Yong Cao

Assistant Professor

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Professional Preparation

2001 – 2005 **Ph.D. in Computer Science**, *Department of Computer Science*, University of California at Los Angeles, Los Angeles, USA.

supervisor Petros Faloutsos

1997 – 2000 **M.S. in Pattern Recognition and Intelligence System**, *Institute of Automation*, Chinese Academy of Sciences, Beijing, China.

supervisors Ruiwei Dai and Jie Tian

1992 – 1997 **B.S. in Computer Science**, *Department of Computer Science*, University of Science and Technology of China, Hefei, China.

Appointments

2007 – now **Assistant Professor**, *Computer Science Department*, Virginia Polytechnic Institute and State University.

2005 – 2007 **Software Engineer**, *Redwood Shores Studio*, Electronic Arts Inc..

2002 – 2003 **Software Engineer**, *Institute for Creative Technologies*, University of Southern California.

2001 – 2005 **Research Assistant**, *Computer Science Department*, University of California at Los Angeles.

Scientific Interests

Visualization & Graphics: High Performance Visualization and Visual Analytics for "Big Data"; Character Animation and Crowd Simulation

Parallel Computing: Parallel Algorithm Design for Many-Core Architectures; Synchronization and Load Balancing for Runtime Systems

Education: Interactive Virtual Environment for Training and Education

Synergistic Activities

Professor Cao is the director of Animation and Gaming Research Lab at Virginia Tech. The lab research focuses on character animation, data visualization, parallel computing on many-core architectures, and video games for training & education.

Professor Cao is a member of the Institute of Creativity, Art, and Technologies (ICAT) at Virginia Tech, whose goal is to facilitate research, creative activity, and education in cutting edge technologies and their use in contemporary arts and design.

Professor Cao is also a member of Center for Human Computer Interaction (HCI) at Virginia Tech, where he researches on real-time tracking, animation, and visualization techniques in virtual environment with multi-modal interactions.

Professional Service

Committees & Panels	2013, member of international program committee, *Pacific Graphics 2013*
	2013, member of international program committee, *The Sixth International Conference on Motion in Games. (MIG 2013).*
	2012, member of international program committee, *The Fifth International Conference on Motion in Games. (MIG 2012).*
	2011, member of proposal review panel, *National Science Foundation, CGA Medium: Computer Graphics and Visualization*
	2011, member of international program committee, *The Fourth International Conference on Motion in Games. (MIG 2011).*
	2011, member of international program committee, *Pacific Graphics 2011 (PG2011).*
	Face and Gesture Recognition 2011 (Area Chair)
	2011, member of international program committee, *The 24th International Conference on Computer Animation and Social Agents (CASA 2011)*
	2010, member of international program committee, *The Sketches and Posters program for SIGGRAPH ASIA 2010*
	2009, member of international program committee, *The 30th Annual Conference of the European Association for Computer Graphics (Eurographics 2009)*
	2009, member of international program committee, *The Sketches and Posters program for SIGGRAPH ASIA 2009*
	2009, member of international program committee, *IADIS Computer Graphics, Visualization, Computer Vision and Image Processing (CGVCVIP 2009) Conference*
	2008, member of proposal review panel, *National Science Foundation, CPA: Graphics and Visualization Program*
	2007, member of proposal review panel, *National Science Foundation, IIS: Creative IT program*
Editorial Appointments	Co-editor of journal, *ACM Computer in Entertainment*
Publication Reviews	Computer and Graphics (Journal), 2013
	European Conference on Computer Vision, 2014
	Journal of Parallel and Distributed Computing, 2012
	IEEE Computer Graphics and Applications, 2012
	IEEE Virtual Reality, 2012
	ACM Siggraph Asia, 2012
	The International Conference on Motion in Games, 2011,2012,2013
	Computer Graphics International (CGI 2012)
	Innovative Parallel Computing (InPar 2012)
	IEEE Transactions on Multimedia (Journal), 2011
	Journal of Supercomputing (Journal), 2011,2013
	IEEE Transactions on Multimedia (Journal), 2010
	Applied Mathematics and Computation (Journal), 2010
	The Visual Computer (Journal), 2010, 2011,2013
	Journal of X-ray Science and Technology (Journal), 2010
	Applied Mathematics and Computation (Journal), 2010
	Annual IEEE International Conference on High Performance Computing, 2009

