

# WOJCIECH JAROSZ

Assistant Professor of Computer Science



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## Current Position

**Assistant Professor** July 2015 – Present  
Dartmouth College Hanover, NH, USA  
 Director of the Visual Computing Lab  
 Department of Computer Science

## Research Interests

My research is concerned with deriving *theoretical models* and developing *computational algorithms* for efficiently capturing, simulating, manipulating, and physically realizing complex visual appearance. In effect, I strive to understand why things look the way they do, how we can simulate their interaction with light efficiently, how we can intuitively author or edit that appearance, and how we can create physical objects with control over their appearance. My publications explore practical applications in several overlapping areas in computer graphics including: participating media rendering, appearance editing & stylization, complex illumination and materials, global illumination, Monte Carlo methods and efficient sampling, high-dynamic range imaging; and computational materials and displays.

## Education

**Ph.D. in Computer Science** Aug. 2003 – Sep. 2008  
University of California, San Diego  
 Advisors: Henrik Wann Jensen & Matthias Zwicker  
 Dissertation: *Efficient Monte Carlo Methods for Light Transport in Scattering Media*

**M.S. in Computer Science** March 2006  
University of California, San Diego  
 Advisor: Henrik Wann Jensen

**B.S. in Computer Science** May 2003  
University of Illinois, Urbana–Champaign  
 Highest Honors  
 Advisors: John C. Hart & Michael Garland  
 Senior Thesis: *Interactive Global Illumination for Improved Lighting Design Workflow*

## Employment History

**Sr. Research Scientist** Jan. 2014 – Jun. 2015  
**Research Scientist** Sep. 2010 – Dec. 2013  
**Post-Doc** March 2009 – Sep. 2010  
Disney Research Zürich, Switzerland  
 Head of Rendering Group  
 The Walt Disney Company (Switzerland) GmbH  
 Supervisor: Markus Gross

**Adjunct Lecturer** August 2009 – June 2015  
ETH Zürich Zürich, Switzerland  
 Department of Computer Science

**Post-Doc** Oct. 2008 – Feb. 2009  
University of California, San Diego  
 Department of Computer Science & Engineering  
 Supervisor: Henrik Wann Jensen

**Research Intern** Summer 2008  
Adobe Software Systems San Jose, CA  
 Advanced Technology Labs  
 Supervisor: Nathan Carr

**Research Intern** Summers of 2003, 2005, 2006  
Industrial Light & Magic San Francisco, CA  
 R&D Group  
 Supervisor: Florian Kainz

**Student Researcher** June 2001 – June 2003  
University of Illinois, Urbana–Champaign  
 Department of Computer Science  
 Supervisor: John C. Hart

## Honors & Awards



### Eurographics Young Researcher Award 2013

The most prestigious early career award for European researchers in computer graphics: “given each year to two young researchers in the field who have already made a significant contribution. The intent of this award is to recognize people early on in their career who have already made a notable contribution and are likely to make more.” See [dartgo.org/jarosz-eg-award](http://dartgo.org/jarosz-eg-award).

### Computer Graphics Forum Cover Image 2017

Image is used on cover of *Computer Graphics Forum* journal for the duration of the year. Co-authors of the image: Alessia Marra, Maurizio Nitti, Marios Papas, Thomas Müller, Markus Gross, Wojciech Jarosz and Jan Novák.

### Computer Graphics Forum Cover Image 2015

Image is used on cover of *Computer Graphics Forum* journal for the duration of the year. Co-authors of the image: Jaroslav Křivánek, Martin Sik, Iliyan Georgiev, Toshiya Hachisuka, Petr Vevoda, Derek Nowrouzezahrai and Wojciech Jarosz.

### Pacific Graphics Best Paper Award 2015

For the paper [19]: R. Hostettler<sup>1</sup> et al. “Dispersion-based Color Projection using Masked Prisms”. In: *Computer Graphics Forum* (Proceedings of Pacific Graphics) 34.7 (Oct. 2015). DOI: 10.1111/cgf.12771.

### UCSD Rendering Competition – 1<sup>st</sup> Place 2004

Won a trip to SIGGRAPH 2004 for rendering a realistic scene of a cluttered desk using a personally-written renderer for CSE 168. See [graphics.ucsd.edu/courses/rendering/2004](http://graphics.ucsd.edu/courses/rendering/2004).

### CRA Outstanding Undergraduate Award 2003

Honorable Mention







### UIUC Dean’s List Fall 1999 – Spring 2003

Every semester during undergrad



## Funding



### Current funding

- \$ NSF Information and Intelligent Systems. (\$494,628), Sole-PI.  August 2018–July 2021  
*CHS: Small: Higher-Order Monte Carlo Samples for Computer Graphics Rendering*
- \$ NVIDIA Corp. (Equipment Grant).  October 2017
- \$ Microsoft Corp. Azure Research Award. (\$20,000), Sole-PI.  September 2017–September 2018
- \$ Autodesk/Solid Angle Corp. Unrestricted Gift. (\$100,000), Sole-PI.  2017, 2018
- \$ Activision Corp. Unrestricted Gift. (\$30,000), Sole-PI.  January 2017, 2018
- \$ Burke Award. (\$12,500), Sole-PI.  2015–2018

### Past funding

- \$ Dartmouth CS Department Equipment Grant. (\$14,000), Co-PI with Devin Balkcom.  2017  
*ABB Robotics - IRB 120 multipurpose industrial robot arm*
- \$ Microsoft Corp. HoloLens Research Grant. (\$100,000), Co-PI with Emily Cooper and Xing-Dong Yang.  2016–2017  
*Augmenting Reality for the Visually Impaired*

## Research Impact



### OpenEXR

[openexr.org](http://openexr.org)

I designed and implemented tiling and multi-resolution support as well as thread-safety and multi-threading in the OpenEXR high-dynamic range image format and library while working at Industrial Light & Magic. The work was paid for in part by a grant from The Academy of Motion Picture Arts and Sciences. Implemented features were first used in *Star Wars*

*Episode III: Revenge of the Sith*, and have since been adopted by all major renderers (Pixar’s RenderMan, NVIDIA’s Mental Ray, Arnold, etc.) and commercial image editing packages (Adobe Photoshop, Creative Suite, etc.). OpenEXR is now the de-facto standard image file format for professional film and special effects production, having been used in dozens of feature films.

