Zhijie Dong

CONTACT
INFORMATION

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RESEARCH
INTERESTS

Deep Learning in Ultrasound, Ultrafast 3D Ultrasound Imaging, Signal & Image
Processing

EDUCATION

University of Illinois Urbana-Champaign, Urbana, IL   Expected May 2023
Ph.D. candidate in Electrical and Computer Engineering
Advisor: Prof. Pengfei Song
Sub Field: Biomedical Imaging & Signal Processing
GPA: 4.0/4.0

University of Michigan, Ann Arbor, MI   Aug 2017 - Dec 2018
M.S. in Electrical and Computer Engineering
Sub Field: Signal & Image Processing and Machine Learning
GPA: 4.0/4.0

Southeast University, Nanjing, China   Aug 2013 - June 2017
B.Eng. in Information Engineering
Honor Student in Chien-Shiung Wu College
GPA: 3.7/4.0

RESEARCH &
PROJECTS

Ultrafast 3D Ultrasound Imaging Using Fast-tilting and Redirecting Reflectors   May 2019 - Present
Advisor: Prof. Pengfei Song, University of Illinois Urbana-Champaign

- Proposed a new 3D ultrasound imaging technique: Fast Acoustic Steering via Tilting Electromechanical Reflectors (FASTER). The FASTER 3D imaging achieved high volume rates with conventional 1D array transducers, which could make 3D ultrasound imaging to be a possibility wherever 2D ultrasound imaging is used;
- Apply FASTER 3D imaging in different imaging modalities such as shear wave imaging and ultrasound microvessel imaging.

Nonparametric Preference Completion with Pairwise Preference
May 2018 - Sept 2018
Advisor: Prof. Clayton Scott, University of Michigan

- Used a k-nearest neighbors-like algorithm to implement preference completion with pairwise preference in a nonparametric setting, thus increased the model generalizability;
- Established a probability bound of ranking mistakes, which tends to zero in the limiting situation.

Histotripsy System Implementation   May 2018 - Dec 2018
Advisor: Prof. Zhen Xu and Dr. Tim Hall, University of Michigan

- Implemented the receiving part of the next generation of Histotripsy system that includes both transmit and receive capability for Non-invasive Ultrasonic Tissue Surgery;
- Used FPGA and HPS to implement ultrasound signal conversion, processing, and transmission with high speed and resolution.

Machine Learning Based Link Adaptation for MIMO System

Sept 2016 - June 2017

Advisor: Prof. Xiqi Gao and Prof. Wenjin Wang, Southeast University

- Proposed a link adaptation scheme in MIMO-OFDM systems through machine learning algorithms to maximize spectral efficiency while maintaining transmission reliability;
- Used Autoencoder architecture to extract features from channel state information (CSI) and exploited intrinsic connection between measurement data and adaptation scheme.

JOURNAL
PAPERS

Chen, X., Lowerison, M., **Dong, Z.**, Han, A., and Song. P., 2022. Deep Learning-Based Microbubble Localization for Ultrasound Localization Microscopy. IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.

You, Q., Trzasko, J.D., Lowerison, M.R., Chen, X., **Dong, Z.**, Sekaran, N.V.C., Llano, D.A., Chen, S. and Song, P., 2022. Curvelet Transform-based Sparsity Promoting Algorithm for Fast Ultrasound Localization Microscopy. IEEE Transactions on Medical Imaging.

Lowerison, M.R., Sekaran, N.V.C., Zhang, W., **Dong, Z.**, Chen, X., Llano, D.A. and Song, P., 2022. Aging-related cerebral microvascular changes visualized using Ultrasound Localization Microscopy in the living mouse. Scientific reports, 12(1), pp.1-11.

You, Q., **Dong, Z.**, Lowerison, M.R. and Song, P., 2021. Pixel-oriented Adaptive Apodization for Planewave Imaging Based on Recovery of the Complete Data Set. IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.

Dong, Z., Kim, J., Huang, C., Lowerison, M.R., Chen, S. and Song, P., 2022. Three-dimensional Shear Wave Elastography Using a 2D Row Column Addressing (RCA) Array. BME Frontiers.

Kim, J., Lowerison, M., Sekaran, N.C., Kou, Z., **Dong, Z.**, Michael, O.L., Llano, D.A. and Song, P., 2021. Improved Ultrasound Localization Microscopy based on Microbubble Uncoupling via Transmit Excitation (MUTE). IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.

Chen, X., Lowerison, M., **Dong, Z.**, Sekaran, N.C., Huang, C., Chen, S., Fan, T.M., Llano, D.A. and Song, P., 2021. Localization free super-resolution microbubble velocimetry using a long short-term memory neural network. bioRxiv.

