Andrew Danner

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Education

Duke University **Durham, NC**
Ph.D. in Computer Science, December 2006.
Advisors: Dr. Pankaj K. Agarwal and Dr. Lars Arge

Duke University **Durham, NC**
M.S. in Computer Science, September 2004.

Gettysburg College **Gettysburg, PA**
B.S. in Physics and Mathematics, May 1999.

Research Summary

My primary research interests are in algorithms for processing large data sets. In big data applications, the transfer of data between slow hard disks and faster internal memory, not CPU speed, limits computing performance. Working in a theoretical model that mimics this behavior, I am interested in finding efficient ways to solve problems in computational geometry on these large data sets. I also consider applications in the Geographic Information Systems (GIS) community. While my initial emphasis is on the underlying algorithms, I prefer to develop solutions that are practical enough to implement and be applied. Recently I have also explore solutions that run in parallel high performance computing environments including MPI/GPU clusters. Additionally, I have worked in the computer science education area, developing tools and curricula for others to use to teach parallel computing concepts to undergraduates.

Professional Experience

Associate Professor, Swarthmore College, Swarthmore, PA.
[March 2014–Present]

Assistant Professor, Swarthmore College, Swarthmore, PA.
[September 2008–March 2014]

Visiting Assistant Professor, Swarthmore College, Swarthmore, PA.
[September 2006–August 2008]

Adjunct Instructor, Elon University, Elon, NC.
[October – December 2005]

Course Instructor, Duke University, Durham, NC.
[Summer 2002]

Software Intern, Environmental Systems Research Institute, Redlands, CA
[May – August 2003 and May – August 2004]

Publications

Authors listed in bold are undergraduates

"Introducing Parallel Computing in a Second CS Course". T. Newhall, K. C. Webb, V. Chaganti, and A. Danner In *Proc. Workshop on Parallel and Distributed Computing Education* (EduPar-22), 2022. Awarded Best Paper.

"ParaVis: A Library for Visualizing and Debugging Parallel Applications". A. Danner, T. Newhall, and K. C. Webb. In *Proc. Workshop on Parallel and Distributed Computing Education* (EduPar-19), 2019.

"Fire Simulator and Fractals: using a visualization library to introduce CUDA". T. Newhall and A. Danner. In *Proc. Workshop on Parallel and Distributed Computing Education* (EduPar-18), 2018.

"Pervasive Parallel and Distributed Computing in a Liberal Arts College Curriculum". T. Newhall, A. Danner, and K. C. Webb. In *Journal of Parallel and Distributed Computing*, vol. 105, 2017.

"Incorporating Parallel and Distributed Computing Across a Liberal Arts Computer Science Curriculum". T. Newhall, A. Danner, and K. Webb. In *Workshop on Education for High-Performance Computing* (EduHPC), 2014.

"A Comprehensive Support Program for Introductory CS Courses: Improved Student Performance and Retention of Underrepresented Groups". T. Newhall, L. Meeden, A. Danner, A. Soni, F. Ruiz, and R. Wicentowski. In *Proc. ACM Symposium on Computer Science Education* (SIGCSE-14), 2014.

"Integrating Parallel and Distributed Computing Topics into an Undergraduate CS Curriculum". A. Danner and T. Newhall. In *Proc. Workshop on Parallel and Distributed Computing Education* (EduPar-13), 2013.

"Hybrid MPI/GPU Interpolation for Grid DEM Construction". A. Danner and **J. Baskin '10, A. Breslow '11, D. Wilikofsky '12**. In *Proc. ACM Symposium on Advances in Geographic Information Systems*, pages 299–308, 2012.

"Bridge detection in grid terrains and improved drainage enforcement." **R. Carlson '11**, and A. Danner. In *Proc. ACM Symposium on Advances in Geographic Information Systems*, pages 250–260, 2010.

"TERRASTREAM: From Elevation Data to Watershed Hierarchies." A. Danner, T. Mølhave, K. Yi, P. K. Agarwal, L. Arge, and H. Mitasova. In *Proc. ACM Symposium on Advances in Geographic Information Systems*, pages 212–219, 2007.

"I/O Efficient Algorithms and Applications in Geographic Information Systems." A. Danner. Ph.D. thesis, Department of Computer Science, Duke University, 2006.

"From Point Cloud to Grid DEM: A Scalable Approach." P. K. Agarwal, L. Arge, and A. Danner. In Andreas Riedl, Wolfgang Kainz, and Gregory Elmes, editors, *Progress in Spatial Data Handling. 12th International Symposium on Spatial Data Handling*, pages 771–788. Springer-Verlag, 2006.