ACM SIGGRAPH ASIA, 2009, 2010, 2011

IEEE Transaction on Visualization and Computer Graphics (Journal), 2004, 2008, 2010

Computer Graphics Forum (Journal), 2008

EURASIP Journal on Audio, Speech, and Music Processing (Journal), 2009

ACM Computer in Entertainment (Journal), 2008

Annual Conference of the European Association for Computer Graphics (Eurographics), 2008, 2009

ACM SIGGRAPH / Eurographics Symposium on Computer Animation, 2004

Graphics Interface, 2005, 2009

Pacific Graphics, 2004,2011,2013

Patent

Date	2008
Title	**On-model Processing for Three-dimensional Animation**
Inventors	Mike Chow, Vishwa Ranjan and Yong Cao
Assignee	Electronic Arts Inc.

Grants

Total: $2,362,709. Personal Share: $743,029.

Title	**BigData: Usable Multiple Scale Big Data Analytics through Interactive Visualization**
Sponsor	National Science Foundation, IIS
Amount	$998,912. Personal Share: $249,728.
Period	01/01/2014 – 04/30/2014
Responsibility	Principle Investigator
Collaborators	Dane Webster, Aditya Johri
Title	**Bio-Inspired Visualization and Analysis of Dynamic Behaviors in Online Learning Communities**
Sponsor	Institute for Creativity, Art, and Technology, Virginia Tech
Amount	$8,958. Personal Share: $8,958.
Period	01/01/2014 – 04/30/2014
Responsibility	Principle Investigator
Collaborators	Dane Webster, Aditya Johri
Title	**Emergency Evacuation Planning for Lane Stadium Interactive Simulation and Visualization**
Sponsor	Emergency Management Office and Athletic Department, Virginia Tech
Amount	$41,735. Personal Share: $21,735.
Period	09/01/2013 – 05/30/2014
Responsibility	Principle Investigator
Collaborators	Dane Webster
Title	**Large Graph Analytics: Visualization, Interaction and Computation**
Sponsor	ICAT and ICTAS, Virginia Tech
Amount	$25,000. Personal Share: $12,500.
Period	09/01/2014 – 08/30/2015
Responsibility	Co-Principle Investigator

Collaborators	Wuchun Feng, Chris North
Title	**Display Ecologies and Large-Scale Graph Visualization**
Sponsor	Department of Energy, PNNL
Amount	$118,290. Personal Share: $58,645.
Period	08/31/2013 – 05/30/2014
Responsibility	Co-Principle Investigator
Collaborators	Chris North
Title	**II-NEW: Living Lab for Asynchronous and Synchronous Investigation of Virtual and Real Environments**
Sponsor	National Science Foundation, CNS
Amount	$585,510. Personal Share: $76,116.
Period	07/01/2013 – 06/30/2015
Responsibility	Co-Principle Investigator
Collaborators	Benjamin Knapp, James Ivory, Ivica Bukvic, Nicholas Polys
Title	**Emergency Evacuation Planning for Lane Stadium: Interactive Simulation and Visualization**
Sponsor	Virginia Tech Emergency Management Office and Athletics Department
Amount	$42,000. Personal Share: $22,000.
Period	07/01/2013 – 06/30/2014
Responsibility	Co-Principle Investigator
Collaborators	Dane Webster
Title	**Visual Analytics**
Sponsor	Virginia Tech ICTAS
Amount	$40,000. Personal Share: $20,000.
Period	09/01/2012 – 06/30/2013
Responsibility	Principle Investigator
Collaborators	Chris North
Title	**Visual Analytics of Large-scale Graphs**
Sponsor	Virginia Tech CHCI GRA Funding Competition
Amount	$12,500. Personal Share: $12,500.
Period	01/01/2012 – 05/31/2012
Responsibility	Principle Investigator
Collaborators	Chris North, Naren Ramakrishnan, Wuchun Feng, Steve Sheetz, and Andrea Kavanaugh
Title	**Application to the Mentoring Micro-grant Program**
Sponsor	Advance VT at Virginia Tech, the Mentoring Micro-grant Program
Amount	$1,500.
Period	03/01/2012 – 02/28/2013
Responsibility	Principle Investigator
Title	**Unified High-Performance Computing and Visualization Framework on GPU to Support MAV Airframe Research**
Sponsor	Department of the Air Force, AFRL
Amount	$31,635.
Period	10/15/2010 – 05/15/2011
Responsibility	Principle Investigator

