Xinyang Li

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Education and Academic Experience

Jul. 2023 – now, Postdoctoral Research Assistant
Department of Automation, Tsinghua University
Advisor: Prof. Qionghai Dai, academician of Chinese Academy of Engineering.

Sep. 2018 – Jul. 2023, Ph.D., Control Science and Engineering
Department of Automation, Tsinghua University
Dissertation: Ultrasensitive Fluorescence Imaging
Advisor: Prof. Qionghai Dai and Prof. Haoqian Wang

Sep. 2014 - July 2018, B.Eng., Automation
School of Electronic an Information Engineering, Xi'an Jiaotong University.

Research

I am currently engaged in interdisciplinary research in computational imaging, optical microscopy, and neuroscience. I have published a series papers in top international journals including *Nature Methods*, *Nature Biotechnology*, *Nature Computational Science*, and *Light: Science & Applications*. My current research includes:

1. Intelligent microscopy: Developing high-performance intelligent image processing methods to improve the performance of optical microscopy.

2. Quantum imaging: Exploring the new paradigm of combining quantum entanglement and optical imaging to surpass the photon shot-noise limit and diffraction limit.

3. Neural functional imaging: Improving the depth, speed, and signal-to-noise ratio of neural functional imaging. Developing advanced processing methods for large-scale neural imaging data to decipher the correlation between animal behavior and neural activity.

Publications

[1] **Xinyang Li**, Yixin Li, Yiliang Zhou, et al. & Qionghai Dai. "Real-time denoising enables high-sensitivity fluorescence time-lapse imaging beyond the shot-noise limit." *Nature Biotechnology* (2023): 282-292. (IF: 46.9)

[2] **Xinyang Li**, Guoxun Zhang, Jiamin Wu, et al. & Qionghai Dai. "Reinforcing neuron extraction and spike inference in calcium imaging using deep self-supervised denoising."

Nature Methods (2021): 1395-1400. (IF: 48.0)

[3] **Xinyang Li**, Xiaowan Hu, Xingye Chen, et al. & Qionghai Dai. "Challenges and opportunities in bioimage analysis." *Nature Methods* (2023): 958-961. (IF: 48.0)

[4] **Xinyang Li**, Yuanlong Zhang, Jiamin Wu & Qionghai Dai. "Spatial redundancy transformer for self-supervised fluorescence image denoising." *Nature Computational Science* (2023). (IF: 11.3)

[5] **Xinyang Li**, Guoxun Zhang, Hui Qiao, et al. & Qionghai Dai. (2021). Unsupervised content-preserving transformation for optical microscopy. *Light: Science & Applications,* (2021): 44-54. (IF: 19.4)

[6] **Xinyang Li**, Yuanlong Zhang, Kan Liu, et al. & Qionghai Dai. "Adaptive optimization for axial multi-foci generation in multiphoton microscopy." *Optics express* (2019): 35948-35961. (IF: 3.8)

[7] **Xinyang Li**, Zhifeng Zhao, Guoxun Zhang, Hui Qiao, et al. & Qionghai Dai. High-fidelity fluorescence image restoration using deep unsupervised learning. *OSA Biophotonics Congress: Biomedical Optics* (2020, Oral presentation).

[8] Yuanlong zhang(#), **Xinyang Li**(#), Hao Xie, et al. & Qionghai Dai. "Hybrid spatio-spectral coherent adaptive compensation for line-scanning temporal focusing microscopy." *Journal of Physics D: Applied Physics* (2018): 024001. (IF: 3.4)

[9] Zhifeng Zhao, Yiliang Zhou, Bo Liu, Jing He, Jiayin Zhao, Yeyi Cai, Jingtao Fan, **Xinyang Li**, Zilin Wang, et al. & Qionghai Dai. "Two-photon synthetic aperture microscopy for minimally invasive fast 3D imaging of native subcellular behaviors in deep tissue." *Cell (2023): 2475-2491 e22*. (IF: 64.5)

[10] Yuanlong Zhang, Guoxun Zhang, Xiaofei Han, Jiamin Wu, Ziwei Li, **Xinyang Li**, Guihua Xiao, Hao Xie, Lu Fang & Qionghai Dai. Rapid detection of neurons in widefield calcium imaging datasets after training with synthetic data. *Nature Methods (2023): 747-754*. (IF: 48.0)

