CURRICULUM VITAE
Darren Jeffrey Strash

Visiting Assistant Professor	Email: dstrash@colgate.edu
Department of Computer Science	http://cs.colgate.edu/~dstrash
Colgate University	Office: (315) 228-7946
13 Oak Drive	Fax: (315) 228-7831
Hamilton, NY 13346	Cell: (315) 750-5864

HIGHLIGHTS

Due to the length of my CV, I briefly list here my most significant accomplishments from just the last two years: I served on the program committees of the two top algorithm engineering conferences (ALENEX 2016, ESA 2018), and published ten papers in peer-reviewed venues, including top-tier conferences sponsored by the ACM, SIAM, and IEEE societies. My paper at GECCO 2017 (an ACM-sponsored conference on evolutionary algorithms) was nominated for the best paper award.

In addition to teaching five courses/year at Colgate, I have supervised five bachelor's theses and 4 master's theses and I am currently supervising a bachelor's thesis. I have also supervised eight undergraduates in other research-related projects in the last year. I am faculty supervisor to the *Colgate Coders*, a diverse campus club that fosters programming creative student-driven projects and I currently train Colgate's ACM ICPC Programming Contest team.

EDUCATION

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

RESEARCH

I develop efficient algorithms to solve real-world scalability problems in network analysis with applications to computational sociology, biology, and chemistry (to name a few). Through interdisciplinary collaboration and the algorithm engineering paradigm, I explore algorithm efficiency in both theory and practice, with the ultimate goal of designing algorithms that are *practical*. Some items from my active research agenda include subgraph enumeration, network visualization, and exact and heuristic algorithms for combinatorial optimization problems.

POST-GRAD PROFESSIONAL EXPERIENCE

Visiting Assistant Professor, *Colgate University*　　　　　　　**Jul. 2016—Present**
5 courses/year, including: Intro. to Computing; Algorithms; Advanced Algorithms
Scaling up combinatorial optimization to massive data sets

Postdoctoral Researcher, *Karlsruhe Institute of Technology*　　　**Oct. 2014—Aug. 2016**
Large-scale combinatorial optimization algorithms, with Peter Sanders

Software Engineer (R&D), *Intel Corporation*　　　　　　　**Jul. 2011—Sep. 2014**
Algorithms for massively parallel lithographic simulations, Lithography Algorithms Group

HONORS AND AWARDS

Fellowships/Scholarships

- *Graduate Assistance in Areas of National Need (GAANN) Fellowship*, 2008-2009

Research Awards

- *Best Paper Nominee*, IEEE International Parallel & Distributed Processing Symposium (IPDPS 2018)
- *Best Paper Nominee*, The Genetic and Evolutionary Computation Conference (GECCO 2017)
- *Best Paper*, International Symposium on Experimental Algorithms (SEA 2011)

Selective Research Programs

- *NASA Partnership Awards for the Integration of Research into Undergraduate Education (PAIR) Project*, 2005–2006
- *NSF Research Experience for Undergraduates (REU)*, Harvey Mudd College, 2005

Academic Awards

- *Julian A. McPhee Scholar* (valedictorian), Cal Poly Pomona, College of Science, 2006

PUBLICATIONS

All authors are listed in alphabetical order, except those marked with *.

Book Chapters

B-1 C. Schulz and D. Strash, "Graph Partitioning – Formulations and Applications to Big Data," *Encyclopedia on Big Data Technologies: Graph Data Management and Analytics*, Springer, (to appear).

Papers in Refereed Journals

J-7 M. Korman, M. Löffler, R. I. Silveira, and D. Strash, "On the Complexity of Barrier Resilience for Fat Regions," Computational Geometry Theory & Algorithms, accepted.

J-6 P. San Segundo, J. Artieda, and D. Strash*, "Efficiently Enumerating all Maximal Cliques with Bit-Parallelism," *Computer & Operations Research*, **92**, 2017, pp. 37–46, doi:10.1016/j.cor.2017.12.006.

J-5 S. Lamm, P. Sanders, C. Schulz, D. Strash, R. F. Werneck, "Finding Near-Optimal Independent Sets at Scale," *Journal of Heuristics*, **23**(4), 2017, pp. 207–229, doi:10.1007/s10732-017-9337-x.

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.

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-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-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.

