Rui Wang

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RESEARCH INTERESTS

My research focuses on photorealistic image synthesis, including global illumination algorithms, real-time and GPU-based rendering, sampling and filtering, and precomputed light transport. I am also interested in image-based modeling, 3D scanning, and general-purpose computation on the GPU.

PROFESSIONAL EXPERIENCE

06/12–Present	**Associate Professor**	
09/06–06/12	**Assistant Professor**	
	Department of Computer Science	
	University of Massachusetts Amherst	
06/05–03/06	**Research Intern**	
	Intel Research Lab	
	Santa Clara, CA	
08/01–08/06	**Research Assistant**	
08/01–08/02	**Teaching Assistant**	
	Department of Computer Science	
	University of Virginia	
04/00–05/01	**Research Intern**	
	ArcSoft China, Hangzhou, China	

EDUCATION

05/03–08/06	**University of Virginia**, Charlottesville, VA
	Ph.D. in Computer Science
	Advisor: Dr. David Luebke
	Thesis: "*Interactive Rendering of Realistic Illumination Models using Wavelet-Based Precomputation*"
08/01–05/03	**University of Virginia**, Charlottesville, VA
	M.S. in Computer Science
08/97–05/01	**Zhejiang University**, Hangzhou, China
	B.S. in Computer Science

RESEARCH PUBLICATIONS

Journal Publications [1]

[1] Yahan Zhou, Zhaoliang Lun, Evangelos Kalogerakis, and Rui Wang, "Implicit Integration for Particle-based Simulation of Elasto-plastic Solids", **Computer Graphics Forum**, [*Proceedings of Pacific Graphics 2013*], conditionally accepted.

[2] Yahan Zhou, Haibin Huang, Li-Yi Wei, and Rui Wang, "Point Sampling with General Noise Spectrum", **ACM Transactions on Graphics** *31(4)* [*Proceedings of ACM SIGGRAPH 2012*, Acceptance rate: 23%], pp. 76:1—76:11.

[3] Ling-Qi Yan, Yahan Zhou, Kun Xu, and Rui Wang, "Accurate Translucent Material Rendering under Spherical Gaussian Lights", **Computer Graphics Forum** *31(7)*, [*Proceedings of Pacific Graphics 2012*].

[4] Kun Xu, Li-Qian Ma, Bo Ren, Rui Wang, and Shi-Min Hu, "Interactive Hair Rendering and Appearance Editing under Environment Lighting", **ACM Transactions on Graphics** *30(5)*, [*Proceedings of ACM SIGGRAPH Asia 2011*, Acceptance rate: 19%], pp. 173:1—173:10.

[5] Li-Yi Wei and Rui Wang, "Differential Domain Analysis for Non-Uniform Sampling", **ACM Transactions on Graphics** *30(4)*, [*Proceedings of ACM SIGGRAPH 2011*, Acceptance rate: 19%], 2011, pp. 50:1–50:10.

[6] John C. Bowers, Jonathan Leahey, and Rui Wang, "A Ray Tracing Approach to Diffusion Curves", **Computer Graphics Forum** *30(4)*, [*Proceedings of Eurographics Symposium on Rendering (EGSR) 2011*, Acceptance rate: 39%], 2011, pp. 1345–1352.

[7] David Maletz and Rui Wang, "Importance Point Projection for GPU-based Final Gathering", **Computer Graphics Forum** *30(4)*, [*Proceedings of Eurographics Symposium on Rendering (EGSR) 2011*, Acceptance rate: 39%], 2011, pp. 1327–1336.

[8] Peter Djeu, Warren Hunt, Rui Wang, Ikrima Elhassan, Gordon Stoll, and William R. Mark, "Razor: An Architecture for Dynamic Multiresolution Ray Tracing", **ACM Transactions on Graphics** *30(5)*, 2011, to appear. (The previous technical report version of this paper has been cited **55** times).

[9] Jurgen Laurijssen, Rui Wang, Ares Lagae, and Philip Dutre, "Precomputed Gathering of Multi-Bounce Glossy Reflections", **Computer Graphics Forum**, 2011, to appear.

[10] John C. Bowers, Rui Wang, Li-Yi Wei, David Maletz, "Parallel Poisson Disk Sampling with Spectrum Analysis on Surfaces", **ACM Transactions on Graphics** 29(5), [*Proceedings of ACM SIGGRAPH Asia 2010*, Acceptance rate: 18%], 2010, pp. 166:1–10. (Cited **18** times).

