LUZHE HUANG

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SUMMARY

- Over 6 years of dedicated research in the realm of **computational imaging**, speicalizing in **computational microscopy**, with a focus on solving intricate **inverse problems** across diverse imaging modalities
- Proficient in designing and implementing cutting-edge **deep learning** and **machine learning** solutions for a spectrum of **imaging and vision** challenges, including image enhancement, restoration, analysis, segmentation, and translation
- Authorship of **15** research articles featured in peer-reviewed journals, with first or co-first authorship in most, accumulating approximately **300** citations

EDUCATION

University of California, Los Angeles | Ph.D., Electrical and Computer Engineering   Sep 2019 - Present
- GPA: 3.96/4
- Received UCLA **Dissertation Year Fellowship** and **Amazon Fellowship**

Zhejiang University | BEng, Optical Science and Engineering, Statistics   Sep 2015 - Jun 2019
- GPA: 3.96/4
- Received **National Scholarship** twice and Zhejiang University **Special Scholarship**

PROJECTS (SELECTED)

Self-supervised learning based on physics consistency and thought experiments (GedankenNet)
- Developed a novel self-supervised neural network using physics-informed learning for enhanced generalization
- Demonstrated self-supervised, experimental-data-free training with only artificial data (thought experiment)

Cycle-consistency-based uncertainty quantification of neural networks in inverse problems
- Built forward-backward cycles for inverse problems and theoretically proved the relation between cycle consistency and network uncertainty
- Developed machine learning algorithms to detect corrupted and out-of-distribution data based on cycle consistency

Fourier Imager Network with superior external generalization (FIN)
- Developed FIN, a novel neural network utilizing global spatial-frequency information in spatial and Fourier domains
- Enhanced FIN with dynamic network modules (eFIN), showcasing its versatility of simultaneous hologram reconstruction, autofocusing and super-resolution

Single-shot autofocusing of microscopy image using deep learning (Deep-R)
- Developed Deep-R, a U-Net for offline microscopy image autofocusing without the need for prior knowledge or measurement of the system point spread function (PSF)
- Demonstrated Deep-R's universality for multiple imaging modalities and non-uniform defocus profile

CAREER EXPERIENCE

Autowise.ai   Shanghai, China
Software R&D Engineer Intern   Feb 2019 - Jun 2019
- Participate in establishing **LiDAR** calibration models under various weather conditions
- Implement **3D point cloud**-based **object detection and segmentation**

TECHNICAL SKILLS

Programming	Python (PyTorch, Tensorflow), R, MATLAB
Frameworks & Tools	Zemax, Unity

PUBLICATIONS (5 OF 15)

1. **L. Huang**, J. Li, X. Ding et al. Cycle-Consistency-Based Uncertainty Quantification of Neural Networks in Inverse Imaging Problems. *Intell Comput*. 2: 0071 (2023)
2. **L. Huang**, H. Chen, et al. Self-supervised learning of hologram reconstruction using physics consistency. *Nat. Mach. Intell.* 5, 895-907 (2023)
3. H. Chen, **L. Huang**[1], et al. Fourier Imager Network (FIN): A deep neural network for hologram reconstruction with superior external generalization. *Light: Sci. Appl.* 11, 254 (2022)
4. **L. Huang**, H. Chen, Y. Luo, et al. Recurrent neural network-based volumetric fluorescence microscopy. *Light Sci. Appl.* 10, 62 (2021)
5. Y. Luo, **L. Huang**[1], Y. Rivenson, A. Ozcan, Single-shot autofocusing of microscopy images using deep learning. *ACS Photonics*, 8, 2, 625-638 (2021)

[1] Co-first author

PUBLICATIONS (CONT'D)

