Shubhabrata Sengupta

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Objective

I am looking for a research oriented role in the industry which allows me to pursue my research interests in parallel data structures and graphics.

Research

Department of Computer Science Davis, CA, USA
University of California Davis
Research Assistant 2005–2010

Working on developing general-purpose algorithms for upcoming graphics architectures. Current research interests are parallel prefix-sum and its variants, developing fast parallel sort, and building sparse data structures on data parallel hardware. I am one of the lead developers of the data parallel primitives library, CUDPP.

Developed new rendering techniques and parallel algorithms on graphics processors, that currently enable interactive film preview and will be feasible for games in coming years. This resulted in a robust algorithm to generate alias-free hard shadows for dynamic scenes at interactive rates.

Teaching

University of California Davis Davis, CA, USA
Teaching Assistant 2004–2005

ECS 15: Introduction to Computers. Dr. Nick Puketza.

Employment

Microsoft Research Redmond, WA, USA
Intern Jun, 2008–Aug, 2008

I was an intern in the Research group working with Hugues Hoppe on building tree based data structures on graphics processors.

NVIDIA Corporation Santa Clara, CA, USA
Intern Jun, 2007–Sep, 2007: Jan, 2008–May, 2008

I was an intern in the Research group working with Michael Garland on data-parallel programming primitives. My work over summer involved developing a data-parallel algorithm to efficiently build a specific spatial hierarchy on graphics processors. I also developed multiple segmented scan algorithms.

Pixar Animation Studios Emeryville, CA, USA
Summer Intern Jun, 2006–Oct, 2006

I contributed to enhancing the shading quality of Pixar's hardware rendering pipeline to closely match that of the offline rendering process in many cases. The technique involves compactly storing and accessing sparse volumetric data on graphics processors.

Sun Microsystems Bangalore, India
Member of Technical Staff 2000–2004
Member of the development team working on SunONE Application Server.

HCL Technologies Broomfield, CO, USA
Tokyo, Japan
Member of Technical Staff 1998–2000
Member of the development team working on REELs tape library management software at StorageTek.
Involved in designing a large online betting system at NTT Japan.

Education

Ph.D in Computer Science, Expected June 2010
University of California, Davis, CA, USA
GPA: 4.00/4.00

M.Sc in Mathematics, June 1998
Indian Institute of Technology, Kharagpur, WB, India
GPA: 8.3/10.0

B.Sc in Mathematics, June 1996
Indian Institute of Technology, Kharagpur, WB, India
GPA: 8.18/10.0

Papers

Dan A. Alcantara, Andrei Sharf, Fatemeh Abbasinejad, Shubhabrata Sengupta, Michael Mitzenmacher, John D. Owens, and Nina Amenta "Real-time Parallel Hashing on the GPU" *ACM Transactions on Graphics*, 28(5):153:1–154:9, December 2009.

Christian Lauterbach, Michael Garland, Shubhabrata Sengupta, David Luebke and Dinesh Manocha "Fast BVH construction on GPUs" *Computer Graphics Forum (Proceedings of Eurographics 2009)*, 28(2):375–384, April 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.

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.

Aaron E. Lefohn, Shubhabrata Sengupta, and John D. Owens "Resolution-Matched Shadow Maps". *ACM Transactions on Graphics*, 26(4):20:1–20:17, October 2007.

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.

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*, 26(1):60–99, January 2006.

SIGGRAPH Sketches

Aaron E. 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.

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

Book Chapters

Mark Harris, Shubhabrata Sengupta, 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.

Technical Reports

Shubhabrata Sengupta, Mark Harris, and Michael Garland "Efficient parallel scan algorithms for GPUs". *NVIDIA Technical Report NVR-2008-003*, December 2008.

John D. Owens, Shubhabrata Sengupta and Daniel Horn "Assessment of Graphic Processing Units (GPUs) for Department of Defense (DoD) Digital Signal Processing (DSP) Applications". Technical Report ECE-CE-2005-3, Department of Electrical and Computer Engineering, University of California, Davis, October 2005.

Patents

Four filed through NVIDIA Corporation. Details upon request.

Open source involvement

One of the lead developers of CUDA Data Parallel Primitives (`http://code.google.com/p/cudpp/`) library.

Fellowships and Awards

- Best Graduate Student Researcher Award, Department of Computer Science, UC-Davis
- Best Paper Award, Graphics Hardware 2007.
- NVIDIA Fellowship, 2007-2008.
- NVIDIA Fellowship, 2008-2009.
- Departmental fellowship, Department of Computer Science, University of California Davis, 2004–2005.
- Outstanding Achievement Award, Sun Microsystems, 2001.
- Outstanding Achievement Award, Sun Microsystems, 2002.

Computer Skills

- Languages: CUDA, C, Cg, C++
- Operating Systems: Almost all flavors of Unix and Windows

References

- Prof John D. Owens: `jowens@ece.ucdavis.edu`
- Prof Nina Amenta: `amenta@cs.ucdavis.edu`

Miscellaneous

Indian citizen on F-1 status. Looking for a full time position upon graduation.