YIILIN LUO

1200 E California Blvd, Keck 138-78, Pasadena, CA 91125
Email: yilinluo@caltech.edu   Google Scholar (Current citation=822, H-index=10)

EDUCATION

California Institute of Technology, Pasadena, US   *09/2020-Present*
  Ph.D., Medical and Electrical Engineering. GPA: 4.1
University of California, Los Angeles, Los Angeles, US   *09/2018-06/2020*
  M.S., Electrical and Computer Engineering. GPA: 3.867
Huazhong University of Science and Technology, Wuhan, China   *09/2014-06/2018*
  B.S., Biomedical Engineering. GPA: 3.98

RESEARCH INTERESTS

- Developing next-generation human-scale photoacoustic tomography (PACT) systems for non-invasive imaging of human organs.
- Innovating HE-equivalent, label-free ultraviolet photoacoustic microscopy (UV-PAM) for real-time intraoperative imaging of fresh specimens.
- Numerical modeling and correction techniques for skull-induced ultrasound aberration in transcranial PACT.
- Leveraging machine learning and classical optimization methods to enhance biomedical imaging techniques, including microscopy and tomography.

PUBLICATIONS (* for co-first author)

Journal Publications

1. **<u>Luo, Y.</u>**, Huang, H., Sastry, K., Hu, P., Tong, X., Kuo, J., Na, S., Villa, U., Anastasio, M. A., Wang, L. V., Full-wave image reconstruction in transcranial photoacoustic computed tomography using a multiphysics finite element method. *IEEE Transactions on Medical Imaging, accepted* (2024).
2. Tong, X.*, Liu, C. Z.*, **<u>Luo, Y.*</u>**, Lin, L*., Dzubnar, J., Invernizzi, M., Zhang, Y., Cao, R., Hu, P., Torres, J., Kasabyan, A., Lai, L., Yee, L., Wang, L. V., Enhancing breast lesion screening and diagnosis by panoramic photoacoustic computed tomography with learning-based classification. *Nature Biomedical Engineering*, under review (2024).
3. Zhang, Y., Na, S., Russin, J. J., Lin, L., **<u>Luo, Y.</u>**, An, Y., Hu, P., Sastry, K., Maslov, K., Liu, C. Y., Wang, L. V., Rotational ultrasound and photoacoustic tomography of the human body. *Nature Biomedical Engineering*, under review (2024).
4. Aborahama*, Y., Sastry, K.*, Cui, M.*, Zhang, Y., **<u>Luo, Y.</u>**, Cao, R., Ku, G., Wang, L.V., De-aberration for noninvasive transcranial photoacoustic computed tomography through an adult human skull. *Nature Machine Intelligence*, *under review* (2024).
5. Sastry, K.*, Aborahama, Y.*, **<u>Luo, Y.</u>**, Zhang, Y., Cui, M., Cao, R., Wang, L. V., Transcranial photoacoustic tomography de-aberrated using boundary elements. *IEEE Transactions on Medical Imaging*, *under review* (2024).
6. Cao, R.*, **<u>Luo, Y.</u>**, Zhao, J., Zeng, Y., Zhang, Y., Zhou, Zerda, A., Wang, L. V., Optical-resolution parallel ultraviolet photoacoustic microscopy for slide-free histology. *Science Advances*, *in press* (2024).
7. Cao, R.*, **<u>Luo, Y.*</u>**, Xu, J., Luo, X., Geng, K., Aborahama, Y., Cui, M., Davis, S., Na, S., Tong, X., Liu, C., Sastry, K., Maslov, K., Hu, P., Zhang, Y., Lin, L., Zhang, Y., Wang, L. V., Single-shot 3D photoacoustic computed tomography with a densely packed array for transcranial functional imaging. *arXiv* preprint (2023).
8. Sastry, K., Zhang, Y., Hu, P., **<u>Luo, Y.</u>**, Tong, X., Na, S., Wang, L. V., A method for the geometric calibration of ultrasound transducer arrays with arbitrary geometries. *Photoacoustics* (2023).
9. Cao, R., Nelson, S. D., Davis, S., Liang, Y., **<u>Luo, Y.</u>**, Zhang, Y., Crawford, B., Wang, L. V., Label-free intraoperative histology of bone tissue via deep-learning-assisted ultraviolet photoacoustic microscopy. *Nature Biomedical Engineering* (2023).
10. Cao, R., Zhao, J., Li, L., Du, L., Zhang, Y., **<u>Luo, Y.</u>**, Jiang, L., Davis, S., Zhou, Q., Zerda, A., Wang, L. V.,

Optical-resolution photoacoustic microscopy with a needle-shaped beam. *Nature Photonics* (2023).

11. Zhang, Y., Liu, T., Singh, M., Çetintaş, E., **Luo, Y.,** Rivenson, Y., Larin, K. V., Ozcan, A., Neural network-based image reconstruction in swept-source optical coherence tomography using undersampled spectral data. *Light: Science & Applications* (2021).

