

John Douglas Owens

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RESEARCH INTERESTS Computer systems; graphics architectures, general-purpose computation on graphics hardware / GPU computing, parallel architectures and programming models, stream architectures.

EDUCATION **Stanford University** Stanford, California
Department of Electrical Engineering 1995–2003
Ph.D., Electrical Engineering, January 2003
M.S., Electrical Engineering, March 1997
Advisors: Professors William J. Dally and Pat Hanrahan
Dissertation Topic: “Computer Graphics on a Stream Architecture”

University of California, Berkeley Berkeley, California
Department of Electrical Engineering and Computer Sciences 1991–1995
B.S., Highest Honors, Electrical Engineering and Computer Sciences, June 1995

EXPERIENCE **University of California, Davis** Davis, California
Associate Professor 2008–
Assistant Professor 2003–2008
Associate Professor in the Department of Electrical and Computer Engineering; member of Graduate Groups of Electrical and Computer Engineering, Computer Science, and Applied Mathematics. Visiting Scientist, Lawrence Berkeley National Laboratory. Visiting Scientist, Los Alamos National Laboratory.

Stanford University Stanford, California
Research Assistant 1997–2002
An architect of the Imagine Stream Processor under the direction of Professor William J. Dally. Responsible for major portions of hardware and software design for Imagine and its tools and applications.

Stanford University Stanford, California
Teaching Assistant Fall 2001
Teaching assistant for Computer Science 99s, “The Coming Revolution in Computer Architecture”, under Professor William J. Dally. Designed course with Professor Dally, including lecture topics, readings, and laboratories.

Interval Research Corporation Palo Alto, California
Consultant 1997–2000
Investigated new graphics architectures under the direction of Dr. Matt Regan.

Stanford University Stanford, California
Research Assistant 1995–1997
Under the direction of Professor Pat Hanrahan, designed and built the Lightning distributed framebuffer.

Silicon Studio, Silicon Graphics Inc. Mountain View, California
Software Engineer Summer 1995
Performed development work on SGI’s Firewalker video-game authoring system, mastering game titles to game platforms.

University of California, Berkeley Berkeley, California
Teaching Assistant Spring 1995
Teaching assistant for Computer Science 150, “Digital Design”, under Professor Richard Newton.
Responsible for laboratory section, office hours, grading, and midterm review.

Intel Corporation, P7 Architecture Group Santa Clara, California
Design Engineer Summer 1994
Designed and implemented graphical user interface to Intel’s Sphinx microarchitecture simulator.

First Person Inc. (subsidiary of Sun Microsystems Inc.) Palo Alto, California
Hardware Designer Summer 1993
Assisted in design of NTSC SBus-compatible framebuffer.

ViewStar Corporation Emeryville, California
Quality Assurance Engineer Summer 1992
Tested and debugged ViewStar’s Document Management System.

Oracle Corporation Redwood Shores, California
Technical Staff Summer 1991
Tested and debugged Oracle for Macintosh.

**REFEREED
PUBLICATIONS**

Shengren Li, Lance Simons, Fatemeh Abbasinejad, Jagadeesh Parkaravoor, Nina Amenta, and John D. Owens. “kANN on the GPU with Shifted Sorting”. In *Proceedings of High Performance Graphics 2012*. June 2012.

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Ritesh A. Patel, Yao Zhang, Jason Mak, and John D. Owens. “Parallel Lossless Data Compression on the GPU”. In *Proceedings of Innovative Parallel Computing (InPar ’12)*. May 2012.

Andrew Davidson and John Owens. “Toward Techniques for Auto-tuning GPU Algorithms”. In Kristján Jónasson, editor, *Applied Parallel and Scientific Computing*, volume 7134 of *Lecture Notes in Computer Science*, pages 110–119. Springer Berlin / Heidelberg, February 2012.

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finement of quadrilateral and hexahedral meshes using two-refinement templates”. *International Journal for Numerical Methods in Engineering*, 88(10):974–985, 9 December 2011.

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Dan A. Alcantara, Vasily Volkov, Shubhabrata Sengupta, Michael Mitzenmacher, John D. Owens, and Nina Amenta. “Building an Efficient Hash Table on the GPU”. In Wen-mei W. Hwu, editor, *GPU Computing Gems*, volume 2, chapter 4, pages 39–53. Morgan Kaufmann, October 2011.

Mohamed S. Ebeida, Scott A. Mitchell, Andrew A. Davidson, Anjul Patney, Patrick M. Knupp, and John D. Owens. “Efficient and Good Delaunay Meshes From Random Points”. In *Proceedings of the SIAM Conference on Geometric and Physical Modeling (GD/SPM11)*, pages 1506–1515. October 2011.

