Zhijie Dong

CONTACT INFORMATION

4031 Beckman Institute
405 N. Mathews Ave.
Urbana, IL 61801

zhijied3@illinois.edu
zjdong.net
(734) 239-3057

RESEARCH INTERESTS

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

EDUCATION

University of Illinois Urbana-Champaign, Urbana, IL Expected May 2024
Ph.D. candidate in Electrical and Computer Engineering
Advisor: Prof. Pengfei Song
Sub Field: Biomedical Imaging
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 - Jun 2017
B.Eng. in Information Engineering
Honor Student in Chien-Shiung Wu College
GPA: 89.6/100

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);
- Achieved high volume-rate 3D ultrasound imaging using FASTER with conventional 1D array transducers;
- Apply FASTER 3D imaging in different imaging modalities such as shear wave imaging and ultrasound microvessel imaging.

Ultrafast 3D Ultrasound Imaging Using 2D Row-Column Addressing (RCA) Arrays Dec 2019 - Present
Advisor: Prof. Pengfei Song, University of Illinois Urbana-Champaign

- Achieved high volume-rate 3D imaging with comparable imaging quality using RCA arrays;
- Implemented 3D shear wave elastography using RCA arrays with external vibration or acoustic radiation force;
- Apply deep-learning based 3D adaptive beamforming with RCA arrays to improve spatial resolution and image contrast.

Histotripsy System Implementation May 2019 - Dec 2019
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.

Nonparametric Preference Completion with Pairwise Preference
May 2018 - Sept 2018

Advisor: Prof. Clayton Scott, University of Michigan

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

Machine Learning Based Link Adaptation for MIMO System
Sept 2016 - Jun 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., 2021. Three-dimensional Shear Wave Elastography Using a 2D Row Column Addressing (RCA) Array. bioRxiv.

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 Acous-

tic 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., 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.

TALK

High volume rate 3D ultrasound imaging techniques, Graduate Student Seminar, Beckman Institute, Urbana, IL, 2021.

AWARDS & SCHOLARSHIPS

Knight Fellowship in Electrical and Computer Engineering for 2022-2023 May 2022
Spring 2022 conference travel award March 2015
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 — Jun 2015

SKILLS & LANGUAGES

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