

# Li Ding

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## Education

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### University of Rochester

Ph.D. (Electrical and Computer Engineering)  
M.S. (Electrical and Computer Engineering)  
Advisor: Dr. Gaurav Sharma

Rochester, NY

08/2015–present  
08/2015–05/2017

### Harbin Institute of Technology

B.S. (Electrical Engineering and Automation)

Harbin, China

09/2011–07/2015

## Research Interests

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My research aims to develop computer vision and machine learning algorithms for real-world applications, such as robotics, medical imaging, AR/VR, and digital heritage. Topics of my research include learning-based and geometric-based registration, data fusion, annotation-efficient deep learning, and semantic segmentation.

## Industrial Experience

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### Facebook Reality Lab, Research Intern

Topic: computer vision and machine learning for audio applications in AR/VR

Redmond, WA

09/2020–12/2020

### Mitsubishi Electric Research Laboratories (MERL), Research Intern

Topic: geometric and semantic deep learning for 3D point clouds.

Cambridge, MA

05/2018–08/2018

### AIG Inc., Research Intern

Topic: computer vision and machine learning for auto insurance claim process.

New York, NY

05/2017–08/2017

## Research Experience

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### Point Cloud Analytics and Application

- Proposed an unsupervised deep learning method for multiple point clouds registration and mapping.
- Developed an unsupervised method for learning compact representation of point clouds.
- Implemented Hough clustering to extract 3D planar structure from point cloud.
- Developed a framework to identify and visualize differences between similar point clouds.

### Data Fusion for Depth Map Upsampling

- Developed a framework for fusing different data modalities for 3D lidar scans and 2D images.
- Proposed an algorithm to precisely calibrate camera with respect to laser scanner.
- Proposed an approach for depth upsampling and hole-filling for RGB-D images.
- Constructed an outdoor scene RGB-D dataset for benchmarking single image dehazing.

### 3D Geo-registration of Wide Area Motion Imagery (WAMI)

- Proposed a novel WAMI geo-registration framework by combining SfM and chamfer alignment.
- Developed a novel algorithm for camera localization.

### Annotation-Efficient Deep Learning For Medical Image Analysis

- Proposed an approach for generating pixel-wise ground truth for retinal vessel detection in fluorescein angiography (FA).
- Proposed a weakly-supervised method for retinal vessel detection in ultra-widefield fundus photography (UWFFP).
- Constructed datasets for retinal vessel detection in FA and UWFFP.
- Applied computer vision algorithms to automate and enhance clinical analysis of retinal images.

## Publications

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- L. Ding, A. E. Kuriyan, R. S. Ramchandran, C. C. Wykoff, and G. Sharma, "Weakly-supervised vessel detection in ultra-widefield fundus photography via iterative multi-modal registration and learning," *IEEE Trans. Medical Imaging*, accepted for publication, to appear.
- L. Ding, M. Bawany, A. Kuriyan, R. Ramchandran, C. Wykoff and G. Sharma, "A novel deep learning pipeline for retinal vessel detection in fluorescein angiography," *IEEE Trans. on Image Processing*, vol. 29, no. 1, pp. 6561–6573, 2020
- L. Ding, and C. Feng, "DeepMapping: unsupervised map estimation from multiple point clouds," in *IEEE Intl. Conf. Comp. Vision, and Pattern Recog. (CVPR)*, June 2019. **(Oral)**