## Technical Oscar

[dartgo.org/openexr-oscar](http://dartgo.org/openexr-oscar)

My contributions to OpenEXR were recognized in an Academy Award of Technical Achievement in 2007, awarded to Florian Kainz: “Widely adopted, OpenEXR is engineered to meet the requirements of the visual effects industry by providing for lossless and lossy compression of tiered and tiled images.”

## Rendering Software

My research has been incorporated into commercial, proprietary and open-source rendering tools.

- 💡 **Pixar's RenderMan** [renderman.pixar.com](http://renderman.pixar.com)  
Hierarchical sample warping [J55] for importance sampling environment maps, photon beams [J46], residual ratio tracking [J27] and unified points, beams & paths [J28] for participating media, and photon beam diffusion [J33] for subsurface scattering have all been incorporated into RenderMan.
- 💡 **Disney's Hyperion** [dartgo.org/hyperion](http://dartgo.org/hyperion)  
Residual ratio tracking [J27] for participating media has also been incorporated into Disney's proprietary renderer *Hyperion*, which has been used to produce all of Disney's animated films since *Big Hero 6*.
- 💡 **PBRT version 3** [pbrt.org](http://pbrt.org)  
Several of the techniques I developed in my research (including photon beam diffusion [J33] and residual ratio tracking [J27]) have been incorporated into version 3 of the open-source PBRT rendering system, which is a standard rendering framework used in dozens of academic publications.
- 💡 **Radiance** [radiance-online.org](http://radiance-online.org)  
Our Hessian-based irradiance caching technique [J35] is part of the Radiance Architectural Lighting Simulation Tool.

## Movie Credits

[dartgo.org/jarosz-imdb](http://dartgo.org/jarosz-imdb)

I have worked on, and been credited in a number of feature films for my contributions to computer graphics research.

- 🎬 **Big Hero 6** ..... 📅 2014  
“Senior Research Scientist (Disney Research)”  
For co-developing (with Jan Novák and Andrew Selle) the residual ratio tracking technique [J27] used to render the fog, clouds, and other volumetric effects throughout the film.
- 🎬 **Planes: Fire & Rescue** ..... 📅 2014  
“Research Scientist (Disney Research)”  
For contributing (with Dr. Ralf Habel) a method for artist-tunable but physically based, secondary motion of trees.
- 🎬 **Frozen** ..... 📅 2013  
“Research Scientist (Disney Research)”  
While researching the appearance of granular materials [J20], we took measurements (along with Dr. Marios Papas & Dr. Ralf Habel) of real snow using our custom capture device [J32], leading to the improved realism of all snow and ice in the film.
- 🎬 **Tangled** ..... 📅 2010  
“Research Scientist (Research)”  
For co-developing (with Andrew Selle, Dylan Laceywell, and Jared Johnson) the artistic volumetric lighting system [J43] used for two shots in the film, including the climactic revival sequence.

## Supervision



### Current Ph.D. Students (👤) and Postdocs (👤)

- 👤 Zack Misso, PhD ..... 📅 2017–Present
- 👤 Benedikt Bitterli, PhD ..... 📅 2016–Present

### Past Ph.D. Students (👤) and Postdocs (👤)

- 👤 Srinath Ravichandran, PhD (now @ SideFx) ..... 📅 2015–2017
- 👤 Nicolas Vibert, visiting PhD from McGill ..... 📅 Fall 2017
- 👤 Yuan Tian, PhD ..... 📅 2015–2016
- 👤 Gurprit Singh, Postdoc (now @ MPI) ..... 📅 2015–2017
- 👤 Marios Papas, PhD (now @ Disney Research) ..... 📅 2011–2016  
📄 *A computational appearance fabrication framework, and derived applications*
- 👤 Romain Prévost, PhD ..... 📅 2013–2016  
📄 *Physics-based optimization for assisted creation of tangible artifacts*
- 👤 Fabrice Rousselle, Postdoc (now @ NVIDIA Research) ..... 📅 2014–2015
- 👤 Jan Novák, Postdoc (now @ NVIDIA Research) ..... 📅 2014–2015
- 👤 Ralf Habel, Postdoc (now @ Disney Animation) ..... 📅 2012–2014
- 👤 Derek Nowrouzezahrai, Postdoc (now Prof. @ McGill) ..... 📅 2010–2011

### Other Ph.D. Dissertation Committees

- 👤 Iliyan Georgiev, PhD (Saarland University) ..... 📅 2015  
📄 *Path Sampling Techniques for Efficient Light Transport Simulation*
- 👤 Jan Novák, PhD (Karlsruhe Institute of Technology) ..... 📅 2014  
📄 *Efficient Many-Light Rendering of Scenes with Participating Media*
- 👤 Laurent Belcour, PhD (Université de Grenoble) ..... 📅 2012  
📄 *A Frequency Analysis of Light Transport*
- 👤 Adolfo Muñoz, PhD (Universidad de Zaragoza) ..... 📅 2010  
📄 *Light Transport in Participating Media*





