Mark Silberstein, Assaf Schuster, and John D. Owens. “Accelerating sum-product computations on hybrid CPU-GPU architectures”. In Wen-mei W. Hwu, editor, *GPU Computing Gems*, volume 2, chapter 36, pages 501–517. Morgan Kaufmann, October 2011.

Jeff A. Stuart, Pavan Balaji, and John D. Owens. “Extending MPI to Accelerators”. In *ASBD 2011: First Workshop on Architectures and Systems for Big Data*. October 2011.

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John Jenkins, Isha Arkatkar, John D. Owens, Alok Choudhary, and Nagiza F. Samatova. “Lessons Learned from Exploring the Backtracking Paradigm on the GPU”. In *Euro-Par 2011: Proceedings of the 17th International European Conference on Parallel and Distributed Computing*, volume 6853 of *Lecture Notes in Computer Science*, pages 425–437. Springer, August/September 2011.

Everett H. Phillips, Yao Zhang, Roger L. Davis, and John D. Owens. “Acceleration of 2-D Compressible Flow Solvers with Graphics Processing Unit Clusters”. *Journal of Aerospace Computing, Information, and Communication*, 8(8):237–249, August 2011.

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Christopher P. Stone, Earl P. N. Duque, Yao Zhang, David Car, John D. Owens, and Roger L. Davis. “GPGPU parallel algorithms for structured-grid CFD codes”. In *Proceedings of the 20th AIAA Computational Fluid Dynamics Conference*, 2011-3221. June 2011.

Andrew Davidson, Yao Zhang, and John D. Owens. “An Auto-tuned Method for Solving Large

Tridiagonal Systems on the GPU”. In *Proceedings of the 25th IEEE International Parallel and Distributed Processing Symposium*, pages 956–965. May 2011.

Jeff A. Stuart and John D. Owens. “Multi-GPU MapReduce on GPU Clusters”. In *Proceedings of the 25th IEEE International Parallel and Distributed Processing Symposium*, pages 1068–1079. May 2011.

Andrew Davidson and John D. Owens. “Register Packing for Cyclic Reduction: A Case Study”. In *Proceedings of the Fourth Workshop on General Purpose Processing on Graphics Processing Units*, pages 4:1–4:6. March 2011.

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Jeff A. Stuart, Cheng-Kai Chen, Kwan-Liu Ma, and John D. Owens. “Multi-GPU Volume Rendering using MapReduce”. In *HPDC '10: Proceedings of the 19th ACM International Symposium on High Performance Distributed Computing / MAPREDUCE '10: The First International Workshop on MapReduce and its Applications*, pages 841–848. June 2010.

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Workloads on the GPU”. In *Proceedings of High Performance Graphics 2010*, pages 29–37. June 2010.

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Luke J. Gosink, Kesheng Wu, E. Wes Bethel, John D. Owens, and Kenneth I. Joy. “Data Parallel Bin-Based Indexing for Answering Queries on Multi-Core Architectures”. In *Proceedings of the 21st International Conference on Scientific and Statistical Database Management*, volume 5566 of *Lecture Notes in Computer Science*, pages 110–129. Springer, June 2009.

Jeff A. Stuart and John D. Owens. “Message Passing on Data-Parallel Architectures”. In *Proceedings of the 23rd IEEE International Parallel and Distributed Processing Symposium*. May 2009.

Brian Budge, Tony Bernardin, Jeff A. Stuart, Shubhabrata Sengupta, Kenneth I. Joy, and John D. Owens. “Out-of-core Data Management for Path Tracing on Hybrid Resources”. *Computer Graphics Forum (Proceedings of Eurographics 2009)*, 28(2):385–396, April 2009.

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Sanjiv S. Samant, Junyi Xia, Pınar Muyan-Özçelik, and John D. Owens. “High performance computing for deformable image registration: Towards a new paradigm in adaptive radiotherapy”. *Medical Physics*, 35(8):3546–3553, August 2008.

Pınar Muyan-Özçelik, John D. Owens, Junyi Xia, and Sanjiv S. Samant. “Fast Deformable Registration on the GPU: A CUDA Implementation of Demons”. In *Proceedings of the 2008 International Conference on Computational Science and Its Applications (First Technical Session on UnConventional High Performance Computing [UCHPC '08])*, pages 223–233. July 2008.

Mark Silberstein, Assaf Schuster, Dan Geiger, Anjul Patney, and John D. Owens. “Efficient Computation of Sum-products on GPUs Through Software-Managed Cache”. In *Proceedings of the 22nd ACM International Conference on Supercomputing*, pages 309–318. June 2008.

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Mark Harris, Shubhabrata Sengupta, and John D. Owens. “Parallel Prefix Sum (Scan) with CUDA”. In Hubert Nguyen, editor, *GPU Gems 3*, chapter 39, pages 851–876. Addison Wesley, August 2007.

