

Yide Zhang

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TRAINING AND EDUCATION

California Institute of Technology, Pasadena, California USA

NIH K99 Postdoctoral Fellow in Medical Engineering and Electrical Engineering 2019 - Present

University of Notre Dame, Notre Dame, Indiana USA

Doctor of Philosophy in Electrical Engineering 2014 - 2019

Master of Science in Electrical Engineering 2014 - 2017

Dissertation: *Super-Sensitivity and Super-Resolution Quantitative Multiphoton Microscopy*

Huazhong University of Science and Technology, Wuhan, China

Bachelor of Engineering in Automation *with Highest Honors* 2010 - 2014

Thesis: *Research on Memristor-Based Memory Networks and Computing Technology*

RESEARCH EXPERIENCE

Caltech Optical Imaging Laboratory

2019 - Present

NIH K99 Postdoctoral Fellow Advisor: Lihong V. Wang, Ph.D. Pasadena, California USA

Biophotonics Research Group

2014 - 2019

Research Assistant Advisor: Scott S. Howard, Ph.D. Notre Dame, Indiana USA

National Key Laboratory of Image Processing & Intelligence

2012 - 2014

Research Assistant Advisor: Zhigang Zeng, Ph.D. Wuhan, Hubei China

JOURNAL PUBLICATIONS

- J28 **Yide Zhang**[†], Zhe He[†], Xin Tong[†], David C. Garrett, Rui Cao, and Lihong V. Wang, “Quantum imaging of biological organisms through spatial and polarization entanglement”, *Science Advances*, vol. 10, no. 10, pp. eadk1495, Mar. 2024, DOI: 10.1126/sciadv.adk1495. [Featured News](#).
- J27 Ruofan Cao, **Yide Zhang**, and Jessica Houston, “Editorial: Phasor analysis for fluorescence lifetime data”, *Frontiers in Bioinformatics* (Editorial), vol. 4, no. 1375480, pp. 1-2, Feb. 2024, DOI: 10.3389/fbinf.2024.1375480.
- J26 **Yide Zhang**[†], Peng Hu[†], Lei Li, Rui Cao, Anjul Khadria, Konstantin Maslov, Xin Tong, Yushun Zeng, Laiming Jiang, Qifa Zhou, and Lihong V. Wang, “Ultrafast longitudinal imaging of haemodynamics via single-shot volumetric photoacoustic tomography with a single-element detector”, *Nature Biomedical Engineering*, Nov. 2023, DOI: 10.1038/s41551-023-01149-4. [Curated in Nature Outlook: Medical Diagnostics](#). Highlighted in *Nature Biomedical Engineering*’s News & Views. [Featured News](#). [Featured in NIH NIBIB’s Science Highlights](#).
- J25 **Yide Zhang**, “Deep learning-enhanced microscopy with extended depth-of-field”, *Light: Science & Applications* (News & Views), vol. 12, no. 284, pp. 1-3, Nov. 2023, DOI: 10.1038/s41377-023-01323-y.
- J24 Zhe He[†], **Yide Zhang**[†], Xin Tong[†], Lei Li, and Lihong V. Wang, “Quantum microscopy of cells at the Heisenberg limit”, *Nature Communications*, vol. 14, no. 2441, pp. 1-8, Apr. 2023, DOI: 10.1038/s41467-023-38191-4. [Highlighted in Caltech’s 2023 Year in Review](#). [Featured News](#).

