ZHE ZHANG

Email: zhangzhe2018@mail.ioa.ac.cn; **Phone:** +86-17343032202
No. 21 North 4th Ring Road, Haidian District, Beijing 100190, China

EDUCATION

Institute of Acoustics, Chinese Academy of Sciences (IACAS) **09/2017-Present**
Candidate, M.E. in Electronic Engineering
Major: Audio Signal Processing
Overall GPA: 3.63/4.0

School of Physics Science and Engineering, Tongji University **09/2013-06/2017**
B.S. in Applied Physics
Major: Acoustics
Overall GPA: 4.5/5.0

RESEARCH EXPERIENCE

Real-time DSP Sound Source Localization System Based on Circular Microphone Array Using SRP Method in Harmonic Domain
Institute of Acoustics, Chinese Academy of Sciences (IACAS)
05/2019-Present

- Optimized the *SRP* method in circular harmonic domain for DSP-based real-time implementation.
- Developed C library functions to support complex matrix manipulations on DSP.
- Developed a framework for DSP implementation of sound source localization algorithms.
- Experimented with the prototype system and evaluated the accuracy of azimuth estimated.
- Developed the TCP server on PC to display the estimated result and visualize the spatial spectrum.
- Attempted to combine the sound localization with audio content analysis features.

Sound Localization and Separation in Three-dimensional Space Using a Single Microphone with a Metamaterial Enclosure
Institute of Acoustics, Chinese Academy of Sciences (IACAS)
02/2019-07/2019

- Instructed experiment procedure, made experiment plan, and designed the demonstration method.
- Conducted the binaural recording session using Head and Torso Simulator.
- Routed audio hardware and software and solved technical problems.
- Mixed audio tracks, produced the corresponding video, and other supporting materials.

DSP-Based Implementation of a Real-time Sound Field Visualization System
Institute of Acoustics, Chinese Academy of Sciences (IACAS)
08/2018-01/2019

- Modified and improved the hardware of *TMS320C6678* DSP develop board and microphone array.
- Performed computer simulations of *SONAH* algorithm to evaluate the performance and complexity of

the algorithm via *MATLAB*.

- Designed a multi-core program framework taking advantages of multi-core structure and DDR3 memory to support tasks with large computing burden and large storage of data.
- Developed and tested the embedded programs via offline processing and experiments.
- Experimented with the prototype and evaluated the resolution of sound visualization.
- Worked on the paper and gave an oral report in *ICHSA 2019* conference.

Improved MUSIC Algorithm with Enhanced Matrix for Estimating Harmonic Components
Institute of Acoustics, Chinese Academy of Sciences (IACAS)
11/2017-02/2018

- Proposed a method of estimating the number of harmonic components by observing the trend of eigenvalues of the self-correlation matrix of the signal's enhanced matrix.
- Conducted the experiments of estimating harmonic components under different *SNR* situations to evaluate the performance of the algorithm.
- Compared the results of using different window functions.
- Compared the proposed algorithm with the *Periodogram* method.

Undergraduate Thesis: Measurement of Total Sound Energy Density Based on Sound Field Microphone
Institute of Acoustics, Tongji University
01/2017-06/2017

- Designed the structure for recording A-Format audio signals in different cardinal directions based on *SoundField SPS200* microphone.
- Measured frequency response of the microphone element from different directions in 3D space.
- Derived the ideal spatial response of B-Format from spherical harmonic functions.
- Computed the filter banks converting the A-Format signals captured by the microphone array to the B-Format signals using the Least Square Method.
- Compared the results of conversion between the built filter bank and the audio plug-in *SurroundZone* officially provided by *SoundField*.

Study on the Decay of Sound Energy in Stage-Auditorium Coupled Sound Field of Theaters
Institute of Acoustics, Tongji University
06/2016-09/2017

- Designed and supervised the construction of the scale model of the theater in a sound-proof chamber.
- Measured the *T60s* of certain points of stage and auditorium inside the model under different situations of acoustical absorption coefficients.
- Analyzed the collected data to predict the reverberation in different locations inside a theater with acoustical coupling phenomenon between stage and auditorium.

PUBLICATIONS

- **Z. Zhang**, M. Wu, and J. Yang, "*DSP-Based Implementation of a Real-Time Sound Field Visualization System Using SONAH Algorithm*," in Advances in Harmony Search, Soft Computing and Applications, Cham, 2020, pp. 99–110.

- X.Y. Han, M. Wu, J. Yang, **Z. Zhang**, "*Sound Source Localization Using Distributed Microphone in Spherical Harmonics Domain*," Journal of Signal Processing, vol. 35, no. 9, pp. 1564-1571, 2019.
- X.C. Sun, H. Jia, **Z. Zhang**, Y.Z. Yang, Z.Y. Sun, and J. Yang, "*Sound Localization and Separation in Three-dimensional Space Using a Single Microphone with a Metamaterial Enclosure*," Advanced Science, DOI: 10.1002/advs.201902271, 2019.
- **Z. Zhang**, M. Wu, X.Y. Han, and J. Yang, "*Performance Comparison of UCA and UCCA based Real-time Sound Source Localization Systems using Circular Harmonics SRP Method*," arXiv: 1911.12616, 2019. (In Revision, *Applied Acoustics*)

HONORS & AWARDS

- Best Paper, Audio Engineering Annual Conference of Acoustical Society of China, 2019
- Academic Scholarship, IACAS, 2019
- AMBASSADOR of Kadenze, Kadenze, 2019
- Academic Scholarship, IACAS, 2018
- National Encouragement Scholarship, Tongji University, 2016
- 2nd Class Outstanding Student Scholarship, Tongji University, 2015
- 1st Class Outstanding Student Scholarship, Tongji University, 2014
- Successful Participant MCM/ICM Contest, Tongji University, 2014

INTERNS & ACTIVITIES

- Recording & Mixing Engineer, *E-Business* (band), Beijing, 10/2019-present
- Audio Engineer & PA Engineer, *Traditional Orchestra of University of Chinese Academy of Sciences*, Beijing, 09/2018-07/2019
- One-man band, *The Artifacts of Ripples*, Beijing, 03/2018-Present
- Tech documents composing and translation, *Waves Audio Ltd.*, Beijing, 11/2017-02/2018
- Composing, Arrangement, Recording, Mixing and Guitarist, *Subaqua Roaming Guide* (band), Beijing, 09/2017-06/2018
- Recording Engineer, *The Machinery of Other Skeletons* (band), Shanghai, 06/2016-11/2016
- Associate Sound Engineer & Stage Tech, *MAO Livehouse*, Shanghai, 10/2015-02/2017
- Bassist & Producer, *Narcissus* (band), Shanghai, 05/2015–06/2017
- Investigator, *Environmental Protection Agency of Zhabei District*, Shanghai, 2014 Summer

SKILLS & INTERESTS

- Computer: C/C++, Matlab, Embedded Developing, Python, JUCE
- Creative Coding: ChucK, MAX/MSP, FAUST, Processing
- Music: Guitar, Synthesizer, Recording, Mixing, Sound Design, Reaktor
- Interest: Musical Instruments, Soundscape, Nature, Reading, Sports
- Language Fluency: Proficient in English, Native in Mandarin

MORE INFO

My detailed CV: https://zhezhang.me/cv/
My portfolio: https://zhezhang.me/portfolio/