CURRICULUM VITAE

Darren Strash

Postdoctoral Researcher
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OBJECTIVE: I am seeking a full-time tenure-track position in Computer Science at a university where I can apply my extensive practical and research experience to conduct cutting-edge research and mentor the next generation of Computer Scientists.

CITIZENSHIP: U.S.A.

EDUCATION

Ph.D.	2011	*Algorithms for Sparse Geometric Graphs and Social Networks* Computer Science, University of California, Irvine (Michael T. Goodrich and David Eppstein, advisors), GPA: 3.99
M.S.	2008	Computer Science, University of California, Irvine
B.S.	2006	Computer Science, California State Polytechnic University, Pomona Minor: Mathematics, GPA: 3.97 Honors: Summa Cum Laude, Valedictorian of the College of Science

RESEARCH INTERESTS

My passion is to reveal and resolve the mismatch between the theory and practice of algorithms, with applications in large-scale network analysis and computational geometry. My work often involves first understanding real-world properties of data sets, then designing algorithms that exploit these properties to gain efficiency that is not possible otherwise. This includes both theoretical efficiency and efficiency of algorithms in practice (algorithm engineering). Some specific areas that interest me are combinatorial optimization, subgraph counting/listing, network visualization, shortest paths, range searching, and dynamic data structures.

HONORS AND AWARDS

- Intel: Technology Manufacturing Group (TMG) Excellence Award, 2014
- Intel: Technology Manufacturing Group (TMG) Excellence Award, 2013
- Intel: Intel Software Quality Award, 2012
- Best Paper, SEA 2011 (as voted by conference attendees)
- UC Irvine: Chair Fellowship, 2006-2010
- UC Irvine: GAANN Fellowship, 2008-2009
- Cal Poly Pomona: Julian A. McPhee Scholar (valedictorian) of the College of Science, 2006
- Cal Poly Pomona: Best Presentation, 1st Annual College of Science Research Symposium, 2006
- Cal Poly Pomona: Computer Science Department Boeing Scholarship, 2006
- Cal Poly Pomona: NASA PAIR Program, 2005–2006
- Harvey Mudd College: NSF Research Experience for Undergraduates, 2005
- Cal Poly Pomona: Computer Science Department Boeing Scholarship, 2005

PUBLICATIONS

Papers in Refereed Journals:

J-1. D. Eppstein, M.T. Goodrich, and D. Strash, "Linear-Time Algorithms for Geometric Graphs with Sublinearly Many Edge Crossings," *SIAM Journal on Computing*, **39**(8), 2010, pp. 3814–3829, doi:10.1137/090759112.

J-2. D. Eppstein, M.T. Goodrich, D. Strash, and L. Trott, "Extended Dynamic Subgraph Statistics using h-index Parameterized Data Structures," *Theoretical Computer Science*, **447**, 2012, pp. 44–52, doi:10.1016/j.tcs.2011.11.034. Special issue for COCOA 2010.

J-3. D. Eppstein, M.T. Goodrich, M. Löffler, D. Strash, and L. Trott, "Category-Based Routing in Social Networks: Membership Dimension and the Small-World Phenomenon," *Theoretical Computer Science*, **514**, 2013, pp. 96–104, doi:10.1016/j.tcs.2013.04.027. Special issue for GA 2011.

J-4. D. Eppstein, M. Löffler, and D. Strash, "Listing All Maximal Cliques in Large Sparse Real-World Graphs in Near-Optimal Time," *ACM Journal of Experimental Algorithmics*, **18**(3): 3.1, 2013, doi:10.1145/2543629. Special issue for SEA 2011.

Journal Papers in Preparation:

J-5. M.T. Goodrich and D. Strash, "Succinct Greedy Geometric Routing in the Euclidean Plane."

J-6. M. Korman, M. Löffler, R. I. Silveira, and D. Strash, "On the Complexity of Barrier Resilience for Fat Regions," (Submitted to ACM Trans. on Algorithms).

Papers in Refereed Conference Proceedings:

C-1. D. Eppstein, M.T. Goodrich, and D. Strash, "Linear-Time Algorithms for Geometric Graphs with Sublinearly Many Crossings," *Proc. 20th ACM-SIAM Symposium on Discrete Algorithms* (SODA 2009), 2009, pp. 150–159, doi:10.1137/1.9781611973068.18, arXiv:0812.0893.

C-2. M.T. Goodrich and D. Strash, "Succinct Greedy Geometric Routing in the Euclidean Plane," *Proc. 20th International Symposium on Algorithms and Computation* (ISAAC 2009), Lecture Notes in Computer Science, vol. 5878, 2009, pp. 781–791, doi:10.1007/978-3-642-10631-6_79, arXiv:0812.3893.

C-3. M.T. Goodrich and D. Strash, "Priority Range Trees," *Proc. 21st International Symposium on Algorithms and Computation* (ISAAC 2010), Lecture Notes in Computer Science, vol. 6506, 2010, pp. 97–108, doi:10.1007/978-3-642-17517-6_11, arXiv:1009.3527.

