

ROBERT KOOIMA
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EDUCATION

Ph.D., Electronic Visualization Laboratory (EVL) and the Dept. of Computer Science, University of Illinois at Chicago (UIC), Chicago, IL 2004–2008

Concentrated on virtual reality (VR), data visualization, and real-time 3D graphics. Completed my dissertation “Planetary-scale Terrain Composition,” a scalable terrain data visualization that homogenizes elevation and surface-mapped data handling as real-time image manipulation using GPU-based fragment shading. The implementation supports stereoscopic VR and cluster-based rendering for ultra-high-resolution tiled displays. This work was supported by the NSF-funded OptIPuter project and the Adler Planetarium.

M.S., Computer Science, University of Iowa, Iowa City, IA 1997–2001

Thesis entitled “A Framework for Tele-Immersive Application Development,” for which I developed a set of network-synchronized objects and 3D GUI widgets used to develop collaborative VR applications for the CAVE and Immersadesk.

B.S., Computer Science and Mathematics, University of Iowa 1993–1997

PROFESSIONAL EXPERIENCE

Adjunct Professor, Dept. of Computer Science, Louisiana State University (LSU) 2010–present

Post-doctoral Researcher, Center for Computation & Technology (CCT), LSU 2009–present

Developed and presented the LSU course CSC4356 Interactive Computer Graphics in Fall 2010. Presented CSC4700 Video Game Design in Spring 2009, 2010, and 2011. Developed and proposed curriculum for CSC4263 Video Game Design, which was adopted. Constructed a TacTile high-resolution multi-touch FTIR LCD table for use in CSC4700/4263 in 2009 and 2010, demonstrating it at SIGGRAPH 2009. Constructed a 16 megapixel tiled display for use in CSC4263 in 2011. Developed a custom Apple iOS e-book application for delivery of interactive 3D course content in CSC4263.

Research Assistant, EVL, UIC 2004–2008

Developed “Electro,” a scripting system for cross-platform application development targeting VR systems, tiled displays, and desktop systems. Electro has been used in UIC’s Video Game Development course, exhibits at the Adler Planetarium & Astronomy Museum, and several projects and prototypes at EVL. Assisted in the development of the Varrier and Dynallax autostereoscopic VR systems, the Immersadesk4 stereo display, and the LambdaTable and TacTile high-resolution table displays. Acted as visualization consultant to the Space Visualization Lab at the Adler Planetarium and to the California Institute for Telecommunications and Information Technology at the University of California at San Diego.

Research Associate, Center for Advanced Engineering Environments, Old Dominion University and NASA Langley Research Center, Hampton, VA. 2001–2004

Assisted in the design, implementation, and programming of two stereoscopic VR devices, one using a spherical projection, the other blending multiple projectors. Worked with multi-modal interfaces to virtual environments, creating a dynamic PDA-based control interface. Developed custom structural visualization code for NASA Langley. Build a Beowulf cluster for structural analysis research and rendering.

Open Source Software Developer **2000–present**

- *Electro*, a cross-platform scripting system for the development of interactive 3D applications for cluster-driven tiled displays and VR devices.
- *Neverball*, a cross-platform 3D video game using a custom physics simulator and renderer.
- *Neverputt*, a 3D miniature golf game based on the *Neverball* game engine.

Research Assistant and Teaching Assistant, University of Iowa **1993–2001**

Research Assistant for the Advanced Research Computing Service (1998–2001). Developed applications for real-time 3D visualization and VR. Presented a regular course on parallel programming. *Research Assistant* for the Department of Computer Science (1997–2000). Designed and implemented a formal language for semantic specification for programming language translation and compiler construction. *Teaching Assistant* in CS (1999–2000). Assisted with a graduate course on parallel programming. *Research Assistant* in CS (1994–1995). Implemented a system for testing and comparing parallel discrete event simulation methods. *Research Assistant* in the Department of Physics and Astronomy (1993–1994). Implemented a simulation to model the impact of dam management on flooding.

COURSES TAUGHT

CSC4263/ART4020 Video Game Design	Spring 2011
CSC4356/ME4573 Interactive Computer Graphics	Fall 2010
CSC4700/ART4020 Video Game Design	Spring 2010
CSC4700/ART4020 Video Game Design	Spring 2009

PROFESSIONAL ACTIVITIES

Discussion panelist at the opening of “Synthesis: Processing and Collaboration” with Dan Sandin, Tom DeFanti, and Sheldon Brown, gallery@Calit2, University of California San Diego, San Diego, CA, January 13, 2011.

