Sean Curtis

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Research Interests

Simulation of physical systems, collision detection, pedestrian modeling, games, multi-agent navigation, motion planning, virtual reality

Education

May 2014	Ph.D., Computer Science, University of North Carolina, Chapel Hill, NC
May 2008	M.S., Computer Science, University of North Carolina, Chapel Hill, NC
Jun 2006	B.S., Computer Science, University of Utah, Salt Lake City, UT
Dec 2001	B.A., German, Brigham Young University, Provo, UT

Experience

Research/Academic

8/13 to 3/14	Staff Scientist, UNC-CH, GAMMA group Research and software development in crowd simulation--*Menge* crowd simulation framework (under Prof. Dinesh Manocha).
7/09 to 8/13	Graduate Research Assistant, UNC-CH, GAMMA group Performed independent and collaborative research in physical simulation and crowd simulation (under Prof. Dinesh Manocha).
6/06 to 6/08	Graduate Research Assistant, UNC-CH, GAMMA group Performed research in acceleration structures and collision detection (under Prof. Dinesh Manocha).
5/07 to 8/07	Intern, Walt Disney Animation Studios Developed novel algorithms for accelerating continuous collision detection in in-house cloth simulation system; efforts yielded a 3X improvement in performance (under Rasmus Tamstorf).
8/05 to 8/06	Undergraduate Research Assistant, University of Utah, SCI Research in post-processing filters for finite element analysis methods (under Prof. Mike Kirby).

Teaching

Fall 2010	Instructor, *Introduction to Scientific Programming* Taught data collection, analysis, and visualization through critical thinking and programming to 45, non-computer-science undergraduates.

Professional

7/15 to now	**Process Engineer, Boeing Research & Technology** Work with the Human-Systems Integration Team to provide robust software solutions for improving the manufacturing process through technology through measurement technology, human factors and ergonomics, and efficient production systems.
3/14 to 6/15	**Programmer/Analyst, Boeing** Lead architect and technical lead for visualization tools in support of engineering and manufacturing Boeing commercial aircraft. Mentor for team of developers.
7/08 to 7/09	**Software Engineer, Walt Disney Animation Studios** Developed tools to aid animators. Specifically, developed a keyframe-able constraint system and library system for creating, editing, applying and managing animation clips and poses.
12/05 to 5/06	**Intern, NextPage** Assisted in the redesign and re-implementation of the core NextPage document tracking software, particularly the model abstraction between database and user interface.
4/02 to 8/05	**Freelance Artist** Created 3D content for various clients—most notably the National Center for Missing and Exploited Children and Dr. Florian Solzbacher at the Microsystems Laboratory at the University of Utah.
5/96 to 4/02	**Senior Content Developer, Viewpoint** Senior modeler, lead animator, and technical director. Responsible for developing animation services. Responsibilities included sculpting, modeling, texturing and animating in multiple packages on multiple platforms.

Publications

Journal Publications

Sean Curtis, Andrew Best, Dinesh Manocha. Menge: A Modular Framework for Simulating Crowd Movement. Collective Dynamics, [S.I.], v. 1, p. 1-40, mar. 2016. ISSN 2366-8539. doi:http://dx.doi.org/10.17815/CD.2016.1.

Sahil Narang, Andrew Best, Sean Curtis, Dinesh Manocha, "Generating Pedestrian Trajectories Consistent with the Fundamental Diagram based on Physiological and Psycholgocial Factors", PLoS ONE 10(4): e0117856. doi:10.1371/journal.pone.0117856, 2015

Abhinav Golas, Rahul Narain, Sean Curtis, Ming Lin, "Hybrid Long-Range Collision Avoidance for Crowd Simulation," IEEE Transactions on Visualization and Computer Graphics, July 2014, pp. 1022-1034, 2014.

Sean Curtis, Basim Zafar, Adnan Gutub, Dinish Manocha, "Right of Way: Asymmetric Agent Interactions in Crowds," The Visual Computer, Vol. 29, Issue 12, pp. 1277-1292, 2013.

Ravish Mehra, Nikunj Raghuvanshi, Lakulish Antani, Anish Chandak, Sean Curtis, Dinesh Manocha, "Wave-based Sound Propagation in Large Open Scenes using an Equivalent Source Formulation," ACM Transactions on Graphics, Vol. 32, No. 2, 2013

Stephen J. Guy, Sean Curtis, Ming C. Lin, Dinesh Manocha, "Least-effort trajectories lead to emergent crowd behaviors," Phys. Rev. E, Vol. 85, 2012.

