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**Research Interests:** Realistic rendering, appearance modeling, computational photography, machine learning techniques for graphics and vision.

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#### CURRENT APPOINTMENT:

**Research assistant professor**, Dept. of Computer Science, University of Southern California (since July 2009).

**Senior computer scientist**, Graphics Lab., USC Institute for Creative Technologies (since October 2007).

#### EDUCATION:

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| 2003 – 2007 | PhD in Computer Science. The University of British Columbia, Canada.<br>Supervisor - Prof. Wolfgang Heidrich. |
| 2000 – 2003 | MS in Computer Science, Stony Brook University, USA.<br>Advisor - Distinguished Prof. Arie Kaufman.           |
| 1996 – 2000 | BE in Computer Science and Engineering, Gujarat University, India.  |

#### Ph.D. THESIS:

**Realistic Materials and Illumination Environments.** The University of British Columbia, June 2007, (recipient of 2007 Alain Fournier PhD Thesis Award).

#### JOURNAL PUBLICATIONS:

- **Circularly Polarized Spherical Illumination Reflectometry.** Abhijeet Ghosh, Tongbo Chen, Pieter Peers, Cyrus A. Wilson, Paul Debevec. ACM Transactions on Graphics (Proc. SIGGRAPH Asia), 29(5), 2010.
- **Temporal Upsampling of Performance Geometry using Photometric Alignment.** Cyrus A. Wilson, Abhijeet Ghosh, Pieter Peers, Jen-Yuan Chiang, Jay Busch, Paul Debevec. ACM Transactions on Graphics, 29(2), March 2010.
- **A Basis Illumination Approach to BRDF Measurement.** Abhijeet Ghosh, Wolfgang Heidrich, Shruthi Achutha, and Matthew O'Toole. International Journal of Computer Vision (Marr Prize special issue: ICCV07), 90(2): 183-197, 2010.
- **Estimating Specular Roughness and Anisotropy from Second Order Spherical Gradient Illumination.** Abhijeet Ghosh, Tongbo Chen, Pieter Peers, Cyrus A. Wilson, Paul Debevec. Computer Graphics Forum (Proc. EGSR), 28(4), 1161-1170, 2009.
- **Compressive Light Transport Sensing.** Pieter Peers, Dhruv K. Mahajan, Bruce Lamond, Abhijeet Ghosh, Wojciech Matusik, Ravi Ramamoorthi, Paul Debevec. ACM Transactions on Graphics, 28(1), January 2009.
- **Practical Modeling and Acquisition of Layered Facial Reflectance.** Abhijeet Ghosh, Tim Hawkins, Pieter Peers, Sune Frederiksen, Paul Debevec. ACM Transactions on Graphics (Proc. SIGGRAPH Asia), 27(5), 2008.
- **Correlated Visibility Sampling for Direct Illumination.** Abhijeet Ghosh and Wolfgang Heidrich. The Visual Computer (Proc. of Pacific Graphics) 22: 693-701, 2006.
- **High Dynamic Range Display Systems.** Helge Seetzen, Wolfgang Heidrich, Wolfgang Stuerzlinger, Greg Ward, Lorne Whitehead, Matthew Trentacoste, Abhijeet Ghosh, Andrejs Vorozcovs. ACM Transactions on Graphics (Proc. SIGGRAPH 2004), 23(3): 760-768.
- **Simple Blurry Reflections with Environment Maps.** Michael Ashikhmin and Abhijeet Ghosh. Journal of Graphics Tools, 7(4): 3-8, 2002.

