

# Jinwei Gu

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## CONTACT

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## RESEARCH INTERESTS

My general research interest is in the area of computer graphics. In particular, my research has focused on studying the appearance models of various types of dynamic natural phenomena (*e.g.*, dirt and dust texture formation on glass, rusting of iron, growing of grass, charring of wood) and on applying these appearance models to synthesize photo-realistic images, which can be used in computer games, special effects for movies, and photograph editing softwares.

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## EDUCATION

<b>Columbia University</b> Ph.D. in Computer Science Dissertation: <i>Measurement, Modeling, and Synthesis of Time-Varying Appearance of Natural Phenomena</i> Advisers: Shree Nayar, Peter Belhumeur and Ravi Ramamoorthi	09/2005–present
<b>Tsinghua University, China</b> M.S. in Automation Thesis: <i>Fingerprint Orientation Field Modeling and Its Applications</i> ( <i>Honor: Outstanding Master's Thesis Award</i> ) Adviser: Jie Zhou	09/2002–07/2005
<b>Tsinghua University, China</b> B.S. in Automation	09/1998–07/2002

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## HONORS

Principal Scholarship Award, Tsinghua University, 2005  
Outstanding Master's Thesis Award, Tsinghua University, 2005  
Excellent Graduate Student Award, Tsinghua University, 2004  
Intel Technology and Information Fellowship, 2004  
Top-Ranked Student Scholarship, Tsinghua University, 1999, 2000, 2001

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## RESEARCH EXPERIENCE

**Columbia University** 09/2005–present

Graduate Student and Research Assistant

*Advisers: Shree Nayar, Peter Belhumeur and Ravi Ramamoorthi*

My research is focused on modeling, measuring, and digitally recreating the visual appearance of complex dynamic natural phenomena. This research has a variety of applications in computer graphics and digital photography. Specifically, I proposed solutions to three open problems in this field: creating time-varying surface appearance for photorealistic rendering, extending structured light methods to measure dynamic volume density, and modeling the appearance of contaminated transparent surfaces. Based on the knowledge of the underlying appearance models for these dynamic natural phenomena, I also developed algorithms to remove weathering artifacts from already-captured photographs.

**Adobe Creative Technology Lab** 05/2008–08/2008

Research Intern

*Adviser: Wojciech Matusik*

I investigated novel methods for printing documents with various reflectance properties and their potential applications to novel display devices.

**Microsoft Research Asia** 03/2003–09/2004

Research Intern

*Advisers: Stephen Lin and Harry Shum*

Together with Dr. Lin and other coauthors, I developed an algorithm to estimate a camera's response curve from a single input image, based on the linearity of image irradiance on the edge pixels. I was also involved in several other projects, including texture analysis and synthesis, facial expression analysis, and face contour matching with cartoon images.

**Tsinghua University, China** 09/2002–07/2005

Graduate Student and Research Assistant

*Adviser: Jie Zhou*

My research was focused on modeling the orientation field of fingerprint images based on its intrinsic structure and topological properties, as well as applying the derived models to complete the graphical representation of fingerprint images, to improve the performance of fingerprint recognition, and to develop robust algorithms for singular point analysis.

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## TEACHING EXPERIENCE

**Teaching assistant, Columbia University, New York, NY**

E6162: Appearance Modeling in Vision and Graphics	Spring 2006
COMS 4731: Computer Vision	Fall 2007
COMS 6998: Computational Photography	Spring 2007, Spring 2008
CS4737/CS6737: Biometrics	Fall 2006, Fall 2008