Shubhabrata Sengupta, Mark Harris, Yao Zhang, and John D. Owens. “Scan Primitives for GPU Computing”. In *Graphics Hardware 2007*, pages 97–106. August 2007. Best Paper Award.

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John D. Owens. “Towards Multi-GPU Support for Visualization”. *Journal of Physics: Conference Series*, 78:012055 (5pp), June 2007.

John D. Owens, David Luebke, Naga Govindaraju, Mark Harris, Jens Krüger, Aaron E. Lefohn, and Tim Purcell. “A Survey of General-Purpose Computation on Graphics Hardware”. *Computer Graphics Forum*, 26(1):80–113, March 2007.

John D. Owens. “The Installation and Use of OpenType Fonts in \LaTeX ”. *TUGboat: Communications of the \TeX Users Group*, 27(2):112–118, December 2006.

Adam Moerschell and John D. Owens. “Distributed Texture Memory in a Multi-GPU Environment”. In *Graphics Hardware 2006*, pages 31–38. September 2006.

Leo Szumel and John D. Owens. “The Virtual Pheromone Communication Primitive”. In Phillip B. Gibbons, Tarek Abdelzaher, James Aspnes, and Ramesh Rao, editors, *Proceedings of the Second IEEE International Conference on Distributed Computing in Sensor Systems*, volume 4026 of *Lecture Notes in Computer Science*, pages 135–149. Springer, June 2006.

Aaron E. Lefohn, Shubhabrata Sengupta, Joe Kniss, Robert Strzodka, and John D. Owens. “Glift: Generic Data Structures for the GPU”. In *Proceedings of the 2006 Workshop on Edge Computing Using New Commodity Architectures*, pages D–15–16. May 2006.

Shubhabrata Sengupta, Aaron E. Lefohn, and John D. Owens. “A Work-Efficient Step-Efficient Prefix Sum Algorithm”. In *Proceedings of the 2006 Workshop on Edge Computing Using New Commodity Architectures*, pages D–26–27. May 2006.

Sung W. Park, Lars Linsen, Oliver Kreylos, John D. Owens, and Bernd Hamann. “Discrete Sibson Interpolation”. *IEEE Transactions on Visualization and Computer Graphics*, 12(2):243–253, March/April 2006.

Aaron E. Lefohn, Joe Kniss, Robert Strzodka, Shubhabrata Sengupta, and John D. Owens. “Glift: Generic, Efficient, Random-Access GPU Data Structures”. *ACM Transactions on Graphics*, 25(1):60–99, January 2006.

Sung Park, Lars Linsen, Oliver Kreylos, John D. Owens, and Bernd Hamann. "A Framework for Real-Time Volume Visualization of Streaming Scattered Data". In *Proceedings of the Tenth International Fall Workshop on Vision, Modeling, and Visualization*, pages 225–232. November 2005.

Joe Kniss, Aaron Lefohn, Shubhabrata Sengupta, Robert Strzodka, and John D. Owens. "Octree Textures on Graphics Hardware". In *Technical Sketches Program, ACM SIGGRAPH 2005*. August 2005.

Aaron Lefohn, Shubhabrata Sengupta, Joe Kniss, Robert Strzodka, and John D. Owens. "Dynamic Adaptive Shadow Maps on Graphics Hardware". In *Technical Sketches Program, ACM SIGGRAPH 2005*. August 2005.

John D. Owens, David Luebke, Naga Govindaraju, Mark Harris, Jens Krüger, Aaron E. Lefohn, and Tim Purcell. "A Survey of General-Purpose Computation on Graphics Hardware". In *Eurographics 2005, State of the Art Reports*, pages 21–51. August 2005.

Leo Szumel, Jason LeBrun, and John D. Owens. "Towards a Mobile Agent Framework for Sensor Networks". In *Proceedings of the Second IEEE Workshop on Embedded Networked Sensors (EmNetS-II)*, pages 79–87. May 2005.

Aaron Lefohn, Joe Kniss, and John Owens. "Implementing Efficient Parallel Data Structures on GPUs". In Matt Pharr, editor, *GPU Gems 2*, chapter 33, pages 521–545. Addison Wesley, March 2005.

John Owens. "Streaming Architectures and Technology Trends". In Matt Pharr, editor, *GPU Gems 2*, chapter 29, pages 457–470. Addison Wesley, March 2005.

Andrew T. Riffel, Aaron E. Lefohn, Kiril Vidimce, Mark Leone, and John D. Owens. "Mio: Fast Multipass Partitioning via Priority-Based Instruction Scheduling". In *Graphics Hardware 2004*, pages 35–44. August 2004.

