereeing for Journals and Conferences

Journal of the ACM, SIAM Journal of Computing, Algorithmica, Theoretical Computer Science, IEEE Transactions on Information Theory, Journal of Discrete Algorithms, Internet Mathematics, IEEE Transactions on Parallel and Distributed Systems, Journal of Parallel and Distributed Computing, IEEE/ACM Transactions on Networking, The Computer Journal, Mathematics of Operations Research, Information Processing Letters, ACM Transactions on Sensor Networks, Journal of Mathematical Biology, Ad hoc Networks, Computer Networks, Computational Optimization and Applications, Proceedings of the Royal Society, IEEE Symposium on the Foundations of Computer Science (FOCS), ACM Symposium on the Theory of Computing (STOC), ACM-SIAM Symposium on Discrete Algorithms (SODA), ACM-Symposium on

the Principles of Distributed Computing (PODC), ACM Symposium on Parallel Algorithms and Architectures (SPAA), European Symposium on Algorithms (ESA), IEEE Conference on Computer Communications (INFOCOM), IEEE International Conference on Distributed Computing Systems (ICDCS), IEEE International Conference on Information Theory (ISIT), International Conference on Parallel Processing (ICPP).

7.5 Organizational Activities

1. Organized the 53rd Midwest Theory Day (<http://www.cs.purdue.edu/MTD>) at the Department of Computer Science, Purdue University on Saturday, Dec. 2, 2006.
2. Co-organized a weekly graduate seminar called *Curious Minds* (<http://www.cs.purdue.edu/naal/CuriousMinds>) in the Department of Computer Science, Fall 2002 — Fall 2006. This seminar discussed interesting problems and topics in computer science and also its connections with other scientific disciplines. Usually each semester is organized around one or two themes. The themes for the Spring 2006 seminar were Quantum Computing and Complex networks. The theme for the Fall 2006 seminar was Information Science.

8 Students

8.1 Ph.D. Students Supervised

1. **Maleq Khan.** Graduated in 2007. Ph.D. in Computer Science.
Dissertation: *Distributed Approximation Algorithms for Minimum Spanning Trees and Related Problems with Applications to Ad hoc Networks*.
First employment: Post-doctoral Fellow, Network Dynamics and Simulation Science Laboratory, Virginia Bioinformatics Institute, Virginia Polytechnic and State University, Blacksburg, VA.
Pandurangan's Research Assistant, Fall 2003 — Spring 2007 (except for Fall 2006).
Bilsland Dissertation Fellowship, 2007—2008.
2. **Jen-Yeu Chen.** Graduated in 2007. Ph.D. in Electrical and Computer Engineering.
Co-advised with Professor Jianghai Hu (ECE).
Dissertation: *Distributed Randomized Algorithms for Robust Aggregate Computation in Wireless Sensor Networks*.
First employment: Assistant professor, Department of Electrical Engineering, National Dong Hwa University, Taiwan.
3. **Vasil Denchev.** Dissertation topic: *Distributed Quantum Computing*. Expected graduation in 2010. Advanced to Doctoral Candidacy, May 2008.

8.2 Ph.D. Advisory Committees

1. *Computer Science*: Maleq Khan (Chair), Vasil Denchev (Chair), Yongwook Choi, Gahyun Park, Robert Gwadera, Fijoy George Vadakumpadan, Amit Shirsat, Ahsan Habib, Barry Whitman, Yu Tak Ma.

2. *Electrical and Computer Engineering*: Jen-Yeu Chen (Co-chair), Gagan Gupta.
3. *Chemistry*: Hefeng Wang.
4. *External*: Fei Xiong (Dartmouth College, Computer Science).