- J23 Xin Tong†, Zhe He†, **Yide Zhang**†, Samuel Solomon, Li Lin, Qiyuan Song, and Lihong V. Wang, “Experimental full-domain mapping of quantum correlation in Clauser-Horne-Shimony-Holt scenarios”, *Physical Review Applied*, vol. 19, no. 034049, pp. 1-16, Feb. 2023, DOI: 10.1103/PhysRevApplied.19.034049.
- J22 Yogeshwar Nath Mishra†, Peng Wang†, Florian J. Bauer, **Yide Zhang**, Dag Hanstorp, Stefan Will, and Lihong V. Wang, “Single-pulse real-time billion-frames-per-second planar imaging of ultrafast nanoparticle-laser dynamics and temperature in flames”, *Light: Science & Applications*, vol. 12, no. 47, pp. 1-12, Feb. 2023, DOI: 10.1038/s41377-023-01095-5. [Light: Science & Applications Top Downloads](#). [Featured News](#).
- J21 Zhongtao Cheng, Chengmingyue Li, Anjul Khadria, **Yide Zhang**, and Lihong V. Wang, “High-gain and high-speed wavefront shaping through scattering media”, *Nature Photonics*, vol. 17, no. 2, pp. 299-305, Jan. 2023, DOI: 10.1038/s41566-022-01142-4. [Featured News](#).
- J20 Li Lin†, Xin Tong†, Susana Cavallero, **Yide Zhang**, Shuai Na, Rui Cao, Tzung K. Hsiai, and Lihong V. Wang, “Non-invasive photoacoustic computed tomography of rat heart anatomy and function”, *Light: Science & Applications*, vol. 12, no. 12, pp. 1-9, Jan. 2023, DOI: 10.1038/s41377-022-01053-7.
- J19 Rui Cao†, Jingjing Zhao†, Lei Li, Lin Du, **Yide Zhang**, Yilin Luo, Laiming Jiang, Samuel Davis, Qifa Zhou, Adam de la Zerda, and Lihong V. Wang, “Optical-resolution photoacoustic microscopy with a needle-shaped beam”, *Nature Photonics*, vol. 17, no. 1, pp. 89-95, Dec. 2022, DOI: 10.1038/s41566-022-01112-w. [Highlighted by Nature](#). [Featured News](#).
- J18 Rui Cao, Scott D. Nelson, Samuel Davis, Yu Liang, Yilin Luo, **Yide Zhang**, Brooke Crawford, and Lihong V. Wang, “Label-free intraoperative histology of bone tissue via deep-learning-assisted ultraviolet photoacoustic microscopy”, *Nature Biomedical Engineering*, vol. 7, no. 2, pp. 124-134, Sept. 2022, DOI: 10.1038/s41551-022-00940-z. [Featured News](#).
- J17 **Yide Zhang**†, Binglin Shen†, Tong Wu, Jerry Zhao, Joseph C. Jing, Peng Wang, Kanomi Sasaki-Capela, William G. Dunphy, David Garrett, Konstantin Maslov, Weiwei Wang, and Lihong V. Wang, “Ultrafast and hypersensitive phase imaging of propagating internodal current flows in myelinated axons and electromagnetic pulses in dielectrics”, *Nature Communications*, vol. 13, no. 5247, pp. 1-12, Sept. 2022, DOI: 10.1038/s41467-022-33002-8. [Featured News](#).
- J16 Varun Mannam, **Yide Zhang**, Yinhao Zhu, Evan Nichols, Qingfei Wang, Vignesh Sundaresan, Siyuan Zhang, Cody Smith, Paul W. Bohn, and Scott S. Howard, “Real-time image denoising of mixed Poisson-Gaussian noise in fluorescence microscopy images using ImageJ”, *Optica*, vol. 9, no. 4, pp. 335-345, Apr. 2022, DOI: 10.1364/OPTICA.448287.
- J15 **Yide Zhang**, Ian H. Guldner, Evan L. Nichols, David Benirschke, Cody J. Smith, Siyuan Zhang, and Scott S. Howard, “Instant FLIM enables 4D *in vivo* lifetime imaging of intact and injured zebrafish and mouse brains”, *Optica*, vol. 8, no. 6, pp. 885-897, June 2021, DOI: 10.1364/OPTICA.426870. [Optica Top Downloads](#).
- J14 Lei Li†, Yang Li†, **Yide Zhang**, and Lihong V. Wang, “Snapshot photoacoustic topography through an ergodic relay of optical absorption *in vivo*”, *Nature Protocols*, vol. 16, no. 5, pp. 2381-2394, May 2021, DOI: 10.1038/s41596-020-00487-w. [Nature Protocols’ Featured Protocol of the Week](#).
- J13 Varun Mannam, **Yide Zhang**, Xiaotong Yuan, Cara Ravasio, and Scott S. Howard, “Machine learning for faster and smarter fluorescence lifetime imaging microscopy”, *Journal of Physics: Photonics*, vol. 2, no. 4, pp. 042005, Sept. 2020, DOI: 10.1088/2515-7647/abac1a.
- J12 **Yide Zhang**, Sergei Rouvimov, Xiaotong Yuan, Karla Gonzalez-Serrano, Alan C. Seabaugh, and Scott S. Howard, “Resolution enhancement of transmission electron microscopy by super-resolution radial fluctuations”, *Applied Physics Letters*, vol. 116, no. 4, pp. 044105, Jan. 2020, DOI: 10.1063/1.5128353.

