

Jinwei Ye

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Research Interests

- Computer Vision
- Computational Photography
- Computer Graphics
- Virtual/Augmented Reality
- Machine Learning

Education

- Ph.D., Computer Science, January 2014
University of Delaware, Newark, DE 19716
Dissertation: Ray Geometry in Multi-perspective Cameras: A Case Study of XSlit Imaging and Applications
Dissertation Committee: Jingyi Yu (Advisor), Chandra Kambhamettu, Christopher Rasmussen, and Oliver Cossairt
- B.Eng., Electronics and Information Engineering, June 2009
Huazhong University of Science and Technology, Wuhan, China

Research Experience

- Researcher*, University of Delaware, Newark, DE Jan 2017 - Jul 2017
- Computational Photography and Computer Vision
- Senior Scientist*, Innovation Center of Canon U.S.A., San Jose, CA Sep 2014 - Dec 2016
- Computational Imaging and Machine Learning for Shape Reconstruction
- Postdoctoral Researcher*, US Army Research Laboratory, Adelphi, MD Sep 2013 - Sep 2014
- Multi-Modality Biometric Recognition
 - Mentor: Dr. S. Susan Young
- Graduate Research Assistant*, University of Delaware, Newark, DE Sep 2009 - Jan 2014
- Computational Cameras for Scene Understanding
 - Advisor: Prof. Jingyi Yu
- Research Intern*, Robert Bosch Research, Palo Alto, CA Jun 2012 - Aug 2012
- Applications of Light Field Imaging
 - Mentor: Dr. Liu Ren

Research Projects

- **3D Reconstruction of Mirror-like Objects**

Constructed a two-layer liquid crystal display (LCD) for measuring the shape of mirror-like object; designed optimized illumination patterns to increase acquisition efficiency; developed a surface reconstruction algorithm that combines surface pieces from multiple viewpoints; results published in International Conference on Computational Photography (ICCP) 2016.

- **Multi-Spectral Light Field Camera**

Designed a multi-spectral light field camera by altering the camera architect using multi-spectral filters; discovered image sparsity in spectral domain by statistical analysis on multi-spectral images; developed an optimization algorithm for high-resolution multi-spectral image reconstruction using compressive sensing theory; results presented in OSA meeting on Imaging Systems (IS) 2015.

- **Multi-Modality Biometric Recognition**

Designed a face recognition system using multi-modality sensors; proposed invariant facial features that are robust to poses, expressions, and illumination conditions.

- **Saliency Detection on Light Fields**

Exploited the unique refocusing capability of a light field camera to acquire focusness, depths and objectness cues; designed a tailored algorithm for saliency detection on light field images; compared the detected saliency with human visual attention; results published in IEEE Transaction on Pattern Analysis and Machine Intelligence.

- **XSlit Imaging**

Designed and built a prototype XSlit camera by using a pair of cylindrical lenses; developed comprehensive theories and algorithms to use XSlit images for Manhattan scene reconstruction; explored applications of XSlit imaging for stereo matching; studied defocus and depth-of-field of XSlit lens; developed coded aperture scheme for depth estimation and all-focus image recovery; results published in IEEE Conference in Computer Vision and Pattern Recognition (CVPR) 2012, International Conference on Computer Vision (ICCV) 2013, European Conference on Computer Vision (ECCV) 2014.

- **Ray geometry analysis in multi-perspective cameras**

Conducted a comprehensive ray geometry analysis for studying general multi-perspective cameras; thoroughly discussed the design, modeling, and implementation of a broad range of multi-perspective cameras and their applications in computer graphics and vision; results published in a survey paper in the Journal of Visual Computer.

- **Gas flow reconstruction by light path triangulation**

Developed a novel computational imaging solution to accurately and robustly reconstruct small to medium scale gas flows; exploited using the light field probe to acquire a dense set of ray-ray correspondences for recovering their light paths; derived a PDE system to correlate light paths with the refractive index field of gas flow; developed an iterative optimization scheme to solve for all light path PDEs as a group; the results published in IEEE Conference in Computer Vision and Pattern Recognition (CVPR) 2013.