12. Yang, X., Huang, L., **Luo, Y.,** Wu, Y., Wang, H., Rivenson, Y., Ozcan, A., Deep-learning-based virtual refocusing of images using an engineered point-spread function. *ACS Photonics* (2021).

13. Huang, L., Chen, H., **Luo, Y.,** Rivenson, Y., Ozcan, A., Recurrent neural network-based volumetric fluorescence microscopy. *Light: Science & Applications* (2021).

14. **Luo, Y.*,** Huang, L.*, Rivenson, Y., & Ozcan, A., Single-shot autofocusing of microscopy images using deep learning. *ACS Photonics* (2021).

15. Wu, Y., Rivenson, Y., Wang, H., **Luo, Y.,** Ben-David, E., Bentolila, L. A., Pritz, C., Ozcan, A., Three-dimensional virtual refocusing of fluorescence microscopy images using deep learning. *Nature methods* (2019).

16. Wu, Y., **Luo, Y.*,** Chaudhari, G., Rivenson, Y., Calis, A., de Haan, K., Ozcan, A., Bright-field holography: cross-modality deep learning enables snapshot 3D imaging with bright-field contrast using a single hologram. *Light: Science & Applications* (2019).

17. Zhang, Y., Ceylan Koydemir, H., Shimogawa, M. M., Yalcin, S., Guziak, A., Liu, T., Oguz, I., Huang, Y., Bai, B., **Luo, Y.,** Luo, Y., Wei, Z., Wang, H., Bianco, V., Zhang, B., Nadkarni, R., Hill, K., Ozcan, A., Motility-based label-free detection of parasites in bodily fluids using holographic speckle analysis and deep learning. *Light: Science & Applications* (2018).

18. **Luo, Y.*,** Wang, A.*, Liu, M., Lei, T., Zhang, X., Gao, Z., Jiang, H., Gong, H., Yuan, J., Label-free brainwide visualization of senile plaque using cryo-micro-optical sectioning tomography. *Optics Letters* (2017).

Patents

1. Ozcan, A., Rivenson, Y., **Luo, Y.,** & Huang, L., Single-shot autofocusing of microscopy images using deep learning. U.S. Patent Application No. 17/908,864 (2023).

2. Ozcan, A., Rivenson, Y., Wang, H., **Luo, Y.,** De Haan, K., Zhang, Y., & Bai, B., Method and system for digital staining of microscopy images using deep learning. U.S. Patent Application No. 17/783,260 (2023).

Conference Presentations

1. Cao, R., Zhao, J., Li, L., Du, L., Zhang, Y., **Luo, Y.,** Jiang, L., Davis., S., Zhou, Q., Zerda, A., Wang, L. (2023, March). Needle-shaped beam optical-resolution photoacoustic microscopy with an extended depth of field (Conference Presentation). In Photons Plus Ultrasound: Imaging and Sensing 2023 (p. PC123790G). **SPIE**.

2. Yang, X., Huang, L., **Luo, Y.,** Wu, Y., Wang, H., Rivenson, Y., Ozcan, A. (2022, May). 3D Virtual Refocusing of Point Spread Function (PSF) Engineered Images Using Cascaded Neural Networks. In **CLEO**: Science and Innovations (pp. STh5J-5). Optica Publishing Group.

3. Zhang, Y., Liu, T., Singh, M., Çetintaş, E., **Luo, Y.,** Rivenson, Y., Larin, K. V., Ozcan, A. (2022, May). Deep learning-based image reconstruction in optical coherence tomography using undersampled spectral data. In 2022 Conference on Lasers and Electro-Optics (**CLEO**) (pp. 1-2). IEEE.

4. Yang, X., Huang, L., **Luo, Y.,** Wu, Y., Wang, H., Rivenson, Y., Ozcan, A. (2022, March). Three-dimensional virtual refocusing of point-spread function engineered images using cascaded neural networks. In AI and Optical Data Sciences III (p. PC1201906). **SPIE**.

5. Zhang, Y., Liu, T., Singh, M., Çetintaş, E., **Luo, Y.,** Rivenson, Y., Larin, K. V., Ozcan, A. (2022, March). Deep learning-based image reconstruction in swept-source optical coherence tomography using undersampled spectral data. In Multimodal Biomedical Imaging XVII (p. PC119520D). **SPIE**.

6. Xilin, Y., Huang, L., **Luo, Y.,** Wu, Y., Wang, H., Rivenson, Y., Ozcan, A. (2021, August). Virtual refocusing of fluorescence images using an engineered point-spread function and deep learning. In Emerging Topics in Artificial Intelligence (ETAI) 2021 (Vol. 11804, p. 1180425). **SPIE**.

7. Huang, L., Chen, H., **Luo, Y.,** Rivenson, Y., Ozcan, A. (2021, August). Convolutional recurrent neural network-enabled volumetric fluorescence imaging. In Emerging Topics in Artificial Intelligence (ETAI) 2021

(Vol. 11804, p. 1180411). **SPIE**.