### Interns (👤)

- 👤 Adrian Blumer ..... 📅 Fall 2014
- 👤 David Koerner ..... 📅 Fall 2014
- 👤 Hugo Loi ..... 📅 Summer 2014
- 👤 Oliver Klehm ..... 📅 Summer 2014
- 👤 Rafael Hostettler ..... 📅 Summer 2014
- 👤 Simon Kallweit ..... 📅 Summer 2014
- 👤 Benedikt Bitterli ..... 📅 2014

 Christian Regg, PhD .....  2010–2011

## Masters Theses (👤+)




+ Annie Dai (in progress) .....  2018–Present  
+ Xi Deng (in progress) .....  2017–Present  
+ Shaojie Jiao .....  2017–2018  
+ Thomas Müller .....  2015–2016  
 *Modeling and Rendering Heterogeneous Granular Materials*  
+ Benedikt Bitterli .....  2015  
 *Informed Choices in Primary Sample Space*  
+ Adrian Blumer .....  2013–2014  
 *Modular Radiance Transfer for Trees*  
+ Romain Prévost .....  2012–2013  
 *A Multi-Layering Framework for Raytraced Diffusion Curves*  
+ Jorge Schwarzhaupt (now @ Weta Digital) .....  2011–2012  
 *Occlusion-Aware Hessians for Error Control in Irradiance Caching*  
+ Marina Späni .....  2011–2012  
 *Rendering Dynamic Objects in Dynamic Environments*  
+ Thomas Houit .....  2011–2012  
 *The Magic Lens: Refractive Steganography*  
+ Thomas Siegrist .....  2011–2012  
 *Stereoscopic Perception of Material Reflectance*  
+ Michael Morandi .....  2011–2012  
 *Directional Occlusion Volumes*  
+ Philipp Keller .....  2011  
 *Manufacturing Layered Attenuators for Multiple Prescribed Shadow Images*  
+ Silvan Tschoop .....  2011  
 *Facial Performance Appearance Capture and Rendering*  
+ Stefan Geiger .....  2010–2011  
 *An Immersive 3D Augmented Reality Lens*  
+ Benjamin Müller .....  2010–2011  
 *Analytic Lighting in the Presence of Participating Media*  
+ Pascal Goffin .....  2009–2010  
 *Fast Ray Tracing of Line Primitives*

+ Shuoran Yang .....  2014  
+ Károly Zsolnai .....  Summer 2013  
+ Johannes Meng (now @ Weta Digital) .....  Summers 2012, 2013  
+ Iliyan Georgiev (now @ Solid Angle) .....  Summer 2012  
+ Jan Novák (now @ Disney Research) .....  Summers 2011, 2012  
+ Wenzel Jakob (now Prof. @ EPFL) .....  2010–2011  
+ Robert Thomas .....  Summer 2010  
+ Marios Papis (now @ Disney Research) .....  Summer 2010  
+ Jared M. Johnson (now @ Google) .....  Summer 2010  
+ Derek Nowourzezahrai (now Prof. @ McGill) .....  Summer 2009

## Bachelor Theses/Projects (👤)

 Neerja Thakkar (in progress) .....  2018–Present  
+ Afnan Enayet (in progress) .....  2018–Present  
+ Bailey Miller .....  2017–2018  
+ George J. Hito .....  2017–2018  
 *Overlaying Virtual Scale Models on Real Environments Without the Use of Peripherals*  
+ Jonathan Huang .....  2016–2017  
 *A HoloLens Application to Aid People who are Visually Impaired in Navigation Tasks*  
+ Simon Kallweit .....  2013  
 *Photon Beam Methods in Rendering*  
+ Benedikt Bitterli .....  2012–2013  
 *BSSRDF Explorer: A Rendering Framework for the BSSRDF*  
+ Jakob Progsch .....  2012–2013  
 *BRDF Fitting using Nonlinear Optimization Methods*  
+ Sebastien Millius .....  2011  
 *Fabrication Method Analysis for Goal-Based Caustics Surfaces*  
+ Adrian Blumer .....  2011  
 *Visibility Silhouette Level-of-Detail*





## Ph.D. Habilitation Committees

 Cyril Soler (Université de Grenoble) .....  June 2014  
 *Models and Analyses for Image Synthesis*



## Teaching



**Assistant Professor, Department of Computer Science, Dartmouth College** .....  Fall 2015–Present

- COSC 11: Foundations of Applied Computer Science .....  Winter 2019
- COSC 77/177: Computer Graphics .....  Fall 2018, 2017, 2016
- COSC 89/189: Computational Aspects of Digital Photography .....  Winter 2018, Fall 2015
- COSC 87/187: Rendering Algorithms .....  Spring 2018, 2017, 2016

**Lecturer, Department of Computer Science, ETH Zürich, Switzerland** .....  Fall 2009–Spring 2015

- 252-5705-00G: Image Synthesis (2015: with Wenzel Jakob) .....  Spring 2012, 2013, 2014, 2015
- 252-0543-01L: Computer Graphics (2009: with Alex Hornung, 2010: with Alex Hornung & Ilya Baran) .....  Fall 2009, 2010



<b>Teaching Assistant, Dept. of Computer Science &amp; Engineering, UC San Diego</b> .....	📅 Fall 2005 – Spring 2008
○ CSE168: Rendering Algorithms (teaching assistant, guest lecturer) .....	📅 Spring 2005, 2006, 2007, 2008
○ CSE169: Computer Animation (teaching assistant) .....	📅 Winter 2006
○ CSE167: Introduction to Computer Graphics (teaching assistant) .....	📅 Fall 2005

## Publications



Below you can find a list of my academic publications and patents (separated by type and sorted by year), along with links to accompanying project pages, direct PDF downloads, and approximate citation counts scraped from my Google Scholar *profile*.