## PUBLICATIONS

1. Jinwei Gu, Ravi Ramamoorthi, Peter Belhumeur and Shree Nayar. "Removing Image Artifacts Due to Dirty Camera Lenses and Thin Occluders". *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)*, Dec. 2009.
2. Wojciech Matusik, Boris Ajdin, Jinwei Gu, Jason Lawrence, Hendrik P.A. Lensch, Fabio Pellacini, and Szymon Rusinkiewicz. "Printing Spatially-Varying Reflectance". *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)*, Dec. 2009.
3. Jinwei Gu, Shree Nayar, Eitan Grinspun, Peter Belhumeur, and Ravi Ramamoorthi. "Compressive Structured Light for Recovering Inhomogenous Participating Media". *Proceedings of European Conference on Computer Vision (ECCV)*, Oct. 2008, pp 845-858.
4. Jinwei Gu, Ravi Ramamoorthi, Peter Belhumeur, and Shree Nayar. "Dirty Glass: Modeling and Rendering Contaminations on Transparent Surfaces". *Proceedings of Eurographics Symposium on Rendering (EGSR)*, June 2007.
5. Jinwei Gu, Chien-I Tu, Ravi Ramamoorthi, Peter Belhumeur, Wojciech Matusik, and Shree Nayar. "Time-Varying Surface Appearance: Acquisition, Modeling, and Rendering". *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, vol. 25, no. 3, June 2006, pp 762-771.
6. Stephen Lin, Jinwei Gu, Shuntaro Yamazaki, and Heung-Yeung Shum. "Radiometric Calibration from a Single Image". *Proceedings of IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2004, vol. 2, pp 938-945.
7. Jie Zhou, Fanglin Chen, and Jinwei Gu. "A Novel Algorithm for Detecting Singular Points from Fingerprint Images". *to appear in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 2008.
8. Jie Zhou, Jinwei Gu and David Zhang, "Singular Points Analysis in Fingerprints Based on Topological Structure and Orientation Field". *International Conference of Biometrics (ICB)*, August 2007, pp 261-270.
9. Jinwei Gu, Jie Zhou, and Chunyu Yang. "Fingerprint Recognition by Combining Global Structure and Local Cues". *IEEE Transactions on Image Processing*, vol. 15, no. 7, 2006, pp 1952-1964.
10. Jie Zhou and Jinwei Gu, "A Model-based Method for the Computation of Fingerprints' Orientation Field". *IEEE Transactions on Image Processing*, vol. 13, no. 6, 2004, pp 821-835.
11. Jie Zhou, David Zhang, Jinwei Gu, and Nannan Wu. "Chapter 14. Graphical Representation of Fingerprint Images". *Integrated Image and Graphics Technologies*, Kluwer academic publisher, Boston, 2004.
12. Jinwei Gu, Jie Zhou, and David Zhang, "A Combination Model for Orientation Field of Fingerprints". *Pattern Recognition*, vol. 37, no. 3, 2004, pp 543-553.
13. Jie Zhou and Jinwei Gu, "Modeling Orientation Fields of Fingerprints with Rational Complex Functions". *Pattern Recognition*, vol. 37, no. 2, 2004, pp 389-391.
14. Jinwei Gu and Jie Zhou, "A Novel Model for Orientation Field of Fingerprints". *Proceedings of IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2003, vol 2, pp 493-498.

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## PRESS COVERAGE

“Space-Time Appearance Factorization”, Computer Graphics World, August, 2006.

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## INVITED TALK

“Creation of Time-Varying Natural Phenomena for Computer Graphics”. Kodak Research Labs, Rochester NY, Oct. 10, 2008.

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## PROFESSIONAL ACTIVITIES

### Reviewer:

- IEEE Transactions on Image Processing, Computer Vision and Image Understanding
- SIGGRAPH 2007; ICCV 2007; CVPR 2007, 2008; Eurographics (EG) 2008, 2009; EGSR 2008, 2009; ICCP 2009; ICC 2007

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## MISCELLANEOUS

Citizenship: People’s Republic of China (currently in the United States on F-1 visa).

Language: Fluent in English, native in Chinese.

Hobbies: Swimming, badminton, photography, movies.

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## REFERENCES

### **Shree K. Nayar**

T.C. Chang Professor, Columbia University

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Email: [nayar@cs.columbia.edu](mailto:nayar@cs.columbia.edu)

### **Peter N. Belhumeur**

Professor, Columbia University

Phone: 212-939-7087

Email: [belhumeur@cs.columbia.edu](mailto:belhumeur@cs.columbia.edu)

### **Ravi Ramamoorthi**

Associate Professor, Columbia University

Phone: 212-939-7082

Email: [ravir@cs.columbia.edu](mailto:ravir@cs.columbia.edu)

### **Stephen Lin**

Senior Researcher, Microsoft Research Asia

Email: [stevelin@microsoft.com](mailto:stevelin@microsoft.com)

### **Jie Zhou**

Professor, Tsinghua University, China

Email: [jzhou@tsinghua.edu.cn](mailto:jzhou@tsinghua.edu.cn)