Fengqiang Li

CONTACT
INFORMATION

Computer Science, Northwestern University

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RESEARCH
INTERESTS

Computational Photography, Computer Vision, Machine/Deep Learning

EDUCATION

Northwestern University, EVANSTON, IL, USA   06/2015 - PRESENT
- *Ph.D. candidate*, Computer Science

Lehigh University, BETHLEHEM, PA, USA   09/2011 - 12/2014
- *Master of Science*, Electrical Engineering

Huazhong University of Science and Technology, WUHAN, CN   09/2007 - 06/2011
- *Bachelor of Science*, Optics

RELATED
GRADUATE
COURSEWORK

Machine Learning, CUDA, Graduate Algorithm, Deep Learning from Scratch, Introduction to Optimization, Introduction to Computational Photographic, Introduction to Computer Vision, Photonic Information Processing.

PROFESSIONAL
EXPERIENCE

Northwestern University   EVANSTON, IL, USA

RESEARCH ASSISTANT WITH DR. OLIVER COSSAIRT   06/2015 - PRESENT

Research on computational algorithms to improve the quality of 3D imaging and inverse problem reconstruction using optimization and machine/deep learning. **Interest** in 3D imaging from micro-scale OCT to marco scale time-of-flight imaging, Photo Stereo 3D imaging, and photometric stereo, and 3D applications in high level computer vision problems such as face recognition and SLAM, and machine perceptions in robots and VR/AR systems.

- Work on multi-frame superresolution for depth imaging [11] and use deep learning for high resolution depth images with multi frames [Ongoing].
- Sensor fusion of a novel depth camera with low lateral resolution and a high lateral resolution RGB camera using rule based and deep learning methods [Ongoing].
- Work on inverse problem reconstructions in scattering media by leveraging compressive sensing and deep learning (ResNet-18) [14,13].
- Working on hands recognition with single-pixel cameras and deep learning [Ongoing].
- Build up a novel 3D imaging system with sub millimeter depth resolution including the instrumentation and image processing [10, 8].
- Utilize compressive sensing to improve the lateral resolution of the off-the-shelf ToF camera by 3 ×, and built a linear model for CS reconstruction for complex-value data [9].
- Photogrammetry and photo-metric stereo and their applications in culture heritage [6,5].
- Working on Non-line-of-sight (NLOS) imaging with superheterodyne holograph [12]

- Working on single frame time-of-flight depth imaging with deep learning [Ongoing].

Facebook Inc. REDMOND, WA, USA
RESEARCH INTERN WITH DR. MICHAEL HALL AND DR. SHUOCHEN SU 05/2019 - 09/2019
Work on machine vision with IR assisted stereo for VR/AR applications.
- Develop a deep learning based fusion of mono and IR images for IR assisted stereo, which is more robust to the rule based methods.
- Build a simulation pipeline with the internal tools to evaluate the dynamic control of the projector for IR assisted stereo, which demonstrates a reduction of the IR illumination power by more than 10×.
- Several patents are drafted.

Oculus VR / Facebook Reality Labs REDMOND, WA, USA
RESEARCH INTERN WITH DR. MICHAEL HALL 05/2018 - 09/2018
Model and evaluate a novel depth camera for AR system and RGB-IR crosstalk correction for novel cameras in VR/AR systems.
- Solve the RGB-IR crosstalk correction with optimization and filtering for the novel CMOS camera in AR system.
- Build the radiometry model for a novel active depth camera.
- Model and evaluate of the novel depth camera with simulations and experiments.
- Five patents filed after the internship.

Google [X] MOUNTAIN VIEW, CA, USA
HARDWARE ENGINEER INTERN WITH DR. EMILY COOPER 06/2016 - 09/2016
Work on machine perception in Robotics team
- Use the off-the-shelf optical simulation tools to design the DOE component for IR assisted stereo.
- Work with the outside vendor to fabricate the DOE component.
- Evaluate the first batch of DOE and verify the design successfully.
- Work with cross-functional teams at Google.
- One patent granted (US10277842B1) [P1].

NSF Innovation Corps program (I-Corps). NEW YORK CITY, NY, USA
ENTREPRENEUR LEAD 02/2014 - 04/2014
- Supported by National Science Foundation (NSF).
- Arranged 68 face-to-face or phone interviews with eye doctors, sales, technician, and university researchers in 6 weeks and updated with a weekly presentation.
- Trained to better communicate with customers and team members.

Lehigh University BETHLEHEM, PA, USA
RESEARCH ASSOCIATE WITH DR. CHAO ZHOU 06/2012 - 08/2014
Research on Biomedical image processing, Optical coherence tomography (OCT) and its biomedical imaging applications [1, 3, 4].
- Hands-on experience to set up a new lab from zero in half a year.

- Designed and set up an ultrahigh-resolution OCM system (include supercontinuum laser, fiber coupler, polarizer, collimator, telescope system, axicon lens, galvo scanner, grating, line-scan camera) with an extended depth of focus of 200, 1.5-axial resolution, and 2.3-transverse resolution.