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[1] In computer graphics, a number of conference proceedings are now published as special issues of associated journals. For example, the ACM SIGGRAPH proceedings are published as a special issue of the ACM Transactions on Graphics (TOG), a leading journal in graphics. Similarly, the proceedings of Eurographics, Eurographics Symposium on Rendering, and Pacific Graphics are published as special issues in the journal Computer Graphics Forum (CGF). Therefore, for these publications, I have included information about the associated conference and the acceptance rate. All papers listed are fully reviewed, revised via a shepherding process, and are considered terminal publications. I have also included Google Scholar citation counts for selected papers.

[11] Jurgen Laurijssen, Rui Wang, Philip Dutre, and Benedict J. Brown, "Fast Estimation and Rendering of Indirect Highlights", *Computer Graphics Forum* 29(4) [*Proceedings of Eurographics Symposium on Rendering (EGSR) 2010*, Acceptance rate: 39%], 2010, pp. 1305–1313.

[12] Xuan Yu, Rui Wang, Jingyi Yu, "Real-time Depth of Field Rendering via Dynamic Light Field Generation and Filtering", *Computer Graphics Forum* 29(7), [*Proceedings of Pacific Graphics (PG) 2010*, Acceptance rate: 17%], 2010, pp. 2099–2107.

[13] Rui Wang, Rui Wang, Kun Zhou, Minghao Pan, Hujun Bao, "An Efficient GPU-based Approach for Interactive Global Illumination", *ACM Transactions on Graphics* 28(3), [*Proceedings of ACM SIGGRAPH 2009*, Acceptance rate: 18%], 2009, pp. 91:1–8. (Cited **55** times).

[14] Rui Wang, Oskar Akerlund, "Bidirectional Importance Sampling for Unstructured Direct Illumination", *Computer Graphics Forum* 28(2), [*Proceedings of Eurographics 2009*, Acceptance rate: 23%], 2009, pp. 269–278. (Cited **11** times).

[15] Ewen Cheslack-Postava, Rui Wang, Oskar Akerlund, Fabio Pellacini, "Fast, Realistic Lighting and Material Design using Nonlinear Cut Approximation", *ACM Transactions on Graphics 27(5)*, [*Proceedings of ACM SIGGRAPH Asia 2008*, Acceptance rate: 18%], 2008, pp. 128:1—10. (Cited **27** times).

[16] Xuan Yu, Rui Wang, Jingyi Yu, "Interactive Glossy Reflections using GPU-based Ray Tracing with Adaptive LOD", *Computer Graphics Forum 27(7)*, [*Proceedings of Pacific Graphics (PG) 2008*, Acceptance rate: 18%], 2008, pp. 1987–1996.

[17] Rui Wang, Ewen Cheslack-Postava, Rui Wang, David Luebke, Qianyong Chen, Wei Hua, Qunsheng Peng, Hujun Bao, "Real-time Editing and Relighting of Homogeneous Translucent Materials", *The Visual Computer Journal 24(7-9)*, [*Proceedings of Computer Computer Graphics International (CGI) 2008*, Acceptance rate: 18%], 2008, pp. 565–575. (Cited **9** times).

[18] Rui Wang, John Tran, David Luebke, "All-Frequency Relighting of Glossy Objects", *ACM Transactions on Graphics 25(2)*, 2006, pp. 293–318. (Cited **37** times).

[19] Nolan Goodnight, Rui Wang, Greg Humphreys, "Computation on Programmable Graphics Hardware", *IEEE Computer Graphics and Applications* 25(5), 2005, pp. 12–15. (Cited **42** times).

[20] Rui Wang, John Tran, David Luebke, "All-Frequency Interactive Relighting of Translucent Objects with Single and Multiple Scattering", *ACM Transactions on Graphics 24(3)*, [*Proceedings of ACM SIGGRAPH 2005*, Acceptance rate: 21%], 2005, pp. 1202–1207. (Cited **80** times).

Refereed Conference Publications

[21] Yahan Zhou, Jacqueline Field, Erik Learned-Miller, and Rui Wang, "Scene Text Segmentation via Inverse Rendering", *Proceedings of **ICDAR 2013 (oral paper)***.

[22] Mark McCartin-Lim, Andrew McGregor, and Rui Wang, "Approximate Principal Direction Trees", *Proceedings of the 29th **Intl. Conf. on Machine Learning (ICML)** 2012*.

[23] Yahan Zhou and Rui Wang, "An Algorithm for Creating Geometric Dissection Puzzles", *Proceedings of Bridges 2012*, to appear.