8.3 Masters Students Supervised

1. **Tomek Czajka**. Graduated in 2007.
 Research Topic: Randomized Algorithms and Gossip-based computation. *Publication*: T. Czajka and G. Pandurangan. Improved Random Graph Isomorphism, *Journal of Discrete Algorithms*, **6**, 2008, 85-92.
 First employment: Google.
2. **Hetunandan Kamichetty**. Graduated in 2005.
 Co-advised with Prof. Chris Bailey-Kellogg.
 Research Topic: Random graph algorithms for protein structure determination via NMR. *Publication*: H. Kamichetty, C. Bailey-Kellogg, and G. Pandurangan. An Efficient Randomized Algorithm for Contact-Based NMR Backbone Resonance Assignment, *Bioinformatics*, **22**(2), 2006, 172-180.
 Joined as a Ph.D. student in Computer Science at Carnegie Mellon University.
3. **Sheetal Chainraj**. Graduated in 2004.
 Co-advised with Prof. Chris Bailey-Kellogg.
 Research Topic: Random graph approach to protein structure determination. *Publication*: C. Bailey-Kellogg, S. Chainraj, and G. Pandurangan. A Random Graph Approach to NMR Sequential Assignment, *Journal of Computational Biology*, **12**(6-7), 2005, 569-583. **Invited Paper**. Conference version in *Proceedings of the 8th Annual International Conference on Research in Computational Molecular Biology (RECOMB)*, 2004, 58-67.
 First employment: Bloomberg L.P.

8.4 Graduate Student Projects Supervised

1. **Vasil Denchev**. Research Topic: Distributed Quantum Computing. Jan. 2007 — Present.
Publication: Vasil Denchev and Gopal Pandurangan. Distributed Quantum Computing: A New Frontier in Distributed Systems or Science Fiction?, **ACM SIGACT News**, 39(3), September 2008, 77-95.
2. **Yongwook Choi**. Research Topic: Energy-Optimal Distributed Algorithms. Aug. 2007 — Dec., 2007.
Publication: Y. Choi, M. Khan, V. S. A. Kumar, and G. Pandurangan. Energy-Optimal Distributed Algorithms for Minimum Spanning Trees, in *Proceedings of the 20th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, 2008, 188-190.
3. **Tomek Czajka**. Research Topic: Randomized Algorithms and Gossip-based computation. Aug. 2006—May 2007.
Publication: T. Czajka and G. Pandurangan. Improved Random Graph Isomorphism, *Journal of Discrete Algorithms*, **6**, 2008, 85-92.

4. **Derek Drake.** Research Topic: Algorithms for Distance Matrix Reconstruction and Pruning Noisy Random Geometric Graphs. May 2006 — Dec., 2006.
5. **Gahyun Park.** Research Topic: Randomized contention resolution algorithms. Aug. — Dec., 2005.
Publication: G. Pandurangan and G. Park. Analysis of Randomized Protocols for Conflict-Free Distributed Access, *Algorithmica*, **49**(2), 2007, 109-126. Conference version in *Proceedings of the 24th Annual ACM Symposium on Principles of Distributed Computing (PODC)*, 2005, 274.
6. **Hetunandan Kamichetty.** Research Topic: Random graph algorithms for protein structure determination via NMR. Jan. 2005— May 2005.
Publication: H. Kamichetty, C. Bailey-Kellogg, and G. Pandurangan. An Efficient Randomized Algorithm for Contact-Based NMR Backbone Resonance Assignment, *Bioinformatics*, **22**(2), 2006, 172-180.
7. **Alessandro Ferrante.** Pandurangan's Visiting Ph.D. student from University of Salerno, Italy. Research Topic: Combinatorial optimization in power-law graphs. May — July, 2004 and May 2005.
Publication: A. Ferrante, G. Pandurangan, and K. Park. On the Hardness of Optimization in Power-Law Graphs, *Theoretical Computer Science*, **393**, 2008, 220-230. Conference version in *13th Annual International Computing and Combinatorics Conference (COCOON)*, Banff, Canada, 2007, 417-427.
8. **Prathima Rao.** Research Topic: New Web models. Jan. — May, 2004.
9. **Sheetal Chainraj.** Research Topic: Random graph approach to protein structure determination. Aug. 2003 — May 2004.
Publication: C. Bailey-Kellogg, S. Chainraj, and G. Pandurangan. A Random Graph Approach to NMR Sequential Assignment, *Journal of Computational Biology*, **12**(6-7), 2005, 569-583. **Invited** Paper. Conference version in *Proceedings of the 8th Annual International Conference on Research in Computational Molecular Biology (RECOMB)*, 2004, 58-67.
10. **Jayesh Pandey.** Research Topic: Algorithms for random geometric graphs. Jan — June, 2003.