- Set up three different spectral domain OCM systems with center wavelength of 800 nm and 1300 nm.

- Wrote a neuron counting algorithm for neuron analysis in 3D brain slice sample [3].

SKILLS   Python, MATLAB, PyTorch, C++

SELECTED
PUBLICATIONS
[14]. F. Li, M. Zhao, Z. Tian, F. Willomitzer, O. Cossairt, **" End-to-end learned imaging through scattering media with ghost imaging"**, *under submission*, 2019.

[13]. H. Wu, M. Zhao, F. Li, Z. Tian, M. Zhao, **" Underwater polarizationbased single pixel imaging"**, *Journal of the Society for Information Display*, 2019.

[12]. F. Willomitzer, F. Li, M. M. Balaji, P. Rangarajan, O. Cossairt, **" High Resolution Non-Line-of-Sight Imaging with Superheterodyne Remote Digital Holography"**, *OSA COSI*, 2019.

[11]. F. Li, Pablo Ruiz, Oliver Cossairt, Aggelos K. Katsaggelos, **" Multi-frame Superresolution for Time-of-flight Imaging"**, *Proc. ICASSP*, 2019.

[10]. F. Li, F. Willomitzer, P. Rangarajan, A. Velten, M. Gupta, O. Cossairt, **" SH-ToF: Micro Resolution Time-of-Flight Imaging with Superheterodyne Interferometry"**, *Proc. ICCP*, Pittsburgh, 2018.

[9]. F. Li, H. Chen, A. Pediredla, C. Yeh, Ashok Veeraraghavan, Oliver Cossairt, **" CS-ToF: High-resolution Compressive Time-of-ight Imaging with Phasors"**, *OSA Optics Express* 25(25), 31096-31110, 2017.

[8]. F. Li, J. Yablon, A. Velten, M. Gupta, O. Cossairt, **"High-depth-resolution range imaging with multiple-wavelength superheterodyne interferometry using 1550-nm lasers"**, *OSA Applied Optics* 56(31), H51-H56, 2017.

[7]. F. Li, N. Matsuda, M. Walton, O. Cossairt, **" Fluorescence Lifetime Estimation Using A Dynamic Vision Sensor**, *Proc. SPIE DCS*, Anthem, 2017.

[6]. C. Yeh, F. Li, Gianluca Pastorelli, Marc Walton, Aggelos K. Katsaggelos, Oliver Cossairt, **" Shape-from-Shifting: Uncalibrated Photometric Stereo with a Mobile Device**, *e-Science, IEEE 13th International Conference*, Auckland, 2017.

[5]. C. Yeh, N. Matsuda, X. Huang, F. Li, M. Walton and O. Cossairt, **" A Streamlined Photometric Stereo Framework for Cultural Heritage"**, *Proc. ECCV Workshop*, Amesterdam, 2016

[4]. F. Li, Y. Song, A. Dryer, W. Cogguillo, Y. Berdichevsky, C. Zhou, **"Non-destructive evaluation of seizure-induced neuronal changes in organotypic brain cultures using ultrahigh-resolution optical coherence microscopy"**, *Neurophotonics* 1(2), 2014.

[3]. F. Li, T. Xu, D. Nguyen, X. Huang, C. Chen, C. Zhou, **"Label-free evaluation of angiogenic sprouting in microengineered devices using ultrahigh-resolution optical coherence microscopy"**, *Journal of Biomedical Optics* 19(1), 2014.

[2]. M. Xiao, F. Li, Z. Wan, **"Gaussian beam coupling on a MEMS mirror array"**, *Optik - International Journal for Light and Electron Optics*, 124(24), 2013.

[1]. T. Xu, F. Li, D. Nguyen, C. Chen, C. Zhou, X. Huang, **"Delineating 3D Angiogenic Sprouting in OCT via Multiple Active Contours"**, *In proceedings of Medical Imaging and Augmented Reality*, 2013.

PATENTS	[P1]. E. Cooper, <u>F. Li</u>,**"Dynamic range for depth sensing"**, US10277842B1,**Granted**, 2019.

HONORS AND AWARDS	**Travel grants** from Northwestern University, 2018, 2019. **Dean's Fellowship** from Lehigh University, 2011. **National Scholarship for Encouragement** from Ministry of Education of China, 2010. **National Scholarship** from Ministry of Education of China, 2009.

TEACHING EXPERIENCE	Teaching Assistant, Introduction to Computational Photography, EECS, 2018 Fall

PAPER REVIEW	CVPR 2015, ICCV 2019, ICCP 2019, Optics Express, Journal of the Society for Information Display, Remote Sensing, Sensors, Applied Sciences, Chinese Optics Letter

REFERENCES	Prof. Oliver Cossairt, Northwestern University	ollie@eecs.northwestern.edu
	Prof. Aggelos Katsaggelos, Northwestern University	aggk@eecs.northwestern.edu