Publications, continued

"I/O-Efficient Hierarchical Watershed Decomposition of Grid Terrain Models." L. Arge, A. Danner, H. Haverkort, and N. Zeh. In Andreas Riedl, Wolfgang Kainz, and Gregory Elmes, editors, *Progress in Spatial Data Handling. 12th International Symposium on Spatial Data Handling*, pages 825–844. Springer-Verlag, 2006.

"Computing Pfafstetter Labellings I/O-Efficiently." L. Arge, A. Danner, H. Haverkort, and N. Zeh. *Proc. 1st Workshop on Massive Geometric Data Sets*, Pisa, 2005, Münster University, Dept. of Computer Science, technical report 02/05-I.

"I/O-efficient Point Location using Persistent B-trees." L. Arge, A. Danner, and **S. Teh**. *ACM Journal on Experimental Algorithmics 8*, 2003.

"Cache-Oblivious Data Structures for Orthogonal Range Searching." P. Agarwal, L. Arge, A. Danner, and B. Holland-Minkley. In *Proc. ACM Symposium on Computational Geometry (SOCG)*, pages 237–245, 2003.

"I/O-efficient Point Location using Persistent B-trees." L. Arge, A. Danner, and **S. Teh**. In *Proc. Workshop on Algorithm Engineering and Experiments (ALENEX)*, pages 82–92, 2003.

Student Thesis Advising

Joshua Gluck '14 Honors, Performance modeling and analysis of high performance computing applications.

Ryan Carlson '11 Honors, Bridge detection in grid terrains and improved drainage enforcement.

Bryce Wiedenbeck '08, Improved watershed labelling.

Student Research Advising

Michael Selvaggio '21 "Parallel viewshed extraction on multiresolution terrains", Summer 2019.

Joshua Gluck '14, "Performance modeling and analysis of high performance computing applications", Summer 2013.

Jonathan Cronin '14, "Improved drainage enforcement in high resolution terrains", Summer 2013.

David Wilikofsky '12, "Hybrid GPU/MPI interpolation of elevation point clouds", Summer 2011.

Alexander Breslow '11, "Hybrid GPU/MPI interpolation of elevation point clouds", Summer 2010.

Ryan Carlson '11 Honors, "Bridge detection in grid terrains and improved drainage enforcement", Summer 2009 and Summer 2010.

Jake Baskin '10, "Parallelized grid interpolation of elevation point clouds", Summer 2009.

Bryce Wiedenbeck '08 "Improved watershed labelling", Summer 2007.

Grants

Swarthmore College Constance Hungerford Faculty Support Fund. $1500, 2013.

co-PI with PI Tia Newhall on NSF/IEEE-TCPP Early Adopter: Integrating core topics in parallel and distributing computing in the undergraduate CS curriculum. $2500, 2012.

Michener Faculty Fellowship for second semester sabbatical support, 2011-2012, 2022-2023.

Presentations

"ParaVis: A Library for Visualizing and Debugging Parallel Applications" EduPar-19, Rio de Janeiro, May 2019.

"Digital Mapping with Lasers: Breakthroughs and Challenges" Gettysburg College Physics Colloquium, Gettysburg, Pennsylvania, October 2014.

"The Deluge of Data and the Reign of Algorithms" Gettysburg College Computer Science Colloquium Series, Gettysburg, Pennsylvania, April, 2014.

"Integrating Parallel and Distributed Computing Topics into an Undergraduate CS Curriculum" EduPar, Boston, Massachusetts, May, 2013.

"The Deluge of Data and the Reign of Algorithms" Faculty Lecture Series, Swarthmore, Pennsylvania, March, 2013.

"Hybrid MPI/GPU Interpolation for Grid DEM Construction" ACM-GIS, Redondo Beach, California, November 2012.

"External Memory Merge Sort." Department of Computer Science, Washington and Lee University, Lexington, Virginia, Jan 2012.

"Bridge detection in grid terrains and improved drainage enforcement." Department of Geography, Washington and Lee University, Lexington, Virginia, Jan 2012.

"TERRASTREAM: From Elevation Data to Watershed Hierarchies." Washington and Lee University, Lexington, Virginia, Jan 2012.

"Bridge detection in grid terrains and improved drainage enforcement." Duke University, Durham, North Carolina, October 2011.