Title	**EAGER: Creative IT: Hyper Drama Storytelling: Engaging and Nurturing Creativity in K-12 Students**
Sponsor	National Science Foundation, IIS 0954048
Amount	$298,053. Personal Share: $146,473.
Period	09/01/2009 – 08/31/2011
Responsibility	Principle Investigator
Collaborators	Francis Quek, Joe LeGault
Title	**EAGER: Drummer Game: A Massive-Interactive Socially-Enabled Strategy Game**
Sponsor	National Science Foundation, IIS 0940723
Amount	$149,648. Personal Share: $67,632.
Period	07/01/2009 – 10/30/2010
Responsibility	Principle Investigator
Collaborators	Ivica Bukvic, Francis Quek, Dane Webster
Title	**Virtual Jamestown: The Paspahegh Project An interactive, computer simulation of the Native-American Paspahegh Site**
Sponsor	Virginia Tech Art, Creative Technology and Education (ACTE) Mini-Grant
Amount	$5,000.00. Personal Share: $2,000.
Period	08/30/2008 – 05/14/2009
Responsibility	Co-Principle Investigator
Collaborators	Dane Webster, Crandall Shifflett

Publications

Dissertation

Yong Cao. *Expressive Speech-Driven Facial Animation*. PhD thesis, University of California at Los Angeles, Los Angeles, CA, USA, May 2005. Chair-Petros Faloutsos.

Book Chapter

SeungIn Park, Chao Peng, Francis Quek, and Yong Cao. A crowd modeling framework for socially plausible animation behaviors. In Marcelo Kallmann and Kostas Bekris, editors, *Motion in Games*, volume 7660 of *Lecture Notes in Computer Science*, pages 146–157. Springer Berlin Heidelberg, November 2012.

Bryan Cunningham and Yong Cao. Levels of realism for cooperative multi-agent reinforcement learning. In Ying Tan, Yuhui Shi, and Zhen Ji, editors, *Advances in Swarm Intelligence*, volume 7331 of *Lecture Notes in Computer Science*, pages 573–582. Springer Berlin Heidelberg, June 2012.

Yong Cao. Many-core architecture oriented parallel algorithm design for computer animation. In Jan Allbeck and Petros Faloutsos, editors, *Motion in Games*, volume 7060 of *Lecture Notes in Computer Science*, pages 180–191. Springer Berlin / Heidelberg, November 2011.

Chao Peng, Seung In Park, Yong Cao, and Jie Tian. A real-time system for crowd rendering: parallel lod and texture-preserving approach on gpu. In *Motion in Games*, Lecture Notes in Computer Science, pages 27–38. Springer Berlin Heidelberg, Berlin, Heidelberg, November 2011.

Debprakash Patnaik Wu-chun Feng, Yong Cao and Naren Ramakrishnan. *GPU computing Gems, Emerald Edition, Chapter 15: Temporal Data Mining for Neuroscience*, chapter 15, pages 211–230. Elsevier Inc., February 2011.

Yong Cao, Petros Faloutsos, and Frédéric Pighin. *Data-Driven 3D Facial Animation, Chapter 10: Speech Motion Decomposition and Editing*, pages 175–186. Springer, December 2007.

Journal

Seung In Park, Francis Quek, and Yong Cao. Simulating and animating social dynamics: embedding small pedestrian groups in crowds. *Computer Animation and Virtual Worlds*, 24(3-4):155–164, May 2013.

Yong Cao, Debprakash Patnaik, Sean Ponce, Jeremy Archuleta, Patrick Butler, Wu-chun Feng, and Naren Ramakrishnan. Parallel mining of neuronal spike streams on graphics processing units. *International Journal of Parallel Programming*, pages 1–28, December 2012. 10.1007/s10766-011-0181-6.

SeungIn Park, Yong Cao, LayneT. Watson, and Francis Quek. Performance analysis of a novel gpu computation-to-core mapping scheme for robust facet image modeling. *Journal of Real-Time Image Processing*, pages 1–16, September 2012.