Papers Appearing in Refereed Proceedings

C-20 D. Funke, S. Lamm, P. Sanders, C. Schulz, D. Strash, and M. von Looz, "Communication Agnostic Massively Parallel Graph Generation," *Proc. 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS 2018)*, accepted, **best paper nomination**. arXiv:1710.07565.

C-19 M. Henzinger, A. Noe, C. Schulz, and D. Strash, "Practical Minimum Cut Algorithms," *Proc. 20th Meeting on Algorithm Engineering and Experiments* (ALENEX 2018), accepted, arXiv:1708.06127.

C-18 D. Hespe, C. Schulz, and D. Strash, "Scalable Kernelization for Maximum Independent Sets," *Proc. 20th Meeting on Algorithm Engineering and Experiments* (ALENEX 2018), accepted, arXiv:1708.06151.

C-17 N. Sitchinava and D. Strash, "Reconstructing Generalized Staircase Polygons with Uniform Step Length," *Proc. 25th International Symposium on Graph Drawing and Network Visualization* (GD 2017), to appear, arXiv:1708.09842.

C-16 P. Sanders, C. Schulz, D. Strash, and R. Williger, "Distributed Evolutionary k-way Node Separators" *Proc. Conference on Genetic and Evolutionary Computing and Combinatorial Optimization* (GECCO 2017), pp. 345-352, ACM, 2017, doi:10.1145/3071178.3071204, arXiv:1702.01692, **best paper nomination**.

C-15 R. Kimmig, H. Meyerhenke, and D. Strash, "Shared Memory Parallel Subgraph Enumeration," *Proc. 31st IEEE International Parallel and Distributed Processing Symposium Workshops (IEEE IPDPSW 2017): 7th IEEE Workshop on Parallel / Distributed Computing and Optimization* (PDCO 2017), pp. 519–529, IEEE, 2017, doi:10.1109/IPDPSW.2017.133, arXiv:1705.09358.

C-14 L. Barth, B. Niedermann, M. Nöllenburg, and D. Strash, "Temporal Map Labeling: A New Unified Framework with Experiments," *Proc. 24th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems* (ACM SIGSPATIAL 2016), pp. 23:1–23:10, ACM, 2016, doi:10.1145/2996913.2996957, arXiv:1609.06327.

C-13 D. Strash, "On the Power of Simple Reductions for the Maximum Independent Set Problem," *Proc. 22nd International Computing and Combinatorics Conference* (COCOON 2016), LNCS, vol. 9797, 2016, pp. 345–356, doi:10.1007/978-3-319-42634-1_28, arXiv:1608.00724.

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), LNCS, vol. 9685, 2016, pp. 118–133, doi:10.1007/978-3-319-38851-9_9, arXiv:1602.01659.

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

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), LNCS, vol. 9411, 2015, pp. 192–198, doi:10.1007/978-3-319-27261-0_16, arXiv:1509.00442.

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), LNCS, vol. 8243, 2014, pp. 201–216, doi:10.1007/978-3-642-45346-5_15, arXiv:1302.4707.

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), LNCS, vol. 8037, 2013, pp. 499–511, doi:10.1007/978-3-642-40104-6_43, arXiv:1204.4714.

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-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), LNCS, vol. 6630, 2011, pp. 364–375, doi:10.1007/978-3-642-20662-7_31, arXiv:1103.0318, **best paper**.

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), LNCS, vol. 6506, 2010, pp. 403–414, doi:10.1007/978-3-642-17517-6_36, arXiv:1006.5440.

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), LNCS, vol. 6508, 2010, pp. 128–141, doi:10.1007/978-3-642-17458-2_12, arXiv:1009.0783.

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

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), LNCS, vol. 5878, 2009, pp. 781–791, doi:10.1007/978-3-642-10631-6_79, arXiv:0812.3893.

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.

Papers in Workshops with Informal Proceedings

W-6 H.-K. Ahn, E. Oh, L. Schipf, F. Stehn, and D. Strash, "Quickest Pair-Visibility Problems: How to Minimize Distance-to-Sight,", *Proc. 34th European Workshop on Computational Geometry* (EuroCG 2018), accepted.

W-5 L. Kleist, B. Klemz, A. Lubiw, L. Schlipf, F. Staals, and D. Strash, "Convexity-Increasing Morphs of Planar Graphs," *Proc. 34th European Workshop on Computational Geometry* (EuroCG 2018), accepted.

