# Eric Shaffer

Center for Simulation of Advanced Rockets
Department of Computational Science and Engineering
University of Illinois at Urbana-Champaign
1304 W. Springfield Avenue
Urbana, IL 61801

*Voice:* 217-344-3180
*FAX:* 217-333-1910
*E-mail:* shaffer1@uiuc.edu
*WWW:* http://www.csar.uiuc.edu/~shaffer1

## Objective

Obtain a position utilizing abilities to:

- Collaborate and advise on research projects in areas of expertise
- Actively seek funding through proposal writing and presentation
- Provide support as a technical team lead
- Continue research and development in massive data processing, geometry processing, scientific and information visualization, and parallel computation

## Education

**Ph.D. Computer Science**, October 2005
Dissertation: *Multiresolution Methods for Processing Massive Meshes*
Advisor: Professor Michael Garland
University of Illinois at Urbana-Champaign

**M.S. Computer Science**, September 1996
Advisor: Professor Ravi Janardan
University of Minnesota, Minneapolis

**B.S. Mathematics and Computer Science**, May 1992
University of Illinois at Urbana-Champaign

## Experience

**Research Scientist** — **August 2007 – Present**
Center for Simulation of Advanced Rockets — University of Illinois

Duties include developing research solutions in the areas of high-performance and geometric computing, managing a research team, and acquiring funding to support research efforts. Technical lead of a collaborative project providing meshing solutions to The Boeing Company for use in computational fluid dynamics simulations. Also serving as the Principal Investigator of a project to improve the parallel performance of a combustion simulation code from Caterpillar Inc. Responsibilities include overseeing the budget, supervising a professional programmer and two students, and supplying technical guidance. Developed grant proposals that brought in over $500,000 for these projects.

**Postdoctoral Research Associate** — **2005 – 2007**
Center for Simulation of Advanced Rockets — University of Illinois

Provided meshing solutions necessary for accurate and efficient simulation of solid-propellant rockets. Research efforts focused on the design and implementation of a scalable mesh smoothing method, generalized boundary constraints for propagating meshes, and coarsening methods for quadrangulated meshes.

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**Research Assistant** **2002 – 2005**
Computer Science Department University of Illinois

Designed algorithms and data structures that operate on massive geometric data sets. Other duties included software coding and testing, preparing publications, and giving presentations.

**Web Programmer** **2002-2003**
Decision and Information Sciences Division Argonne National Laboratory

Developed the MetCast web service, created installation distribution, and wrote documentation. This service allows secure, real-time access to meteorological data gathered by a separate remote sensing application. MetCast is currently running at several Army chemical weapon depots.

**Research Programmer** **1996 – 2002**
Pablo Research Group University of Illinois

One of the principal designers and developers of Virtue, a virtual reality performance visualization environment for parallel and distributed computations. Worked on a team that built and maintained a high-performance, Myrinet-connected Linux cluster. Developed Java-based device control software as part of the Pablo Smart Spaces initiative. Wrote quarterly reports for funding agencies, and assisted in writing grant proposals.

**Teaching Assistant** **1994 – 1996**
Computer Science Department University of Minnesota

Taught recitation sections for the Department of Computer Science, specifically Introduction to Discrete Mathematics, and Introduction to Computer Organization. Duties included lecturing, holding question and answer sessions, and grading. Also designed homework assignments, programming projects, and exams. Received Best Computer Science TA Award, Winter Quarter 1995.

**Programmer** **1992 – 1994**
IBM Rochester, MN

Worked on operating system development team, providing and maintaining internal licensed code supporting the Save/Restore function of OS/400 (the operating system of the AS/400). Duties included design, development, unit testing, component testing, and customer support.

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**Grants**

Caterpillar Inc.: *Optimized Numerical Computation for Converge$^{TM}$* **2008 – 2010**
Eric Shaffer (PI) [$110,000]

Caterpillar Inc.: *Meshing and Visualization for Cut-Cell Methods* **2007 – 2009**
Eric Shaffer (PI) [$250,000]

Caterpillar Inc.: *Massive Parallelization of xFD Combustion Code* **2006 – 2008**
Michael Heath (PI) and Eric Shaffer (Co-PI) [$190,000]

The Boeing Company: *Boeing-UIUC Meshing Collaboration* **2006 – 2007**
Michael Heath (PI) Eric Shaffer (Co-PI) [$100,000]

**Papers in Preparation**

*Coarsening Non-simplical Meshes for Scientific Computation.* E. Shaffer, T. Xia.