- J11 **Yide Zhang**, Takashi Hato, Pierre C. Dagher, Evan L. Nichols, Cody J. Smith, Kenneth W. Dunn, and Scott S. Howard, “Automatic segmentation of intravital fluorescence microscopy images by K-means clustering of FLIM phasors”, *Optics Letters*, vol. 44, no. 16, pp. 3928-3931, Aug. 2019, DOI: 10.1364/OL.44.003928. *Optics Letters*’ Featured Paper of Volume 44, Issue 16.
- J10 **Yide Zhang**[†], Evan L. Nichols[†], Abigail M. Zellmer, Ian H. Guldner, Cody Kankel, Siyuan Zhang, Scott S. Howard, and Cody J. Smith, “Generating intravital super-resolution movies with conventional microscopy reveals actin dynamics that construct pioneer axons”, *Development*, vol. 146, no. 5, pp. dev171512, Mar. 2019, DOI: 10.1242/dev.171512. Supplementary software available at DOI: 10.7274/r0-5hhg-5578. [Featured News 1](#) [Featured News 2](#).
- J9 **Yide Zhang**, David Benirschke, Ola Abdalsalam, and Scott S. Howard, “Generalized stepwise optical saturation enables super-resolution fluorescence lifetime imaging microscopy”, *Biomedical Optics Express*, vol. 9, no. 9, pp. 4077-4093, Sept. 2018, DOI: 10.1364/BOE.9.004077.
- J8 **Yide Zhang**, Prakash D. Nallathamby, Genevieve D. Vigil, Aamir A. Khan, Devon E. Mason, Joel D. Boerckel, Ryan K. Roeder, and Scott S. Howard, “Super-resolution fluorescence microscopy by stepwise optical saturation”, *Biomedical Optics Express*, vol. 9, no. 4, pp. 1613-1629, Apr. 2018, DOI: 10.1364/BOE.9.001613. *NDIIF Award for Best Biological Imaging Publication 2018*. [Featured News](#).
- J7 Genevieve Vigil, **Yide Zhang**, Aamir Khan, and Scott Howard, “Description of deep saturated excitation multiphoton microscopy for super-resolution imaging”, *Journal of the Optical Society of America A*, vol. 34, no. 7, pp. 1217-1223, July 2017, DOI: 10.1364/JOSAA.34.001217.
- J6 Aamir A. Khan, Genevieve D. Vigil, **Yide Zhang**, Susan K. Fullerton-Shirey, and Scott S. Howard, “Silica-coated ruthenium-complex nanoprobe for two-photon oxygen microscopy in biological media”, *Optical Materials Express*, vol. 7, no. 3, pp. 1066-1076, Mar. 2017, DOI: 10.1364/OME.7.001066.
- J5 **Yide Zhang**, Genevieve D. Vigil, Lina Cao, Aamir A. Khan, David Benirschke, Tahsin Ahmed, Patrick Fay, and Scott S. Howard, “Saturation-compensated measurements for fluorescence lifetime imaging microscopy”, *Optics Letters*, vol. 42, no. 1, pp. 155-158, Jan. 2017, DOI: 10.1364/OL.42.000155.
- J4 **Yide Zhang**, Aamir A. Khan, Genevieve D. Vigil, and Scott S. Howard, “Super-sensitivity multiphoton frequency-domain fluorescence lifetime imaging microscopy”, *Optics Express*, vol. 24, no. 18, pp. 20862-20867, Sept. 2016, DOI: 10.1364/OE.24.020862.
- J3 **Yide Zhang**, Aamir A. Khan, Genevieve D. Vigil, and Scott S. Howard, “Investigation of signal-to-noise ratio in frequency-domain multiphoton fluorescence lifetime imaging microscopy”, *Journal of the Optical Society of America A*, vol. 33, no. 7, pp. B1-B11, July 2016, DOI: 10.1364/JOSAA.33.0000B1.
- J2 Gang Bao, **Yide Zhang**, and Zhigang Zeng, “Memory analysis for memristors and memristive recurrent neural networks”, *IEEE/CAA Journal of Automatica Sinica*, vol. 7, no. 1, pp. 96-105, Jan. 2020, DOI: 10.1109/JAS.2019.1911828.
- J1 Shiping Wen, Zhigang Zeng, Tingwen Huang, and **Yide Zhang**, “Exponential adaptive lag synchronization of memristive neural networks via fuzzy method and applications in pseudorandom number generators”, *IEEE Transactions on Fuzzy Systems*, vol. 22, no. 6, pp. 1704-1713, Dec. 2014, DOI: 10.1109/TFUZZ.2013.2294855.

SELECTED CONFERENCE PUBLICATIONS

- C27 **Yide Zhang**, Peng Hu, Lei Li, Rui Cao, Anjul Khadria, Konstantin Maslov, Xin Tong, Yushun Zeng, Laiming Jiang, Qifa Zhou, and Lihong V. Wang, “Ultrafast single-shot 3D photoacoustic tomography *in vivo* using a single-element detector”, *SPIE Photonics West 2024*, San Francisco, California USA, Mar. 2024, DOI: 10.1117/12.3007503. *Seno Medical Best Paper Award*.

