AJITH MASCARENHAS

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SUMMARY

Expertise in research and software development in the areas of computational geometry and topology, computer graphics, streaming algorithms, management of massive data sets, scientific data-analysis and visualization, and design and analysis of algorithms.

SKILLS

Development: C++, C, Java, Perl
Graphics/Visualization: OpenGL, Qt
Web technology: HTML, CSS, Javascript

EDUCATION

May 2006	Ph.D. (Computer Science)	Univ. of North Carolina at Chapel Hill
May 2004	M.S. (Computer Science)	Univ. of North Carolina at Chapel Hill
Jan. 1999	M.E. (Computer Science)	Indian Institute of Science, Bangalore, India
June 1996	B.E. (Computer Eng.)	Karnataka Regional Eng. College, Suratkal, India

PROFESSIONAL EXPERIENCE

- **POST-DOCTORAL RESEARCH STAFF, Combustion Research Facility, Sandia National Labs; Livermore, CA**
  Oct. 2008 – Present
  - Developed topological segmentation and feature tracking software for analyzing combustion simulation data.
  - Design and development of Jacobi set based critical point tracking for combustion data.
  - Integrate segmentation display and interaction with ViSUS, an out-of-core, progressive visualization framework.
  - Published results in Topoinvis '09.
- **POST-DOCTORAL RESEARCH STAFF, Center for Applied Scientific Computing (CASC), Lawrence Livermore National Lab (LLNL); Livermore, CA**
  Jan. 2006 – Sept. 2008
  - Developed software to manage and process massive simulation data sets and geometric models.
  - Collaborated with applied scientists to develop software for topological and quantitative analysis of combustion simulations, and hydrodynamic instability simulations.
  - Developed software for shape analysis of massive geometric models on commodity computers.
  - Published results in IEEE Visualization '06, ACM SIGGRAPH '07, Computational Geometry: Theory and Algorithms, 2008.
- **COMPUTER SCIENTIST/MATH PROGRAMMER, CASC, LLNL; Livermore, CA**
  Sept. 2005 – Jan. 2006
  Developed and implemented an improved algorithm for guaranteed critical point tracking in time-dependent data. Successfully defended Ph.D. thesis at UNC-Chapel hill.
- **SCIENTIST/ENGINEERING TECHNICAL SCHOLAR, CASC, LLNL; Livermore, CA**
  Summer 2002, 2003, 2004.
  Advisor: Valerio Pascucci
  June - Aug. 2004: Implemented algorithm to compute time-varying Reeb graphs.
  July - Aug. 2003: Developed theory and algorithm to compute time-varying Reeb graphs.

Implemented volume grid re-ordering for streaming isosurface computation.
June - Aug. 2002: Computed Jacobi sets for tracking critical points of time-varying functions.

- **GRADUATE RESEARCH ASSISTANT, Dept. of Computer Science, UNC-Chapel Hill; NC**
  Aug. 2000 - Dec. 2005: Analysis of time-varying volume data. Advisor: Jack Snoeyink
  Aug. 1999 - July 2000: Haptic rendering of geometric models. Advisor: Ming Lin
- **SOFTWARE ENGINEER, IBM Global Services, Bangalore, India**
  Nov. 1996 - July 1997
  Team member: Java-beans for project management software. Designed and developed Java beans to support graphs and charts in project planning.

AWARDS

- IEEE Visualization 2006 award for Best Application Paper, October 2006.
- IBM-Solutions Research Center, New Delhi, Research fellowship award, 1999.

PUBLICATIONS

Refereed Journals:

1. *Robust On-line Computation of Reeb Graphs: Simplicity and Speed*. V. Pascucci, G. Scorzelli, P.-T. Bremer, and **A. Mascarenhas**, in ACM Transactions on graphics, pages 58.1-58.9, 2007, Proceedings of SIGGRAPH 2007.
2. *Understanding the Structure of the Turbulent Mixing Layer in Hydrodynamic Instabilities*. D. Laney, P.-T. Bremer, **A. Mascarenhas**, P. Miller, and V. Pascucci, in IEEE Transactions on Visualization and Computer Graphics Vol. 12, No.5, pages 1053-1060, 2006. Proceedings of IEEE VIS 2006.
3. *Time-varying Reeb Graphs for Continuous Space-Time Data*, H. Edelsbrunner, J. Harer, **A. Mascarenhas**, J. Snoeyink, and V. Pascucci, in Computation Geometry: Theory and Applications. 41, 3, pages 149-166, Nov. 2008
4. *Topological Feature Extraction and Tracking*, P.-T. Bremer, E. Bringa, M. Duchaineau, A. Gyulassy, D. Laney, **A. Mascarenhas**, V. Pascucci, in Proceedings of SciDAC 2007 Scientific Discovery through Advanced Computing, volume 78, page 012032 (5pp). Journal of Physics Conference Series, June 2007.
5. *Understanding the Structure of the Turbulent Mixing Layer in Hydrodynamic Instabilities*. P.-T. Bremer, W. Cabot, A. Cook, D. Laney, **A. Mascarenhas**, P. Miller, and V. Pascucci, in Proceedings of SciDAC 2006 – Scientific Discovery through Advanced Computing, volume 46, pages 556-560. Journal of Physics Conference Series, June 2006.