C-4. D. Eppstein, M.T. Goodrich, D. Strash, and L. Trott, "Extended Dynamic Subgraph Statistics using h-index Parameterized Data Structures," *Proc. 4th International Conference on Combinatorial Optimization and Applications* (COCOA 2010), Lecture Notes in Computer Science, vol. 6508, 2010, pp. 128–141, doi:10.1007/978-3-642-17458-2_12, arXiv:1009.0783.

C-5. D. Eppstein, M. Löffler, and D. Strash, "Listing All Maximal Cliques in Sparse Graphs in Near-Optimal Time," *Proc. 21st International Symposium on Algorithms and Computation* (ISAAC 2010), Lecture Notes in Computer Science, vol. 6506, 2010, pp. 403–414, doi:10.1007/978-3-642-17517-6_36, arXiv:1006.5440.

C-6. D. Eppstein and D. Strash, "Listing All Maximal Cliques in Large Sparse Real-World Graphs," *Proc. 10th International Symposium on Experimental Algorithms* (SEA 2011), Lecture Notes in Computer Science, vol. 6630, 2011, pp. 364–375, doi:10.1007/978-3-642-20662-7_31, arXiv:1103.0318.

C-7. D. Eppstein, M.T. Goodrich, M. Löffler, D. Strash, and L. Trott, "Category-Based Routing in Social Networks: Membership Dimension and the Small-World Phenomenon," *Proc. 3rd International Conference on Computational Aspects of Social Networks* (CASoN 2011), 2011, pp. 102–107, doi:10.1109/CASON.2011.6085926, arXiv:1108.4675.

C-8. M. Löffler, J. A. Simons, and D. Strash, "Dynamic Planar Point Location with Sub-logarithmic Local Updates," *Proc. 13th International Symposium on Algorithms and Data Structures* (WADS 2013), Lecture Notes in Computer Science, vol. 8037, 2013, pp. 499–511, doi:10.1007/978-3-642-40104-6_43, arXiv:1204.4714.

C-9. M. Korman, M. Löffler, R. I. Silveira, and D. Strash, "On the Complexity of Barrier Resilience for Fat Regions," *Proc. 9th International Symposium on Algorithms and Experiments for Sensor Systems, Wireless Networks and Distributed Robotics* (ALGOSENSORS 2013), Lecture Notes in Computer Science, vol. 8243, 2014, pp. 201–216, doi:10.1007/978-3-642-45346-5_15, arXiv:1302.4707.

C-10. I. Kostitsyna, M. Nöllenburg, V. Polishchuk, A. Schulz, and D. Strash, "On Minimizing Crossings in Storyline Visualizations," *Proc. 23rd International Symposium on Graph Drawing and Network Visualization* (GD 2015), Lecture Notes in Computer Science, vol. 9411, 2015, pp. 192–198, doi:10.1007/978-3-319-27261-0_16, arXiv:1509.00442.

C-11. S. Lamm, P. Sanders, C. Schulz, D. Strash, and R. F. Werneck, "Finding Near-Optimal Independent Sets at Scale," *Proc. 18th Workshop on Algorithm Engineering and Experiments* (ALENEX 2016), 2016, pp. 138–150, doi:10.1137/1.9781611974317.12, arXiv:1509.00764.

C-12. J. Dahlum, S. Lamm, P. Sanders, C. Schulz, D. Strash, and R. F. Werneck, "Accelerating Local Search for the Maximum Independent Set Problem," *Proc. 15th International Symposium on Experimental Algorithms* (SEA 2016), accepted. arXiv:1602.01659.

Conference Papers in Preparation:

C-13. D. Strash, "On the Power of Simple Reductions for the Maximum Independent Set Problem," (Submitted to COCOON 2016).

Other Publications:

O-1. L. Effinger-Dean, C. Erickson, M. O'Neill, and D. Strash, "Garbage Collection for Trailer Arrays," *Proc. 3rd Workshop on Semantics, Program Analysis and Computing Environments for Memory Management* (SPACE 2006), pp. 83–90.

O-2. L. Effinger-Dean, C. Erickson, M. O'Neill, and D. Strash, "Extending Garbage Collection to Complex Data Structures," *Proc. 3rd Workshop on Semantics, Program Analysis and Computing Environments for Memory Management* (SPACE 2006), pp. 91–97.

O-3. D. Eppstein, M.T. Goodrich, M. Löffler, D. Strash, and L. Trott, "Category-Based Routing in Social Networks: Membership Dimension and the Small-World Phenomenon." *Workshop on Graph Algorithms and Applications* (GA 2011), Zürich, Switzerland, July 2011.

O-4. N. Sitchinava, D. Strash, "Reconstructing a Unit-Length Orthogonally Convex Polygon from its Visibility Graph," *32nd European Workshop on Computational Geometry* (EuroCG 2016), Lugano, Switzerland, March 2016.