Fei Yang, Qingde Li, Dehui Xiang, Yong Cao, and Jie Tian. A versatile optical model for hybrid rendering of volume data. *IEEE Transactions on Visualization and Computer Graphics*, 18(6):925–937, June 2012.

Chao Peng and Yong Cao. A gpu-based approach for massive model rendering with frame-to-frame coherence. *Computer Graphics Forum*, 31(2pt2):393–402, May 2012.

Ying Zhuge, Yong Cao, Robert W. Miller, and Jayaram K. Udupa. Parallel fuzzy connected image segmentation on gpu. *Medical Physics*, 38(7):4365–4371, June 2011.

Yong Cao, Wen C. Tien, Petros Faloutsos, and Frédéric Pighin. Expressive speech-driven facial animation. *ACM Transaction on Graphics*, 24(4):1283–1302, October 2005.

Yong Cao, Jie Tian, and Feng Qiu. Research of progressive meshes algorithm applied in virtual endoscopy system. *Journal of Software (Chinese Academy of Sciences)*, 13(4):677–685, 2002.

Jingchun Liu, Jie Tian, and Yong Cao. The architecture and implementation of pacs system. *Chinese Journal of Medical Imaging Technology*, 16(1):76–78, 2002.

Feng Qiu, Jie Tian, and Yong Cao. The summarization of pacs system. *Chinese Journal of Medical Imaging Technology*, 16(1):73–75, 2002.

Conference

Weiwei Cai, Xuesong Li, Yong Cao, Junpeng Wang, and Lin Ma. Practical aspects of three-dimensional flame imaging using tomographic chemiluminescence. In *AIAA Science and Technology Forum and Exposition (SciTech 2014)*, 2014.

Junpeng Wang, Fei Yang, and Yong Cao. Cache-aware iso-surface volume rendering with cuda. In *IEEE Scientific Visualization (SciVis) Conference (Poster Paper)*, 2014.

Junpeng Wang, Fei Yang, and Yong Cao. Cache-aware sampling strategies for texture-based ray casting on gpu. In *The 4th IEEE Symposium on Large Data Analysis and Visualization (LDAV)*, 2014.

Seung In Park, Francis Quek, and Yong Cao. Simulating and animating social dynamics: embedding small pedestrian groups in crowds. In *The 26th Internation Conference on Computer Animation and Social Agents*, Istanbul, Turkey, May 2013.

Neda Mohammadi, Junpeng Wang, Yong Cao, and Mehdi Setareh. Smats: sketch-based modeling and analysis of truss systems. In *2013 ARCC Architectural Research Conference*, Charlotte, North Carolina, March 2013.

Chao Peng and Yong Cao. Integrating occlusion culling with parallel lod for rendering complex 3d environments on gpu. In *Proceedings of the ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games*, I3D '13, pages 187–187, New York, NY, USA, March 2013. ACM.

Bryan Cunningham and Yong Cao. Non-reciprocating sharing methods in cooperative q-learning environments. In *Proceedings of the The 2012 IEEE/WIC/ACM International Joint Conferences on Web Intelligence and Intelligent Agent Technology - Volume 02*, WI-IAT '12, pages 212–219, Washington, DC, USA, December 2012. IEEE Computer Society.

Seung In Park, Francis Quek, and Yong Cao. Modeling agent social joint actions via micro and macro coordination strategies. In *Proceedings of the The 2012 IEEE/WIC/ACM International Joint Conferences on Web Intelligence and Intelligent Agent Technology - Volume 02*, WI-IAT '12, pages 180–187, Washington, DC, USA, December 2012. IEEE Computer Society.

Seung In Park, Francis Quek, and Yong Cao. Modeling social groups in crowds using common ground theory. In *Proceedings of the Winter Simulation Conference*, WSC '12, pages 113:1–113:12. Winter Simulation Conference, December 2012.

SeungIn Park, Chao Peng, Francis Quek, and Yong Cao. A crowd modeling framework for socially plausible animation behaviors. In *The 5th International Conference on Motion in Games*, Rennes, France, November 2012.

Chao Peng, Peng Mi, and Yong Cao. Load balanced parallel gpu out-of-core for continuous lod model visualization. In *Proceedings of the 2012 SC Companion: High Performance Computing, Networking Storage and Analysis*, SCC '12, pages 215–223, Washington, DC, USA, November 2012. IEEE Computer Society.