8.5 Undergraduate Student Projects Supervised

1. Tim Jacobs. Honors Research Project: Simulation and Analysis of a Simple Churn-Tolerant Structured Peer-to-Peer Network. May — August, 2008. Currently a senior in computer science at Purdue.
2. Matt Schmidt. Research Project: Approximation algorithms for generalized vertex cover problems, September — December 2004. Joined as a Ph.D. student in Computer Science at North Carolina State University.
3. Aly Azeem Khan. Research Project: Secure communication using small-world networks, February — August 2004. Joined as a Ph.D. student in Computer Science at Carnegie Mellon University. Currently Ph.D. student in Computer Science at Columbia University.

- Jonathan Williford. Research Project: Web Algorithms. January — May, 2003. Research presented at the Undergraduate Research day, School of Science, Purdue University, April 2003.

9 Teaching

9.1 Courses Taught at Purdue University

- Introduction to Analysis of Algorithms (CS381)*, the required core undergraduate course in algorithms (junior level).
Obtained a teaching evaluation of **4.5** (out of 5) in Spring 2008, one of the **highest** teaching evaluations among all computer science courses taught in that semester.
- Design and Analysis of Algorithms (CS580)*, the graduate course in algorithms (one of the two required theory courses for Masters and Ph.D. students).
Obtained a teaching evaluation of **4.8** (out of 5) in Spring 2006, one of the **highest** teaching evaluations among all computer science courses taught in that semester.
Lecture notes available at <http://www.cs.purdue.edu/homes/gopal/cs580-2008/>.
- Distributed Network Algorithms*, a new course offered at the graduate level in Fall 2007.
Teaching evaluation of **4.5** (out of 5).
Course material available at <http://www.cs.purdue.edu/homes/gopal/cs590A-2007/>.
- Randomized Algorithms and Probabilistic Techniques in Computer Science (CS590R)*, a new graduate course on probabilistic techniques and their applications in computer science.
Obtained a teaching evaluation of **4.9** (out of 5) in Spring 2004, **the highest** teaching evaluation among all graduate computer science courses taught in that semester.
Obtained a teaching evaluation of **4.8** (out of 5) in Fall 2005, the **second highest** teaching evaluation among all graduate computer science courses taught in that semester.
Course material available at <http://www.cs.purdue.edu/homes/gopal/cs590-2004/>.
- Algorithms for Communication Networks (CS590R)*, a new graduate course on the algorithmic and mathematical underpinnings of modern communication networks in Spring 2003.
Teaching evaluation of 4.1 (out of 5) in Spring 2003.
Lecture notes available at <http://www.cs.purdue.edu/homes/gopal/cs590-2003/>.
- Theory of Computation and Computational Complexity (CS584)*, the graduate course in theory of computation (one of the two required theory courses for Masters and Ph.D. students).
Teaching evaluation of 3.8 (out of 5) in Spring 2005.
Course material available at <http://www.cs.purdue.edu/homes/gopal/cs584-2007/>.
- Introduction to Simulation and Modeling of Computer Systems (CS543)*, a graduate course.
Teaching evaluation of 3.8 (out of 5) in Fall 2003.
Course material available at <http://www.cs.purdue.edu/homes/gopal/cs543/>.