- C26 **Yide Zhang**, Zhe He, Xin Tong, David C. Garrett, Rui Cao, and Lihong V. Wang, “Quantum imaging of biological organisms using hyperentangled photon pairs”, *SPIE Photonics West 2024*, San Francisco, California USA, Mar. 2023.
- C25 Xin Tong, Zhe He, **Yide Zhang**, Lei Li, and Lihong V. Wang, “Super-resolution quantum microscopy at the Heisenberg limit”, *SPIE Photonics West 2024*, San Francisco, California USA, Mar. 2023, DOI: 10.1117/12.3000759.
- C24 Xin Tong, Zhe He, **Yide Zhang**, Samuel A. Solomon, Li Lin, Qiyuan Song, and Lihong V. Wang, “Experimental full-domain mapping of quantum correlation in Clauser-Horne-Shimony-Holt scenarios”, *SPIE Photonics West 2024*, San Francisco, California USA, Mar. 2023, DOI: 10.1117/12.3001290.
- C23 **Yide Zhang**, Binglin Shen, Tong Wu, Jerry Zhao, Joseph Jing, Peng Wang, Kanomi Sasaki-Capela, William Dunphy, David Garrett, Konstantin Maslov, Weiwei Wang, and Lihong V. Wang, “Ultra-fast phase imaging of propagating current flows in myelinated axons and electromagnetic pulses in dielectrics”, *SPIE Photonics West 2023*, San Francisco, California USA, Feb. 2023, DOI: 10.1117/12.2653-137. **Hitachi High-Tech Best Presentation Award.**
- C22 Xin Tong, Li Lin, Susana Cavallero, **Yide Zhang**, Shuai Na, Rui Cao, Tzung K. Hsiai, and Lihong V. Wang, “Non-invasive photoacoustic computed tomography of cardiac anatomy and function in rats”, *SPIE Photonics West 2023*, San Francisco, California USA, Feb. 2023, DOI: 10.1117/12.2653147.
- C21 Rui Cao, Jingjing Zhao, Lei Li, Lin Du, **Yide Zhang**, Yilin Luo, Laiming Jiang, Samuel P. Davis, Qifa Zhou, Adam de la Zerda, and Lihong V. Wang, “Needle-shaped beam optical-resolution photoacoustic microscopy with an extended depth of field”, *SPIE Photonics West 2023*, San Francisco, California USA, Feb. 2023, DOI: 10.1117/12.2650561.
- C20 Rui Cao, Scott D. Nelson, Samuel Davis, Yu Liang, Yilin Luo, **Yide Zhang**, Brooke Crawford, and Lihong V. Wang, “Label-free ultraviolet photoacoustic histology via deep learning for rapid intraoperative diagnosis of bone cancer”, *SPIE Photonics West 2022*, San Francisco, California USA, Feb. 2022. **Best Paper Award of Photons Plus Ultrasound Conference.**
- C19 Varun Mannam, **Yide Zhang**, Xiaotong Yuan, Takashi Hato, Pierre C. Dagher, Evan L. Nichols, Cody J. Smith, Kenneth W. Dunn, and Scott Howard, “Convolutional neural network denoising in fluorescence lifetime imaging microscopy (FLIM)”, *SPIE Photonics West 2021*, Online Only, Mar. 2021, DOI: 10.1117/12.2578574. **BiOS’21 3-Minute Poster Prize.**
- C18 Varun Mannam, **Yide Zhang**, Xiaotong Yuan, and Scott Howard, “Deep learning-based super-resolution fluorescence microscopy on small datasets”, *SPIE Photonics West 2021*, Online Only, Mar. 2021, DOI: 10.1117/12.2578519.
- C17 Xiaotong Yuan, Varun Mannam, **Yide Zhang**, and Scott Howard, “Overcoming the fundamental limitation of frequency-domain fluorescence lifetime imaging microscopy spatial resolution”, *SPIE Photonics West 2021*, Online Only, Mar. 2021, DOI: 10.1117/12.2577284.
- C16 Varun Mannam, **Yide Zhang**, Yinhao Zhu, and Scott Howard, “Instant image denoising plugin for ImageJ using convolutional neural networks”, *Biomedical Optics 2020*, Washington, DC USA, Apr. 2020, DOI: 10.1364/MICROSCOPY.2020.MW2A.3.
- C15 **Yide Zhang**[†], Yinhao Zhu[†], Evan Nichols, Qingfei Wang, Siyuan Zhang, Cody Smith, and Scott Howard, “A Poisson-Gaussian denoising dataset with real fluorescence microscopy images”, *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2019)*, Long Beach, California USA, June 2019, DOI: 10.1109/CVPR.2019.01198.
- C14 **Yide Zhang**, Ian H. Guldner, Evan L. Nichols, David Benirschke, Cody J. Smith, Siyuan Zhang, and Scott S. Howard, “Three-dimensional deep tissue multiphoton frequency-domain fluorescence lifetime imaging microscopy via phase multiplexing and adaptive optics”, *SPIE Photonics West 2019*, San Fran-

cisco, California USA, Feb. 2019, DOI: 10.1117/12.2510674. **JenLab Young Investigator Award. Featured News.**