Presentation of “A Multi-viewer Tiled Autostereoscopic Virtual Reality Display” at the 17th ACM Symposium on Virtual Reality Software & Technology, Hong Kong, China, November 22–24, 2010.

Presentation of “Interactive 3D: Displays, Devices and Applications” at the Information Science & Technology Colloquium Series, NASA Goddard Space Flight Center, Greenbelt, MD, October 13, 2010.

Presentation of “Video Game Development” at the LSU Computer Science Intensive Orientation for Students 2010 (CIOS), Baton Rouge, LA, August 10, 2010.

Service on the steering committee of the International Planetarium Society Conference 2012, Pennington Planetarium, Baton Rouge, LA.

Presentation of “Planetary-scale Processing and Visualization,” a seminar at the LSU Department of Computer Science, Baton Rouge, LA, October 31, 2009.

Demonstration of “Passing ‘Place for Games’” in the Information Aesthetics Showcase, SIGGRAPH 2009, New Orleans, LA, August 3–7, 2009.

Presentation of “Planetary-scale Terrain Composition,” a seminar at the LSU Center for Computation & Technology, Baton Rouge, LA, May 16, 2008.

Presentation of “Real-time Digital Dome Rendering Techniques and Technologies” at the International Planetarium Society 2008 Conference, Chicago, IL, July 2008.

Installation of “MoonWall,” “Mars Transporter,” and “StarFlight,” interactive 3D visualization exhibits demonstrating large-scale astronomical data at the Adler Planetarium and Astronomy Museum, Chicago, IL, 2007–present.

Demonstration of the “Planetary Scale Terrain Composition” algorithm at SC’07, Reno, NV, November 2007, and at the Annual Meeting of AAAS, Chicago, IL, January 2008.

Presentation of “The Varrier,” a seminar at the Adler Planetarium & Astronomy Museum, Chicago, IL, March 30, 2007.

Presentation of “A GPU Sub-pixel Algorithm for Autostereoscopic Virtual Reality” at IEEE Virtual Reality 2007, Charlotte, NC, March 2007.

Demonstration of Personal Varrier autostereoscopic display at SC’05, Seattle, WA, November 2005

Demonstration of Personal Varrier at the iGrid 2005 Workshop, UCSD, September 2005.

JOURNAL ARTICLES

Thomas A. DeFanti, Daniel Acevedo, Richard A. Ainsworth, Maxine D. Brown, Steven Cutchin, Gregory Dawe, Kai-Uwe Doerr, Andrew Johnson, Chris Knox, **Robert Kooima**, Falko Kuester, Jason Leigh, Lance Long, Peter Otto, Vid Petrovic, Kevin Ponto, Andrew Prudhomme, Ramesh Rao, Luc Renambot, Daniel J. Sandin, Jurgen P. Schulze, Larry Smarr, Madhu Srinivasan, Philip Weber, Gregory Wickham, “The Future of the CAVE,” *Central European Journal of Engineering*, Versita, Springer-Verlag GmbH, November 2, 2010.

Ge, J., Hutanu, A., Toole, C., **Kooima, R.**, Hossain, I., Allen, G., “An Experimental Distributed Visualization System for Peta-scale Computing,” *Computing in Science & Engineering*, vol. 12, no. 5, pp. 78–82, September/October 2010.

Hutanu, A., Schnetter, E., Bengner, W., Bentivegna, E., Clary, A., Diener, P., Ge, J., **Kooima, R.**, Korobkin, O., Liu, K., Löffler, F., Paruchuri, R., Tao, J., Toole, C., Yates, A. and Allen, G., “Large Scale Problem Solving Using Automatic Code Generation and Distributed Visualization” In *Scalable Computing: Practice and Experience*, vol. 11, no. 2, pp. 205–220, June 2010.

Kooima, R., Leigh, J., Johnson, A., Roberts, D., Subbarao, M., DeFanti, T., “Planetary-scale Terrain Composition” In *IEEE Transactions on Visualization and Computer Graphics*, vol. 15, no. 5, pp. 719–733, Sep-Oct 2009.