9.2 New Courses Developed at Purdue University

1. **Distributed Network Algorithms:** Taught in Fall 2007. Developed a new course about distributed computing in general, and distributed network algorithms, in particular. With the emergence of the Internet and other modern networking technologies such as peer-to-peer networks, overlay networks, and ad hoc wireless and sensor networks, it is has become all the more important to design and analyze efficient distributed algorithms for solving various key distributed computing problems. This course first covered the basics of distributed algorithms. Then distributed network algorithms for solving fundamental network optimization problems were covered. This includes leader election, routing algorithms (including shortest paths), spanning trees, and minimum spanning trees. Applications to the Internet, peer-to-peer, ad hoc and sensor networks was stressed throughout the course. The last part of the course dealt with recent cutting-edge stuff from journals and conferences. This course was of interest to not only to algorithms and theory students, but also to students interested in networking and distributed systems including those working in the Internet, peer-to-peer, ad hoc wireless and sensor networks. Lecture slides for this course are available on the Web at <http://www.cs.purdue.edu/homes/gopal/cs590A-2007>.
2. **Randomized Algorithms and Probabilistic Techniques in Computer Science:** Taught in Spring 2004 and Fall 2005. Developed a new course which introduces probability theory in computer science. Probabilistic techniques, in general, and randomized algorithms, in particular, play an increasingly important role in a variety of computer science applications ranging from cryptography and communication networks to Web search engines, AI reasoning, data mining, and bioinformatics. This course serves as an introduction to probability theory in computer science, in particular to randomized algorithms and to probabilistic analysis of algorithms. The course introduces basic probability theory and presents applications of randomized algorithms and probabilistic analysis techniques in areas such as combinatorial optimization, data structures, graph algorithmics, communication, parallel and distributed computation, cryptography, biology and more. Assumes no prior knowledge of probability theory. Lecture slides for this course are available on the Web at <http://www.cs.purdue.edu/homes/gopal/cs590-2004>.
3. **Algorithms for Communication Networks:** Taught in Spring 2003. A new graduate course which explores the algorithmic and mathematical underpinnings of communication networks including the Internet, Peer-to-Peer networks, Ad hoc networks, Social networks, and the World Wide Web. The course covers exciting new models and algorithms for these emerging networks. The course emphasizes probabilistic modeling and probabilistic analysis of networks. An important component of this course is to stimulate problem solving skills of students. Topics include probability theory, randomized and probabilistic algorithms, distributed algorithms, routing protocols, contention resolution protocols, queuing theory, Peer-to-Peer network protocols, social networks (small-world phenomenon), and ad hoc networks. The lecture slides, class notes, and problem sets for this course are available on the Web at <http://www.cs.purdue.edu/homes/gopal/cs590>.

9.3 Teaching Assistantships at Brown University

Teaching Assistant involved in setting homeworks, preparing lecture slides, and giving guest lectures in the following courses:

1. *Design and Analysis of Algorithms (CS157)* (Fall 2001), a graduate/undergraduate course.
2. *Probabilistic Methods in Computer Science (CS155)* (Fall 1998), a graduate/undergraduate course.
3. *Theory of Computation (CS152)* (Spring 1998), a graduate/undergraduate course.

9.4 Courses Taught and Teaching Assistantships at SUNY Albany

1. Instructor for two summer courses for Computer Science undergraduates: *Computer Organization (CSI404)* and *Programming at the Hardware/Software Interface (CSI333)* (June 1997 - August 1997).
2. Instructor for *Discrete Mathematics (CSI210)*, a summer course for undergraduates (June 1996 - July 1996).
3. Teaching Assistant for *Systems Programming (CSI402)* (Spring 1997), an undergraduate course.
4. Teaching Assistant for *Theory of Computation (CSI509)* (Fall 1996 and Spring 1996), a graduate course.
5. Teaching Assistant *Discrete Mathematics (CSI210)* (Fall 1995), an undergraduate course.

10 Committees at Purdue

Computer Science Department:

1. Chair, Colloquia Committee, 2002-2003.
2. Member, Graduate Study Committee, 2003-2004.
3. Member, Graduate Admissions Committee, 2004-2005.
4. Member, Graduate Admissions Committee, 2005-2006.
5. Chair, Colloquia Committee, 2006-2007.
6. Chair, Colloquia Committee, 2007-2008.
7. Member, Library Committee, 2007-2008.
8. Member, Graduate Admissions Committee, 2008-2009.

College of Science:

1. Grade Appeals Committee (Alternate), 2008-2009.
2. School of Science Grievance Hearing Committee, 2003-2005.

11 Memberships of Professional Societies

1. Sigma Xi, The Scientific Research Society.
2. Association for Computing Machinery (ACM) and Special Interest Group in Algorithms and Computation Theory (SIGACT).
3. Institute of Electrical and Electronics Engineers (IEEE) and IEEE Computer Society.

12 U.S. Visa Status

U.S. Legal Permanent Resident.