- C13 **Yide Zhang**, David Benirschke, Ola Abdalsalam, and Scott S. Howard, “Super-resolution multi-photon frequency-domain fluorescence lifetime imaging microscopy by generalized stepwise optical saturation (GSOS)”, *SPIE Photonics West 2019*, San Francisco, California USA, Feb. 2019, DOI: 10.1117/12.2507663.
- C12 Ola Abdalsalam, **Yide Zhang**, Scott Howard, and Thomas D. O’Sullivan, “Self-calibrated frequency domain diffuse optical spectroscopy with a phased source array”, *SPIE Photonics West 2019*, San Francisco, California USA, Feb. 2019, DOI: 10.1117/12.2510422.
- C11 **Yide Zhang**, Prakash D. Nallathamby, Evan L. Nichols, Cody J. Smith, Ryan K. Roeder, and Scott S. Howard, “Super-resolution and high-speed quantitative multiphoton microscopy”, *Seventh Annual Harper Cancer Research Institute Research Day*, Notre Dame, Indiana USA, Apr. 2018, DOI: 10.7274/r0-zqes-kr15. **Poster Contest Third Prize.**
- C10 **Yide Zhang**, David Benirschke, and Scott S. Howard, “Stepwise optical saturation microscopy: obtaining super-resolution images with conventional fluorescence microscopes”, *Biomedical Optics 2018*, Hollywood, Florida USA, Apr. 2018, DOI: 10.1364/TRANSLATIONAL.2018.JTh3A.27.
- C9 **Yide Zhang**, David Benirschke, and Scott S. Howard, “Super-resolution fluorescence imaging by stepwise optical saturation microscopy”, *IEEE Annual Mini-symposium on Electron Devices and Photonics*, Notre Dame, Indiana USA, Oct. 2017, DOI: 10.7274/r0-bbyt-9j45. **Best Presentation Award.**
- C8 **Yide Zhang**, Genevieve D. Vigil, Aamir A. Khan, and Scott S. Howard, “Doubling the sensitivity of multiphoton frequency-domain fluorescence lifetime images”, *CLEO: Science and Innovations 2017*, San Jose, California USA, May 2017, DOI: 10.1364/CLEO_SI.2017.SM3C.6.
- C7 Genevieve D. Vigil, **Yide Zhang**, Aamir A. Khan, and Scott S. Howard, “Simulation and experimental design of saturated excitation (SAX) multiphoton microscopy (MPM)”, *CLEO: Applications and Technology 2017*, San Jose, California USA, May 2017, DOI: 10.1364/CLEO_AT.2017.JTu5A.64.
- C6 **Yide Zhang**, Genevieve D. Vigil, Aamir A. Khan, and Scott S. Howard, “Super-sensitivity and super-resolution multiphoton fluorescence lifetime imaging microscopy”, *NDnano Symposium: Nanotechnology in the Treatment of Neurodegenerative Disorders*, Notre Dame, Indiana USA, Mar. 2017, DOI: 10.7274/r0-k1dc-5q52. **Best Poster Award.**
- C5 Aamir A. Khan, Susan K. Fullerton-Shirey, Genevieve D. Vigil, **Yide Zhang**, and Scott S. Howard, “Highly stable two-photon oxygen imaging probe based on a ruthenium-complex encapsulated in a silica-coated nanomicelle”, *CLEO: Applications and Technology 2016*, San Jose, California USA, June 2016, DOI: 10.1364/CLEO_AT.2016.ATu4O.3.
- C4 Aamir A. Khan, Genevieve D. Vigil, **Yide Zhang**, and Scott S. Howard, “Theoretical analysis of the signal-to-noise ratio of two-photon oxygen imaging probes”, *Biomedical Optics 2016*, Fort Lauderdale, Florida USA, Apr. 2016, DOI: 10.1364/CANCER.2016.JW3A.48.
- C3 **Yide Zhang**, Genevieve D. Vigil, Aamir A. Khan, and Scott S. Howard, “High-resolution frequency-domain multiphoton fluorescence lifetime imaging microscopy”, *Fifth Annual Harper Cancer Research Institute Research Day*, Notre Dame, Indiana USA, Apr. 2016, DOI: 10.7274/r0-vt1g-bp12.
- C2 **Yide Zhang**, and Scott S. Howard, “On increasing the imaging rate of frequency-domain multiphoton fluorescence lifetime imaging microscopy”, *IEEE Annual Mini-symposium on Electronic and Photonics*, Notre Dame, Indiana USA, Oct. 2015, DOI: 10.7274/r0-dw42-x854.
- C1 **Yide Zhang**, Zhigang Zeng, and Shiping Wen, “Implementation of memristive neural networks with spike-rate-dependent plasticity synapse”, *IEEE International Joint Conference on Neural Networks (IJCNN)*, Beijing, China, July 2014, DOI: 10.1109/IJCNN.2014.6889740.

PATENTS

- P6 Lihong Wang, Xin Tong, Zhe He, **Yide Zhang**, “Hyper-Heisenberg limit quantum microscopy”, US Provisional Patent Application (filed on Sept. 20, 2023).
- P5 Lihong Wang, **Yide Zhang**, “Single-shot 3D imaging using a single detector”, US Non-Provisional Patent Application: 18/410,842 (filed on Jan. 11, 2024).
- P4 Scott Howard, Genevieve Vigil, and **Yide Zhang**, “Super-sensitivity multiphoton frequency-domain fluorescence lifetime imaging microscopy”, US Patent Number: US11,181,727B2 (granted on Nov. 23, 2021).
- P3 Scott Howard, **Yide Zhang**, and Cody J. Smith, “Super-resolution fluorescence microscopy by stepwise optical saturation”, US Patent Number: US11131631B2 (granted on Sept. 28, 2021).
- P2 **Yide Zhang**, Zhigang Zeng, Yidong Zhu, Mingfu Cao, and Junfeng Zhao, “Signal processing circuit”, US Patent Number: US10586590B2 (granted on Mar. 10, 2020), EP Patent Number: EP3282449B1 (granted on Aug. 7, 2019), CN Patent Number: CN107210064B (granted on Feb. 14, 2020).
- P1 **Yide Zhang**, Zhigang Zeng, Shiping Wen, Mingfu Cao, and Junfeng Zhao, “Neuron simulation circuit”, CN Patent Application Number: CN201510508806.6A, Publication Number: CN106470023A.

GRANTS

NIH K99/R00 Pathway to Independence Award

2024-2025

- Sponsor: National Institute of Biomedical Imaging and Bioengineering (NIBIB), National Institutes of Health (NIH)
- Title: “Next-generation photoacoustic imaging for real-time, non-invasive monitoring of brain oxygen metabolism”
- Role: Principal Investigator
- Total budget: \$127,465
- Duration: 12 months

NIH T32 Ruth L. Kirschstein Institutional National Research Service Award

2023-2024

- Sponsor: National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH)
- Title: “Single-shot 3D photoacoustic tomography using a single-element detector for cardiovascular imaging”
- Role: Principal Investigator
- Total budget: \$78,613
- Duration: 12 months

S2I Early- or Mid-Stage Research Projects

2023-2025

- Sponsor: Center for Sensing to Intelligence (S2I), Caltech
- Title: “N-fold super-resolution quantum microscopy”
- Role: Co-Investigator
- Total budget: \$90,000
- Duration: 24 months

Berry Family Foundation Graduate Fellowship

2017-2018

- Sponsor: Advanced Diagnostics and Therapeutics (AD&T), University of Notre Dame
- Title: “Fast, accurate, and noninvasive diagnostic and therapeutic techniques enabled by super-sensitivity, super-resolution, and super-penetration quantitative multiphoton microscope in living tissue”
- Role: Principal Investigator

- Total budget: \$25,000
- Duration: 12 months

TEACHING EXPERIENCE

Center for Teaching, Learning, & Outreach, California Institute of Technology 2022-2023

- Transforming Your Research into Teaching: 5-session short-course focused on participants learning the skills of course design and developing a college-level course based on their area of research expertise. Topics covered included introduction to course design, designing purposeful assessment, and implementing evidence-based teaching strategies. Short-course culminated in a completed course alignment plan and a 1-slide 'chalk talk' presentation communicating key course learning goals.
- Teaching Statement Workshop: Interactive workshop that provides up-to-date information, case studies, and exercises that help participants draft or refine their teaching statement.

