Shuying Li

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EDUCATION

Department of Biomedical Engineering, Washington University in St. Louis   **St. Louis, US**
Ph.D., Biomedical Engineering   05.2023(expected)

Department of Mechanical Engineering, University of Michigan   **Ann Arbor, US**
MS, Mechanical Engineering   05.2018

College of Energy Engineering, Zhejiang University   **Hangzhou, China**
BS, Energy & Environmental Systems Engineering (*Outstanding graduates of Zhejiang*)   06.2016

RESEARCH EXPERIENCES

Research Interests:

Biomedical Imaging, Computer-aided Diagnosis, Image Processing, Deep Learning

Optical and Ultrasound Imaging Lab   Advisor: Quing Zhu

2018-present
Thesis project

Ultrasound-guided Diffuse Optical Tomography (DOT) for Breast Cancer Imaging

Tools: MATLAB, Python, PyTorch, TensorFlow, scikit-learn

- Developed a projection-based outlier removal algorithm and a connect component analysis-based artifact removal algorithm guided with ultrasound segmentation to reduce image artifacts.
- Designed a multilayer-perceptron to generate data for DOT difference imaging to simplify the data acquisition and mitigate mismatch errors.
- Designed a convolutional autoencoder to extract features from DOT measurements and a Random Forest classifier for real-time breast lesion classification without DOT reconstruction.
- (Ongoing) Developed a fusion neural network to combine DOT with US images to classify breast lesions.
- Involved in developing a CNN to estimate breast tissue optical properties using DOT.
- Involved in developing a neural network with physical constraints for DOT image reconstruction.

2018-present

Optical Coherence Tomography (OCT) for Colorectal & Ovarian Cancer Diagnosis

Tools: MATLAB, Python, PyTorch, TensorFlow, Keras, scikit-learn

- Calculated statistical features of depth-resolved attenuation maps from OCT images for ovarian cancer diagnosis.
- Designed a customized ResNet to classify OCT colorectal images and achieved an AUC of 0.96.
- (Ongoing) Applied a weakly-supervised learning framework to classify OCT colorectal images.

2018-2020

Spatial Frequency Domain Imaging (SFDI) for Colorectal Tissue Assessment

- Designed an AdaBoost algorithm for SFDI colorectal image classification. (scikit-learn)

Optical Imaging Laboratory   Advisor: Xueding Wang, Xinmai Yang

2017-2018

Image-guided Photo-mediated Ultrasound Therapy

- Simulated bubble dynamics under simultaneous laser & ultrasound and validated the simulations with experiments on tubes filled with blood. (**_Tool:_** MATLAB)

SELECT PUBLICATIONS

2022   • **Li, S. ***, Luo, H. *, Kou, S., & Zhu, Q. Depth-resolved attenuation mapping of human ovary and fallopian tube using optical coherence tomography. (Under preparation)

- **Li, S.,** Zhang, M., Xue, M., & Zhu, Q. (2022). Difference imaging from single measurements in diffuse optical tomography: A deep learning approach. ***Journal of Biomedical Optics***, *27*(8), 086003.
- Luo, H.*, **Li, S.*,** Zeng, Y.*, …, Zhu, Q. (2022). Human colorectal cancer tissue assessment using optical coherence tomography catheter and deep learning. ***Journal of Biophotonics,*** e202100349. **(Inside cover)**

2021
- Zou, Y., Zeng, Y., **Li, S.,** & Zhu, Q. (2021). Machine learning model with physical constraints for diffuse optical tomography. ***Biomedical Optics Express***, *12*(9), 5720-5735.
- **Li, S.,** Zhang, M., & Zhu, Q. (2021). Ultrasound segmentation-guided edge artifact reduction in diffuse optical tomography using connected component analysis. ***Biomedical Optics Express,*** *12*(8), 5320-5336.
- Zhang, M., **Li, S.,** Zou, Y., & Zhu, Q. (2021). Deep learning-based method to accurately estimate breast tissue optical properties in the presence of the chest wall. ***Journal of Biomedical Optics,*** *26*(10), 106004.
- **Li, S.,** Huang, K., Zhang, M., Uddin, K. S., & Zhu, Q. (2021). Effect and correction of optode coupling errors in breast imaging using diffuse optical tomography. ***Biomedical Optics Express,*** *12*(2), 689-704. **(Most downloaded papers)**

2020
- **Li, S.*,** Zeng, Y.*, Chapman Jr, W. C.*, Erfanzadeh, M., Nandy, S., Mutch, M., & Zhu, Q. (2020). Adaptive Boosting (AdaBoost)-based multiwavelength spatial frequency domain imaging and characterization for ex vivo human colorectal tissue assessment. ***Journal of Biophotonics***, *13*(6), e201960241. **(Inside cover)**

2018
- **Li, S.*,** Qin, Y.*, Wang, X., & Yang, X. (2018). Bubble growth in cylindrically-shaped optical absorbers during photo-mediated ultrasound therapy. ***Physics in Medicine & Biology***, *63*(12), 125017.

AWARDS & HONORS

2022   Student Paper Award finalist, Optica Biophotonics Congress 2022 (top 4)

PhD Outstanding Research Awards (3 out of 144 BME PhD students)

2020   Best Poster Award at Siteman Cancer Center Research Forum (top 5)

2018   Rackham Graduate Student Research Grants ($1500)

2017   Outstanding graduates of Zhejiang Province

2016   Excellent Graduation Thesis Award

National Scholarship (top 2%)

2015   National Scholarship (top 2%)

2014   Second-class Scholarship (top 11%)

PEER REVIEW ACTIVITIES

(6) Journal of Biomedical Optics

(3) International Journal of Imaging Systems & Technology

(3) Biomedical Optics Express

(2) IEEE Transactions on Biomedical Engineering

(3) Journal of Biophotonics

(1) Computer Methods and Programs in Biomedicine

(1) Optics Express

(1) Journal of Innovative Optical Health Sciences

TEACHING & OUTREACH ACTIVITIES

High school science coach (Summer 2022)

Assistant instructor for BME 444/544 – Biomedical Instrumentation (Spring 2020)

Grader for ME 335 – Heat Transfer (Fall 2017)

Grader for ME 235 – Thermodynamics I (Spring 2017)