Ujval J. Kapasi, Scott Rixner, William J. Dally, Brucek Khailany, Jung Ho Ahn, Peter Mattson, and John D. Owens. "Programmable Stream Processors". *IEEE Computer*, 36(8):54–62, August 2003.

Brucek Khailany, William J. Dally, Scott Rixner, Ujval J. Kapasi, John D. Owens, and Brian Towles. "Exploring the VLSI Scalability of Stream Processors". In *Proceedings of the Ninth Annual International Symposium on High-Performance Computer Architecture*, pages 153–164. February 2003.

Ujval J. Kapasi, William J. Dally, Brucek Khailany, John D. Owens, and Scott Rixner. "The Imagine Stream Processor". In *Proceedings of the IEEE International Conference on Computer Design*, pages 282–288. Freiburg, Germany, September 2002.

John D. Owens, Brucek Khailany, Brian Towles, and William J. Dally. "Comparing Reyes and OpenGL on a Stream Architecture". In *Graphics Hardware 2002*, pages 47–56. September 2002.

John D. Owens, Ujval J. Kapasi, Peter Mattson, Brian Towles, Ben Serebrin, Scott Rixner, and William J. Dally. "Media Processing Applications on the Imagine Stream Processor". In *Proceedings of the IEEE International Conference on Computer Design*, pages 295–302. Freiburg, Germany, September 2002.

Ben Serebrin, John D. Owens, Brucek Khailany, Peter Mattson, Ujval J. Kapasi, Chen H. Chen, Jinyung Namkoong, Stephen P. Crago, Scott Rixner, and William J. Dally. "A Stream Processor

Development Platform”. In *Proceedings of the IEEE International Conference on Computer Design*, pages 303–308. Freiburg, Germany, September 2002.

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Peter Mattson, William J. Dally, Scott Rixner, Ujval J. Kapasi, and John D. Owens. “Communication Scheduling”. In *Proceedings of the Ninth International Conference on Architectural Support for Programming Languages and Operating Systems*, pages 82–92. November 2000.

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John D. Owens, William J. Dally, Ujval J. Kapasi, Scott Rixner, Peter Mattson, and Ben Mowery. “Polygon Rendering on a Stream Architecture”. In *2000 SIGGRAPH/Eurographics Workshop on Graphics Hardware*, pages 23–32. August 2000.

Scott Rixner, William J. Dally, Ujval J. Kapasi, Peter Mattson, and John D. Owens. “Memory Access Scheduling”. In *Proceedings of the 27th International Symposium on Computer Architecture*, pages 128–138. June 2000.

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OTHER PUBLICATIONS

Stanley Tzeng and John D. Owens. “Finding Convex Hulls Using Quickhull on the GPU”. *CoRR*, abs/1201.2936(1201.2936v1), January 2012.

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Publication links are available at <http://www.ece.ucdavis.edu/~jowens/pubs.html>.

FUNDING

Intel Science and Technology Center for Visual Computing. PI P. Hanrahan (Stanford), theme leads M. Agrawala (Berkeley), D. James (Cornell), J. Owens (UC Davis), S. Seitz (Washington). 8 universities participating, ~30 PIs. January 2011–December 2015. \$15M over 5 years.

National Science Foundation (Award # OCI-1032859) *SDCI: HPC: Improvement: Infrastructure for Multi-Node Manycore Computing*. Office of Cyberinfrastructure. PI J. Owens. September 2010–August 2013. \$391,859.

National Science Foundation (Award # CCF-1017399) *SHF:Small:Software Fundamentals for Manycore Systems*. Division of Computer and Communication Foundations—Software and Hardware Foundations. PI J. Owens. August 2010–July 2013. \$499,825.

Center for Information Technology Research in the Interest of Society (CITRIS) seed funding grant *Computational Tools for River and Estuary Flow Prediction*. PI J. Owens, co-PI B. Younis. Fall 2010–Summer 2011. \$70,810.

National Science Foundation (Award # IIS-0964357) *HCC: Medium: Collaborative Research: Data-Parallel Hash Tables: Theory, Practice and Applications*. IIS—Human-centered Computing program. PI A. Amenta; co-PIs J. Owens, M. Mitzenmacher (Harvard). August 2010–July 2013. Proposed \$677,994 (UCD); funded at \$532,084.

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National Nuclear Security Administration (NNSA). *Real-Time Three-Dimensional Exploration of Wide-Area High-Resolution Aerial Video* (Award # SC09-PDP08-23). PI K. Joy, co-PI J. Owens. \$800,000.

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UC MICRO proposal *Automotive Computing using the GPU* (award #08-57, tied to BMW, NVIDIA, and Rambus gifts dated March 2008). PI J. Owens. September 2008–December 2009. \$28,208.

BMW. Unrestricted gift. March 2008. \$25,000.

