LUZHE HUANG

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SUMMARY

- Proficient in designing and implementing cutting-edge **machine learning** and **AI** solutions, especially for a spectrum of **multi-modal** challenges, including image reconstruction, generation, and video understanding
- 7 years of dedicated research in the realm of **computer vision**, specializing in **computational imaging**
- Over **70** research articles published on peer-reviewed journals & conferences, accumulating over **1000** citations

EDUCATION

University of California, Los Angeles| Ph.D., Electrical and Computer Engineering Sep 2019 - Oct 2024
- 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)

Multi-modal large language model for large-scale recommendation system June 2025 - Present
- Designed a self-supervised approach **aligning MLLM embedding** with multiple down-streaming business needs while maintaining its **semantic and reasoning capabilities**
- Architected a specialized fine-tuning process for MLLM, integrating **user collaborative signals** for region-specific deployments in recommendation scenarios

Generative recommendation Oct 2024 - Present
- Engineered a novel generative recall framework for TikTok's recommendation engine, utilizing **multi-query multi-token prediction** to effectively model and serve users' complex and diverse interest profiles
- Resolved the efficiency-performance trade-off and performance degradation of transformers in processing **user long histories** by leveraging **sequence compression** and **gated attention** mechanism, boosting both serving throughput and recommendation quality

Multi-scale conditonal generative model Sep 2023 - Oct 2024
- Developed a image pyramid generative model in multi-scale wavelet domain for **image restoration** tasks
- Systematically integrated **diffusion model** and **GAN** for the generation of multi-scale wavelet components

Self-supervised learning based on physical laws and thought experiments (GedankenNet) Feb 2022 - Aug 2023
- Developed a novel **self-supervised** neural network using **physics-informed learning** and **pure artificial data** (thought experiments), showing superior performance and generalization than supervised models
- Addressed the reliance of supervised learning on large-scale, high-quality labels and their limited generalization
- **Synergistically designed** generalizable optical system and backend image processing model

Cycle-consistency uncertainty quantification of neural networks on inverse problems Dec 2022 - Oct 2023
- Built novel **uncertainty quantification** for neural networks on inverse problems using forward-backward cycles
- Developed machine learning algorithms to detect **corrupted** and **out-of-distribution** data based on cycle consistency
- Developed **autonomous quality and hallucination monitor** for neural networks

CAREER EXPERIENCE

TikTok San Jose, USA
Machine Learning Scientist Oct 2024 - Present
- MLLM-based video understanding, generative recommendation, cold-start recommendation

Autowise.ai Shanghai, China
Software R&D Engineer Intern Feb 2019 - Jun 2019
- 3D point cloud-based object detection and segmentation, LiDAR calibration models

TECHNICAL SKILLS

Programming	Python (PyTorch, Tensorflow, JAX), C++, SQL, R, MATLAB
Frameworks & Tools	Zemax

PROFESSIONAL SERVICE

- Served as reviewers for top journals including Nature Machine Intelligence, IEEE Transactions on Medical Imaging, Optics Express, Biomedical Optics Express, JOSA A, etc.
- Reviewed more than **20** research articles.
- Mentored more than **10** undergrad and master students and supervised them conducting research projects in UCLA.

PUBLICATIONS (SELECTED)

1. Y. Zhang, **L. Huang**, N. Pillar et al. ,Virtual staining of label-free tissue in imaging mass spectrometry. ***Science Advances*** 11, eadv0741 (2025)
2. **L. Huang**, Y. Li, N. Pillar et al. A robust and scalable framework for hallucination detection in virtual tissue staining and digital pathology. ***Nature Biomedical Engineering*** (2025)
3. Y. Zhang, **L. Huang**, N. Pillar et al. Pixel super-resolved virtual staining of label-free tissue using diffusion models. ***Nature Communications*** 16, 5016 (2025)
4. Y. Ma, J. Park, **L. Huang** et al. Light-field tomographic fluorescence lifetime imaging microscopy. *PNAS* 121.40, e2402556121 (2024)
5. M.J. Fanous, P. Casteleiro Costa, C. Isil, **L. Huang**, Neural network-based processing and reconstruction of compromised biophotonic image data. *Light: Science & Applications* 13, 231 (2024).
6. Y. Li, N. Pillar, J. Li, T. Liu, D. Wu, S. Sun, G. Ma, K. de Haan, **L. Huang** et al. "Virtual histological staining of unlabeled autopsy tissue." ***Nature Communications*** 15, 1684 (2024)
7. V.N. Astratov, Y.B. Sahel, Y.C. Eldar, **L. Huang**, A. Ozcan et al. "Roadmap on Label-Free Super-Resolution Imaging." *Laser & Photonics Reviews* 2200029 (2023)
8. 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. ***Nature Methods*** 20, 1645-1660 (2023)
9. **L. Huang**, H. Chen, et al. Self-supervised learning of hologram reconstruction using physics consistency. ***Nature Machine Intelligence*** 5, 895-907 (2023)
10. H. Chen, **L. Huang** et al. Fourier Imager Network (FIN): A deep neural network for hologram reconstruction with superior external generalization. *Light: Science & Applications* 11, 254 (2022)
11. **L. Huang**, H. Chen, Y. Luo, et al. Recurrent neural network-based volumetric fluorescence microscopy. *Light: Science & Applications* 10, 62 (2021)
12. **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 Transactions on Medical Imaging*, 38, 11, 2695-2704 (2019)

CONFERENCE PUBLICATIONS (SELECTED)

1. **L. Huang**, H. Chen, T. Liu, and A. Ozcan, "Self-supervised, physics-informed learning for hologram reconstruction" in SPIE Photonics West 2024 (AI/ML **Best Paper**)
2. **L. Huang**, H. Chen, T. Liu, and A. Ozcan, "Self-supervised neural network for holographic microscopy (invited)," in Conference on Lasers and Electro-Optics, Technical Digest Series, 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)

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