

# Zhijie Dong

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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

Spring 2022 Conference Travel Award	June 2022
Knight Fellowship in Electrical and Computer Engineering for 2022-2023	May 2022
Spring 2022 conference travel award	March 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  
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