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

W-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." *Proc. Workshop on Graph Algorithms and Applications* (GA 2011), Zürich, Switzerland, July 2011.

W-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.

W-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.

Manuscripts in Preparation and Under Submission

M-3 H.-K. Ahn, E. Oh, L. Schipf, F. Stehn, and D. Strash, "Quickest Pair-Visibility Problems: How to Minimize Distance-to-Sight." (submitted to SWAT 2018).

M-2 L. Kleist, B. Klemz, A. Lubiw, L. Schlipf, F. Staals, and D. Strash, "Convexity-Increasing Morphs of Planar Graphs," (submitted to WG 2018).

M-1 N. Sitchinava and D. Strash, "Reconstructing Generalized Staircase Polygons with Uniform Step Length," (invited to Journal of Graph Algorithms and Applications).

TALKS GIVEN

Invited Talks
- *Computing Near-Optimal Independent Sets in Huge Complex Networks*, Tohoku University, Sendai, Japan, July 21, 2016

Conference/Workshop Talks
- *Reconstructing Generalized Staircase Polygons with Uniform Step Length*, GD 2017
- *On the Power of Simple Reductions for the Maximum Independent Set Problem*, COCOON 2016
- *Reconstructing a Unit-Length Orthogonally Convex Polygon from its Visibility Graph*, EuroCG 2016
- *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

OPEN SOURCE SOFTWARE DEVELOPED FOR RESEARCH

- **TemporalLabeling**: Computing non-overlapping labels efficiently for GPS navigation: http://i11www.iti.kit.edu/temporallabeling/
- **OpenPLS**: An open implementation of PLS algorithms for maximum clique and related problems: https://github.com/darrenstrash/open-pls
- **KernelMIS**: Computing a maximum independent set exactly through kernelization: https://github.com/darrenstrash/kernel-mis
- **OpenMCS**: An open implementation of the MC* family of maximum clique algorithms: https://github.com/darrenstrash/open-mcs
- **KaMIS**: Karlsruhe Maximum Independent Sets: http://algo2.iti.kit.edu/kamis/
- **QuickCliques**: Efficiently list all maximal cliques of a graph: https://github.com/darrenstrash/quick-cliques

INVITATION-ONLY RESEARCH WORKSHOPS ATTENDED

2017: *1st Hawaiian Workshop on Parallel Algorithms and Data Structures*
2017: *Dagstuhl Seminar: Applications of Topology to the Analysis of 1-Dimensional Objects*
2016: *19th Korean Workshop on Computational Geometry (KWCG)*
2015: *2nd Dynamic Algorithms for Networks in Changing Environments (DANCE)*

RESEARCH VISITS

2017: *Hamilton College*; Clinton, NY, USA. Host: David Perkins
2016: *Tohoku University*; Sendai, Japan. Host: Matias Korman
2014: *Utrecht University*; Utrecht, the Netherlands. Host: Maarten Löffler

COURSES TAUGHT

Colgate University

Spring	2018	*Analysis of Algorithms*	2 sections/2 labs
Fall	2017	*Advanced Algorithms: Algorithms for Big Data*	1 section
Fall	2017	*Analysis of Algorithms*	1 section/1 lab
Spring	2017	*Analysis of Algorithms*	2 sections/2 labs
Fall	2016	*Introduction to Computing I*	2 sections/1 lab

Karlsruhe Institute of Technology

Spring	2016	*Graph Algorithms* (seminar)
Fall	2015	*Computational Geometry*, Master's level
Spring	2015	*Algorithms for Large Social Networks in Theory and Practice* (seminar)

University of California, Irvine

2008–2011	Invited Lecturer for: *Graph Algorithms*, *Computational Geometry*, *Practical Computer Security*, and *Fundamental Data Structures and Algorithms*
2007–2008	Teaching Assistant for: *Data Structures and Algorithms* (3), *Fundamental Data Structures and Algorithms*

NON-THESIS STUDENT PROJECTS SUPERVISED

- Fall 2017: *Accelerating branch-and-reduce search for minimum vertex cover*
  ▶ with Michael Rapaport '18
- Summer 2017: *Fast maximum clique computation using graph partitioning*
  ▶ with Rohan Chaudhari '19
- Summer 2017: *Auto-generating pretty tables of experimental data*
  ▶ with Daniel Gathogo '21
- Spring 2017: *Solving linear programming relaxations with the Hopcroft-Karp algorithm*
  ▶ with Armando Belardo '18
- Spring 2017: *Real-time visualization of trajectory grouping algorithms*
  ▶ with Abeneazer Chafamo '17, Rohan Chaudhari '19, Mark Ma '18, Peter Olson '18, Nianyi Wang '18