- **Image pre-compensation to facilitate impaired vision**

Developed an image pre-compensation scheme to improve the viewing experience of people with myopia/hyperopia; developed an image-based method to estimate the visual aberration functions; developed a novel image pre-compensation scheme that accounts for non-linear projector/display responses; extended the solution to mobile platforms; results published in IEEE Conference in Computer Vision and Pattern Recognition (CVPR) 2014.

- **Dynamic fluid surface acquisition and 3D reconstruction**

Developed a novel and simple computational imaging solution to robustly and accurately recover 3D dynamic fluid surfaces; Exploited using Bokode - a computational optical device that emulates a pinhole projector - for capturing ray-ray correspondences which can then be used to directly recover the surface normals; derived a new angular-domain surface integration scheme to recover the surface from the normal fields; results published in IEEE Conference in Computer Vision and Pattern Recognition (CVPR) 2012.

Publications¹

- Nianyi Li, **Jinwei Ye**, Yu Ji, Haibin Ling, and Jingyi Yu. “Saliency Detection on Light Fields” (12 pages). Accepted by *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*.
- Siu-Kei Tin*, **Jinwei Ye***, Mahdi Nezamabadi, and Can Chen. “3D Reconstruction of Mirror-type Objects using Efficient Ray Coding” (11 pages). In Proceedings of *IEEE International Conference on Computational Photography (ICCP) 2016*, pp 1 - 11. **Oral Presentation**
- **Jinwei Ye** and Francisco Imai. “High Resolution Multi-spectral Image Reconstruction on Light Field via Sparse Representation” (3 pages). Presented in *Imaging Systems and Applications, Optical Society of America*, 2015. **Oral Presentation**
- Yu Ji, **Jinwei Ye**, and Jingyi Yu. “Depth Reconstruction from the Defocus Effect of an XSlit Camera” (3 pages). Presented in *Computational Optical Sensing and Imaging, Optical Society of America*, 2015. **Oral Presentation**
- **Jinwei Ye**, Yu Ji, Wei Yang, and Jingyi Yu. “Depth-of-Field Analysis and Coded Aperture Imaging on XSlit Cameras” (8 pages). In Proceedings of *the European Conference on Computer Vision (ECCV) 2014*, pp 753 - 766. **Oral Presentation** [Acceptance Rate: 2.6%]
- Wei Yang, Yu Ji, **Jinwei Ye**, S. Susan Young, and Jingyi Yu. “Coplanar Common Points in Non-Centric Cameras” (8 pages). In Proceedings of *the European Conference on Computer Vision (ECCV) 2014*, pp 220 - 233. [Acceptance Rate: 29%]
- Yu Ji, **Jinwei Ye**, Sing Bing Kang, and Jingyi Yu. “Image Pre-compensation: Balancing Contrast and Ringing” (8 pages). In Proceedings of *the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2014*, pp 3350 - 3357. [Acceptance Rate: 29.88%]
- Nianyi Li, **Jinwei Ye**, Yu Ji, Haibin Ling and Jingyi Yu. “Saliency Detection on Light Fields” (8 pages). In Proceedings of *the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2014*, pp 2806 - 2813. [Acceptance Rate: 29.88%]
- **Jinwei Ye**, Yu Ji, and Jingyi Yu. “A Rotational Stereo Model Based on XSlit Imaging” (8 pages). In Proceedings of *the IEEE International Conference on Computer Vision (ICCV) 2013*, pp 489 - 496. **Oral Presentation** [Acceptance Rate: 2.52%]
- **Jinwei Ye**, Yu Ji and Jingyi Yu. “Manhattan Scene Understanding Via XSlit Imaging” (8 pages). In Proceedings of *the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2013*, pp 81 - 88. [Acceptance Rate: 25.2%]
- Yu Ji, **Jinwei Ye** and Jingyi Yu. “Reconstructing Gas Flows Using Light Paths Approximation” (8 pages). In Proceedings of *the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2013*, pp 2507 - 2514. **Oral Presentation** [Acceptance Rate: 3.2%]
- **Jinwei Ye** and Jingyi Yu. “Ray Geometry in Non-pinhole Cameras: A Survey” (20 pages). In *the Visual Computer (TVCI)*, March 2013, pp 93 - 112.
- **Jinwei Ye**, Yu Ji, Feng Li and Jingyi Yu. “Angular Domain Reconstruction of Dynamic 3D Fluid Surfaces” (8 pages). In Proceedings of *the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2012*, pp 310 - 317. [Acceptance Rate: 24%]