8. Huang, L., **Luo, Y.,** Rivenson, Y., Ozcan, A. (2021, May). Neural network-based single-shot autofocusing of microscopy images. In **CLEO**: Applications and Technology (pp. ATu4L-2). Optica Publishing Group.

9. Huang, L., **Luo, Y.,** Rivenson, Y., Ozcan, A. (2021, May). Volumetric fluorescence microscopy using convolutional recurrent neural networks. In 2021 Conference on Lasers and Electro-Optics (**CLEO**) (pp. 1-2). IEEE.

10. Huang, L., **Luo, Y.,** Rivenson, Y., Ozcan, A. (2021, March). Deep learning-based single-shot autofocusing of microscopy images. In Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XIX (Vol. 11647, p. 116470Y). **SPIE**.

11. Huang, L., **Luo, Y.,** Rivenson, Y., Ozcan, A. (2021, March). Deep-learning-based volumetric imaging in fluorescence microscopy. In Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVIII (Vol. 11649, p. 116490G). **SPIE**.

12. Wu, Y., **Luo, Y.,** Chaudhari, G., Rivenson, Y., De Haan, K., Calis, A., Ozcan, A. (2020, August). 3D reconstruction of a hologram with brightfield contrast using deep learning. In Emerging Topics in Artificial Intelligence 2020 (Vol. 11469, p. 1146919). **SPIE**.

13. Wu, Y., Rivenson, Y., Wang, H., **Luo, Y.,** Ben-David, E., Bentolila, L. A., Pritz, C., Ozcan, A. (2020, May). Deep-z: 3D virtual refocusing of fluorescence images using deep learning. In **CLEO**: Applications and Technology (pp. AW3T-6). Optica Publishing Group.

14. Wu, Y., **Luo, Y.,** Chaudhari, G., Rivenson, Y., Calis, A., de Haan, K., Ozcan, A. (2020, March). Cross-modality deep learning brings bright-field image contrast to digital holographic microscopy (Conference Presentation). In Quantitative Phase Imaging VI (Vol. 11249, p. 112490R). **SPIE**.

15. Wang, H., Koydemir, H. C., Qiu, Y., Bai, B., Zhang, Y., Jin, Y., Tok, S., Yilmaz, E.C., Gumustekin, E., **Luo, Y.,** Rivenson, Y., Ozcan, A. (2020, March). Deep learning enables high-throughput early detection and classification of bacterial colonies using time-lapse coherent imaging (Conference Presentation). In Optics and Biophotonics in Low-Resource Settings VI (Vol. 11230, p. 112300E). **SPIE**.

16. Wu, Y., Rivenson, Y., Wang, H., **Luo, Y**., Ben-David, E., Bentolila, L. A., Pritz, C. Ozcan, A. (2020, March). Deep-learning based three-dimensional virtual refocusing of fluorescence microscopy images (Conference Presentation). In Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVII (Vol. 11245, p. 112450P). **SPIE**.

17. **Luo, Y.,** Wu, Y., Chaudhari, G., Rivenson, Y., Calis, A., De Haan, K., Ozcan, A. (2019, May). Holographic Reconstruction with Bright-field Microscopy Contrast using Cross-Modality Deep Learning. In **CLEO**: Applications and Technology (pp. AM2I-3). Optica Publishing Group.

18. Zhang, Y., Koydemir, H. C., Shimogawa, M. M., Yalcin, S., Guziak, A., Liu, T., Oguz, I., Huang, Y., Bai, B., **Luo, Y.,** Luo, Y., Wei, Z., Wang, H., Bianco, V., Zhang, B., Nadkarni, R., Hill, K., Ozcan, A. (2019, May). High-Throughput and Label-Free Detection of Motile Parasites in Bodily Fluids Using Lensless Time-Resolved Speckle Imaging. In **CLEO**: Applications and Technology (pp. ATu4K-2). Optica Publishing Group.

19. **Luo, Y.,** Wang, A., Liu, M., Lei, T., Zhang, X., Gao, Z., Liang, H., Gong, H., Yuan, J. (2018, March). Cryo-micro-optical sectioning tomography for label-free brainwide visualization of senile plaque (Conference Presentation). In Neural Imaging and Sensing 2018 (Vol. 10481, p. 104810M). **SPIE**.

HONOR & AWARDS

- 2015 National Scholarship
- 2017 National Scholarship
- 2018 Highest undergraduate honor in HUST (20/8000)
- UCLA 2018 Photonics Scholarship – Multi-year Research Award
- Caltech 2020 Pyott fellowship in Medical Engineering

REVIEWER SERVICES

OSA: Optics Letters (2), Biomedical Optics Express (5)

OPTICA: Journal of the Optical Society of America A (1), Photonics Research (1)
IEEE: IEEE Transactions on Medical Imaging (5), IEEE Transactions on Biomedical Engineering (1)
Wiley: Journal of Applied Clinical Medical Physics (3)
PLOS: PLOS Computational Biology (1), PLOS One (1)
De Gruyter: Nanophotonics (1)