## CONFERENCE PUBLICATIONS:

- **Effect of Illumination on Automatic Expression Recognition: A Novel 3D Relightable Facial Database.** Giota Stratou, Abhijeet Ghosh, Paul Debevec, Louis-Philippe Morency. IEEE International Conference on Automatic Face and Gesture Recognition (FG 2011), Santa Barbara, USA, March 2011.
- **Image-based Separation of Diffuse and Specular Reflections using Environmental Structured Illumination.** Bruce Lamond, Pieter Peers, Abhijeet Ghosh, Paul Debevec. International Conference on Computational Photography, April 2009.
- **Active Learning from Discrete Choice Data.** Eric Brochu, Nando de Freitas and Abhijeet Ghosh. Advances in Neural Information Processing Systems (NIPS) 2007.
- **BRDF Acquisition with Basis Illumination.** Abhijeet Ghosh, Shruthi Achutha, Wolfgang Heidrich, and Matthew O'Toole. Proc. of IEEE International Conference on Computer Vision (ICCV) 2007 (oral presentation, Marr Prize Honorable mention).
- **Sequential Sampling for Dynamic Environment Map Illumination.** Abhijeet Ghosh, Arnaud Doucet, and Wolfgang Heidrich. Proc. of Eurographics Symposium on Rendering 2006, pp.115-126.
- **Real Illumination from Virtual Environments.** Abhijeet Ghosh, Matthew Trentacoste, Helge Seetzen and Wolfgang Heidrich. Proc. of Eurographics Symposium on Rendering 2005, pp. 243-252.
- **Bidirectional Importance Sampling for Direct Illumination.** David Burke, Abhijeet Ghosh and Wolfgang Heidrich. Proc. of Eurographics Symposium on Rendering 2005, pp. 147-156.
- **Volume Rendering for High Dynamic Range Displays.** Abhijeet Ghosh, Matthew Trentacoste and Wolfgang Heidrich. Proc. of Volume Graphics 2005, pp. 91-98.
- **Hardware Assisted Multichannel Volume Rendering.** Abhijeet Ghosh, Poojan Prabhu, Arie Kaufman and Klaus Mueller. Computer Graphics International, July 2003: 2-7, IEEE Computer Society Press.

## INVITED CONTRIBUTION:

- **Cook-Torrence BRDF model.** Invited chapter in the Encyclopedia of Computer Vision. Katsushi Ikeuchi (Ed.).

## OTHER REFEREED CONTRIBUTIONS:

- **Free-form Polarized Spherical Illumination Reflectometry.** Kaori Kikuchi, Bruce Lamond, Abhijeet Ghosh, Pieter Peers, Paul Debevec. SIGGRAPH Asia 2010 Sketch.
- **Combining Spherical Harmonics and Point-Source Illumination for Efficient Image-Based Relighting.** Borom Tunwattanapong, Abhijeet Ghosh, Paul Debevec. SIGGRAPH 2010 Poster.
- **Data-Driven Diffuse-Specular Separation of Spherical Gradient Illumination.** Tongbo Chen, Abhijeet Ghosh, Paul Debevec. SIGGRAPH 2009 poster.
- **Estimating Specular Roughness from Polarized Second Order Spherical Gradient Illumination.** Abhijeet Ghosh, Pieter Peers, Cyrus A. Wilson, Paul Debevec. SIGGRAPH 2009 Technical Talk.
- **2D and 3D Facial Correspondences via Photometric Alignment.** Cyrus A. Wilson, Abhijeet Ghosh, Pieter Peers, Jen-Yuan Chiang, Jay Busch, Paul Debevec. SIGGRAPH 2009 Technical Talk.
- **Considering Shape Reconstruction from Specular Reflection.** Tomohito Masueda, Abhijeet Ghosh, Wanchun Ma, Hiroki Unten, Paul Debevec. SIGGRAPH Asia 2008 Technical Sketch.
- **Estimating Multi-layer Scattering in Faces using Direct-Indirect Separation.** Abhijeet Ghosh and Paul Debevec. SIGGRAPH 2008 Technical Talk.
- **Preference Galleries for Material Design.** Eric Brochu, Abhijeet Ghosh and Nando de Freitas. SIGGRAPH 2007 Poster (Winner of the ACM Student Research Competition).
- **The D-BRDF Model as a Basis for BRDF Acquisition.** Abhijeet Ghosh and Wolfgang Heidrich. SIGGRAPH 2007 Poster.
- **Sequential Sampling for Dynamic Environment Maps.** Abhijeet Ghosh, Arnaud Doucet, and Wolfgang Heidrich. SIGGRAPH 2006 Technical Sketch.
- **Correlated Visibility Sampling for Direct Illumination.** Abhijeet Ghosh and Wolfgang Heidrich. SIGGRAPH 2005 Technical Sketch.
- **Real Illumination from Virtual Environments.** Abhijeet Ghosh, Matthew Trentacoste, Helge Seetzen and Wolfgang Heidrich. SIGGRAPH 2005 Technical Sketch.
- **Bidirectional Importance Sampling for Illumination from Environment Maps.** David Burke, Abhijeet Ghosh and Wolfgang Heidrich. SIGGRAPH 2004 Technical Sketch.

