

# John Augustine

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Research Fellow

Division of Mathematics, School of physical and Mathematical Sciences  
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## Education

Ph.D.	2006	The Donald Bren School of Information and Computer Sciences, University of California at Irvine. Dissertation: Near-Optimal Solutions for Powering-Down Problems and Scheduling Jobs in FPGAs. (Sandy Irani, advisor)
M.S.	2002	Elec. & Computer Engg., Louisiana State University. Thesis: Offline and Online Variants of the Traveling Salesman Problem (Jaganathan Ramanujam & Steven Seiden, advisors)
M.S.	2001	Systems Science, Louisiana state University Project: Matrix based Population Simulation Software. (Aiichiro Nakano, advisor)
B.E.	1998	Computer Science and Engineering, University of Madras.

## Research Interests

I am interested in algorithms. Within algorithms, my work has spanned online and offline optimization, computational geometry, and algorithmic game theory. While most of my work involves theoretical analysis of algorithms, I have also done some experimental research.

## Appointments and Visits

- Research Fellow, Division of Mathematics, Nanyang Technological University. Sept. 2009 — present.
- Visiting Scientist, Theoretical Computer Science, Institute of Mathematical Sciences, Chennai, India. July 2009 — Aug. 2009.
- Scientist, Tata Research Development and Design Centre, Pune, India. July 2007 — June 2009.
- Visiting Assistant Professor, Department of Computer Science, Colby College, ME, USA. Sept. 2006 — May 2007.
- Teaching and Research Assistant, Donald Bren School of Information and Computer Sciences, University of California, Irvine, CA. Aug. 2002 — June 2006.
- Programmer and Systems Admin., Louisiana State University. Sept. 1998 — July 2002.
- Intern, Aeronautical Development Agency, Bangalore, India. Jan. 1998 — March 1998.

**Journal Articles**

- J-1** John Augustine and Steven Seiden, “Linear Time Approximation Schemes for Vehicle Scheduling problems,” *Theoretical Computer Science*, Volume 324, Issues 2-3, September 2004, pp. 147-160.
- J-2** John Augustine, Sandy Irani and Chaitanya Swamy, “Optimal Power-Down Strategies,” *SIAM Journal on Computing*, Volume 37, Issue 5, January 2008, pp. 1499-1516.
- J-3** John Augustine, Sudarshan Banerjee, and Sandy Irani, “Strip packing with precedence constraints and strip packing with release times,” *Theoretical Computer Science*, Volume 410, Issues 38-40, 6 September 2009, pp. 3792-3803.
- J-4** John Augustine, Brian Putnam, and Sasanka Roy, “Largest Empty Circle Centered on a Query Line,” *Journal of Discrete Algorithms*, Volume 8, Issue 2, June 2010, Pages 143-153.
- J-5** John Augustine, David Eppstein, and Kevin A. Wortman, “Approximate Weighted Farthest Neighbor Queries and Minimum Dilation Stars,” accepted to appear in *Discrete Mathematics Algorithms and Applications*.

**Refereed Conference Publications**

- C-1** John Augustine and Steven Seiden, “Linear Time Approximation Schemes for Vehicle Scheduling problems,” Proceedings of the 8th Scandinavian Workshop on Algorithm theory (SWAT), 2002. (Preliminary version of article J-1.)
- C-2** John Augustine, Sandy Irani, and Chaitanya Swamy, “Optimal Power-Down Strategies,” Proceedings of the 45th Annual IEEE Symposium on Foundations of Computer Science (FOCS), 2004. (Preliminary version of article J-2.)
- C-3** Mohamed Aly and John Augustine, “Online Packet Admission And Oblivious Routing In Sensor Networks,” Proceedings of the 17th International Symposium on Algorithms and Computation (ISAAC), 2006.
- C-4** John Augustine, Sudarshan Banerjee, and Sandy Irani, “Strip packing with precedence constraints and strip packing with release times,” Proceedings of the 18th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2006. (Preliminary version of article J-3.)
- C-5** Pranjali Pagey, John Augustine, Rahul Kelkar, and Harrick Vin, “A tool for server consolidation engagements,” In TCS Technical Architects Conference (TACTiCS), 2009.
- C-6** Deepak Jeswani, Nakul Korde, Dinesh Patil, Maitreya Natu, and John Augustine, “Probe Station Selection Algorithms for Fault Management in Computer Networks,” Second International Conference on Communication Systems and Networks (COMSNETS), 2010.
- C-7** John Augustine, David Eppstein, and Kevin A. Wortman, “Approximate Weighted Farthest Neighbor Queries and Minimum Dilation Stars,” The 16th Annual International Computing and Combinatorics Conference (COCOON), 2010. (Preliminary version of article J-5.)
- C-8** John Augustine and Nick Gravin, “On the Continuous CNN Problem,” The 21st International Symposium on Algorithms and Computation (ISAAC), 2010.