[11] Guoxun Zhang, Xiaopeng Li, Yuanlong Zhang, Xiaofei Han, **Xinyang Li**, Jinqiang Yu, Boqi Liu, Jiamin Wu, Li Yu & Qionghai Dai. Rapid detection of neurons in widefield calcium imaging datasets after training with synthetic data. *Nature Methods* (2023). (IF: 48.0)

[12] Yi Zhang, Yuling Wang, Mingrui Wang, Yuduo Guo, **Xinyang Li**, Yifan Chen, Zhi Lu, Jiamin Wu, Xiangyang Ji, and Qionghai Dai. "Multi-focus light-field microscopy for high-speed large-volume imaging." *PhotoniX (2022): 1-20*. (IF: 16.5)

[13] Chaowei Zhuang, **Xinyang Li**, Yuanlong Zhang, et al. & Qionghai Dai. "Photobleaching imprinting Enhanced background rejection in line-scanning temporal focusing microscopy." *Frontiers in Chemistry (2020): 1185*. (IF: 5.5)

[14] Soheil Soltani, Ashkan Ojaghi, Hui Qiao, Nischita Kaza, **Xinyang Li**, Qionghai Dai, et al. & Francisco E. Robles. "Prostate cancer histopathology using label-free multispectral deep-UV microscopy quantifies phenotypes of tumor aggressiveness and enables multiple diagnostic virtual stains." *Scientific Reports (2022): 9329*. (IF: 4.6)

[15] Shi, Ruheng, Cheng Jin, Hao Xie, Yuanlong Zhang, **Xinyang Li**, Qionghai Dai & Lingjie Kong. "Multi-plane, wide-field fluorescent microscopy for biodynamic imaging in vivo." *Biomedical Optics Express (2019): 6625-6635*. (IF: 3.4)

[16] Zhang, Yuanlong, Tiankuang Zhou, Xuemei Hu, **Xinyang Li**, Hao Xie, et al. & Qionghai Dai. "Overcoming tissue scattering in wide-field two-photon imaging by extended

detection and computational reconstruction." *Optics Express (2019): 20117-20132*. (IF: 3.8)

Lectures

✧ **Xinyang Li**, "Deep self-supervised denoising enables ultrasensitive fluorescence imaging beyond the shot-noise limit", The 3rd CAAl International Conference on Artificial Intelligence, invited talk on intelligent microscopy, July 2023.

✧ **Xinyang Li**, "Real-time denoising of fluorescence imaging using DeepCAD-RT", Tsinghua Laboratory of Brain and Intelligence, Lab Seminar, April 2023.

✧ **Xinyang Li**, "Deep self-supervised denoising enables ultrasensitive fluorescence imaging beyond the shot-noise limit", Tsinghua IDG/McGovern Institute for Brain Research, Seminar on Neuroscience Frontiers, September 2022.

✧ **Xinyang Li**, "Reinforcing neuron extraction and spike inference in calcium imaging using deep self-supervised denoising", Peking University, Lab Seminar, March 2022.

✧ **Xinyang Li** and Guoxun Zhang, "High-fidelity fluorescence image restoration using deep unsupervised learning", OSA Biophotonics Congress, Oral Presentation, April 2020.

Honors

✧ Outstanding Ph.D. Graduate of Beijing, 2023.
✧ Outstanding Ph.D. Graduate of Tsinghua University, 2023.
✧ Outstanding Doctoral Dissertation of Tsinghua University, 2023.
✧ Award for Excellent Academic Lecture, THU-IDG/McGovern Institute for Brain Research, 2023.
✧ National Scholarship, Tsinghua University, 2022.
✧ THU-IDG/McGovern Award for Outstanding Research Achievement, 2022.
✧ National Scholarship, Tsinghua University, 2021.
✧ First Prize for Outstanding Laboratory Contribution, Tsinghua University, 2021.
✧ Outstanding Graduate Student Leaders, Xi'an Jiaotong University, 2018.
✧ National Scholarship, Xi'an Jiaotong University, 2017.
✧ National Scholarship, Xi'an Jiaotong University, 2016.
✧ Outstanding Student Leaders, Xi'an Jiaotong University, 2016.
✧ National Scholarship, Xi'an Jiaotong University, 2015.