Gail W. Pieper, Thomas A. DeFanti, Qian Liu, Mason Katz, Phil Papadopoulos, Joseph Keefe, Greg Hidley, Greg Dawe, Ian Kaufman, Bryan Glogowski, Kai-Uwe Doerr, Jurgen P. Schulze, Falko Kuester, Peter Otto, Ramesh Rao, Larry Smarr, Jason Leigh, Luc Renambot, Alan Verlo, Lance Long, Maxine Brown, Dan Sandin, Venkatram Vishwanath, **Robert Kooima**, Javier Girado, Byungil Jeong, “Visualizing Science: The OptIPuter Project,” In *SciDAC Review*, Issue 12, Spring 2009, IOP Publishing in association with Argonne National Laboratory, for the US Department of Energy, Office of Science.

Kooima, R., Roberts, D., SubbaRao, M., “Real-time Digital Dome Rendering Techniques and Technologies” To appear in *Planetarian: Journal of the International Planetarium Society*.

Peterka, T., **Kooima, R.**, Sandin, D., Johnson, A., Leigh, J., DeFanti, T., “Advances in the Dynallax Solid-State Dynamic Parallax Barrier Autostereoscopic Visualization Display System” In *IEEE Transactions on Visualization and Computer Graphics*, vol. 14, no. 3, pp. 487–499, May-June 2008.

Ge, J., Sandin, D., Johnson, A., Peterka, T., **Kooima, R.**, Girado, J., DeFanti T., “Point-based VR Visualization for Large-scale Mesh Datasets by Real-time Remote Computation” In the *International Journal of Image and Graphics*, vol. 8, issue 2, April 2008

Leigh, J., Renambot, L., Johnson, A., Jeong, B., Jagodic, R., Schwarz, N., Svistula, D., Singh, R., Aguilera, J., Wang, X., Vishwanath, V., Lopez, B., Sandin, D., Peterka, T., Girado, J., **Kooima, R.**, Ge, J., Long, L., Verlo, A., DeFanti, T., Brown, B., Cox, D., Patterson, R., Dorn, P., Wefel, P., Levy, S., Tollandis, J., Reitzer, J., Prudhomme, T., Coffin, T., Davis, B., Wielinga, P., Stolk, B., Koo, G., Kim, J., Han, S., Kim, J., Corrie, B., Zimmerman, T., Boulanger, P., Garcia, M., "The Global Lambda Visualization Facility: An International Ultra-High-Definition Wide-Area Visualization Collaboratory" In the *International Journal of Future Generation Computer Systems*, Elsevier, 22.8 (2006), pp. 964–971.

Peterka, T., Sandin, D., Ge, J., Girado, J., **Kooima, R.**, Leigh, J., Johnson, A., Thiebaut, M., DeFanti, T., "Personal Varrier: Autostereoscopic Virtual Reality for Distributed Scientific Visualization" In the *International Journal of Future Generation Computer Systems*, Elsevier, 22.8 (2006), pp. 976–983.

CONFERENCE PROCEEDINGS

Kooima, R., Prudhomme, A., Schulze, J., Sandin, D., DeFanti, T., "A Multi-viewer Tiled Autostereoscopic Virtual Reality Display," in the *Proceedings of the 17th ACM Symposium on Virtual Reality Software and Technology*, Hong Kong, China, Nov 22–24, 2010.

J. Ge, **R. Kooima**, A. Hutanu, "High-Resolution Remote Visualization of Ray-Casted Volume Rendering on GPU Cluster", Poster, International Conference of High Performance Computing, Network, Storage and Analysis 2010 (SC'10).

Ullmer, B., Dever, Z., Sankaran, R., Toole, C., Freeman, C., Cassady, B., Wiley, C., Diabi, M., Wallace, A., Delatin, M., Tregre, B., Liu, K., Jandhyala, S., **Kooima, R.**, Branton, C., Parker, R., "Cartouche: Conventions for Tangibles Bridging Diverse Interactive Systems" at the Fourth International Conference on Tangible, Embedded and Embodied Interaction, Cambridge, MA, January 25–27, 2010.

Peterka, T., **Kooima, R.**, Girado, J., Ge, J., Sandin, D., DeFanti, T., "Evolution of the Varrier Autostereoscopic VR Display: 2001–2007" in *Proceedings of SPIE*, 2007

Peterka, T., **Kooima, R.**, Girado, J., Ge, J., Sandin, D., Johnson, A., Leigh, J., Schulze, J., DeFanti, T., "Dynallax: Solid State Dynamic Parallax Barrier Autostereoscopic VR Display" In *Proceedings of IEEE Virtual Reality*, Charlotte, NC, March 10–14, 2007.