Yong Cao, Reese Moore, Peng Mi, Alex Endert, Chris North, and Randy Marchany. Dynamic analysis of large datasets with animated and correlated views: Vast 2012 mini challenge # award: Honorable mention for good use of coordinated displays. In *2012 IEEE Conference on Visual Analytics Science and Technology (VAST)*, pages 283–284, October 2012.

Bryan Cunningham and Yong Cao. Levels of realism for cooperative multi-agent reinforcement learning. In *The Third International Conference on Swarm Intelligence*, Shenzhen, China, June 2012.

Chao Peng and Yong Cao. A gpu-based approach for massive model rendering with frame-to-frame coherence. In *Eurographics, the 33rd Annual Conference of the European Association for Computer Graphics*, Cagliari, Italy, May 2012.

Seung In Park, Yong Cao, and Francis Quek. Modeling small group behaviors in large crowd simulation. In *Proceedings of the ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games*, I3D '12, pages 213–213, New York, NY, USA, March 2012. ACM.

Eric D. Ragan, Curtis Wilkes, Yong Cao, and Doug A. Bowman. The effects of virtual character animation on spatial judgments. In *Proceedings of the 2012 IEEE Virtual Reality*, VR '12, pages 141–142, Washington, DC, USA, March 2012. IEEE Computer Society.

Yong Cao. Many-core architecture oriented parallel algorithm design for computer animation. In *Proceedings of the 4th international conference on Motion in Games*, MIG'11, pages 180–191, Berlin, Heidelberg, November 2011. Springer-Verlag.

Robert Hagan and Yong Cao. Multi-gpu load balancing for in-situ visualization. In *The 2011 International Conference on Parallel and Distributed Processing Techniques and Applications*, pages 305–311, July 2011.

Chao Peng and Yong Cao. A real-time algorithm for search-based motion synthesis. In *2011 International Conference on Computer Graphics and Virtual Reality, CGVR'11*, pages 10–16, Las Vegas, Nevada, USA, July 2011.

Kresimir Matković, Denis Gračanin, Mario Jelović, and Yong Cao. Adaptive interactive multi-resolution computational steering for complex engineering systems. In *Proceedings of EuroVis Workshop on Visual Analytics*, pages 45–48, May 31st 2011.

Colin Braley, Robert Hagan, Yong Cao, and Denis Gracanin. Gpu assisted real-time isosurface volume rendering using depth based coherence and variance bricking. In L. Deligiannidis H. R. Arabnia and A. Solo, editors, *The 2010 International Conference on Computer Graphics and Virtual Reality*, pages 3–9, Las Vegas, Nevada, USA, July 2010. CSREA Press.

Yong Cao and Mithilesh Kumar. A motion graph approach for interactive 3d animation using low-cost sensors. In L. Deligiannidis H. R. Arabnia and A. Solo, editors, *The 2010 International Conference on Computer Graphics and Virtual Reality*, pages 39–45, Las Vegas, Nevada, USA, July 2010. CSREA Press.

Seung In Park, Yong Cao, and Layne T. Watson. A novel computation-to-core mapping scheme for robust facet image modeling on gpus. In H. R. Arabnia, editor, *The 2010 International Conference on Parallel and Distributed Processing Techniques and Applications*, volume I, pages 189–195, Las Vegas, Nevada, USA, July 2010. CSREA Press.

Yong Cao, Debprakash Patnaik, Sean Ponce, Jeremy Archuleta, Patrick Butler, Wu-chun Feng, and Naren Ramakrishnan. Towards chip-on-chip neuroscience: fast mining of neuronal spike streams using graphics hardware. In *Proceedings of the 7th ACM international conference on Computing frontiers*, CF '10, pages 1–10, New York, NY, USA, May 2010. ACM.

Colin Braley, Robert Hagan, Yong Cao, and Denis Gracanin. Gpu accelerated isosurface volume rendering using depth-based coherence. In *The 2nd ACM SIGGRAPH Conference and Exhibition in Asia (Siggraph ASIA 2009), Poster Paper*, pages 1 – 1, Yokohama, Japan, December 2009.

Ashley Robinson, Chao Peng, Francis Quek, and Yong Cao. Interacting with stories. In *WOCCI '09: Proceedings of the 2nd Workshop on Child, Computer and Interaction*, pages 1–6, New York, NY, USA, November 2009. ACM.