"Bridge detection in grid terrains and improved drainage enforcement." ACM-GIS, San Jose, California, November 2010.

"Supervised Learning for Bridge Detection in Digital Elevation Models." Bowdoin College, Brunswick, Maine, October 2009.

"TERRASTREAM: From Elevation Data to Watershed Hierarchies." Williams College, Williamstown, Massachusetts, September 2008.

"TERRASTREAM: From Elevation Data to Watershed Hierarchies." ACM-GIS, Seattle, Washington, November 2007.

Presentations (continued)

"From Point Cloud to Grid DEM: A Scalable Approach." SDH, Vienna, Austria, July 2006.

"I/O-Efficient Hierarchical Watershed Decomposition of Grid Terrain Models." SDH, Vienna, Austria, July 2006.

"Methods for Efficient Processing of Large Terrain Datasets and Applications." NCGIS, Winston-Salem, North Carolina, March 2005.

"Cache-Oblivious Data Structures for Orthogonal Range Searching." ACM Symposium on Computational Geometry, San Diego, California, June 2003.

"I/O-efficient Point Location using Persistent B-trees." Workshop on Algorithm Engineering and Experiments, Baltimore, Maryland, January 2003.

Professional Service

ACM SIGSPATIAL (ACM-GIS) Reviewer 2008–2009, 2011–Present

SIGCSE Reviewer 2007–2016.

ACM SIGSPATIAL newsletter editor, November 2011-November 2014.

ACM-GIS Proceedings Co-Chair, 2009–2010.

Institutional Service

Computer Science Department Chair, 2021–2022, 2023-Present.

ΦBK Executive Committee Member 2009–Present.

Center for Innovation and Leadership Advisory Committee, 2021-2022.

Aydelotte Foundation Steering Committee, 2020–2021.

Fellowship and Prizes Committee, 2008–2010,2018–2019.

Athletics Master Plan Steering Committee, 2018–2019

Middle States Working Group 8 Co-Chair, 2017-2018

CJC Committee, 2016–2017

Parking and Transportation Committee, 2013–2015.

Equal Opportunity Advisory Committee, 2012–2014.

ITS Committee, 2009–2011, 2013–2014.

Sigma Xi Treasurer, 2009–2011.

ACM programming contest coach, 2006–2008.

Course Teaching

Enrollment shown in parentheses. Courses with separate lab sections are labelled with +L.

Algorithmic Problem Solving/Intro to Computer Science (CPSC21)
Spring 2007 (17), Fall 2007 (21), Fall 2008 (23), Spring 2009 (25), Fall 2009 (24+L), Fall 2012 (29+L), Fall 2013 (34+L), Spring 2015 (34+L), Fall 2015 (26+L), Spring 2019 (33+L), Fall 2019 (34+L), Spring 2022 (34+L)

Introduction to Computer Systems (CPSC31)
Fall 2014 (45+L), Spring 2021 (36+L), Fall 2021 (Lab Only 24)

Data Structures and Algorithms (CPSC35)
Fall 2007 (9), Spring 2008 (28), Spring 2010 (28+L), Fall 2010 (26+L), Spring 2011 (40+L), Spring 2017 (Lab Only 20), Fall 2017 (Lecture Section 1, 38, Labs A and B 37)

Computer Graphics (CPSC40) – Cross-Listed as ENGN26
Spring 2009 (18), Spring 2011 (20+L), Spring 2013 (27+L), Fall 2014 (26+L), Fall 2016 (section 1 25+L, section 2 25+L), Fall 2018 (14+L), Fall 2020 (19+L)

Algorithms (CPSC41)
Fall 2006 (11), Fall 2008 (12), Fall 2012 (44+L)

Theory of Computation (CPSC46) – Cross-Listed as MATH46
Spring 2007 (18), Spring 2010 (29+L), Spring 2014 (30+L), Spring 2018 (30+L)

Directed Reading in Computer Graphics (CPS93.02)
Fall 2021 (1)

Directed Reading in 3D Game Engine Design (CPS93.02)
Spring 2015 (3)

Research Project in Flow Routing on Noisy Terrains (CPS93)
Spring 2013 (1)

Research Project in Scalable Watershed Labelling (CPS93)
Fall 2007 (1)

Senior Conference - Computational Geometry and GIS (CPSC97)
Fall 2006 (12), Spring 2008 (17)

Other

Please refer to `http://www.cs.swarthmore.edu/~adanner/` for additional information.