¹In computer vision, one of the leading journals is the IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI) and leading conferences are IEEE Conference on Computer Vision and Pattern Recognition (CVPR), International Conference on Computer Vision (ICCV) and European Conference on Computer Vision (ECCV). Papers in these conferences are rigorously reviewed, with acceptance rates around 20%, and below 5% for oral presentations. In computational photography, the leading conference is IEEE International Conference on Computational Photography (ICCP), with the acceptance rates around 20% and all accepted papers are presented orally.

* indicates equal contribution.

US Patents

- A Method for Specular Object Reconstruction by Complementing the Visual Hull Using Integration Surface From Ray-Ray Triangulation, Application Number 62408544, Filed in 2016
- Shape Measurement of Transparent Object using Coded Illumination, Application Number 62334984, Filed in 2016
- Measuring Shape of Specular Objects by Local Projection of Coded Patterns, Application Number 15151388, Filed in 2016
- Devices, Systems and Methods for Single-Shot High-Resolution Multispectral Image Acquisition, Application Number 14962486, Filed in 2015
- Depth Value Measurement, Application 14993350, Filed in 2015
- Measuring Surface Geometry using Illumination Direction Coding, Application Number 14937648, Filed in 2015
- XSlit Camera, Application Number WO2015051282A3, Filed in 2014

Honors and Awards

- Patent Award, Innovation Center of Canon U.S.A., 2015, 2016
- Doctoral Consortium Travel Award, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2014
- Frank A. Pehrson Graduate Student Achievement Award, University of Delaware, 2014
- Quantum Leap Innovations Graduate Student Excellence Award, University of Delaware, 2013
- Professional Development Award, University of Delaware, 2012, 2013
- Honorable Graduation, Huazhong University of Science and Technology, 2009
- Excellent Undergraduate Student Award, Huazhong University of Science and Technology, 2006-2008

Presentations

- International Conference on Computational Photography (ICCP), May 2016: “3D Reconstruction of Mirror-type Objects using Efficient Ray Coding”
- OSA Congress on Imaging and Applied Optics, June 2015: “High Resolution Multi-spectral Image Reconstruction on Light Field via Sparse Representation”
- Canon U.S.A., Inc., August 2014: “3D Reconstruction of Transparent Objects”
- Shanghai Jiao Tong University (SJTU), China, April 2014: “Multi-perspective Imaging and Its Applications” (via remote video recording)

Professional Service

- Program Committee of
 - International Conference on Computer Vision and Pattern Recognition (CVPR) 2016, 2017
 - European Conference on Computer Vision (ECCV) 2016
 - Pacific Graphics (PG) 2014, 2015, 2016
 - ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry (VRCAI) 2016

- Reviewer of
 - IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)
 - IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
 - IEEE Transactions on Instrumentation & Measurement (TIM)
 - Springer Journal of Machine Vision and Applications (MVA)
 - Springer Journal of Visual Computer (TVCJ)
 - Elsevier Journal of Computer Vision and Image Understanding(CVIU)
 - Elsevier Journal Pattern Recognition (PR)
- Student Volunteer of International Conference on Computer Vision and Pattern Recognition (CVPR) 2013