1. A., Vasily N., Y. B. Sahel, Y. C. Eldar, **L. Huang**, A. Ozcan et al. "Roadmap on Label-Free Super-Resolution Imaging." *Laser Photonics Rev.* 2200029 (2023)
2. J. Park, B. Bai, D. H. Ryu, T. Liu, C. Lee, Y. Luo, M. J. Lee, **L. Huang** et al. Artificial intelligence-enabled quantitative phase imaging methods for life sciences. *Nat. Methods* 20, 1645-1660 (2023)
3. H. Chen, **L. Huang**[1], et al. eFIN: Enhanced Fourier Imager Network for Generalizable Autofocusing and Pixel Super-Resolution in Holographic Imaging. *IEEE JSTQE*, 29, 4, 1-10 (2023)
4. Y. Zhang, **L. Huang**[1], et al. Virtual Staining of Defocused Autofluorescence Images of Unlabeled Tissue Using Deep Neural Networks. *Intelligent Computing* 9818965 (2022)
5. **L. Huang**, X. Yang, et al. Few-shot Transfer Learning for Holographic Image Reconstruction using a Recurrent Neural Network. *APL Photonics* 7, 070801 (2022)
6. X. Yang, **L. Huang**[1], Y. Luo, et al. Deep-learning-based virtual refocusing of images using an engineered point-spread function. *ACS Photonics* 8, 7, 2174-2182 (2021)
7. **L. Huang**, T. Liu, et al. Holographic image reconstruction with phase recovery and autofocusing using recurrent neural networks. *ACS Photonics* 8, 6, 1763-1774 (2021)
8. **L. Huang**, Y. Fu, R. Chen, et al. SNR-adaptive OCT angiography enabled by statistical characterization of intensity and decorrelation based on multi-variate time series model. *IEEE Trans. Med. Imaging*, 38, 11, 2695-2704 (2019)
9. **L. Huang**, X. Wang, Y. Yuan, S. Gu, Y. Shen, An improved algorithm of NLOS imaging based on Bayesian statistics. *JOSA.A* 36, 5, 834-838 (2019)
10. **L. Huang**, T. Fang, Q. Shuai, Calibration and imaging of a CT system, *Chinese Journal of Engineering Mathematics.* 34, 1 (2017)

CONFERENCE PUBLICATIONS (SELECTED)

1. **L. Huang**, H. Chen, T. Liu, and A. Ozcan, "Self-supervised, physics-informed learning for hologram reconstruction" in Photonics West 2024 (BiOS AI/ML Best Paper)
2. **L. Huang**, H. Chen, T. Liu, and A. Ozcan, "Self-supervised neural network for holographic microscopy," in CLEO 2023, Technical Digest Series (Optica Publishing Group, 2023), paper ATu3Q.4
3. **L. Huang**, X. Yang, T. Liu, A. Ozcan, "Few-shot generalizable hologram reconstruction model using a recurrent neural network (RNN) (Conference Presentation)," Proc. SPIE PC12204, Emerging Topics in Artificial Intelligence (ETAI) 2022, PC122040H (4 October 2022)
4. **L. Huang**, T. Liu, X. Yang, Y. Luo, Y. Rivenson, and A. Ozcan, "Phase Recovery and Holographic Imaging using Recurrent Neural Networks (RNNs)," in Conference on Lasers and Electro-Optics, Technical Digest Series (Optica Publishing Group, 2022), paper ATh1D.5
5. **L. Huang**, T. Liu, X. Yang, Y. Luo, Y. Rivenson, A. Ozcan, "Holographic image reconstruction with phase recovery and autofocusing using recurrent neural networks," Proc. SPIE 11970, Quantitative Phase Imaging VIII, 119700C (2 March 2022)

PROFESSIONAL SERVICE

- Served as reviewers for top peer-reviewed journals including IEEE Transactions on Medical Imaging, Biomedical Optics Express, Optics Express, etc.
- Reviewed more than **10** research articles.
- Mentored more than **10** undergrad and master students and supervised them conducting research projects in UCLA.
- Served as grader for multiple undergrad- and graduate-level courses in UCLA.

ACHIEVEMENTS & AWARDS

- UCLA Dissertation Year Fellowship
- Amazon Doctoral Student Fellowship
- UCLA ECE Department Fellowship
- Zhejiang University Special Scholarship (Supreme award for Undergraduates)
- Zhejiang University Chu Kochen College Innovation Scholarship
- National Scholarship ($\times 2$)
- MATLAB Innovation Prize (Special Prize) in China Undergraduate Mathematical Contest in Modeling

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