NVIDIA. Unrestricted gift. March 2008. \$25,000.

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UC Discovery Grant, Industry-University Cooperative Research Program, *Workshop on On-and Off-Chip Interconnection Networks for Multicore Systems* (award # COM06-324), PI J. Owens. \$15,000.

National Science Foundation (CCF), *Workshop on On-And Off-Chip Interconnection Networks for Multicore Systems* (award # 0644602), PI W. Dally, co-PI J. Owens, awarded August 2006. \$29,638.

Undergraduate Education in Parallel Architecture, NVIDIA Teaching Fellowship, Fall 2006. \$25,000.

A Common Software Interface for GPU Data Structures, Los Alamos National Laboratory. PI J. Owens. 15 July 2006–15 September 2006. \$32,663.

Department of Energy “Scientific Discovery through Advanced Computing” program. *SciDAC Institute for Ultra-Scale Visualization* (contract DE-FC02-06-ER25777). PI K.-L. Ma, co-PIs R. Ross, N. Max, H.-W. Shen, K. Moreland, J. Owens, J. Huang, G. Humphreys. 2006–2011. \$8,228,429.

UC MICRO proposal *Scientific Computing for Energy Technology Applications Using Graphics Hardware* (tied to Chevron gift dated October 2005). PI J. Owens. August 2006–December 2007. \$16,625.

Intel Corporation Grant: *CEEL: Computer Engineering Education Laboratories with Wireless Networking Extension at UC Davis*. 2006. PI C.-N. Chuah; co-PIs S. Ghiasi, J. Owens, P. Mohapatra, K. Wilken. \$95,254 (\$50,000 from Intel).

Chevron. Unrestricted gift. October 2005. \$20,000.

National Science Foundation (Award # CCF-0541448) *Data Structures for Data-Parallel Architectures*. Foundations of Computing Processes and Artifacts program. PI J. Owens. July 2006–June 2009. Proposed \$419,436; funded at \$200,000.

Lockheed-Martin (via DOD) *Assessment of GPUs for DoD DSP Applications*. PI J. Owens. June 2005–June 2006. \$50,000.

UC Davis–Los Alamos National Laboratory “Cooperative Agreement for Research and Education” (“CARE”) proposal *Solving the Multipass Partitioning Problem for Graphics Hardware*. PI J. Owens; co-PI P. McCormick, LANL. 1 October 2004–31 January 2005. \$54,708.

Chevron-Texaco. Unrestricted gift. September 2004. \$20,000.

UC MICRO proposal *Scientific Computing for Energy Technology Applications Using Graphics Hardware* (tied to ChevronTexaco gift dated December 2003). PI J. Owens. August 2004–December 2005. \$14,588.

Department of Energy Early Career Principal Investigator Award. *A Programming Framework for Scientific Applications on CPU-GPU Systems*. PI J. Owens. 3 years, 15 August 2004–15 August 2007, granted two one-year no-cost extensions. \$300,000.

Los Alamos National Laboratory. *GPU/MPP Investigations*. PI J. Owens, summer 2004. \$18,000.

Chevron-Texaco. Unrestricted gift. December 2003. \$20,000.

UCD Faculty Research Grant Program. *The UC Davis Metanet: A Scalable, Ubiquitous, Extensible Framework for Sensor Networks*. PI J. Owens. August 2003 (for 2003–2004 academic year). \$14,000.

UCD New Faculty Research Grant. *Client-Side Computation using Graphics Hardware for Video-conferencing and Immersive Environments*. PI J. Owens. January 2003. \$4000.

PATENTS

US 7589719. “Fast Multi-pass Partitioning via Priority Based Scheduling”. John Douglas Owens, Andy Riffel, Aaron Lefohn, Mark Leone, and Kiril Vidimce. Issued 15 September 2009.

US 7100026: “System and Method for Performing Efficient Conditional Vector Operations for Data Parallel Architectures.” William J. Dally, Scott Rixner, John D. Owens, and Ujval J. Kapasi. Issued 29 August 2006.

US 6269435: “System and method for implementing conditional vector operations in which an input vector containing multiple operands to be used in conditional operations is divided into two or more output vectors based on a condition vector”. William J. Dally, Scott Whitney Rixner, John Owens, and Ujval J. Kapasi. Issued 31 July 2001.