Debprakash Patnaik, Sean P. Ponce, Yong Cao, and Naren Ramakrishnan. Accelerator-oriented algorithm transformation for temporal data mining. In *Proceedings of the 2009 Sixth IFIP International Conference on Network and Parallel Computing*, NPC '09, pages 93–100, Washington, DC, USA, October 2009. IEEE Computer Society.

Ying Zhuge, Yong Cao, Jayaram K. Udupa, and Robert W. Miller. Gpu accelerated fuzzy connected image segmentation by using cuda. In *The 31st Annual International Conference of the IEEE Engineering in Medical and Biology Society*, pages 6341 – 6344, Minneapolis, MN, September 2009.

Jeremy Archuleta, Yong Cao, Tom Scogland, and Wu-chun Feng. Multi-dimensional characterization of temporal data mining on graphics processors. In *Proceedings of the 2009 IEEE International Symposium on Parallel&Distributed Processing*, IPDPS '09, pages 1–12, Washington, DC, USA, May 2009. IEEE Computer Society.

Bing Fang, Liguang Xie, Pak-Kiu Chung, Yong Cao, and Francis Quek. Full body tracking using an agent-based architecture. In *IEEE 37th Applied Imagery Pattern Recognition Workshop*, pages 1–7, Washington, DC, USA, October 2008.

Seung In Park, Sean Ponce, Jing Huang, Yong Cao, and Francis Quek. Low-cost, high-speed computer vision using nvidia's cuda architecture. In *IEEE 37th Applied Imagery Pattern Recognition Workshop*, pages 1–7, Washington, DC, USA, October 2008.

Liguang Xie, Bing Fang, Yong Cao, and Francis Quek. A nonlinear manifold learning framework for real-time motion estimation using low-cost sensors. In *IEEE 37th Applied Imagery Pattern Recognition Workshop*, pages 1–8, Washington, DC, USA, October 2008.

Jing Huang, Sean Ponce, Seung In Park, Yong Cao, and Francis Quek. Gpu-accelerated computation for robust motion tracking using the cuda framework. In *VIE 2008 - The 5th IET Visual Information Engineering 2008 Conference*, pages 437–442, July 29 - August 1 2008.

Liguang Xie, Mithilesh Kumar, Yong Cao, Denis Gracanin, and Francis Quek. Data-driven motion estimation with low-cost sensors. In *VIE 2008 - The 5th IET Visual Information Engineering 2008 Conference*, pages 600–605, July 29 - August 1 2008.

Ari Shapiro, Yong Cao, and Petros Faloutsos. Style components. In *Proceedings of Graphics Interface 2006*, GI '06, pages 33–39, Toronto, Ont., Canada, Canada, June 2006. Canadian Information Processing Society.

Yong Cao, Petros Faloutsos, Eddie Kohler, and Frédéric Pighin. Real-time speech motion synthesis from recorded motions. In *SCA '04: Proceedings of the 2004 ACM SIGGRAPH/Eurographics symposium on Computer animation*, pages 345–353, Aire-la-Ville, Switzerland, Switzerland, August 2004. Eurographics Association.

Ari Shapiro, Yong Cao, and Petros Faloutsos. Interactive motion decomposition. In *SIGGRAPH '04: ACM SIGGRAPH 2004 Sketches*, page 30, New York, NY, USA, August 2004. ACM.

Yong Cao, Petros Faloutsos, and Frédéric Pighin. Unsupervised learning for speech motion editing. In *SCA '03: Proceedings of the 2003 ACM SIGGRAPH/Eurographics symposium on Computer animation*, pages 225–231, Aire-la-Ville, Switzerland, Switzerland, July 2003. Eurographics Association.

Technical Report

Chao Peng and Yong Cao. Gpu-based streaming for parallel level of detail on massive model rendering. Technical Report TR-11-12, Virginia Polytechnical Institute and State University, July 2011.

Yong Cao, Debprakash Patnaik, Sean Ponce, Jeremy Archuleta, Patrick Butler, Wu chun Feng, and Naren Ramakrishnan. Towards chip-on-chip neuroscience: Fast mining of frequent episodes using graphics processors. Technical report, arXiv.org, May 2009.