Kostis, H., **Kooima, R.**, Kannenberg, J., "Skin: an Interactive hyperstereoscopic electro installation" in *Proceedings of SPIE*, 2007

Tsoupikova, D., **Kooima, R.**, "Passing Excellence, The Interactive Art Visualization Of the Kizhi Ensemble" in the *Proceedings of the CIPA Symposium*, Athens, Greece, October 1–6, 2007.

Leigh, J., Johnson, A., Renambot, L., Sandin, D., DeFanti, T., Brown, M., Jeong, B., Jagodic, R., Krumbholz, C., Svistula, D., Hur, H., **Kooima, R.**, Peterka, T., Ge, J., Falk, C., "Emerging from the CAVE: Collaboration in Ultra High Resolution Environments" in *Proceedings of the First International Symposium on Universal Communication*, Kyoto, Japan, June 14–15, 2007, pp. 96–99.

Kooima, R., Peterka, T., Girado, J., Ge, J., Sandin, D., DeFanti, T., "A GPU Sub-pixel Algorithm for Autostereoscopic Virtual Reality" in *Proceedings of IEEE Virtual Reality 2007*, Charlotte, NC, March 10–14, 2007.

Peterka, T., **Kooima, R.**, Girado, J., Ge, J., Sandin, D., Johnson, A., Leigh, J., Schulze, J., DeFanti, T., "Dynallax: Solid State Dynamic Parallax Barrier Autostereoscopic VR Display" in the *Proceedings of IEEE Virtual Reality 2007*, Charlotte, NC, March 10–14, 2007.

Girado, J., Peterka, T., **Kooima, R.**, Ge, J., Sandin, D., Johnson, A., Leigh, J., DeFanti, T., "Real Time Neural Network-based Face Tracker for VR Displays" in the *Workshop on Trends and Issues in Tracking for Virtual Environments* at IEEE Virtual Reality 2007, Charlotte, NC, March 11, 2007.

Ge, J., Sandin, D., Johnson, A., Peterka, T., **Kooima, R.**, Girado, J., DeFanti T., “Point-based VR Visualization for Large-scale Mesh Datasets by Real-time Remote Computation” in the *Proceedings of ACM Conference on Virtual Reality Continuum and its Applications*, Hong Kong, June 14–17, 2006

Krumbholz, C., Leigh, J., Johnson, A., Renambot, L., **Kooima, R.**, “Lambda Table: High Resolution Tiled Display Table for Interacting with Large Visualizations” at the Workshop on Advanced Collaborative Environments, Redmond, WA, September 8–9, 2005.

PUBLIC INSTALLATIONS

Sandin, D. **Kooima, R.**, Speigel, L., DeFanti, T., “Particle Dreams in Spherical Harmonics,” Calit2, University of California San Diego, San Diego, CA, January 13–March 11, 2011.

Tsoupikova, D., **Kooima, R.**, “Passing ‘Place for Games’”, Information Aesthetics Showcase, SIGGRAPH 2009, New Orleans, LA, August 3–7, 2009.

Kostis, H., **Kooima, R.**, Kannenberg, J., “Skin” Installed at FILE 2007, São Paulo, Brazil.

Kooima, R., Roberts, D., SubbaRao, M., Aguilera, J., “Mars Transporter.” Installed at Adler Planetarium 2007–present, Chicago, IL.

Lopez Silva, B., **Kooima, R.** Schwarz, N., Wolf, L., Donaghy, T., Vanderlinde, K., Willis, S., Sweitzer, J., “Starflight.” Installed at Laboratorio Arte Alameda, Mexico City, Mexico Nov 2006–Feb 2007. Installed at Adler Planetarium, Chicago, IL 2007–present.

AWARDS

Rasmussen, M., Krumbholz, C., **Kooima, R.**, Leigh, J., Fiscella, R., Ai, Z., Jin, B., Dixon, S., Hwang, K., Mer, E., Stevenson, A., Brady, A., Evenhouse, R., Parshall, R., “The Virtual Eye,” winner of the Dr. Frank H. Netter Award, 2007, The Vesalius Trust for Visual Communication in the Health Sciences.