EXTERNAL TALKS

2012: Lawrence Livermore National Laboratory, Synchronization-reducing and Communication-reducing Algorithms and Programming Models for Large-scale Simulations Workshop (plenary talk), Intel Science and Technology Center for Visual Computing yearly retreat, Intel Science and Technology Center for Visual Computing review, Lawrence Berkeley National Laboratory, UC Davis Graduate Group of Applied Mathematics 7th Annual Mini-Conference, Advanced Micro Devices, Qualcomm Research Silicon Valley

2011: Twitter, Northrup Grumman, Pacific Northwest National Laboratory, Harvard (CS 264 guest lecture), Intel Science and Technology Center for Visual Computing webinar, Intel Science and Technology Center for Visual Computing yearly retreat, Harvard (Computer Science Colloquium), MIT, Oxford University, Workshop on Hybrid Multi-core Computing, Infosys

2010: Dagstuhl Seminar 10091 (Data Structures), Stanford (CS 448s guest lecture), KLA Tencor, Lawrence Berkeley National Laboratory, Programming Environments for Emerging Parallel Systems (PEEPS), 6th International Workshop on Parallel Matrix Algorithms and Applications (PMAA '10), Oak Ridge National Laboratory, SciDAC 2010, Center for Scalable Application Development Software (CScADS) Workshop on Scientific Data and Analytics for Extreme Scale Computing, ARM External Research Speaker Conference

2009: Nara Institute of Science and Technology, UC Davis Faculty Mentoring Faculty Program,

Intel Visual Computing Group Tech Summit (Folsom) (keynote), Heterogeneity in Computing Workshop (keynote), GPU Technology Conference (Santa Clara), Supercomputing 2009 (tutorial)

2008: Architectural Support for Programming Languages and Operating Systems (course), International Ph.D. School in Algorithms for Advanced Processor Architectures (Copenhagen), Lund University (Sweden), Workshop on Programming Massively Parallel Processors (Urbana-Champaign), ACM SIGGRAPH (course), HP Labs, IBM Watson, Cal Poly San Luis Obispo, UCSB

2007: Intel Microprocessor Research Lab (Santa Clara), International Workshop on Logic Synthesis, IEEE/NATEA Annual Conference (2007 New Frontiers in Computing Technology), Rambus Tech Forum (Santa Clara), ACM SIGGRAPH 2007 (course) (San Diego), Microsoft Research Asia, Beijing Capital Normal University, Baidu, Tsinghua University, Apple Computer, Supercomputing 2007 (Austin) (tutorial)

2006: Shell Research (Houston), UC Berkeley, Supercomputing 2006 (tutorial), Intel (Folsom)

2005: Microsoft Research, Intel (Santa Clara), National Center for Atmospheric Research, University of Colorado, Graphics Hardware (panel talk), Eurographics, IEEE Visualization (tutorial), Lawrence Livermore National Laboratory, Lockheed-Martin

2004: Microsoft Research, Intel Research (Berkeley), UCSF, High-Performance Embedded Computing Conference, IEEE Visualization (tutorial)

2003: Pixar Animation Studios, Stanford, Sony Research Laboratory, NVIDIA Corporation, Intel Media Research Laboratory

2002 and earlier: Interval Research Corporation, UCLA, UC Davis, UCSD, Sacramento State University, San Francisco State University

PROFESSIONAL SERVICE

Leadership Service

Innovative Parallel Computing (InPar)

—Paper Chair (2012)

Siggraph/Eurographics High Performance Graphics

—General Chair (2011)

—Program Chair (2009)

Graphics Hardware

—Papers Chair (2008)

—Publicity Chair (2005, 2006, 2007)

IS&T/SPIE Electronic Imaging: Parallel Processing for Imaging Applications

—Conference Chair (2011)

2006 Workshop on On- and Off-Chip Interconnection Networks for Multicore Systems

—Chair

Program/Paper Committee Service

Siggraph/Eurographics High Performance Graphics

—Paper Committee (2012, 2010)

ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming (PPoPP)

—Program Committee (2012)

International Conference on Parallel Processing (ICPP)

—Program Committee (2012)

20th Euromicro International Conference on Parallel, Distributed and Network-based Processing, Special Session on GPU Computing and Hybrid Computing

—Program Committee (2012)

ADBIS Workshop on GPUs in Databases (GID)

- Program Committee (2012, 2011)
- Symposium on Application Accelerators in High Performance Computing
- Program Committee (2012, 2011, 2009)
- Second Workshop on Hybrid Multi-core Computing (WHMC 2011)
- Program Committee (2011)
- First International Workshop on Characterizing Applications for Heterogeneous Exascale Systems (CACHES)
- Program Committee (2011)
- IEEE/ACM Supercomputing
- Posters Committee (2011)
- Program Committee (Applications) (2009, 2008)
- Eurographics
- Program Committee, “Computational Graphics” (2009)
- International Program Committee, Short Papers (2007)
- Symposium on Interactive 3D Graphics and Games
- Program Committee (2009, 2008)
- Workshop on General Purpose Processing on Graphics Processing Units
- Program Committee (Second Workshop, 2009)
- Program Committee (First Workshop, 2007)
- 2nd Workshop on Programming Models for Ubiquitous Parallelism (PMUP 2007)
- Program Committee
- External Participant (report contributor), Recommendations from the DOE/ASCR Workshop on Visual Analysis and Data Exploration for the Exascale Era (2007)
- GPGPU Workshop at the 6th International Conference on Computational Science (ICCS 2006)
- Program Committee
- Graphics Hardware
- Program Committee (2004)
- International Workshop on Networked Sensing Systems
- Program Committee (2004, 2005)