THESES SUPERVISED

In Progress (Colgate)

- 2018: Nianyi Wang '18: *Fast Subgraph Enumeration with Graph Partitioning* (Bachelor's)

Completed (Colgate)

- 2017: Haonan (Drew) Zhong '17: *Engineering an Efficient Branch-and-Reduce Algorithm for the Minimum Vertex Cover Problem* (Bachelor's)

Completed (KIT)

- 2017: Sebastian Lamm: *Communication Efficient Algorithms for Generating Massive Networks* (Master's)
- 2017: Demian Hespe: *Scalable Kernelization for the Maximum Independent Set Problem* (Master's)
- 2016: Robert Williger: *Evolutionary k-way Node Separators* (Bachelor's)
- 2016: Marvin Williams: *Evolutionary Graph Coloring* (Bachelor's)
- 2016: Raphael Kimmig: *Parallel Algorithm Engineering for Subgraph Isomorphism Problems* (Diplom: Bachelor's/Master's)
- 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)

PROFESSIONAL SERVICE

Service to Students (Colgate University)

- 2017—present: Faculty advisor for ACM ICPC programming contest preparation
- 2017—present: Faculty advisor for *Colgate Coders* club

Program Committees

- **GD 2018:** 26th International Symposium on Graph Drawing and Network Visualization
- **ESA 2018:** 25th Annual European Symposium on Algorithms, Experimental Track
- **SoCG 2017 Multimedia Track:** 33rd International Symposium on Computational Geometry
- **ALENEX 2016:** 18th Workshop on Algorithm Engineering and Experiments

External Reviewing

I frequently review submissions for journals and refereed conferences. These include:

Journal of the ACM (**JACM**), Algorithmica, Theoretical Computer Science (**TCS**), Journal of Experimental Algorithmics (**ACM JEA**), Computational Geometry: Theory and Applications (**CGTA**), ACM Transactions on Parallel Computing (**ACM TOPC**), INFORMS Journal on Computing (**IJOC**), Journal of Graph Algorithms and Applications (**JGAA**), IEEE Transactions on Parallel and Distributed Systems (**IEEE TPDS**), Journal of Computational Geometry (**JoCG**), The Electronic Journal of Combinatorics (**E-JC**), Journal of Computational Science, ACM-SIAM Symposium on Discrete Algorithms (**SODA**), Canadian Conference on Computational Geometry (**CCCG**), International Symposium on Experimental Algorithms (**SEA**), 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**), International Symposium on Algorithms and Computation (ISAAC), Algorithms, Applied Network Science, IEEE Transactions on Knowledge and Data Engineering (**IEEE TKDE**).

REFERENCES

Teaching References

Vijay Ramachandran, Associate Professor and Chair
Department of Computer Science
Colgate University
13 Oak Drive
Hamilton, NY 13346
Phone: (315) 228-7780
Email: vramachandran@colgate.edu

William Cipolli, Assistant Professor
Department of Mathematics
Colgate University
13 Oak Drive
Hamilton, NY 13346
Phone: (315) 228-6118
Email: wcipolli@colgate.edu

Research References

Peter Sanders, Professor
Karlsruher Institut für Technologie
Fakultät für Informatik
Postfach 6980
76128 Karlsruhe, Germany
Phone: +49 721 608-47580
Email: sanders@kit.edu

Michael T. Goodrich, Professor
Computer Science Department
Donald Bren School of Information & Computer Sciences
University of California, Irvine
Irvine, CA 92697-3435
Phone: (949) 824-9366
Email: goodrich@ics.uci.edu

David Eppstein, Professor
Computer Science Department
Donald Bren School of Information & Computer Sciences
University of California, Irvine
Irvine, CA 92697-3435
Phone: (949) 824-6384
Email: eppstein@ics.uci.edu

Research References (continued)

David M. Mount, Professor
Department of Computer Science
University of Maryland
College Park, MD 20742
Phone: (301) 405-2704
Email: mount@cs.umd.edu