Bold underline author: **Self**.

Bold authors with superscripts: **Postdoc<sup>PD</sup>**, **PhD<sup>PhD</sup>**, **MS<sup>MS</sup>**, **BS<sup>BS</sup>**, and **intern<sup>I</sup>** advisees. **SIGGRAPH** publications also in bold.

### Peer-Reviewed Journal Articles

- [J1] J. Marco, I. Guillén, **W. Jarosz**, D. Gutierrez, and A. Jarabo. “Progressive Transient Photon Beams”. In: *Computer Graphics Forum* 38.1 (Mar. 2019). DOI: 10.1111/cgf.13600. webpage, pdf.
- [J2] **J. Huang<sup>BS</sup>**, M. Kinateder, M. J. Dunn, **W. Jarosz**, X.-D. Yang, and E. A. Cooper. “An augmented reality sign-reading assistant for users with reduced vision”. In: *PLOS ONE* 14.1 (Jan. 2019), pp. 1–9. DOI: 10.1371/journal.pone.0210630. webpage, pdf.
- [J3] **B. Bitterli<sup>PhD</sup>**, S. Ravichandran, T. Müller, M. Wrenninge, J. Novák, S. Marschner, and **W. Jarosz**. “A radiative transfer framework for non-exponential media”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)* 37.6 (Nov. 2018), 225:1–225:17. DOI: 10.1145/3272127.3275103. webpage, pdf, citations: 2.
- [J4] M. Kinateder, **J. Gualtieri<sup>BS</sup>**, M. J. Dunn, **W. Jarosz**, X.-D. Yang, and E. A. Cooper. “Using an Augmented Reality Device as a Distance-based Vision Aid—Promise and Limitations”. In: *Optometry and Vision Science* (June 2018). ISSN: 1538-9235. DOI: 10.1097/OPX.0000000000001232. webpage, pdf, citations: 1.
- [J5] J. Novák, I. Georgiev, J. Hanika, and **W. Jarosz**. “Monte Carlo Methods for Volumetric Light Transport Simulation”. In: *Computer Graphics Forum (Proceedings of Eurographics - State of the Art Reports)* 37.2 (May 2018). webpage, pdf, citations: 8.
- [J6] J. Marco, A. Jarabo, **W. Jarosz**, and D. Gutierrez. “Second-Order Occlusion-Aware Volumetric Radiance Caching”. In: *ACM Transactions on Graphics (Presented at SIGGRAPH)* 37.2 (Apr. 2018). DOI: 10.1145/3185225. webpage, pdf, citations: 2.
- [J7] L. Belcour, G. Xie, C. Hery, M. Meyer, **W. Jarosz**, and **D. Nowrouzezahrai<sup>PD</sup>**. “Integrating Clipped Spherical Harmonics Expansions”. In: *ACM Transactions on Graphics (Presented at SIGGRAPH)* 37.2 (Mar. 2018). DOI: 10.1145/3015459. webpage, pdf, citations: 2.

### Edited Issues & Volumes

- [E1] **W. Jarosz** and P. Peers, eds. *Proceedings of the Eurographics Symposium on Rendering 2014*. Vol. 33. Computer Graphics Forum 4. June 2014.
- [E2] D. Gutierrez and **W. Jarosz**, eds. *Scattering: Acquisition, Modeling, and Rendering*. Vol. 33. IEEE Computer Graphics and Applications 3. Los Alamitos, CA, USA: IEEE Computer Society, May 2013. DOI: 10.1109/MCG.2013.46.




































### Peer-Reviewed Conference Papers

- [P1] L. Maguire, **M. Papis<sup>PhD</sup>**, **W. Jarosz**, P. Fox, G. Dicoski, and M. Olivares. “The Modelling of Caustics to Produce a Projection Image”. In: *Optical Security Documents Conference*. Jan. 2018. webpage, pdf.
- [P2] M. Mara, M. McGuire, **B. Bitterli<sup>PhD</sup>**, and **W. Jarosz**. “An Efficient Denoising Algorithm for Global Illumination”. In: *Proceedings of High Performance Graphics*. Los Angeles, California, USA: ACM, July 2017. ISBN: 978-1-4503-5101-0. DOI: 10.1145/3105762.3105774. webpage, pdf, citations: 11.
- [P3] T. Hachisuka, I. Georgiev, **W. Jarosz**, J. Křivánek, and D. Nowrouzezahrai. “Extended Path Integral Formulation for Volumetric Transport”. In: *Proceedings of EGSR (Experimental Ideas & Implementations)*. The Eurographics Association, June 2017. DOI: 10.2312/sre.20171195. webpage, pdf, citations: 2.
- [P4] J. Marco, **W. Jarosz**, D. Gutierrez, and A. Jarabo. “Transient Photon Beams”. In: *Spanish Computer Graphics Conference (CEIG)*. The Eurographics Association, June 2017. ISBN: 978-3-03868-046-8. DOI: 10.2312/ceig.20171216. webpage, pdf.
- [P5] **R. Prévost<sup>PhD</sup>**, M. Bäcker, **W. Jarosz**, and O. Sorkine-Hornung. “Balancing 3D Models with Movable Masses”. In: *Proceedings of the Vision, Modeling and Visualization Workshop (VMV)*. Eurographics Association, Oct. 2016. DOI: 10.2312/vmv.20161337. webpage, pdf, citations: 5.