*Graph Clustering on a GPU.* E. Shaffer, C. Heeren.

**Journal Publications**

*A Multiresolution Representation for Massive Meshes.* E. Shaffer and M. Garland. IEEE Transactions on Visualization and Computer Graphics, March-April 2005.

**Refereed Conference Publications**

*Streaming Mesh Optimization for CAD.* Tian Xia, Eric Shaffer. 4th International Symposium on Visual Computing. Dec. 2008.

*Streaming Tetrahedral Mesh Optimization.* T. Xia and E. Shaffer. Poster paper, ACM Solid and Physical Modeling Symposium Proceedings, June 2008.

*Parallel Mesh Adaptation for Highly Evolving Geometries with Application to Solid Propellant Rockets.* D. Guoy, T. Wilmarth, P. Alexander, X. Jiao, M. Campbell, E. Shaffer, R. Fiedler, W. Cochran, and P. Suriyamongkol. Proceedings 16th Int. Meshing Roundtable, October 2007.

*A Multiphase Approach to Efficient Surface Simplification.* M. Garland and E. Shaffer. Proceedings of IEEE Visualization 2002, October 2002.

*Efficient Adaptive Simplification of Massive Meshes.* E. Shaffer and M. Garland. Proceedings of IEEE Visualization 2001, October 2001.

*An Approach to Immersive Performance Visualization of Parallel and Wide-Area Distributed Applications.* L. DeRose, M. Pantano, R. Aydt, E. Shaffer, B. Schaeffer, S. Whitmore, and D. Reed. Proceedings of the International Symposium on High Performance Distributed Computing 1999.

**Other Publications**

*Real-Time Immersive Performance Visualization and Steering.* E. Shaffer and D. Reed. ACM SIGGRAPH Computer Graphics Newsletter, May 2000.

*Virtue: Immersive Performance Visualization of Parallel and Distributed Applications.* E. Shaffer, S. Whitmore, B. Schaeffer, and D. Reed. IEEE Computer, December 1999.

## Eric Shaffer

*Performance Analysis of Parallel Systems: Approaches and Open Problems.* D. Reed, R. Aydt, L. DeRose, C. Mendes, R. Ribler, E. Shaffer, H. Simitci, J. Vetter, D. Wells, S. Whitmore, and Y. Zhang. Joint Symposium on Parallel Processing (JSPP), June 1998.

### Teaching

- *Fall 2007–Spring 2008* CS 225: Data Structures and Software Principles
  University of Illinois, Co-lecturer and content developer, 220 Enrolled students
- *Fall 1994 – Spring 1995* CSci 2011: Discrete Structures of Computer Science
  University of MN, TA: Created assignments, graded, taught recitation sections.
- *Fall 1995* CSci 2021: Machine Architecture and Organization
  Univeristy of MN, TA: Created assignments, graded, taught recitation sections.

### Presentations

*Boeing-UIUC Meshing Collaboration.* Presented at:

- Boeing Project Review, University of Illinois at Urbana-Champaign, August 2006

*Smoothing Large Meshes.* Presented at:

- CSAR Noon Seminar, University of Illinois at Urbana-Champaign, May 2005
- Department of Computer Graphics Technology, Purdue University, May 2005

*Efficient Adaptive Simplification of Massive Meshes.* Presented at:

- Lawrence Livermore National Laboratory, June 2001
- IEEE Conference on Visualization, October 2001

Demonstrations of the *Virtue* visualization environment at:

- SC97, a conference on high performance networking and computing, 1997
- various DARPA site visits and reviews, 1997 through 1999

### Honors

Best Computer Science TA Award, University of Minnesota, Winter Quarter 1995
Deans List, University of Illinois: Fall 1988, Fall 1990

### Professional Activities

Reviewer for ACM SIGGRAPH 2003
Reviewer for IEEE Visualization 2004 – 2007
Reviewer for InfoVis 2004 – 2007
Reviewer for Elsevier journal Parallel Computing
Reviewer for IEEE Computer Graphics and Applications
Member of the IEEE Computer Society

### Technical Skills

**Programming Languages**: C, C++, VB .NET, Fortran, ML, Java, Python
**Web Development**: HTML, ASP .NET, PHP, web service development
**Graphics Packages**: OpenGL, VTK, FLTK
**Operating Systems**: Linux/UNIX, Windows, OS/400, OS X
**Platforms**: SGI, SUN, 80x86 machines and clusters, IBM AS/400
**Other Software**: MPI, OpenMP, POSIX threads, Mathematica, MATLAB, sockets