THESES SUPERVISED

- 2016: Michael Vollmer: *Recognizing Simultaneous Proper Interval Graphs* (Master's)
- 2015: Jan Ebbing: *How to Partition a Graph When You Think Like a Vertex* (Bachelor's)
- 2015: Jakob Dahlum: *Boosting Local Search for Maximum Independent Sets* (Bachelor's)

RESEARCH EXPERIENCE

Karlsruhe Institute of Technology **Oct. 2014—Present**

Position: Postdoctoral Researcher with Prof. Peter Sanders

Duties: Design, analyze, and implement efficient algorithms for graph and geometric problems in theory and practice (algorithm engineering), with a focus on combinatorial optimization problems on large to massive networks (big data); teach graduate level courses and lead seminars

Intel Corporation **Jul. 2011—Sep. 2014**

Position: Software Engineer in the Computational Lithography Group

Duties: Research and Development: develop an efficient, feature-rich CAD software toolchain to run massively parallel lithographic simulations, to compute a manufacturable VLSI layout from a non-manufacturable design layout

Tools Used: C++, C++11, python, bash, tsch, make, gcc, cvs, subversion

University of California, Irvine **Sep. 2006—Jun. 2011**

Position: Teaching Assistant and Graduate Student Researcher in the Center for Algorithms and Theory of Computation with Prof. Michael T. Goodrich and Prof. David Eppstein

Duties: Design, analyze, and implement algorithms and data structures; write professional articles; present research results at professional conferences; lead discussion classes; give lectures

California State Polytechnic University, Pomona **Sep. 2005—Jun. 2006**

Position: Student Researcher with Prof. Salam Salloum and Prof. Daisy Sang

Duties: Design and implement a dynamic path finding algorithm for a rover; act as liaison between engineering and software groups

Harvey Mudd College **Jun. 2005—Aug. 2005**

Position: Student Researcher with Prof. Melissa O'Neill

Duties: Design and analyze garbage collection algorithms for persistent data structures

OTHER PRACTICAL WORK EXPERIENCE

Lantronix, Inc. **Jul. 2006—Dec. 2006, Jun. 2007—Dec. 2007**
Position: Intern I–II in Embedded Systems
Duties: Write documentation, write regression tests, perform quality assurance testing, help maintain/debug code base (in C) for embedded systems firmware

California State Polytechnic University, California **Mar. 2004—Jun. 2006**
Position: Student Assistant in Information and Instructional Technology
Duties: Install and manage routers and network switches, troubleshoot network issues

Riverside County District Attorney's Office **Summer 2003**
Position: Intern in Computer Forensics
Duties: Conduct targeted searches for forensic evidence on suspects' computers

TEACHING EXPERIENCE

2015: Lead Lecturer, *Computational Geometry*
2015: Seminar Leader, *Algorithms for Large Social Networks in Theory and Practice*

2011: Invited Lecturer, *Graph Algorithms*
2011: Invited Lecturer, *Computational Geometry*
2010: Invited Lecturer, *Practical Computer Security*
2008: Invited Lecturer, *Fundamental Data Structure and Algorithms*

2008: Teaching Assistant, *Fundamental Data Structure and Algorithms*
2007: Teaching Assistant, *Data Structure and Algorithms*
2007: Teaching Assistant, *Data Structure and Algorithms*

INVITATION-ONLY WORKSHOPS ATTENDED

2015: *Dynamic Algorithms for Networks in Changing Environments (DANCE)*

TALKS GIVEN

- *Finding Near-Optimal Independent Sets at Scale*, ALENEX 2016
- *On Minimizing Crossings in Storyline Visualizations*, GD 2015
- *Listing All Maximal Cliques in Large Sparse Real-World Graphs*, SEA 2011
- *Listing All Maximal Cliques in Sparse Graphs in Near-Optimal Time*, ISAAC 2010
- *Priority Range Trees*, ISAAC 2010
- *Succinct Greedy Geometric Routing in the Euclidean Plane*, ISAAC 2009

FREE AND OPEN SOURCE SOFTWARE

- **Quick Cliques**: Efficiently List all Maximal Cliques of a Graph
  https://github.com/darrenstrash/quick-cliques
- **KaMIS**: Karlsruhe Maximum Independent Sets
  http://algo2.iti.kit.edu/kamis/

PROFESSIONAL SERVICE

Program Committees: ALENEX 2016

Session Chair: ALENEX 2016

Reviewer for: Journal of the ACM (JACM), Algorithmica, Theoretical Computer Science (TCS), Journal of Experimental Algorithmics (JEA), Computational Geometry: Theory and Applications (CGTA), ACM Transactions on Parallel Computing (TOPC), INFORMS Journal on Computing (IJOC), Journal of Graph Algorithms and Applications (JGAA), International Symposium on Experimental Algorithms (TPDS), Journal of Computational Geometry (JoCG), The Electronic Journal of Combinatorics (E-JC), ACM-SIAM Symposium on Discrete Algorithms (SODA), Canadian Conference on Computational Geometry (CCCG), European Symposium on Algorithms (ESA), Symposium on Theoretical Aspects of Computer Science (STACS), International Symposium on Graph Drawing (GD), International Colloquium on Automata, Languages and Programming (ICALP), and ACM International Conference on Computing Frontiers (CF), Computational Geometry: Young Researchers Forum (CG:YRF), Scandinavian Symposium and Workshops on Algorithm Theory (SWAT), International Joint Conference on Artificial Intelligence (IJCAI).

REFERENCES

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