Refereed Conference Proceedings:

1. *Time-varying Reeb Graphs for Continuous Space-Time Data*, H. Edelsbrunner, J. Harer, **A. Mascarenhas**, and V. Pascucci, in Symposium on Computational Geometry, 2004, pages 366-372. (extended version published in CGTA journal, 2008)
2. *Encoding Volumetric Grids for Streaming Isosurface Extraction*, **A. Mascarenhas**, M. Isenburg, V. Pascucci, and J. Snoeyink, in Second International Symposium on 3D Data Processing, Visualization and Transmission, 2004, pages 665-672.
3. *Six Degrees-of-Freedom Haptic Display of Polygonal Models*, A. Gregory, **A. Mascarenhas**, S. Ehmann, M. Lin and D. Manocha, in IEEE Visualization 2001, pages 139-146.

Book Chapters:

1. *Isocontour-based Visualization of time-varying data*, **A. Mascarenhas**, J. Snoeyink, in Mathematical Foundations of Scientific Visualization, Computer Graphics, and Massive Data Exploration, Editors: T. Moeller, B. Hamann, and B. Russell, Springer-Verlag, to appear December 2008.
2. *Six Degrees-of-freedom Haptic Visualization*, **A. Mascarenhas**, S. Ehmann, A. Gregory, M. Lin and D. Manocha, in Touch in Virtual Environments: Haptics and the Design of Interactive Systems. Editors: M. L. McLaughlin, J. P. Hespanha, G. S. Sukhatme. Prentice Hall, 2002.
3. *Scientific Data Managment Challenges in High Performance Visual Data Analysis*, E. W. Bethel, H. Childs, **A. Mascarenhas**, V. Pascucci, Prabhat.. In Arie Shoshani and Doron Rotem, editors, Scientific Data Management: Challenges, Existing Technology, and Deployment. Chapman & Hall/CRC Press, 2008.

Workshops:

1. *Application of Morse Theory to Analysis of Rayleigh-Taylor topology*, P. L. Miller, P-T. Bremer, W. Cabot, A. Cook, D. Laney, **A. Mascarenhas**, V. Pascucci, in International Workshop on the Physics of Compressible Turbulent Mixing, Paris, France, Jul 17 - Jul 21, 2006.
2. *Topological Feature Extraction for Exploration of Terascale Combustion Data*, **A. Mascarenhas**, R. W. Grout, P.-T. Bremer, E. R. Hawkes, V. Pascucci, J. H. Chen, in Topoinvis '09: Topological Methods in Data Analysis and Visualization, Snowbird, Utah, February 23-24, 2009.

Refereed Posters/ Videos:

1. *Ligand Binding to the Pregnane X Receptor by Geometric Matching of Hydrogen Bonds*, R.P. Berretty, D. Hsu, L. Kettner, **A. Mascarenhas**, M. Redinbo, J. Snoeyink, R. Watkins, in Currents in Computational Molecular Biology (RECOMB 2002), L. Florea, B. Walenz, S. Hannenhalli, editors, 2002, pages 22-23.
2. *Implementing Time-varying Contour Trees*, **A. Mascarenhas**, J. Snoeyink, in ACM Computational Geometry Conference, Video Publications 2005.
3. *Analysis of the relationship between high scalar dissipation rate features, flow, and combustion*, R.W. Grout, E.R. Hawkes, J.H. Chen, **A. Mascarenhas**, P.-T. Bremer, V. Pascucci, in 32nd International Symposium on Combustion, 2008, Montreal, Canada.

CONFERENCE PRESENTATIONS AND INVITED TALKS

- Touch in Virtual Environments, a one-day conference on haptics, Integrated Media Systems Center, University of Southern California; Feb. 23, 2001
- Symposium on Computational Geometry, 2004, Polytechnic University, Brooklyn, New York; June 9 -11, 2004.
- Mathematical Foundations of Scientific Visualization, Computer Graphics, and Massive Data Exploration. Banff International Research Station, Banff, Canada; May 22 - 27, 2004.
- The 2nd International Symposium on 3D Data Processing, Visualization, and Transmission (3DPVT) Thessaloniki, Greece; September 6 - 9, 2004.
- Guest lecture. Advanced graduate level course "Morse Theory for Data Analysis and Visualization", University of California-Davis, May 26, 2006.
- Topoinvis '09: Topological Methods in Data Analysis and Visualization, Snowbird, Utah, February 23-24, 2009.

MENTORING AT LLNL

- Amit Patel, Ph.D. candidate at Duke University, Summer 2006.
- Issam Safa, Ph.D. candidate at Ohio State University, Summer 2007.

REFEREE

- IEEE Visualization.
- IEEE Transactions on Visualization and Computer Graphics (TVCG).
- IEEE Virtual Reality.
- ACM Symposium on Computational Geometry.
- ACM Solid and Physical Modeling.
- Eurographics.
- Eurographics/IEEE International Symposium on Volume Graphics.
- Eurographics/IEEE Symposium on Visualization.