## TEACHING EXPERIENCE:

- **Co-Instructor for Advanced Computer Graphics – Photographic Image Synthesis** (CS 599) (with Dr. Paul Debevec and Dr. Pieter Peers), Spring 2009 and Spring 2010, University of Southern California.
- Teaching Assistant for Computer Graphics (CPSC 314), Summer Session 1, 2006, University of British Columbia.
- Teaching Assistant for Algorithm Design and Analysis (CPSC 320), Winter Term 2, 2003-04, University of British Columbia.
- Teaching Assistant for Computer Graphics (CPSC 414), Winter Term 1, 2003-04, University of British Columbia.
- Teaching Assistant for Object Oriented Program Design (CSE 219), Spring 2003, Stony Brook University.

## STUDENT SUPERVISION:

- Borom Tunwattanapong – Co-supervision (with Dr. Paul Debevec) of ongoing doctoral research at USC-ICT. Techniques for efficient image based relighting and editing.
- Anustup Choudhury – Member of PhD advising and examination committee on image enhancement techniques at USC, 2010-11.
- Jun Zheng – Supervision of 3 month internship in summer 2010, USC-ICT. Specular normal synthesis using stochastic super-resolution. Also external member of Jun's PhD examination committee on stochastic super-resolution techniques at UTEP.
- Kaori Kikuchi – Co-supervision (with Dr. Pieter Peers) of Master's thesis 2009-10, USC-ICT. Free-form polarized spherical illumination reflectometry.
- Panagiota Stratou – Co-supervision (with Dr. Louis-Philippe Morency) of 3 month internship in summer 2009 and directed research in 2010, USC-ICT. Acquisition and relighting of facial expression and performance database.
- Tomohito Masueda – Supervision of 3 month internship in spring 2008, USC-ICT. Recovery of shape from specular reflection.
- Matthew O'Toole – Supervision of undergraduate honors thesis 2006-07, University of British Columbia. Real-time rendering of acquired BRDFs.

## GRANTS AND CONTRACTS:

- **NSF grant IIS-1016703** (with Dr. Pieter Peers) – \$475K, Higher order statistics for appearance modeling, 2010-13.
- **AVON contract** – \$100K, Acquisition and rendering of faces with and without makeup.
- **USC-ICT seedling grant** (with Dr. Louis-Philippe Morency) – \$100K, Appearance models for facial expression recognition, 2009-10.

## RECOGNITION AND AWARDS:

- **Motion Picture Film Credit** – AVATAR, Lightstage facial capture, 2009.
- **Alain Fournier Thesis Award** – Best Canadian PhD thesis in computer graphics in 2007.
- **IEEE Marr Prize Honorable Mention** – ICCV 2007 best paper award.
- **University Graduate Fellowship** – The University of British Columbia, 2005 - 06.
- **ATI Technologies Fellowship** 2004 - 05 (4 awards world-wide).
- **IRIS/Precarn Fellowship** 2003 - 04.
- **University Fellowship** – Stony Brook University, 2002 - 03.

## INVITED TALKS:

- **Polarized Illumination Reflectometry** – Optical Society of Southern California, Playa Vista, CA, Nov. 2010.
- **Polarized Spherical Illumination Reflectometry** – University of British Columbia, Vancouver, BC, Aug. 2010.
- **Measurement and Modeling of Layered Facial Reflectance** – Avon Product R&D, Suffern, NY, Sept. 2009.
- **Measurement and Modeling of Material and Facial Reflectance** – Florida State University, Tallahassee, July 2009.
- **Practical Modeling and Acquisition of Facial Appearance and Performance** – Weta Digital, Wellington, New Zealand, June 2009.
- **Measurement, Modeling and Rendering for Realistic Computer Graphics** – CS Colloquium, University of Southern California, March 2009.

- **Measurement and Modeling of Material and Facial Reflectance** – Technische Universität Darmstadt, Germany, June 2008.
- **Realistic Materials and Illumination Environments** – USC Institute for Creative Technologies and Digital Domain Inc., Marina del Rey, CA, April 2007.
- **Sequential Sampling of Environment Maps** – INRIA Futurs, Bordeaux, France, July 2006.
- **High Dynamic Range Acquisition and Display** – UVP Biotech Imaging Systems, Upland, CA, August 2005.
- **Real Illumination from Virtual Environments** – Université de Montréal, July 2005; Bauhaus University at Weimar, Germany, July 2005.
- **Bidirectional Importance Sampling for Direct Illumination** - Bauhaus University at Weimar, July 2005.
- **Volume Rendering for High Dynamic Range Displays** – INRIA Futurs, Bordeaux, France, June 2004.