[24] Richard B. Foster, Rui Wang, Sridhar Mahadevan, "A GPU-based Approximate SVD Algorithm", *Proceedings of the 9th Intl. Conf. on Parallel Processing and Applied Mathematics (PPAM) 2011*, also published on *Springer Lecture Notes in Computer Science (LNCS)* vol. 7203, pp. 569—578*.*

[25] Oskar Akerlund, Mattias Unger, Rui Wang, "Precomputed Visibility Cuts for Interactive Re-lighting with Dynamic BRDFs", In *Proceedings of Pacific Graphics (PG) 2007*, pp. 161–171. [Acceptance rate: 22%]. (Cited **13** times).

[26] Rui Wang, Jiajun Zhu, Greg Humphreys, "Precomputed Radiance Transfer for Real-time Indirect Lighting using a Spectral Mesh Basis", In *Proceedings of Eurographics Symposium on Rendering (EGSR) 2007*, pp. 13–22. [Acceptance rate: 35%]. (Cited **14** times).

[27] Jiajun Zhu, Greg Humphreys, David Koller, Skip Steuart, Rui Wang, "Fast Omni-directional 3D Scene Acquisition with an Array of Stereo Cameras", *Proceedings of IEEE Intl. Conf. on 3-D Digital Imaging and Modeling (3DIM) 2007*, pp. 217–224. [Acceptance rate: 38%].

[28] Rui Wang, Ren Ng, David Luebke, Greg Humphreys, "Efficient Wavelet Rotation for Environment Map Rendering", In *Proceedings of Eurographics Symposium on Rendering (EGSR) 2006*, pp. 173–182. [Acceptance rate: 36%]. (Cited **32** times).

[29] Rui Wang, John Tran, David Luebke, "All-Frequency Relighting of Non-Diffuse Objects using Separable BRDF Approximation", In *Proceedings of Eurographics Symposium on Rendering (EGSR) 2004*, pp. 345–354. [Acceptance rate: 39%]. (Cited **81** times).

[30] Rui Wang and David Luebke, "Efficient Reconstruction of Indoor Scenes with Color", In *Proceedings of Intl. Conf. on 3-D Digital Imaging and Modeling (3DIM) 2003*, pp. 402–409. [Acceptance rate: 40%]. (Cited **7** times).

[31] Nolan Goodnight, Rui Wang, Cliff Woolley and Greg Humphreys, "Interactive Time Dependent Tone Mapping using Programmable Graphics Hardware", In *Proceedings of Eurographics Symposium on Rendering (EGSR) 2003*, pp. 26–37. [Acceptance rate: 37%]. (Cited **67** times).

Refereed Posters

[32] Richard B. Foster and Rui Wang, "Hierarchical Upsampling for Fast Image-based Depth Estimation", *ACM SIGGRAPH 2011*, refereed poster.

[33] Hong Yuan and Rui Wang, "Dynamic Scene Relighting using Precomputed Visibility Cuts and Multi-level Shadow Grids", *ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D) 2009*, refereed poster.

[34] Tenghui Zhu, Rui Wang, David Luebke, "A GPU-Accelerated Render Cache", In *Proceedings of Pacific Graphics (PG) 2005,* refereed short paper.

Unrefereed Technical Reports [2]

- Richard B. Foster, Rui Wang, and Rod Grupen, "A Mobile Robot for Autonomous Scene Capture and Rendering", *UMass Technical Report UM-CS-2011-019, 2011*.

- Hamed Soroush, Rui Wang, Brian Levine, and Mark Corner, "Digital Image Enhancement using a Vehicular Image Capturing Platform", *UMass Technical Report UM-CS-2011-002, 2011*.

- Richard B. Foster and Rui Wang, "Discontinuity Preserving Multi-View Synthesis", *UMass Technical Report UM-CS-2009-054, 2010*.

- David Maletz, John C. Bowers, and Rui Wang, "Reflectance Filtering for Interactive Global Illumination in Semi-Glossy Scenes", *UMass Technical Report UM-CS-2009-057, 2009*.

