

CURRICULUM VITAE

ZHENGYUN ZHANG

Research Scientist
BioSystems & Micromechanics IRG
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EDUCATION

- Ph.D. in Electrical Engineering 2006–2011
Stanford University, Stanford, CA, USA
- M.S. in Electrical Engineering 2004–2006
Stanford University, Stanford, CA, USA
- B.S. in Electrical and Computer Engineering, and Computer Science 2000–2004
Cornell University, Ithaca, NY, USA

DOCTORAL DISSERTATION

- Analysis and Synthesis of Three-dimensional Illumination Using Partial Coherence
Principal Advisor: Professor Marc Levoy
Readers: Professor George Barbastathis, Professor Mark Horowitz
This work investigates the problem of generating three-dimensional light patterns by analyzing coherence properties of existing illumination methods and proposes a coherence synthesis solution.

REFEREED JOURNAL PUBLICATIONS

1. **(Editor's Pick)** Z. Zhang, C. Bao, H. Ji, Z. Shen, G. Barbastathis, "Apparent coherence loss in phase space tomography," *J. Opt. Soc. Am. A* 34 (11), 2025–2033 (2017)
2. J. Shang, Z. Zhang, and H. K. Ng, "Superfast maximum-likelihood reconstruction for quantum tomography," *Phys. Rev. A* 95, 062336 (2017)
3. W. Chen, L. Tian, S. Rehman, Z. Zhang, H. P. Lee, and G. Barbastathis, "Empirical concentration bounds for compressive holographic bubble imaging based on a Mie scattering model," *Opt. Express* 23, 4715–4725 (2015)
4. Y. Zhu, Z. Zhang, and G. Barbastathis, "Phase imaging for absorptive phase objects using hybrid uniform and structured illumination Transport of Intensity Equation," *Opt. Express* 22, 28966–28976 (2014)
5. Z. Zhang, Z. Chen, S. Rehman, and G. Barbastathis, "Phase imaging using shifted wavefront sensor images," *Opt. Lett.* 39, 6177–6180 (2014)
6. L. Tian, Z. Zhang, J. Petrucci, and G. Barbastathis, "Wigner function measurement using a lenslet array," *Opt. Express* 21, 10511–10525 (2013)

7. Z. Zhang, Z. Chen, S. Rehman, and G. Barbastathis, "Factored form descent: a practical algorithm for coherence retrieval," *Opt. Express* 21, 5759–5780 (2013)
8. H. Huang, L. Tian, Z. Zhang, Y. Liu, Z. Chen, and G. Barbastathis, "Path-independent phase unwrapping using phase gradient and total-variation (TV) denoising," *Opt. Express* 20, 14075–14089 (2012)
9. M. Levoy, Z. Zhang, and I. McDowall, "Recording and controlling the 4D light field in a microscope using microlens arrays," *J. Microscopy*, volume 235, issue 2, pages 144–162 (2009)

REFEREED CONFERENCE PUBLICATIONS

1. W. Chen, L. Tian, S. Rehman, Z. Zhang, H. P. Lee, and G. Barbastathis, "Effects of Particle Concentration on Compressive Holographic Particle Flow Imaging," in *Imaging and Applied Optics*, OSA Technical Digest (online) (Optical Society of America, 2015), paper CW2F.4
2. Z. Zhang, W. Chen, G. Barbastathis, "Phase Imaging Using a Hybrid Approach: Combining Wavefront Sensing With the Transport-of-Intensity Equation," in *Digital Holography and Three-Dimensional Imaging*, OSA Technical Digest (online) (Optical Society of America, 2015), paper DT1A.5 (*oral presentation*)
3. Z. Zhang, Z. Chen, S. Rehman, and G. Barbastathis, "Regularized Phase Retrieval from Wavefront Sensor Images and the Importance of Priors," in *Imaging and Applied Optics 2014*, OSA Technical Digest (online) (Optical Society of America, 2014), paper SM2F.6 (*oral presentation*)
4. Z. Zhang and G. Barbastathis, "Regularizers for Coherence Retrieval and Their Physical Interpretation," in *Classical Optics 2014*, OSA Technical Digest (online) (Optical Society of America, 2014), paper CW4C.4 (*oral presentation*)
5. Z. Zhang and G. Barbastathis, "Compressive Effects of Positivity in Coherence Retrieval," in *Imaging and Applied Optics*, OSA Technical Digest (online) (Optical Society of America, 2013), paper CTu3C.4 (*oral presentation*)
6. Z. Zhang and G. Barbastathis, "Coherence Synthesis and Kolmogorov Complexity," in *Digital Holography and Three-Dimensional Imaging*, OSA Technical Digest (online) (Optical Society of America, 2013), paper DW2A.4 (*poster presentation*)
7. Z. Zhang and G. Barbastathis, "Positivity-induced Implicit Compressed Sensing," in *Digital Holography and Three-Dimensional Imaging*, OSA Technical Digest (online) (Optical Society of America, 2013), paper DTh4A.6 (*oral presentation*)
8. Z. Zhang, Z. Chen, and G. Barbastathis, "Quartic Optimization for Coherence Retrieval," in *Imaging and Applied Optics Technical Papers*, OSA Technical Digest (online) (Optical Society of America, 2012), paper CTu1B.4 (*oral presentation*)
9. Y. Huang, L. Tian, Z. Zhang, Y. Liu, and G. Barbastathis, "Path-independent phase unwrapping using phase derivative and total-variation (TV) denoising," in *Biomedical Optics and 3-D Imaging*, OSA Technical Digest (Optical Society of America, 2012), paper DSu2C.2
10. Z. Zhang, G. Barbastathis, and M. Levoy, "Limitations of Coherent Computer Generated Holograms," in *Digital Holography and Three-Dimensional Imaging*, OSA Technical Digest (CD) (Optical Society of America, 2011), paper DTuB5 (*oral presentation*)
11. **(Best Paper Award)** Z. Zhang, and M. Levoy, "Wigner Distributions and How They Relate to the Light Field," in *Computational Photography (ICCP)*, 2009 IEEE International Conference on (2009) (*oral presentation*)