#### CONFERENCE TALKS:

- **Circularly Polarized Spherical Illumination Reflectometry.** SIGGRAPH Asia 2010, Seoul, Dec. 2010.
- **Estimating Specular Roughness and Anisotropy from Second Order Spherical Gradient Illumination.** EGSR 2009, Girona, Spain, June 2009; SIGGRAPH 2009 Technical Talk, Aug. 2009.
- **Practical Modeling and Acquisition of Layered Facial Reflectance.** SIGGRAPH Asia 2008, Singapore, Dec. 2008.
- **Estimating Multi-layer Scattering in Faces using Direct-Indirect Separation.** SIGGRAPH 2008 Technical Talk, Aug. 2008.
- **BRDF Acquisition with Basis Illumination** – ICCV 2007 oral presentation, Rio de Janeiro, Brazil, October 2007.
- **Sequential Sampling of Environment Maps** – Eurographics Symposium on Rendering 2006, Nicosia, Cyprus, June 2006; SIGGRAPH 2006 Sketch talk, August 2006.
- **Correlated Visibility Sampling for Direct Illumination** – SIGGRAPH 2005 Sketch talk, August 2005; Pacific Graphics 2006, Taipei, Taiwan, October 2006.
- **Real Illumination from Virtual Environments** – Eurographics Symposium on Rendering 2005, Konstanz, Germany, July 2005.
- **Bidirectional Importance Sampling for Direct Illumination** – Eurographics Symposium on Rendering 2005, Konstanz, Germany, July 2005.
- **Volume Rendering for High Dynamic Range Displays** – Volume Graphics 05, Stony Brook, NY, June 2005.

#### PROFESSIONAL EXPERIENCE:

- **Consultant on Facial Reflectance Modeling** for visual effects in AVATAR, Weta Digital, 2009.
- Doctoral dissertation research (2003 - 07), Imager Computer Graphics Lab., Computer Science Department, The University of British Columbia. Supervised by Prof. Wolfgang Heidrich.
- Research Internship (summer 2003), USC Institute for Creative Technologies. Supervised by Dr. Paul Debevec. Real-time rendering with high dynamic range lighting for Linear Light Source Reflectometry project.
- Research assistant (2000 - 03), Visualization Lab., Computer Science Department, Stony Brook University. Parallel volume rendering with special purpose hardware. Supervised by Prof. Arie Kaufman.
- Research apprenticeship (1999 - 00), ISRO Space Application Centre, Ahmedabad, India. Multispectral classification of remote sensing data using artificial neural networks. Supervised by Dr. A Senthil Kumar.

#### SERVICE:

- **Conference and Program Co-chair** – IEEE Procams 2011.
- **NSF Panel IIS 10-571** – Graphics & Visualization program, 2011.
- **Program Committee** – EGSR 2011, SIGGRAPH Asia Sketches and Posters 2010, Eurographics Short papers 2011/2010/2008, 3D PVT 2010, Graphics Interface 2008, Pacific Graphics 2006.
- **Paper Session Chair** – SIGGRAPH Asia 2010 (Rendering), GI 2008 (Color and HDR).
- **External Reviewer (papers)** – SIGGRAPH 2004-11, SIGGRAPH Asia 2010, Eurographics 2006-11, EGSR 2006-10, ECCV 2010, ACCV 2007, IEEE TVCG, IEEE PAMI, JOSA, Computer Graphics Forum, Computers&Graphics, GI 2006/09, CGI 2006, I3D 03, VolVis-02, JGT, IPSJ Trans. CVA.
- **External Reviewer (courses)** – SIGGRAPH Asia 2008-09, Eurographics 2009.
- Faculty Recruiting Committee – elected student representative 2006-07, UBC.
- Graduate Admissions Committee – elected student representative 2005-06, UBC.
- Computer Science PhD Breadth Committee volunteer – 2005-06, UBC.
- AMoRe (Imager Graphics Lab) research meetings coordinator 2003 - 07, UBC.
- Computer Science Graduate Student Council - executive member 2002-03, Stony Brook University.
- Student Volunteer – International Workshop on Volume Graphics VG-01.