Kaneb Center for Teaching and Learning, University of Notre Dame 2018

- Certified participant of the Teaching Well Using Technology program that teaches faculty and graduate students how to use multi-media technology tools such as presentations, audios, videos, and digital timelines in an educational setting to enhance teaching and learning.

Biophotonics Research Group, University of Notre Dame 2017-2019

- Trained undergraduate and first-year graduate students on how to perform confocal, two-photon, and fluorescence lifetime imaging experiments using commercial and custom-built microscopes.

Clay Intermediate Center, Clay International Academy 2016

- Participated in an outreach program to go to middle school classrooms and demonstrate cool optics demos and principles to students and inspire them to pursue a career in science.

Department of Electrical Engineering, University of Notre Dame 2015

- As a teaching assistant of EE 30342 - Microelectronic Circuit Design, graded homework, ran weekly Q&A sessions, and assisted undergraduate students in performing microelectronic experiments.

School of Automation, Huazhong University of Science and Technology 2014

- Mentored six undergraduate students to complete their undergraduate thesis projects.

SELECTED AWARDS AND HONORS

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| 2024 | Seno Medical Best Paper Award,
Photons Plus Ultrasound: Imaging and Sensing Conference, SPIE Photonics West |
| 2023 | Hitachi High-Tech Best Presentation Award,
High-Speed Biomedical Imaging and Spectroscopy Conference, SPIE Photonics West |
| 2022 | IOP Publishing Outstanding Reviewer Award, IOP Publishing, Bristol UK |
| 2021 | IOP Publishing Outstanding Reviewer Award, IOP Publishing, Bristol UK |
| 2021 | OSA Outstanding Reviewer, The Optical Society, Washington DC USA |
| 2021 | BiOS'21 3-Minute Poster Prize, SPIE Photonics West |
| 2019 | IOP Publishing Outstanding Reviewer Award, IOP Publishing, Bristol UK |
| 2019 | NDIIF Best Biological Imaging Publication Award 2018, Featured News
Notre Dame Integrated Imaging Facility (NDIIF), Indiana USA |
| 2019 | CRC Award for Computational Sciences and Visualization, Featured News
Center for Research Computing (CRC), University of Notre Dame, Indiana USA |
| 2019 | JenLab Young Investigator Award, Featured News
Multiphoton Microscopy in the Biomedical Sciences Conference, SPIE Photonics West |

- 2018 **James L. Massey Travel Grant**,
Department of Electrical Engineering, University of Notre Dame, Indiana USA
- 2018 **Poster Contest Third Prize**,
Seventh Annual Harper Cancer Research Institute Research Day, Indiana USA
- 2017 **Best Presentation Award**,
IEEE Annual Mini-symposium on Electron Devices and Photonics, Indiana USA
- 2017 **Berry Family Foundation Graduate Fellowship**, Featured News
Advanced Diagnostics and Therapeutics (AD&T), Indiana USA
- 2017 **Graduate Student Research Award** (One Awardee at NDEE),
Department of Electrical Engineering, University of Notre Dame, Indiana USA
- 2017 **Best Poster Award**, NDnano Symposium, University of Notre Dame, Indiana USA
- 2014 **Outstanding Undergraduate Thesis Award** (Ranking 1/205),
Huazhong University of Science and Technology (HUST), Wuhan, China
- 2013 **Meritorious Winner**, Mathematical Contest in Modeling (MCM),
Consortium for Mathematics and Its Applications (COMAP)
- 2013 **Decent Capital's Scholarship** (Top 0.1%), Decent Capital
- 2013 **National Scholarship** (Top 1%), Ministry of Education of China
- 2012 **National Scholarship** (Top 1%), Ministry of Education of China
- 2011 **National Scholarship** (Top 1%), Ministry of Education of China
- 2012 **Prominent Student Award** (Top 1%), HUST, Wuhan, China