HONORS AND AWARDS

- ACM Recognition of Service Award (for service contributions to ACM I3D 2011), 2011
- National Science Foundation CAREER Award, 2008.
- UMass Faculty Research Grant (FRG) Award, 2008.
- Winner of UVA's 2003 Rendering Competition, University of Virginia, 2003
- Outstanding Graduation Thesis Award, Zhejiang University, China, 2001
- Graduated with University Distinction, Zhejiang University, China, 2001
- Baoshan Steel Corporation Fellowship, Zhejiang University, China, 2000
- Eastcom Corporation Fellowship, Zhejiang University, China, 1999

RESEARCH FUNDING

- Rui Wang (PI), Research Gift Fund, Robert Bosch Research, 2011–2012, $50,000.
- Rui Wang (co-PI), with Sridhar Mahadevan (PI), "*Manifold Alignment of High-Dimensional Data Sets*", National Science Foundation CCF-1025120, 2010–2013, $499,909.
- Rui Wang (PI), "*CAREER: Nonlinear Processing of Light Transport Data for Realistic Computer Imagery*", National Science Foundation CCF-0746577, 2008–2013, $400,000.
- Rui Wang (PI), UMass Faculty Research Grant (FRG) award, "*Real-time Image Synthesis using Pre-captured Illumination Datasets*", 2008–2009, $15,000.
- Rui Wang (PI), NVIDIA Faculty Partnership, graphics hardware support, 2008–present.

INVITED TALKS

- "*Parallel Poisson Disk Sampling with Spectrum Analysis on Surfaces*"

May 26, 2011	University of Konstanz, Konstanz, Germany
Mar 1, 2011	Department of Math, UMass Amherst, MA
Dec 10, 2010	Georgia Institute of Technology, Atlanta, GA
Oct 20, 2010	Zhejiang University, Hangzhou, China

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[2] Technical reports that later became refereed publications are not included here.

- "*Interactive Global Illumination using Points*"

  Oct 13, 2010   ChinaGraph, Nanjing, China (**Invited Keynote**)
  Dec 20, 2010   KAIST, Daejeon, South Korea

- "*Efficient and Realistic Rendering using A Nonlinear Cut Representation*"

  Jul 14, 2009   Microsoft Research Asia, Beijing, China
  Jul 22, 2009   Zhejiang University, Hangzhou, China
  Jul 28, 2009   Tsinghua University, Beijing, China

- "*Fast, Realistic Illumination using Nonlinear Piecewise Constants*"

  Oct 31, 2008   Williams College, MA
  May 7, 2008   MIT, Cambridge, MA
  May 8, 2008   Harvard University, Cambridge, MA

- "*Interactive Rendering of Realistic Illumination Models*"

  Oct 2, 2006   University of Delaware, Newark, DE
  May 24, 2006   Stony Brook University, Stony Brook, NY

- "*Precomputed Radiance Transport*"

  May 3, 2005   CS 647 Guest Lecture, University of Virginia, Charlottesville, VA

- "*Efficient Reconstruction of Indoor Scenes with Color*"

  June 5, 2003   University of North Carolina at Chapel Hill, Chapel Hill, NC

TEACHING EXPERIENCE

  Assistant Professor   *University of Massachusetts Amherst, MA*

- S 2013   CMPSCI 473: *Introduction to Computer Graphics*
- S 2012   CMPSCI 691AV: *Advanced Computer Graphics*
- F 2011   CMPSCI 473: *Introduction to Computer Graphics*
- S 2011   CMPSCI 474: *Image Synthesis*
            Revised from CMPSCI 491K. Semi-required course of the RVG track.
- F 2010   CMPSCI 473: *Introduction to Computer Graphics*
- S 2010   CMPSCI 187: *Programming with Data Structures*
            Undergraduate core course. Completely redesigned.
- F 2009   CMPSCI 473: *Introduction to Computer Graphics*
            Revised from 591B. Required course of the *Robotics, Vision, and Graphics* (RVG) track.
- S 2009   CMPSCI 691AD: *General Purpose Computation on the GPU*.
            New graduate course.
- F 2008   CMPSCI 691AC: *Computational Photography*
            New graduate course.
- F 2008   CMPSCI 473/673: *Introduction to Computer Graphics*
- S 2008   CMPSCI 491K/691MM: *Advanced Image Synthesis*

New undergraduate course.

- F 2007   CMPSCI 591B: *Introduction to Computer Graphics*
  Revised from the previous semester with new lectures, assignments, and exams.
- S 2007   CMPSCI 591B: *Introduction to Computer Graphics*
  New undergraduate course.