- [J8] **B. Bitterli**<sup>PHD</sup>, W. Jakob, J. Novák, and **W. Jarosz**. “Reversible Jump Metropolis Light Transport Using Inverse Mappings”. In: *ACM Transactions on Graphics (Presented at SIGGRAPH)* 37.1 (Jan. 2018). DOI: 10.1145/3132704. [webpage](#), [pdf](#), [citations](#): 9.
- [J9] **B. Bitterli**<sup>PHD</sup> and **W. Jarosz**. “Beyond Points and Beams: Higher-Dimensional Photon Samples for Volumetric Light Transport”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH)* 36.4 (July 2017). DOI: 10.1145/3072959.3073698. [webpage](#), [pdf](#), [citations](#): 7.
- [J10] **G. Singh**<sup>PD</sup> and **W. Jarosz**. “Convergence Analysis for Anisotropic Monte Carlo Sampling Spectra”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH)* 36.4 (July 2017). DOI: 10.1145/3072959.3073656. [webpage](#), [pdf](#), [citations](#): 3.
- [J11] **G. Singh**<sup>PD</sup>, **B. Miller**<sup>BS</sup>, and **W. Jarosz**. “Variance and Convergence Analysis of Monte Carlo Line and Segment Sampling”. In: Computer Graphics Forum (Proceedings of EGSR) 36.4 (June 2017). DOI: 10.1111/cgf.13226. [webpage](#), [pdf](#).
- [J12] T. Müller, **M. Papas**<sup>PHD</sup>, M. Gross, **W. Jarosz**, and J. Novák. “Efficient Rendering of Heterogeneous Polydisperse Granular Media”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)* 35.6 (Dec. 2016), 168:1–168:14. DOI: 10.1145/2980179.2982429. [webpage](#), [pdf](#), [citations](#): 15.
- [J13] F. Rousselle, **W. Jarosz**, and J. Novák. “Image-space Control Variates for Rendering”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)* 35.6 (Dec. 2016), 169:1–169:12. DOI: 10.1145/2980179.2982443. [webpage](#), [pdf](#), [citations](#): 9.
- [J14] **A. Blumer**<sup>I</sup>, J. Novák, R. Habel, D. Nowrouzezahrai, and **W. Jarosz**. “Reduced Aggregate Scattering Operators for Path Tracing”. In: Computer Graphics Forum (Proceedings of Pacific Graphics) 35.7 (Oct. 2016), pp. 461–473. DOI: 10.1111/cgf.13043. [webpage](#), [pdf](#), [citations](#): 1.
- [J15] P. H. Christensen and **W. Jarosz**. “The Path to Path-Traced Movies”. In: Foundations and Trends in Computer Graphics and Vision 10.2 (Oct. 2016), pp. 103–175. ISSN: 1572-2740. DOI: 10.1561/06000000073. [webpage](#), [pdf](#), [citations](#): 12.
- [J16] **B. Bitterli**<sup>I</sup>, F. Rousselle, B. Moon, J. A. Iglesias-Gutián, D. Adler, K. Mitchell, **W. Jarosz**, and J. Novák. “Nonlinearly Weighted First-order Regression for Denoising Monte Carlo Renderings”. In: Computer Graphics Forum (Proceedings of EGSR) 35.4 (June 2016), pp. 107–117. DOI: 10.1111/cgf.12954. [webpage](#), [pdf](#), [citations](#): 30.
- [J17] **R. Prévost**<sup>PHD</sup>, A. Jacobson, **W. Jarosz**, and O. Sorkine-Hornung. “Large-Scale Painting of Photographs by Interactive Optimization”. In: Computers & Graphics 55 (Apr. 2016), pp. 108–117. DOI: 10.1016/j.cag.2015.11.001. [webpage](#), [pdf](#), [citations](#): 12.
- [J18] T.-W. Schmidt, F. Pellacini, D. Nowrouzezahrai, **W. Jarosz**, and C. Dachsbacher. “State of the Art in Artistic Editing of Appearance, Lighting, and Material”. In: Computer Graphics Forum 35.1 (Feb. 2016), pp. 216–233. DOI: 10.1111/cgf.12721. [webpage](#), [pdf](#), [citations](#): 26.
- [P6] **D. Koerner**<sup>I</sup>, J. Novák, P. Kutz, R. Habel, and **W. Jarosz**. “Sub-division Next-Event Estimation for Path-Traced Subsurface Scattering”. In: *Proceedings of EGSR (Experimental Ideas & Implementations)*. The Eurographics Association, June 2016. DOI: 10.2312/sre.20161214. [webpage](#), [pdf](#), [citations](#): 3.
- [P7] A. Chapiro, C. O’Sullivan, **W. Jarosz**, M. Gross, and A. Smolic. “Stereo from Shading”. In: *Proceedings of EGSR (Experimental Ideas & Implementations)*. June 2015. DOI: 10.2312/sre.20151173. [webpage](#), [pdf](#), [citations](#): 1.
- [P8] T.-W. Schmidt, F. Pellacini, D. Nowrouzezahrai, **W. Jarosz**, and C. Dachsbacher. “State of the Art in Artistic Editing of Appearance, Lighting, and Material”. In: *Eurographics 2014 - State of the Art Reports*. Strasbourg, France: Eurographics Association, Apr. 2014. DOI: 10.2312/egst.20141041. [webpage](#), [pdf](#), [citations](#): 26.
- [P9] B. J. Loos, **D. Nowrouzezahrai**<sup>PD</sup>, **W. Jarosz**, and P.-P. Sloan. “Delta Radiance Transfer”. In: *Proceedings of ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games*. Costa Mesa, CA: ACM, Mar. 2012. DOI: 10.1145/2159616.2159648. [webpage](#), [pdf](#), [citations](#): 7.
- [P10] **D. Nowrouzezahrai**<sup>PD</sup>, S. Geiger, K. Mitchell, R. Sumner, **W. Jarosz**, and M. Gross. “Light Factorization for Mixed-Frequency Shadows in Augmented Reality”. In: *10th IEEE International Symposium on Mixed and Augmented Reality (Proceedings of ISMAR 2011)*. Oct. 2011. DOI: 10.1109/ISMAR.2011.6092384. [webpage](#), [pdf](#), [citations](#): 43.
- [P11] J. van Baar, S. Poulakos, **W. Jarosz**, **D. Nowrouzezahrai**<sup>PD</sup>, R. Tamstorf, and M. Gross. “Perceptually-Based Compensation of Light Pollution in Display Systems”. In: *Proceedings of the 2011 ACM Symposium on Applied Perception in Graphics and Visualization*. New York, NY, USA: ACM, Aug. 2011. DOI: 10.1145/2077451.2077460. [webpage](#), [pdf](#), [citations](#): 6.
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## 📄 Refereed Sketches, Abstracts, & Talks