Sachin Patil, Jur van den Berg, Sean Curtis, Ming C. Lin and Dinesh Manocha, "Directing Crowd Simulations Using Navigation Fields," IEEE Transactions on Visualization and Computer Graphics, Vol.17, No.2, pp. 244-254, Feb. 2011.

Min Tang, Sean Curtis, Sung-Eui Yoon, Dinesh Manocha, "ICCD: Interactive Continuous Collision Detection between Deformable Models using Connectivity-Based Culling," IEEE Transactions on Visualization and Computer Graphics, Vol. 15, No. 4, pp. 544-557, July/Aug, 2009.

Avneesh Sud, Erik Andersen, Sean Curtis, Ming Lin, and Dinesh Manocha, "Real-time Path Planning in Dynamic Virtual Environments Using Multi-agent Navigation Graphs," IEEE Transactions on Visualization and Computer Graphics, Vol. 14, No. 3, pp. 526-538, 2008.

Michael Steffen, Sean Curtis, Robert M. Kirby and Jennifer K. Ryan, "Investigation of Smoothness-Increasing Accuracy-Conserving Filters for Improving Streamline Integration Through Discontinuous Fields," IEEE Transactions on Visualization and Computer Graphics, Vol. 14, No. 3, pp. 680-692, 2008.

Sean Curtis, Robert M. Kirby, Jennifer K. Ryan and Chi-Wang Shu, "Post-processing for the Discontinuous Galerkin Method Over Non-Uniform Meshes," SIAM Journal of Scientific Computing, Vol. 30, No. 1, pp. 272-289, 2007.

Conference Proceedings

Andrew Best, Sahil Narang, Sean Curtis, Dinesh Manocha, "DenseSense: Interactive Crowd Simulation using Density-Dependent Filters", Eurographics/ACM Siggraph Symposium on Computer Animation (SCA), Vol. 108, pp. 81-86, 2014.

Andrew Best, Sean Curtis, David Kasik, Christopher Senesac, Tim Sikora, Dinesh Manocha, "Ped-Air: a Simulator for Loading, Unloading, and Evacuating Aircraft", In Proc. of PED2014, 2014.

Sean Curtis, Dinesh Manocha, "Pedestrian Simulation using Geometric Reasoning in Velocity Space," In Proc. of PED2012, 2012.

Sean Curtis, Jamie Snape, Dinesh Manocha, "Way Portals: Efficient Multi-Agent Navigation with Line-Segment Goals," ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), pp. 15-22, 2012.

Jens Schneider, Dina Garatly, Madhusudhanan Srinivasan, Stephen J. Guy, Sean Curtis, Steven Cutchin, Dinesh Manocha, Ming C. Lin, Alyn Rockwood, "Towards a Digital Makkah - Using Immersive 3D Environments to Train and Prepare Pilgrims," International Conference on Digital Media and its Applications in Cultural Heritage (DMACH), 2011.

Sean Curtis, Ming C. Lin, Dinesh Manocha, "Walk This Way: A Lightweight, Data-driven Walking Synthesis Algorithm," The Fourth International Conference on Motion in Games, Lecture Notes in Computer Science, Vol. 7060/2011, pp. 400-411, 2011.

Stephen J. Guy, Jatin Chhugani, Sean Curtis, Pradeep Dubey, Ming Lin, and Dinesh Manocha. "PLEdestrians: a least-effort approach to crowd simulation," In Proceedings of the 2010 ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA '10), pp. 119-128, 2010

Jamie Snape, Stephen J. Guy, Jur van den Berg, Sean Curtis, Sachin Patil, Ming C. Lin, Dinesh Manocha, "Independent Navigation of Multiple Robots and Virtual Agents," International Conference on Autonomous Agents and Multiagent Systems (AAMAS), pp. 1645-1646, 2010

Rahul Narain, Abhinav Golas, Sean Curtis, Ming C. Lin, "Aggregate Dynamics for Dense Crowd Simulation," ACM Transactions on Graphics (Proc SIGGRAPH Asia), Vol. 28, pp. 122-122, 2009.

Nico Galoppo, Miguel A. Otaduy, William Moss, Jason Sewall, Sean Curtis, Ming C. Lin, "Controlling Deformable Material with Dynamic Morph Targets," ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), pp. 39-47, 2009

Hengchin Yeh, Sean Curtis, Sachin Patil, Jur van den Berg, Dinesh Manocha and Ming Lin. "Composite Agents," Proceedings of the 2008 ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA '08), pp. 39-47, 2008.