Government Review Panels

- Los Alamos National Laboratory Information & Knowledge Sciences (IKS) Capability Review Committee (2011)
- Department of Energy’s Small Business Innovative Research Program, panelist (2011)
- National Science Foundation proposal panelist and reviewer (2003, 2004, 2005)

TUTORIALS AND COURSES

- Panel Moderator, “Industry Panel on Future Directions in Parallel Processing”, IS&T/SPIE Electronic Imaging: Parallel Processing for Imaging Applications, (January 2011)
- IEEE/ACM Supercomputing, co-instructor, full-day tutorials
- “High Performance Computing with CUDA” (November 2009)
- “High Performance Computing on GPUs with CUDA” (November 2007)
- “General Purpose Computation on Graphics Hardware” (November 2006)
- ACM SIGGRAPH, co-instructor, half-day course, “Beyond Programmable Shading: Fundamentals” (August 2008)
- International Ph.D. School in Algorithms for Advanced Processor Architectures, The IT University of Copenhagen, Denmark, Instructor (June 2008)
- Panel Moderator, “GPUs vs. Multicore CPUs: On a Converging Course or Fundamentally Different?”, Graphics Hardware 2008 (June 2008)
- Thirteenth Annual Conference on Architectural Support for Programming Languages and Operating Systems (ACM ASPLOS ‘08), co-instructor, half-day course, “CUDA: A Heterogeneous Parallel Programming Model for Manycore Computing” (March 2008)
- ACM SIGGRAPH, co-instructor, full-day course, “General Purpose Computation on Graphics Hardware” (August 2007)
- IEEE Visualization, co-instructor, full-day tutorial, “General Purpose Computation on Graphics

Hardware” (October 2004, October 2005)

**PROFESSIONAL
REVIEWING**

Conference ACM SIGGRAPH, High Performance Graphics, Graphics Hardware, Eurographics, ACM SIGGRAPH Asia, ACM Symposium on Interactive 3D Graphics and Games, IEEE/ACM Supercomputing, International Symposium on Computer Architecture, IEEE International Symposium on Information Theory, Symposium on Application Accelerators in High Performance Computing, International Workshop on Characterizing Applications for Heterogeneous Exascale Systems, European Symposium on Algorithms, African Conference on Computational Mechanics

Journal IEEE Transactions on Visualization and Computer Graphics, IEEE Computer Graphics and Applications, Computer Graphics Forum, Proceedings of the IEEE, IEEE Transactions on Computers, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Micro, IEEE Transactions on Mobile Computing, IEEE Transactions on Very Large Scale Integration Systems, IEEE/ACM Transactions on Networking, IEEE Software, ACM Transactions on Architecture and Code Optimization, journal of graphics, gpu, and game tools, The Computer Journal, Journal of Computer Science and Technology, Journal of Low Power Electronics, International Journal of High Performance Computing Applications, IET Image Processing, Computing in Science & Engineering, Journal of Computer Science and Technology, Computers and Electronics in Agriculture

Books Addison-Wesley, Elsevier, GPU Computing Gems

Government and Nonprofit National Science Foundation (panelist and ad hoc), UC MICRO, Department of Energy SBIR/STTR Program, Natural Sciences and Engineering Research Council of Canada, Maryland Industrial Partnerships Program, US Civilian Research and Development Foundation, US-Israel Binational Science Foundation, France-Berkeley Fund

**UNIVERSITY
TEACHING**

EEC 170, Introduction to Computer Architecture (undergraduate)
— Fall 2010, Fall 2007, Winter 2006, Fall 2003
EEC 171, Parallel Architecture (undergraduate)
— Spring 2012, Spring 2011, Spring 2010, Spring 2009, Spring 2008, Spring 2007
EEC 172, Embedded Systems (undergraduate)
— Fall 2005, Winter 2005, Fall 2004
EEC 180A, Digital Systems (undergraduate)
— Winter 2009
EEC 277, Graphics Architecture (graduate)
— Winter 2012, Winter 2011, Winter 2010, Winter 2009, Winter 2008, Winter 2007, Winter 2006, Winter 2005, Winter 2004, Spring 2003

**UNIVERSITY
SERVICE**

Athletics Administrative Advisory Committee (as representative of the Academic Senate), University of California, Davis, 2005–2006, 2006–2007, 2007–2008, 2008–2009, 2009–2010, 2010–2011
— Financial Aid Task Force (subcommittee of AAAC), 2006–2007
— Street Drug Task Force (subcommittee of AAAC), 2007–2008
— Budget Committee (subcommittee of AAAC), 2010–2011
Committee on Academic Support in Athletics, University of California, Davis, 2006–2007
Faculty advisor, Theta Tau Engineering Fraternity, University of California, Davis, 2005–

**PH.D. GRADUATES
SUPERVISED**

Yao Zhang (Ph.D., electrical engineering, completed January 2012). Dissertation title: “Performance Modeling for GPU Architectures”. First employment: postdoc, University of Chicago.