- [S1] **W. Jarosz** and **B. Bitterli**<sup>PHD</sup>. “Beyond Points and Beams: Higher-Dimensional Photon Samples for Volumetric Light Transport”. In: *International Conference on Transport Theory*. Monterey, CA, Oct. 2017. [citations](#): 7.

- [J19] **R. Hostettler**<sup>1</sup>, R. Habel, M. Gross, and **W. Jarosz**. “Dispersion-based Color Projection using Masked Prisms”. In: *Computer Graphics Forum (Proceedings of Pacific Graphics)* 34.7 (Oct. 2015). DOI: 10.1111/cgf.12771.  webpage,  pdf,  citations: 3.
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- [J22] H. Zimmer, **F. Rousselle**<sup>PD</sup>, W. Jakob, O. Wang, D. Adler, **W. Jarosz**, O. Sorkine-Hornung, and A. Sorkine-Hornung. “Path-space Motion Estimation and Decomposition for Robust Animation Filtering”. In: *Computer Graphics Forum (Proceedings of EGSR)* 34.4 (June 2015). DOI: 10.1111/cgf.12685.  webpage,  pdf,  citations: 18.
- [J23] **O. Klehm**<sup>1</sup>, F. Rousselle, M. Papas, D. Bradley, C. Hery, B. Bickel, **W. Jarosz**, and T. Beeler. “Recent Advances in Facial Appearance Capture”. In: *Computer Graphics Forum (Proceedings of Eurographics - State of the Art Reports)* 34.2 (May 2015), pp. 709–733. DOI: 10.1111/cgf.12594.  webpage,  pdf,  citations: 24.
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- [J25] **R. Prévost**<sup>MS</sup>, **W. Jarosz**, and O. Sorkine-Hornung. “A Vectorial Framework for Ray Traced Diffusion Curves”. In: *Computer Graphics Forum* 34.1 (Feb. 2015), pp. 253–264. ISSN: 1467-8659. DOI: 10.1111/cgf.12510.  webpage,  pdf,  citations: 6.
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- [C6] D. Gutierrez, **W. Jarosz**, C. Donner, and S. G. Narasimhan. “Scattering”. In: *ACM SIGGRAPH Courses*. New Orleans, Louisiana: ACM, Aug. 2009, 21:1–21:397. DOI: 10.1145/1667239.1667260.
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- [J31] **I. Georgiev**<sup>1</sup>, J. Křivánek, T. Hachisuka, D. Nowrouzezahrai, and **W. Jarosz**. “Joint Importance Sampling of Low-Order Volumetric Scattering”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)* 32.6 (Nov. 2013). DOI: 10.1145/2508363.2508411. [webpage](#), [pdf](#), [citations: 30](#).
- [J32] **M. Papas**<sup>PhD</sup>, C. Regg, **W. Jarosz**, B. Bickel, P. Jackson, W. Matusik, S. Marschner, and M. Gross. “Fabricating Translucent Materials using Continuous Pigment Mixtures”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH)* 32.4 (July 2013). DOI: 10.1145/2461912.2461974. [webpage](#), [pdf](#), [citations: 28](#).
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- [TR3] **W. Jarosz**, M. Zwicker, and H. W. Jensen. *The Beam Radiance Estimate for Volumetric Photon Mapping*. Tech. rep. CS2008-0914. San Diego, CA: UC San Diego, Jan. 2008. [citations: 108](#).

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- [T1] **W. Jarosz**. “Efficient Monte Carlo Methods for Light Transport in Scattering Media”. PhD thesis. La Jolla, CA, USA: UC San Diego, Sept. 2008. ISBN: 978-0-549-72071-3. [citations: 42](#).
- [T2] **W. Jarosz**. “Interactive Global Illumination for Improved Lighting Design Workflow”. Bachelors thesis. University of Illinois, Urbana–Champaign, Jan. 2002. [webpage](#), [pdf](#).

## 🌟 Patents

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- [P2] B. Bitterli, **W. Jarosz**, and J. Novák. “Indoor scene illumination”. Patent 9852541 B2 (US). Dec. 2017.
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- [P4] K. Subr, K. Mitchell, **W. Jarosz**, and D. Nowrouzezahrai. “Combining sampling arrangements and distributions for stochastic integration in rendering”. Patent 9741153 B2 (US). Aug. 2017.
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- [P6] **W. Jarosz**, I. Georgiev, J. Krivanek, T. Hachisuka, and D. Nowrouzezahrai. “Methods and systems of joint path importance sampling”. Patent 9665974 B2 (US). May 2017.