OTHER CONFERENCE PUBLICATIONS

1. Z. Zhang, and G. Barbastathis, "Transfer Function Analysis of Axial Derivatives in Transport-of-Intensity Quantitative Phase Imaging," in Focus on Microscopy 2016 (*poster presentation*)
2. Z. Zhang, and G. Barbastathis, "Hybrid phase imaging using the transport of intensity equation augmented with wavefront sensing data," in Focus on Microscopy 2015 (*oral presentation*)
3. Z. Zhang, and G. Barbastathis, "Amplitude and phase from light field micrographs," in Focus on Microscopy 2014 (*oral presentation*)
4. M. Levoy, and Z. Zhang, "The light field microscope," in Focus on Microscopy 2007

TEACHING

1. Course Assistant for EE 265: Digital Signal Processing Laboratory, Stanford University, Spring 2011
2. Course Assistant for CS 248: Interactive Computer Graphics, Stanford University, Winter 2011
3. "Wigner Distribution Function to explain Light Fields", part of the short course *Light Fields: Present and Future* conducted by R. Raskar, Z. Zhang, S. B. Oh and A. Accardi at the IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) 2009 in Miami, FL
4. Course Assistant for CS 248: Introduction to Computer Graphics, Stanford University, Fall 2006

SOFTWARE

1. qMLE: Efficient MATLAB routines for quantum tomography (<https://github.com/qMLE/qMLE>)
2. ffd: MATLAB toolbox for factored form descent (<https://github.com/zaltor/ffd>)
3. LFDdisplay: a real-time system for light field microscopy (<http://graphics.stanford.edu/software/LFDdisplay>)

HONORS/AWARDS

- Best Paper Award at the IEEE International Conference on Computational Photography 2009
- Three-year Stanford Graduate Fellowship

EMPLOYMENT HISTORY

- Research Scientist Jan 1, 2015–present
Singapore-MIT Alliance for Research and Technology Centre *Singapore*
Research into optical imaging, leveraging partial coherence, optimization and compressed sensing.
- Postdoctoral Associate Sep 19, 2011–Dec 31, 2014
Singapore-MIT Alliance for Research and Technology Centre *Singapore*
Research into novel optical imaging methods using partial coherence and/or compressed sensing.
- Graduate Research Assistant Spring 2006–Summer 2011
Stanford University *Stanford, CA, USA*
Research with Professor Marc Levoy on light field microscopy, 3D reconstruction and optics.

- Course Assistant for EE 265 Spring 2011
Stanford University *Stanford, CA, USA*
 Assisted the instructor in conducting the Digital Signal Processing Lab course by helping students with homework and project questions during office hours and grading student assignments. Students were tasked with learning digital signal processing and implementing projects on a TI DSP test board.
- Course Assistant for CS 248 Winter 2011
Stanford University *Stanford, CA, USA*
 Assisted the instructor in conducting the Introduction to Computer Graphics course by helping students during office hours, giving review sessions, designing project assignments, and grading student projects. Students were tasked with implementing a basic subset of OpenGL in C and writing a real-time game engine using OpenGL and GLSL.
- Research Assistant Spring 2010–Fall 2010
Massachusetts Institute of Technology *Cambridge, MA, USA*
 Research with Professor George Barbastathis on holograms and three-dimensional optics.
- Photoshop Engineering Intern Summer 2007
Adobe Systems, Inc. *San Jose, CA, USA*
 Analyzed two conference papers from SIGGRAPH and adapted and extended the ideas therein for performance and quality in an implementation within Photoshop, a photography software package.
- Course Assistant for CS 248 Fall 2006
Stanford University *Stanford, CA, USA*
 Assisted the professor in conducting the CS248 Introduction to Computer Graphics course by helping students during office hours, giving review sessions and grading student assignments and exams. Students were required to implement basic computer graphics programs using C and then to write a computer game using OpenGL.
- Research Assistant Summer 2004
Cornell University *Ithaca, NY, USA*
 Implemented core audio signal processing routines for a real-time modular audio processing engine written in C++.

OTHER SKILLS

- Coding:
 MATLAB, Python, C/C++, x86 assembly
- Languages:
 English (native), Mandarin Chinese (fluent), Japanese (conversational)