Zhang, W., Lowerison, M.R., **Dong, Z.**, Miller, R.J., Keller, K.A. and Song, P., 2021. Super-Resolution Ultrasound Localization Microscopy on a Rabbit Liver VX2 Tumor Model: An Initial Feasibility Study. Ultrasound in Medicine & Biology.

Dong, Z., Li, S., Lowerison, M.R., Pan, J., Zou, J. and Song, P., 2020. Fast Acoustic Steering Via Tilting Electromechanical Reflectors (FASTER): A Novel Method for High Volume Rate 3-D Ultrasound Imaging. IEEE transactions on ultrasonics, ferroelectrics, and frequency control, 68(3), pp.675-687.

CONFERENCE
PROCEEDINGS

Dong, Z., Li, S., Lowerison, M.R., Zou, J. and Song, P., 2020, September. High

volume rate 3D ultrasound imaging using fast-tilting reflectors. In 2020 IEEE International Ultrasonics Symposium (IUS) (pp. 1-4). IEEE.

Dong, Z., Shi, J., Wang, W. and Gao, X., 2018, September. Machine learning based link adaptation method for MIMO system. In 2018 IEEE 29th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC) (pp. 1226-1231). IEEE.

CONFERENCE ABSTRACTS	**Dong, Z.**, Shin, Y., Chen, X., You, Q., Lowerison, M.R., Anastasio, M. and Song, P., Raw channel data-based phase aberration correction for ultrasound localization microscopy using conditional generative adversarial networks, 183rd Meeting of the Acoustical Society of America, Nashville, TN, 2022

Kim, J., **Dong, Z.**, Lowerison, M.R., Sekaran, N.C., You, Q., Llano, D.A. and Song, P., Deep Learning-based 3D Beamforming on a 2D Row Column Addressing (RCA) Array for 3D Super-resolution Ultrasound Localization Microscopy, IEEE International Ultrasonics Symposium, Venice, Italy, 2022.

Dong, Z., Kim, J., Lowerison, M.R., Lok, U.W., Chen, S. and Song, P., Deep-Learning Based 3D Adaptive Beamforming Using a 2D Row-Column Addressing (RCA) Array, Annual Integrative Ultrasound Meeting, San Diego, CA, 2022.

Dong, Z., Huang, C., Chen, S. and Song, P., 3D Shear Wave Elastography Using a 2D Row-Column Addressing (RCA) Array and External Vibration, IEEE International Ultrasonics Symposium, Xi'an, China, 2021.

Dong, Z., Li, S., Lowerison, M.R., Cario, J., Zou, J. and Song, P., High Volume Rate 3D Ultrasound Imaging Using Fast-Tilting and Redirecting Reflectors, IEEE International Ultrasonics Symposium, Xi'an, China, 2021.

Lowerison, M.R., Sekaran, N.C., **Dong, Z.**, Chen, X., Llano, D.A. and Song, P., Ultrasound Localization Microscopy of a Mouse Model of Aging, IEEE International Ultrasonics Symposium, Xi'an, China, 2021.

Chen, X., Lowerison, M.R., **Dong, Z.** and Song, P., In Vivo Chicken Chorioallantoic Membrane (CAM) Vascular Model Development for Deep Learning-Based Ultrasound Localization Microscopy, IEEE International Ultrasonics Symposium, Xi'an, China, 2021.

Chen, X., Lowerison, M.R., **Dong, Z.**, Sekaran, N.C., Llano, D.A. and Song, P., Deep Learning-Based Microbubble Localization for Fast Ultrasound Localization Microscopy, IEEE International Ultrasonics Symposium, Las Vegas, NV, 2020.

Lowerison, M.R., Zhang, W., **Dong, Z.**, Miller, R.J., Keller, K.A. and Song, P., Super-resolution Ultrasound Localization Microscopy on a Rabbit Liver VX2 Tumor Model: an Initial Feasibility Study, IEEE International Ultrasonics Symposium, Las Vegas, NV, 2020.

AWARDS & SCHOLARSHIPS	Knight Fellowship in Electrical and Computer Engineering for 2022-2023	
		May 2022
	Spring 2022 conference travel award	Mar 2022
	Merit Student in Southeast University	Nov 2015 & 2016
	Meritorious Winner in Interdisciplinary Contest in Modeling	Apr 2016

President Scholarship, top 1%, Southeast University   Nov 2015
The First Prize of the tenth Freescale Cup Intelligent Car Contest East China Region
                                                                        Aug 2015
Zhiwei Zhang Scholarship, top 1%, Southeast University   June 2015

SKILLS &   High-level languages: Python, C/C++, Julia
LANGUAGES   Algorithm development: MATLAB
                   Libraries Toolkit: TensorFlow, Pytorch
                   Hardware description language: Verilog HDL
                   Others: Linux, git
                   Languages: native in Chinese (Mandarin), fluent in English