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- [J44] **W. Jakob**<sup>1</sup>, C. Regg, and **W. Jarosz**. "Progressive Expectation–Maximization for Hierarchical Volumetric Photon Mapping". In: *Computer Graphics Forum (Proceedings of EGSR)* 30.4 (June 2011). DOI: 10.1111/j.1467-8659.2011.01988.x. [webpage](#), [pdf](#), [citations](#): 23.
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- [P8] **W. Jarosz**, J. Meng, M. Papas, R. Habel, C. Dachsbacher, and S. Marschner. "Bidirectional point distribution functions for rendering granular media". Patent 9472016 B2 (US). Oct. 2016.
- [P9] R. Habel and **W. Jarosz**. "Photon beam diffusion". Patent 9401043 B1 (US). July 2016.
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- [P14] **W. Jarosz**, M. Papas, D. Nowrouzezahrai, and T. Houit. "Refractive steganography lens and method for determining milling plan for same". Patent 8964295 B2 (US). Apr. 2015.
- [P15] H. Bowles, K. Mitchell, R. Sumner, **W. Jarosz**, and M. Gross. "Iterative reprojection of images". Patent 8624891 B2 (US). Jan. 2014.
- [P16] **W. Jarosz**, D. Nowrouzezahrai, R. Thomas, P.-P. Sloan, and M. Zwicker. "Image processing using iterative generation of intermediate images using photon beams of varying parameters". Patent 8638331 B1 (US). Jan. 2014.
- [P17] **W. Jarosz**, D. Nowrouzezahrai, and S. Watson. "Compensation for self-scattering on concave screens". Patent 8611005 B2 (US). Dec. 2013.
- [P18] S. C. Geiger, **W. Jarosz**, M. J. Lang, K. J. Mitchell, D. Nowrouzezahrai, R. W. Sumner, and T. Williams. "Virtual lens - rendering for augmented reality". Patent 9164723 B1 (US). Jan. 2013.

## Invited Talks & Lectures

- [L1] "Computer Graphics: Bridging the gap between art & science". Invited talk, Dartmouth/Hanover High School STEM Pathways series. Sept. 2018.
- [L2] "Mastering the Interaction of Light & Matter: From Real to Virtual, and Back Again". MIT CSAIL, Graphics Lunch. Feb. 2016.
- [L3] "Mastering the Interaction of Light & Matter: From Real to Virtual, and Back Again". Invited Talk at BBN/Raytheon Technologies. Feb. 2016.
- [L4] "Visual Computing Lab Research Overview". Invited talk, Dartmouth Thayer School of Engineering Colloquium. Feb. 2016.

- [J49] T. Hachisuka, **W. Jarosz**, R. P. Weistroffer, K. Dale, G. Humphreys, M. Zwicker, and H. W. Jensen. “Multidimensional Adaptive Sampling and Reconstruction for Ray Tracing”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH)* 27.3 (Aug. 2008), 33:1–33:10. DOI: 10 . 1145 / 1360612.1360632.  webpage,  pdf,  citations: 158.
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- [J52] **W. Jarosz**, M. Zwicker, and H. W. Jensen. “Irradiance Gradients in the Presence of Participating Media and Occlusions”. In: *Computer Graphics Forum (Proceedings of EGSR)* 27.4 (June 2008), pp. 1087–1096. DOI: 10.1111/j.1467-8659.2008.01246.x.  webpage,  pdf,  citations: 18.
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- [J55] P. Clarberg, **W. Jarosz**, T. Akenine-Möller, and H. W. Jensen. “Wavelet Importance Sampling: Efficiently Evaluating Products of Complex Functions”. In: *ACM Transactions on Graphics (Proceedings of SIGGRAPH)* 24.3 (Aug. 2005), pp. 1166–1175. DOI: 10.1145/1073204.1073328.  webpage,  pdf,  citations: 159.
- [L5] “Mastering the Interaction of Light & Matter: From Real to Virtual, and Back Again”. Computer Science Colloquium, Williams College. Oct. 2015.
- [L6] “High Dynamic Range Photography”. Invited Talk, Universidad de Zaragoza. Mar. 2015.
- [L7] “Mastering the Interaction of Light & Matter: From Real to Virtual, and Back Again”. Invited Talk, Visual Computing Lab, UC Berkeley. Aug. 2014.
- [L8] “Mastering the Interaction of Light & Matter: From Real to Virtual, and Back Again”. Stanford University. Computer Science Seminar, Invited Talk. Mar. 2014.
- [L9] “Mastering the Interaction of Light & Matter: From Real to Virtual, and Back Again”. Dartmouth College, Computer Science Colloquium. Feb. 2014.
- [L10] “The Perils of Evolutionary Rendering Research: Beyond the Point Sample”. Invited Talk, EGSR 2013. June 2013.
- [L11] “The Perils of Evolutionary Rendering Research: Beyond the Point Sample”. Keynote Talk. Journées du groupe de travail rendu. Mar. 2013.
- [L12] “The Perils of Evolutionary Rendering Research: Beyond the Point Sample”. Invited Talk, TU Wien Graphics Konversatorium. Feb. 2013.
- [L13] “*Tangled: Behind the Magic*”. Scientifica<sup>11</sup>: Zürcher Wissenschaftstage, Disney-Night. Aug. 2011.
- [L14] “The Research Behind the Magic”. Computer Science - Distinguished Lecture Series, UIUC. Nov. 2010.
- [L15] “Non-Photorealistic Rendering”. Invited lecture for CSE 168, UCSD. June 2008.
- [L16] “Textures, Environment mapping, and Procedurals”. Invited lecture for CSE 168, UCSD. May 2008.
- [L17] “Efficient Light Transport in Scattering Media”. Invited Talk, Walt Disney Animation Studios, Los Angeles. Feb. 2008.
- [L18] “Efficient Light Transport in Scattering Media”. Invited lecture for CSE 272, UCSD. Dec. 2007.
- [L19] “Texturing”. Invited lecture for CSE 168, UCSD. May 2007.
- [L20] “Global Illumination”. Invited lecture for CSE 168, UCSD. May 2006.
- [L21] “OpenEXR: Towards Realtime Playback”. SIGGRAPH 2005 OpenEXR Birds of a Feather. Aug. 2005.
- [L22] “Non-Photorealistic Rendering”. Invited lecture for CSE 168, UCSD. June 2005.