Yong Cao, Debprakash Patnaik, Sean Ponce, Jeremy Archuleta, Patrick Butler, Wu chun Feng, and Naren Ramakrishnan. Towards chip-on-chip neuroscience: Fast mining of frequent episodes using graphics processors. Technical report, Virginia Polytechnical Institute and State University, May 2009.

Sean Ponce, Huang Jing, Seung In Park, Chase Khoury, Francis Quek, and Yong Cao. An application-oriented approach for accelerating data-parallel computation with graphics processing unit. Departmental Technical Report TR-09-05, Computer Science Department, Virginia Polytechnical Institute and State University, March 2009.

Invited Keynote Presentation or Talks

2013 GPU Technology Conference. March 21, 2013. "Multi-GPU Load Balancing for Simulation and Rendering".

2013 GPU Technology Conference. March 21, 2013. "Adaptive Simplification for Massive Model Rendering on GPUs".

2012 Pacific Northwest National Laboratory. October 12, 2012. "Data Intensive Computing and Visualization on Many-Core Architectures".

2012 China Internet Network Information Center. January 2012. "Data Ming and Information Visualization at Virginia Tech".

2012 NQ Mobile (Security) Inc. January 2012. "Many-core Architecture Oriented Parallel Algorithm Design".

2012 CUNY-NSF Workshop on Accelerators in High Performance Computing and Computational Science. June 6, 2012. “Data Intensive Computing and Visualization on Many-Core Architectures”.

2011 The Fourth International Conference on Motion In Games. November 14, 2011. “Many-core Architecture Oriented Parallel Algorithm Design in Computer Animation”.

2011 Chinese Academy of Sciences. July 2011. “Many-core (GPU) Architecture Oriented Parallel Algorithm Design”.

2011 Xi’an Electronic Science and Technology University. July 2011. “Many-core (GPU) Architecture Oriented Parallel Algorithm Design”.

2011 Hebei University of Engineering. July 2011. “Parallel Computing on Many-core Architecture: Research and Trend”.

2011 University of North Carolina at Chapel Hill. March 2, 2011. “Many-core Architecture Oriented Parallel Algorithm Design in Computer Graphics”.

2010 Taxes A&M University. November 1, 2010. “Towards Chip-on-Chip Neuroscience: Fast Mining of Neuronal Spike Streams Using Graphics Hardware”.

Awards and News Coverage

2012 IEEE 2012 VAST Mini Challenge Award: Dynamic Analysis of Large Datasets With Animated and Correlated Views.

2008 SpotLight on Innovation, Virginia Tech. Dec 9, 2008. ÒStudents, professor work to create a software program to produce real-time visualizations of seismic simulation dataÓ.

2007 Washington Times. August 30, 2007. Video Game Programming.

Software Developed

AVIST: Animated Visualization Toolkit. The software is designed for real-time visualization and analysis of massive scale datasets. The software was introduced and recently won at the IEEE VAST Mini Challenge 2012. A new grant from the Department of Energy was obtained to continue the development of AVIST. The software is an open-source project and available through the Google Code site.

Massive Model Rendering Tool. The goal of the software is to provide real-time visualization capacity for massive 3D geometry datasets. The project was initiated with the collaboration of the Boeing Company to visualize its Boeing 777 airplane model, which includes hundreds of millions of geometric primitives. The software will be released at an open-source project website soon.

Crowd Simulation and Visualization System. The software was initially developed in a NSF funded project for developing a massive multi-character video game using crowd control research. While supporting various research projects for human behavior simulation, the software will be extended for evacuation planning simulation, such as a funded project by the Virginia Tech police department and athletic department for crowd modeling and simulation at Lane Stadium. The software will be released at an open-source project website soon.