- C-9** Sangameshwar Patil, Sasanka Roy, John Augustine, Amanda Redlich, Sachin Lodha, and Harrick Vin, Anand Deshpande, Mangesh Gharote, and Ankit Mehrotra, “Minimizing Testing Overheads in Database Migration Lifecycle.” The 16th International Conference on Management of Data (COMAD), 2010.
- C-10** John Augustine, Qi Han, Sachin Lodha, Philip Loden, and Sasanka Roy, “Tight Analysis of Shortest Path Convergecast in Wireless Sensor Networks.” The 17th Computing: the Australasian Theory Symposium (CATS), 2011.

### Manuscripts

- M-1** John Augustine, Sandip Das, Anil Maheswari, Subhas Nandy, Sasanka Roy, and Swami Sarvattomananda, “Querying for the Largest Empty Geometric Object in a Desired Location.” A preliminary version is at <http://arxiv.org/abs/1004.0558>. Current results (that subsume the preliminary version) can be discussed.
- M-2** John Augustine, Ning Chen, Edith Elkind, Angelo Fanelli, Nick Gravin, and Dmitry Shiryayev, “Dynamics of Profit-Sharing Games.” Current version available at <http://arxiv.org/abs/1010.5081>.

### Student Symposia

- S-1** Deepak Jeswani, Nakul Korde, Dinesh Patil, Maitreya Natu, and John Augustine, “Probe Station Selection for Robust Network Monitoring,” Student Research Symposium on High Performance Computing (HiPC), 2009.

### Works in Progress

The following are very brief descriptions. More information will be provided if requested.

- W-1** Given a bipartite graph modeling the valuation of various goods by consumers, we are interested in pricing the goods and allocating them to consumers in a manner that maximizes revenue while ensuring that the solution is both envy free and Pareto optimal. This is joint work with Ning Chen and Hua Xia.
- W-2** In a network congestion game, we introduce the notion of incentives in which some of the cost of the edges can be borne by a central authority. We ask: what is the minimum incentive required to bring the price of stability to 1? This is joint work with Ioannis Caragiannis, Kalaitzis Christos, and Angelo Fanelli.

### Research Proposals

- R-1** “Multi-Objective Optimization for Effective Data Centre Management.” This proposal was accepted for funding by Fonds National de la Recherche, Luxembourg, according to the Aides a la Formation-Recherche postdoctoral grant scheme, 2009. (Declined in favor of position at Nanyang Technological University.)

**Theses**

- T-1** John E. Augustine, “Offline and Online Variants of the Traveling Salesman Problem,” Master’s thesis at Louisiana State University, December 2002.
- T-2** John E. Augustine, “Near-Optimal Solutions for Powering-Down Problems and Scheduling Jobs in FPGAs.” Ph.D. dissertation at the University of California, Irvine, September 2006.

**Professional Service**

- Program Committee member for the International Conference on Wireless Algorithms, Systems, and Applications, 2010, Beijing, China.
- Reviewed articles for several peer-reviewed conferences and journals.

**Select Presentations**

- P-1** “Combinatorial Optimization: Bridging Theory and Practice,” a four-part series at Tata Research Development and Design Centre, Pune, India. November 2007.
- P-2** “Fun with Algorithms,” a presentation aimed at engaging undergraduate students in algorithmic research. Presented at several colleges in Pune, India.
- P-3** “Algorithmic Graph Theory,” an invited talk at National Conference on Computational Mathematics and Soft Computing, July 2009, at Women’s Christian College, Chennai, India.
- P-4** “Optimal Shortest Path Algorithms for the Convergecast Problem in Sensor Networks,” a presentation at the Institute of Mathematical Sciences and Chennai Mathematical Institute, Chennai, India (August 2009).