## Service & Professional Activities



### Chairing & Editorial duties

- **Associate editor**, Journal of Computer Graphics Techniques (JCGT) .....  2015–Present
- **Associate editor**, Computer Graphics Forum (Wiley) .....  2014–2017
- **Papers co-chair**, Eurographics Symposium on Rendering (EGSR) .....  2014

## Conference Committees

- **Steering Committee**, Eurographics Symposium on Rendering (EGSR) ..... 📅 2017–Present
- **Technical Papers Committee**, ACM SIGGRAPH ..... 📅 2012, 2013, 2015, 2019
- **Papers Committee**, Eurographics Symposium on Rendering (EGSR) ..... 📅 2010–2012, 2016, 2017, 2019
- **Full Papers International Program Committee**, Eurographics (EG) ..... 📅 2013, 2014, 2016, 2019
- **Technical Papers Committee**, ACM SIGGRAPH Asia ..... 📅 2017
- **International Program Committee**, GRAPP ..... 📅 2015
- **Technical Program Committee**, SIBGRAPI ..... 📅 2014
- **Papers Committee**, ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (i3D) ..... 📅 2012–2014
- **Sketches Committee**, SIGGRAPH Asia ..... 📅 2008, 2009

## Reviewer

- ACM SIGGRAPH ..... 📅 2004–2019
- ACM SIGGRAPH Asia ..... 📅 2008–2010, 2012–2014, 2017–2018
- ACM Transactions on Graphics (TOG) ..... 📅 2009–2018
- Eurographics (EG) ..... 📅 2008–2016, 2018
- Eurographics Symposium on Rendering (EGSR) ..... 📅 2005, 2009–2012, 2015–2019
- Computer Graphics Forum ..... 📅 2009–2011, 2013–2017
- The Visual Computer ..... 📅 2007, 2010
- Interactive Ray Tracing ..... 📅 2007

## College Committees

- Department Webmaster ..... 📅 2015–Present
- M.S. D.A. admissions ..... 📅 2016–2017, 2019
- Building planning committee ..... 📅 2019
- Faculty recruiting ..... 📅 2017–2018
- Ph.D. admissions ..... 📅 2014–2016

## Other

- Symposium on Computer Animation ..... 📅 2007  
*Student Volunteer*
- SIGGRAPH UIUC Student Chapter ..... 📅 Jul. 2001–Jun. 2002  
*President*

## Press & Media Coverage



- 📄 “The physics of movie-making: making computer animation more realistic.” *SciTech Europa*. November 30, 2018.  
<https://www.scitecheuropa.eu/computer-animation-movie-making/91132/>
- 📄 “New software will let artists control how light interacts with objects.” *ars|technica*. November 30, 2018.  
<https://arstechnica.com/science/2018/11/new-software-will-let-artists-control-how-light-interacts-with-objects/>
- 📄 “Every grain of sand: Method efficiently renders massive assemblies of granular materials.” *PhysOrg*. December 8, 2016.  
<https://phys.org/news/2016-12-grain-sand-method-efficiently-massive.html>
- 📄 “You Can Stop Worrying, Disney Figured Out How to Make Perfect CG Sugar.” *Gizmodo*. December 8, 2016.  
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- 📄 “This simulation is so good it’s hard to believe it’s not real.” *Popular Mechanics*. December 8, 2016.  
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- 📄 “Disney Research Devises a Method of 3D Printing Models That

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<https://3dprint.com/151798/disney-research-balancing/>
- 📄 “Scientists Develop Spray Cans That Know What to Paint.” *Wall Street Journal Video*. May 2, 2016.  
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- 📄 “Move over Banksy! Robotic spray can helps novices reproduce photos as giant ‘paint by numbers’ murals.” *Daily Mail*. April 8, 2016.  
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- ☰ "Scientists invent robotic 'artist' that spray paints giant murals." *PhysOrg*. April 7, 2016.  
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- ☰ "Think You Know Rainbows? Look Again." *Scientific American*. February 26, 2016.  
<http://www.scientificamerican.com/article/think-you-know-rainbows-look-again-slide-show1/>
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- ☰ "5 Crazy New Ideas Out Of Disney Research." *FastCompany*. August 7, 2015.  
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- ☰ "New method efficiently renders granular materials at multiple scales." *PhysOrg*. August 5, 2015.  
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- ☰ "New algorithms improve animations featuring fog, smoke and underwater scenes." *PhysOrg*. November 18, 2013.  
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- ☰ "How Strange Twinned Rainbows Form." *Live Science*. August 2012.  
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- ☰ "Imagining how light behaves in 2D world gives researchers insights for faster 3D rendering." *PhysOrg*. August 6, 2012.  
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- ☰ "SIGGRAPH In San Diego: Graphics, Video And Rock." *Jacobs School News*. Aug. 4, 2005.
- ☰ "Calitz Lights Up SIGGRAPH 2005." *HPCWire*. Aug. 4, 2005.
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