4. Y. Zhang\*, L. Ding\*, and G. Sharma, "A local-linear-fitting-based matting approach for joint hole-filling and depth upsampling of RGB-D images," *Journal of Electronic Imaging (JEI)*, 28(3):033019–1 – 13, May/Jun., 2019. (\* indicates equal contribution)
5. L. Ding, A. Kuriyan, R. Ramchandran, and G. Sharma, "Retinal vessel detection in wide-field fluorescein angiography with deep neural networks: a novel training data generation approach," in *IEEE Intl. Conf. Image Proc. (ICIP)*, Sept. 2018, pp. 356–360.
6. L. Ding, A. Kuriyan, R. Ramchandran, and G. Sharma, "Quantification of longitudinal changes in retinal vasculature from wide-field fluorescein angiography via a novel registration and change detection approach," in *IEEE Intl. Conf. Acoust., Speech, and Signal Proc. (ICASSP)*, April 2018, pp. 1070–1074.
7. L. Ding, A. Kuriyan, R. Ramchandran, and G. Sharma, "Multi-scale morphological analysis for retinal vessel detection in wide-field fluorescein angiography," in *IEEE Western NY Image and Sig. Proc. (WNYISPW)*, Nov 2017, pp 1–5.
8. L. Ding, A. Elliethy, and G. Sharma, "3D georegistration of wide area motion imagery by combining SfM and chamfer alignment of vehicle detections to vector roadmaps," in *IEEE Intl. Conf. Image Proc. (ICIP)*, Sept 2017, pp. 1487–1491.
9. Y. Zhang, L. Ding, and G. Sharma, "HazeRD: an outdoor scene dataset and benchmark for single image dehazing," in *IEEE Intl. Conf. Image Proc. (ICIP)*, Sept 2017, pp. 3205–3209.
10. L. Ding and G. Sharma, "Fusing structure from motion and lidar for accurate dense depth map estimation," in *IEEE Intl. Conf. Acoust., Speech, and Signal Proc. (ICASSP)*, March 2017, pp. 1283–1287.
11. Y. Zhang, L. Ding, and G. Sharma, "A local-linear-fitting-based matting approach for accurate depth upsampling," in *IEEE Western NY Image and Sig. Proc. (WNYISPW)*, Nov 2016, pp. 1–5. (**Best Paper**)
12. L. Ding, A. Elliethy, E. Freedenberg, S. A. Wolf-Johnson, J. Romphf, P. Christensen, and G. Sharma, "Comparative analysis of homologous buildings using range imaging," in *IEEE Intl. Conf. Image Proc. (ICIP)*, Sept 2016, pp. 4378–4382.
13. M. Bawany, L. Ding, R. Ramchandran, G. Sharma, C. Wykoff, and A. Kuriyan, "Automated vessel density detection in fluorescein angiography images correlates with vision in proliferative diabetic retinopathy," *Plos one*, 15.9 (2020): e0238958.

## Honors and Awards

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- o ICIP Top Reviewer Recognition Certificate 2020
- o CVPR Student Volunteer 2019
- o ICIP Travel Grant 2017
- o Best Paper Award, Western NY Image and Sig. Proc. Workshop (WNYISPW) 2016
- o Excellent Bachelor's Degree Dissertation, Harbin Institute of Technology 2015
- o Siemens China Scholarship (top 3%) 2013, 2014

## Skills

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- o **Programming:** Python, MATLAB, C/C++, Bash
- o **Library:** Pytorch, TensorFlow, OpenCV, Point Cloud Library (PCL), Open3D

## Professional Services

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- o Reviewer
  - IEEE Transactions on Image Processing, 2019 - 2020
  - IEEE Transactions on Medical Imaging, 2020
  - IEEE Journal of Biomedical and Health Informatics, 2020
  - IEEE Geoscience and Remote Sensing Letters, 2020
  - Multimedia Tools and Applications, 2020
  - Journal of Electronic Imaging, 2020
  - Journal of Medical Imaging, 2020
  - International Conference on Image Processing (ICIP), 2016 - 2020
  - International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2017 - 2020
- o Teaching Assistant, ECE Dept., Univ. of Rochester
  - Fall 2016, ECE 440, Introduction to Random Processes
  - Fall 2017, ECE 241, Signals
- o Teaching Assistant, Deep Learning Institute, NVIDIA
  - Deep Learning Workshop, April, 2018