**Detailed Work History****Research Fellow, School of Physical and Mathematical Sciences,  
Nanyang Technological University**

Singapore (September 2009 — present).

Member of the Theoretical Computer Science group.

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**Visiting Scientist, Theoretical Computer Science,  
Institute of Mathematical Sciences**

Chennai, India (July 2009 — August 2009).

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**Scientist, Tata Consultancy Services**

Pune, India (July 2007 — June 2009).

Scientist at the Tata Research Development and Design Centre, an R&D division of Tata Consultancy Services. Member of the Applied Algorithms and Optimization Group in the Systems Research Lab. Engaged in researching and implementing solutions (using JAVA) to optimization problems arising in virtualization, software consolidation and cloud computing. Gained valuable insights into research challenges and emerging trends in IT industry.

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**Visiting Assistant Professor, Colby College**

Waterville, ME, USA (Sept. 2006 — June 2007).

*Weaving the Web, Fall 2006:* Introduced non-majors to web design. The course included an HTML component (1 project) and a longer Javascript component (3 projects).

*Analysis of Algorithms, Fall 2006:* The class comprised of junior and senior computer science majors. The course included standard undergraduate algorithmic topics such as asymptotic notations, sorting, greedy algorithms, divide-and-conquer algorithms, dynamic programming, and various graph algorithms including graph searching, shortest paths, minimum spanning trees, and strongly connected components.

*Structured Programming and Elementary Algorithms, Spring 2007:* The class introduced JAVA programming to potential computer science majors. The language was taught using a pedagogical programming environment, BlueJ, designed specifically for introducing programming from an object oriented perspective.

*Topics in Computational Geometry and Graphics, Spring 2007:* The class had junior and senior computer science majors. Several topics were broadly sampled from Computer Graphics and Computational Geometry. The course included basic wireframe modeling of 3D objects, rendering techniques, planar point location, convex hull, Voronoi diagram, and Delaunay triangulation.

*Student Advising:* Advised the final year honors thesis of Ms. Andreea Olea at Colby College. She explored the partitioning of the vertices of directed acyclic graphs (DAGs). This problem finds application in embedded systems with components (vertices in our DAG) that can be implemented either in hardware or in software.

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**Research and Teaching Asst, Univ. of Calif. at Irvine**

Irvine, CA, USA (Sept. 2002 — June 2006).

*Research:* Designed algorithms for combinatorial optimization problems. The primary source of problems have been from the domain of systems design, specifically motivated by recent trends in designing power conserving systems. Other domains include computational geometry and

vehicle scheduling.

*Teaching:* Duties included facilitating discussion sections, lecturing, and grading. The courses assisted in the capacity of a TA or grader are Discrete Mathematics (twice), Design and Analysis of Algorithms (3 times), Graph Algorithms (once) and Technical Writing (once).

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**Programmer and Systems Administrator, Louisiana State Univ.**

Baton Rouge, LA, USA (Sept. 1998 — Aug. 2002).

*Programming:* Developed software in C++ for modeling fish population trends in various habitats using the matrix modeling technique. This technique was implemented in a highly generalized fashion to allow researchers at Louisiana State to model species with significantly disparate life stages that needed uniquely tailored time-steps.

*Systems:* Administered a DEC ALPHA/LINUX lab. Maintained printers and PCs.

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**Programmer (internship), Aeronautical Development Agency**

Bangalore, India (Jan. 1998 — Mar. 1998).

Developed software for visualizing flight recorder data using Visual C++.

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**MISCELLANEOUS**

- Recipient, 2005 UCI Information and Computer Science Outstanding TA award.
- Served in Hurricane Katrina relief efforts in New Orleans, LA and Gulfport, MS.
- Volunteer at Think Together (<http://www.thinktogether.org>), a non-profit provider of after-school learning programs for low-income students, 2004 - 2006.
- Hobbies: hiking, biking, photography (<http://www.flickr.com/photos/augblog>).

**Citizenship:** India

**REFERENCES**

Available upon request.