MEDIA COVERAGE

- “Using Polarization to Improve Quantum Imaging”, Caltech News, Mar. 19, 2024.
- “New Technology Brings Advanced Blood Imaging Closer to the Clinic”, NIH NIBIB’s *Science Highlights*, Feb. 16, 2024.
- “Fast Capturing of Deep Blood Flow”, *Nature Biomedical Engineering*’s News & Views, Dec. 27, 2023.
- “2023 Year in Review”, Caltech News, Dec. 18, 2023.
- “Advancements Make Laser-Based Imaging Simpler and Three-Dimensional”, Caltech News, Dec. 1, 2023.
- “A Quantum Entanglement Microscope”, The Science Blog of Fédération Française de Sociétés Scientifiques, July 3, 2023.
- “Quantum Entanglement Doubles Microscope Resolution”, Physics World, June 6, 2023.
- “Quantum Entanglement of Photons Doubles Microscope Resolution”, Caltech News, May 1, 2023.
- “Worlds Fastest Laser Camera Films Combustion in Real Time”, University of Gothenburg News, Feb. 24, 2023.
- “Wavefront Shaping: From Telescopes to Biological Tissue”, Caltech News, Feb. 24, 2023.
- “Sharp Laser Beam Reveals Internal Organs in Stunning 3D”, *Nature Research Highlights*, Dec. 6, 2022.
- “Seeing More with a Needle-Shaped Laser”, Caltech News, Dec. 1, 2022.
- “Super-Fast Camera Captures Electrical Signals Moving Through Nerve Cells”, PetaPixel, Oct. 11, 2022.
- “High-Speed Camera Captures Signals Traveling Through Nerve Cells”, Caltech News, Oct. 6, 2022.
- “Laser Light Offers New Tool for Treating Bone Cancer”, Caltech News, Sept. 19, 2022.
- “Notre Dame Professor Discovers New Cell Imaging Technique”, The Observer, Oct. 26, 2020.
- “Super Resolution Ghosts”, University of Notre Dame Stories, Oct. 1, 2019.
- “Bringing Super-Resolution Microscopy to the Masses”, Wiley Analytical Science, Sept. 11, 2019.
- “Your Motivation Matters: Engineering to Heal”, The Wire at the University of Notre Dame, Sept. 10, 2019.

- “NDIIF Celebrates 10 Year Anniversary at Annual Imaging Workshop”, Biophysics at Notre Dame, May 17, 2019.
- “Super Resolution Imaging Made Easy”, Wiley Analytical Science, Mar. 5, 2019.
- “Open-Source Application Creates Super-Resolution Images of Cell Development in Living Animals”, Notre Dame News, Mar. 1, 2019.
- “Graduate Student Receives JenLab Young Investigator Award”, Notre Dame Research, Feb. 18, 2019.
- “A “Simple” Solution to a Common Situation”, The College of Engineering at the University of Notre Dame, Apr. 5, 2018.
- “Notre Dame Graduate Students Awarded Fellowships for Cross-Disciplinary Biomedical Research”, Notre Dame Research, July 5, 2017.

RESEARCH INTERESTS

Photoacoustic imaging, ultrafast imaging, quantum imaging, fluorescence imaging, brain imaging, and artificial intelligence in imaging.

PROFESSIONAL SERVICE

Invited Speaker

- “Extreme Imaging: Breaking the Fundamental Barriers in Optical Imaging”, *Special Seminar of Wyant College of Optical Sciences*, The University of Arizona, Tucson, Arizona USA, Apr. 16, 2024.
- “Advancing the Frontiers of AMO Physics: Extreme Imaging Techniques for Optical and Quantum Sciences”, *TAMU AMO/IQSE Seminar*, Texas A&M University, College Station, Texas USA, Apr. 5, 2024.
- “Extreme Imaging: Surpassing Optical Limits for Scientific Discovery”, *TAMU Physics and Astronomy Colloquium*, Texas A&M University, College Station, Texas USA, Apr. 4, 2024.
- “Extreme Imaging: Breaking the Fundamental Barriers in Optical Imaging”, *UC Irvine EECS and BLI Seminar*, University California, Irvine, Irvine, California USA, Mar. 13, 2024.
- “Ultrafast Single-Shot 3D Photoacoustic Tomography *In Vivo* using a Single-Element Detector”, *A Special MedE Symposium to Celebrate the 10th Anniversary of the Andrew and Peggy Cherng Department of Medical Engineering*, Pasadena, California USA, Mar. 7, 2024.
- “Extreme Imaging: Breaking the Fundamental Barriers in Optical Imaging”, *CU Boulder ECEE Seminar*, University of Colorado Boulder, Boulder, Colorado USA, Feb. 19, 2024.
- “Extreme Imaging: Breaking the Fundamental Barriers in Optical Imaging”, *UT Austin ECE Seminar*, The University of Texas at Austin, Austin, Texas USA, Feb. 12, 2024.
- “Ultrafast Single-Shot 3D Photoacoustic Tomography *In Vivo* using a Single-Element Detector”, *UCLA Cardiovascular Engineering Research Laboratory (PI: Tzung Hsiai)*, UCLA, Online, Jan. 26, 2024.
- “Ultrafast Single-Shot 3D Photoacoustic Tomography *In Vivo* using a Single-Element Detector”, *The 15th International Conference on Ultrasound Engineering for Biomedical Applications*, Torrance, California USA, July 21, 2023.
- “Ultrafast Phase Imaging of Propagating Current Flows in Myelinated Axons and Electromagnetic Pulses in Dielectrics”, *Caltech Postdoc L(a)unch Seminar*, Pasadena, California USA, May 5, 2023.
- “Ultrafast and Hypersensitive Phase Imaging of Propagating Internodal Current Flows in Myelinated Axons”, *The International Society for Brain Mapping and Therapeutics (SBMT) 2023/20th Annual World Congress of SBMT*, Los Angeles, California USA, Feb. 16, 2023.
- “Ultrafast Phase Imaging of Propagating Current Flows in Myelinated Axons and Electromagnetic Pulses in Dielectrics”, *Complex Media Optics Lab (PI: Sylvain Gigan)*, *École Normale Supérieure (ENS)*, Online, Dec. 6, 2022.
- “Ultrafast Phase Imaging of Propagating Current Flows in Myelinated Axons and Electromagnetic Pulses in Dielectrics”, *Caltech Electrical Engineering Advisory Council Meeting*, Pasadena, California USA, Nov. 29, 2022.