Shubhabrata Sengupta (Ph.D., computer science, completed December 2010). Dissertation title: "Efficient Primitives and Algorithms for Many-core architectures". 2008 Best Graduate Researcher Award, UC Davis Computer Science Department. NVIDIA Graduate Fellowships, 2007–8, 2008–9. First employment: Intel Research.

Eric Lengyel (Ph.D., computer science, completed March 2010). Dissertation title: "Voxel-Based Terrain for Real-Time Virtual Simulations". First employment: Terathon Software LLC.

Leo Szumel (Ph.D., electrical and computer engineering, completed September 2008). Dissertation title: "On The Programming of Emergent Sensor Network Systems". First employment: Sentilla.

Aaron Lefohn (Ph.D., computer science, completed June 2006). Dissertation title: "Glif: Generic Data Structures for Graphics Hardware". 2006 Best Doctoral Dissertation Award, UC Davis Computer Science Department. First employment: Neoptica, acquired by Intel in October 2007.

**M.S. GRADUATES
SUPERVISED**

Will Kohut (M.S., electrical and computer engineering, completed June 2011). Thesis title: "Protein All-Atom Energy Evaluation on a GPU". First employment: NVIDIA.

Everett Phillips (M.S., mechanical and aerospace engineering, completed March 2010). Co-advised with Dr. Roger Davis, UCD MAE. First employment: NVIDIA.

Vladimir Glavtchev (M.S., electrical and computer engineering, completed December 2009). Thesis title: "EU Speed-limit Sign Detection Using a Graphics Processing Unit (GPU)". First employment: BMW Group Technology Office, Palo Alto.

Adam Moerschell (M.S., electrical and computer engineering, completed March 2007). Thesis title: "Distributed Texture Memory in a Multi-GPU Environment". First employment: ATI, acquired by AMD.

Scott Goering (M.S., electrical and computer engineering, completed March 2005). Thesis title: "Performance of On-Demand Routing Algorithms in Dense, Constrained Networks". First employment: Intel.

**CURRENT
STUDENTS**

Currently primary advisor for: Calina Copos (Ph.D., applied science); Andrew Davidson (Ph.D., electrical and computer engineering); Afton Geil (Ph.D., electrical and computer engineering); Kshitij Gupta (Ph.D., electrical and computer engineering); Jason Mak (Ph.D., computer science); Pınar Muyan-Özçelik (Ph.D., computer science); Anjul Patney (Ph.D., electrical and computer engineering); Ritesh Patel (M.S., electrical and computer engineering); Andy Riffel (Ph.D., electrical and computer engineering); Jeff Stuart (Ph.D., computer science); Stanley Tzeng (Ph.D., computer science); Yangzihao Wang (Ph.D., computer science).

**ACTIVITIES AND
HONORS**

NVIDIA CUDA Fellow, 2012
Nominee, ASUCD Excellence in Education Award (College of Engineering), 2010
Finalist, ASUCD Excellence in Education Award (College of Engineering), 2009
ECE Graduate Student Association Award for Graduate Teaching and Mentorship, 2009
Best Paper Award, Graphics Hardware 2007
Nominee, ASUCD Excellence in Education Award (College of Engineering), 2007
NVIDIA Faculty Teaching Fellowship, 2006
Department of Energy Early Career Principal Investigator Award, 2004
Stanford Computer Systems Laboratory Bureaucrat (student representative to faculty), 1996–2000
Stanford Program for Academic Excellence Mentor, 1997–2000

Stanford Women's Intercollegiate Water Polo Volunteer Assistant Coach, 1999–2002
Stanford College of Engineering Lawrence R. Thielen Memorial Fellowship
Charles Mills Gayley Fellowship for Graduate Study
Eta Kappa Nu (Mu Chapter)
Tau Beta Pi (California Alpha Chapter)
University of California, Berkeley Men's Intercollegiate Water Polo, 1991–1994
Order of the Golden Bear, University of California, Berkeley
University of California, Berkeley Regents and Alumni Scholar
National Merit Scholar
United States Presidential Scholar
Eagle Scout, Boy Scouts of America