ADVISING

- *PhD Students*

Zhaoliang Lun	(entered in Fall 2011)
Haibin Huang	(entered in Fall 2011)
Yahan Zhou	(entered in Fall 2010)
John C. Bowers	(entered in Fall 2009)

- *Master Students*

Richard B. Foster	(graduated in Spring 2011, now at United Technologies, Hartford, MA)
David Maletz	(graduated in Fall 2010, now an independent game developer)
Hong Yuan	(graduated in Fall 2009, now at Disney Interactive Studios, Austin, TX)
Oskar Akerlund	(exchange student from Linköping Univ., completed MS at UMass in 2008)
Mattias Unger	(exchange student from Linköping Univ., completed MS at UMass in 2008)

- *Other Graduate Students*

Jurgen Laurijssen	(visiting student in Fall 2009, K.U. Leuven, Belgium)
Gu Ye	(visiting student in Fall 2008, Zhejiang University, China)
Yannan Shen	(independent study, MS, Math)

- *Undergraduate Students*

Walter Stumpf	(summer REU and independent study in 2011)
Stephen Giguere	(summer REU in 2011, 2012)
Jonathan Leahey	(summer REU in 2010)
Jim Gummeson	(summer REU in 2010)
Andrew Chan	(independent study in 2011)
Matthew Meehan	(independent study in 2008)
William Baumann	(independent study in 2007)

- *Committee Members*

Xuan Yu	(PhD, external member, Univ. of Delaware)
Tingxin Yan	(PhD, external member, Stony Brook University)
Jurgen Laurijssen	(PhD, external member, K.U. Leuven, Belgium)
Tian Xia	(PhD, external member, Univ. of Illinois Urbana-Champagne)
Yu-Chi Lai	(PhD, external member, Univ. of Wisconsin-Madison)
Audrey Lee	(PhD, UMass Amherst)

Mark McCartin-Lim	(Synthesis Project, UMass Amherst)
Hamed Soroush	(Synthesis Project, UMass Amherst)
Marwan Mattar	(Synthesis Project, UMass Amherst)
Richard B. Foster	(Synthesis Project, UMass Amherst)
Christopher Giroir	(Masters, CS, UMass Amherst)
Sripati Sah	(Masters, MIE, UMass Amherst)

EXTERNAL SERVICE

- ***Conference and Program Chairs***
  <u>Papers Co-Chair</u>, ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D) 2012
  <u>General Co-Chair</u>, ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D) 2011

- ***Session Chairs at Conferences***
  Eurographics Symposium on Rendering (EGSR) 2011, chaired Paper Session "*Accelerating Global Illumination*"
  ACM I3D 2010, chaired the Poster Session, and Paper Session "*Shadows and Transparency*"
  Pacific Graphics 2007, chaired Paper Session "*Rendering I*"

- ***Technical Program Committees***
  SIGGRAPH Asia 2012, 2013 Posters Jury
  SIGGRAPH Asia 2009
  Eurographics Symposium on Rendering (EGSR) 2009, 2010, 2011, 2012, 2013
  Pacific Graphics (PG) 2007, 2009, 2010, 2011, 2012, 2013
  ProCams Workshop 2009

- ***Journal/Conference Paper Reviewing***
  ACM SIGGRAPH 2005–2013
  ACM SIGGRAPH Asia 2008–2013
  Eurographics 2005–2009
  Eurographics Symposium on Rendering (EGSR) 2005–2011
  Pacific Graphics (PG) 2006–2011
  ACM Transactions on Graphics (TOG)
  IEEE Transactions on Visualization and Computer Graphics (TVCG)
  Journal of Visual Communication and Image Representation (JVCIP)
  IEEE Visualization

- ***Panelist***
  National Science Foundation, 2007
  National Science Foundation, 2008

DEPARTMENTAL SERVICE

- ***Committee Member***
  Honors Program Director (S 2013)
  Undergraduate Event Committee Chair (S 2013)

Undergraduate Recruiting Committee (2011—2012)
Undergraduate Program Committee (Faculty-in-charge for CS minor) (2010–2011, 2011—2012)
Undergraduate Program Committee (2009–2010)
Graduate Program Committee (2008–2009)
Personnel Committee (2007–2008)
Graduate Admissions Committee (2006–2007, 2007–2008)
Curriculum Committee (2006–2007)

- ***Speaker / Event Organizer***
  Mt. Holyoke College Wearable Electronics Workshop, Spring 2013
  Smith College Wearable Electronics Workshop, Fall 2012
  UMass CMPSCI Wearable Electronics Night, Fall 2011
  ACM Chapter Meeting, Fall 2010
  Undergraduate First Friday Meeting, Fall 2006, Spring 2011
  Systems Lunch, Fall 2007
  CMPSCI 191A (RAP) Seminar, Fall 2006, Fall 2007, Fall 2008
  Professionalism Seminar, Fall 2006