Min Tang, Sean Curtis, Sung-Eui Yoon, and Dinesh Manocha, "Interactive Continuous Collision Detection between Deformable Models using Connectivity-Based Culling," Symposium on Solid and Physical Modeling 2008 (SPM), pp. 25-36, 2008.

Sean Curtis, Rasmus Tamstorf, and Dinesh Manocha, "Fast Collision Detection for Deformable Models using Representative-Triangles", Proc. of Symposium on Interactive 3D Graphics and Games (I3D), pp. 61-69, 2008.

Sung-Eui Yoon, Sean Curtis, and Dinesh Manocha, "Ray Tracing Dynamic Scenes using Selective Restructuring", Eurographics Symposium on Rendering (EGSR), Vol. 28, 2007.

Avneesh Sud, Erik Andersen, Sean Curtis, Ming C. Lin, and Dinesh Manocha, "Real-time Path Planning for Virtual Agents in Dynamic Environments," IEEE Virtual Reality, pp. 91-98, 2007.

Workshops

Sean Curtis, Stephen J. Guy, Basim Zafar, Dinesh Manocha, "Virtual Tawaf: A Case Study in Simulating the Behavior of Dense, Heterogeneous Crowds," 1st IEEE Workshop on Modeling, Simulation and Visual Analysis of Large Crowds, 2011.

Ming C. Lin, Stephen Guy, Rahul Narain, Jason Sewall, Sachin Patil, Jatin Chhugani, Abhinav Golas, Jur van den Berg, Sean Curtis, David Wilkie, Paul Merrell, Changkyu Kim, Nadathur Satish, Pradeep Dubey and Dinesh Manocha, "Interactive modeling, simulation and control of large-scale crowds and traffic," "Motion in Games", Lecture Notes in Computer Science, Volume 5288/2009, Springer Berlin/ Heidelberg, 2009.

Peter Shirley, William Thompson, Sean Curtis, and David Gallup, "Stylized Browsing in Space and Time," VAST2004: The 5th International Symposium on Virtual Reality, Archaeology and Cultural Heritage, December 2004.

Invited Talks

Menge: A Modular Framework for Simulating Crowd Movement. Workshop on Crowd Modeling, Simulation and Data. Transportation Research Board 94th Annual Meeting. January 2015

Professional Service

Journal and Conference Article Reviewing

Computers and Graphics ► Simulation Modelling Practice and Theory ► Transactions on Modeling and Computer Simulation ► Computer Animation and Virtual Worlds ► Computer Graphics Forum ► ACM Transactions on Graphics ► IEEE Transactions on Visualization and Computer Graphics ► IEEE Computer Graphics and Applications

IEEE Industrial Electronics Society ► Computer Animation and Social Agents (CASA) ► Computer Graphics International, European Association for Computer Graphics (EuroGraphics) ► ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D) ► IEEE International Conference on Robotics and Automation (ICRA) ► IEEE International Conference on Intelligent Robots and Systems (IROS) ► International Conference on Intelligent Virtual Agents (IVA) ► Motion in Games ► Pacific Conference on Computer Graphics and Applications (PacificGraphics) ► ACM SIGGRAPH / Eurographics Symposium on Computer Animation (SCA) ► ACM Special Interest Group on Computer Graphics and Interactive Techniques (SIGGRAPH) ► ACM Special Interest Group on Computer Graphics and Interactive Techniques in Asia

(SIGGRAPH Asia) ► Eurographics Symposium on Parallel Graphics and Visualization (PacificGraphics) ► ACM Symposium on Virtual Reality Software and Technology (VRST) ► Transportation Research Board (TRB) ► Arabian Journal for Science and Engineering

Published Software

Menge: A Modular Framework for Simulating Crowd Movement (http://gamma.cs.unc.edu/Menge) An open-source, cross-platform, modular platform for simulating crowd movement. Its extensible architecture allows for straight-forward extension to introduce novel behaviors while fully exploiting previously existing, compatible techniques.

Awards and Honors

2005	Phi Kappa Phi, Tau Beta Pi, Golden Key
2005	Eccles Scholarship
2004	Chevron Scholarship
2003	Departmental Scholarship
1992	Trustees Scholar
1992	National Merit Finalist

Skills

Programming: Python, C/C++, C#, Java, OpenGL, 3D graphics data structures and algorithms.

Digital Content Creation: Very experienced in modeling, texturing, rigging and animating using Maya, 3DS Max, Mirai, MotionBuilder, and Photoshop. Proficient in Adobe Premiere and After Effects.

Miscellaneous

High fluency in German. Basic conversational fluency in Japanese.

Sample gallery of artwork can be seen at: http://www.cs.unc.edu/~seanc/artwork.html