Teaching Experience

CS 6204 **Parallel Visualization of Massive Data**, *Instructor*, Computer Science Department, Virginia Tech.
Fall 2013

CS 5234 **Advanced Parallel Computation**, *Instructor*, Computer Science Department, Virginia Tech.
Spring 2013

CS 5984 **Advanced Computer Graphics: Parallel Computing and Visualization on GPUs**, *Instructor*, Computer Science Department, Virginia Tech.
Fall 2011, Fall 2010

CS4644 **Creative Computing Studio:Drummer Game**, *Instructor*, Computer Science Department, Virginia Tech.
Spring 2010

CS4644 **Creative Computing Studio:Video Game Design**, *Instructor*, Computer Science Department, Virginia Tech.
Fall 2010, Spring 2012, Spring 2013, Spring 2014

CS5894 **Accelerator-Based Parallel Computing**, *Instructor*, Computer Science Department, Virginia Tech.
Spring 2009

CS5894 **Video Game and Interactive Media**, *Instructor*, Computer Science Department, Virginia Tech.
Spring 2008

CS4204 **Computer Graphics**, *Instructor*, Computer Science Department, Virginia Tech.
Fall 2007, Fall 2008, Spring 2010, Spring 2012, Fall 2014

CS6204 **Character Animation**, *Instructor*, Computer Science Department, Virginia Tech.
Spring 2007, Spring 2009, Spring 2011

CS174A **Introduction to Computer Graphics**, *Teaching Assistant*, Computer Science Department, UCLA.
Fall 2004

CS141 **Computer Algorithm**, *Teaching Assistant*, Computer Science Department, UC Riverside.
Winter 2001

CS12 **Programming with C++**, *Teaching Assistant*, Computer Science Department, UC Riverside.
Fall 2000

CS8 **Introduction to Computer Science**, *Teaching Assistant*, Computer Science Department, UC Riverside.
Fall 2000

Course Designed and Enhanced

CS4204 Computer Graphics. Updated the course textbook and modified the course significantly to embrace the new standard for graphics programming using the OpenGL Shader Language (GLSL).

CS5234 Advance Parallel Computation. Extends beyond GPU computing to general computing on many-core architecture, focus on parallel algorithm design techniques.

CS4644 Creative Computing Studio: Video Game Design. Commented by the students as the "Best course in my life" (quoted from teaching evaluation forms)

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Directed Ph.D Dissertations and Master Theses

2014 Sruthi Iyer (Master). May 2014. Title: "Design Study to Visualize Stock Market Bubble Formations and Bursts". 80 pages.

2013 Chao Peng (Ph.D.). May 2013. Title: "Real-time Visualization of Massive 3D Models on GPU Parallel Architectures". 127 Pages. He is currently at Southern Polytechnic State Univerisity.

2013 Seung In Park (Ph.D.). February 2013. Title: "Modeling Social Group Interactions for Realistic Crowd Behaviors". 123 Pages. She is currently at Samsung Research.

2012 Bryan Cunningham (Master). August 2012. Title: "Non-Reciprocating Sharing Methods in Cooperative Q-Learning Environments". 85 Pages.

2011 Robert Hagan (Master). June 2011. Title: "Multi-GPU Load Balancing for Simulation and Rendering". 86 Pages.

2009 Sean Ponce (Master). July 2009. Title: "Towards Algorithm Transformation for Temporal Data Mining on GPU". 55 Pages.

2008 Mithilesh Kumar (Master). July 2008. Title: "A Motion Graph Approach for Interactive 3D Animation using Low-cost Sensors". 70 Pages.

2008 Muruganand Karthikeyan (Master). August 2008. Title: "Real Time Crowd Visualization Using the GPU". 67 Pages.

Service on Ph.D. Dissertation Committees

2013 Tom Scogland. Title: "Runtime Adaptation for Autonomic Heterogeneous Computing". Advisor: Wuchun Feng. Computer Science Department.

2012 Mohammad Alkandari. Title: "A Model of Multicultural Software Project Team Management applied in Requirements Engineering". Advisor: Shawn Bohner. Computer Science Department.

2012 Shucai Xiao. Title: "Generalizing the Utility of Graphics Processing Units in Large-Scale Heterogeneous Computing Systems". Advisor: Wuchun Feng. Computer Science Department.

2012 Shaimaa Lazem. Title: "An Interdisciplinary Approach To Quality Of Experience Provision in Distributed Dynamic Cooperative Environments". Advisor: Dennis Gracanin. Computer Science Department.

2011 Bing Fang. Title: "A General Framework of Human Tracking Using Agent-based Architecture". Advisor: Francis Quek. Computer Science Department, 2011.

2011 Ryan P. McMahan. Title: "Exploring the Effects of Higher-Fidelity Display and Interaction for Virtual Reality Games". Advisor: Doug Bowman. Computer Science Department.

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