- “Ultrafast Phase Imaging of Propagating Current Flows in Myelinated Axons and Electromagnetic Pulses in Dielectrics”, *Dushu Forum/The 2nd Research Forum for Young Scientists, University of Science and Technology of China*, Online, Nov. 25, 2022.
- “NDCSSA Excellent Graduate Experience Sharing Session”, *Notre Dame Chinese Students and Scholars Association (NDCSSA) Talk No. 3*, Notre Dame, Indiana USA, Aug. 28, 2019.
- “NDIIF Best Biological Imaging Publication Award 2018: Stepwise Optical Saturation (SOS) Microscopy and Beyond”, *6th Annual Midwest Imaging and Microanalysis Workshop*, Notre Dame, Indiana USA, May 6, 2019.
- “Three-Dimensional, Deep Tissue, Super-Resolution Multiphoton FLIM via Phase Multiplexing”, *AD&T External Review*, Notre Dame, Indiana USA, Mar. 25, 2019.
- “Research in ND Electrical Engineering: A Graduate Student’s Perspective”, *Notre Dame Electrical Engineering Graduate Applicant Recruiting Event*, Notre Dame, Indiana USA, Mar. 8, 2019.
- “Novel Super-Resolution Fluorescence Microscopy Methods in Application to Bio and Materials Sciences”, *Notre Dame Electron Microscopy Club Meeting*, Notre Dame, Indiana USA, Feb. 13, 2019.

Editorship

- Topic Editor, Research Topics “Phasor Analysis for Fluorescence Lifetime Data”, *Frontiers in Bioinformatics*
- Guest Associate Editor, Cellular Biochemistry Section, *Frontiers in Cell and Developmental Biology*
- Guest Editor, Special Issue “Interpretation of Machine Learning: Prediction, Representation, Modeling, and Visualization”, *Computational Intelligence and Neuroscience*
- Guest Editor, Special Issue “Advanced Optics Engineering”, *Materials*

Journal Reviewer

- **Nature Portfolio**: Nature Methods, Nature Biomedical Engineering, Light: Science & Applications, Scientific Reports
- **Optica (OSA)**: Optica, Photonics Research, Biomedical Optics Express, Optics Letters, Optics Express, Journal of the Optical Society of America A, Applied Optics
- **SPIE**: Journal of Biomedical Optics, Optical Engineering, Journal of Electronic Imaging
- **IEEE**: IEEE Electron Device Letters, IEEE Transactions on Biomedical Engineering
- **IOP**: Physics in Medicine and Biology, Methods and Applications in Fluorescence, Journal of Physics: Photonics, Journal of Optics, Inverse Problems, Engineering Research Express, New Journal of Physics, Machine Learning: Science and Technology
- **AIP**: Applied Physics Letters, Journal of Applied Physics, Review of Scientific Instruments, APL Machine Learning
- **Elsevier**: Knowledge-Based Systems, Pattern Recognition Letters, Optics Communications
- **MDPI**: Bioengineering, Sensors, Photonics, Diagnostics, Applied Sciences, Life, Micromachines, Electronics, Mathematics, Information, Cancers, Veterinary Sciences, Biomolecules, Machine Learning and Knowledge Extraction, Computers
- **Frontiers**: Frontiers in Physiology, Frontiers in Computer Science, Frontiers in Bioinformatics, Frontiers in Earth Science
- **Springer**: Food and Bioprocess Technology
- **Wiley**: Journal of Biophotonics

Conference Reviewer

- European Conference on Computer Vision (ECCV)
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)
- Conference on Neural Information Processing Systems (NeurIPS)
- International Conference on Intelligent Control and Information Processing (ICICIP)

Grant Reviewer

- Research Grants Council (RGC) of Hong Kong General Research Fund (GRF) 2024
- Berthiaume Institute For Precision Health Technology Development Fund 2023
- Berthiaume Institute For Precision Health Discovery Fund 2023
- Berthiaume Institute For Precision Health Discovery Fund 2022
- Institute for Precision Health at Notre Dame Fund 2021

Contributor to Research Community

- Medical Diagnostics, *Nature Outlook*, Dec. 13, 2023.
- “Single-shot 3D photoacoustic tomography based on a single-element detector for ultrafast imaging of hemodynamics”, Bioengineering and Biotechnology at Nature Research, Dec. 4, 2023.
- Program Committee Member, ICICIP 2021, June 16, 2021.
- IOP Trusted Reviewer, IOP Publishing, Sept. 22, 2020.
- Certified Publons Academy Peer Reviewer, Publons, June 8, 2020.
- Certified Reviewer for OSA Journals, The Optical Society (OSA), Dec. 15, 2019.
- “ ‘Publish or perish’ will not perish”, Behavioural and Social Sciences at Nature Research, Oct. 10, 2019.

PROFESSIONAL MEMBERSHIP

Member, Optica - formerly the Optical Society (OSA)
Member, International Society for Optics and Photonics (SPIE)
Member, Institute of Electrical and Electronics Engineers (IEEE)
Member, American Association for the Advancement of Science (AAAS)