

Jianjun, HE

Responsible, and Determined || Audio and Acoustic Signal Processing
Email: JHE007@e.ntu.edu.sg Mobile Phone: (+65) 8869-9876
Address: BLk 720, Jurong West Ave 5, #07-88, Singapore, 640720



Home pages (click icons to access):   

Education:

Nanyang Technological University (NTU), Singapore *Jan, 2012 - Aug, 2015*

Doctor of Philosophy in Electrical and Electronic Engineering,

Thesis: Spatial Audio Reproduction Using Primary Ambient Extraction

Research interests: Information technology, acoustics/audio/speech/music signal processing, 3D audio, active control of sound and noise, machine learning, virtual/augmented reality.

Awards: Singapore Ministry of Education Scholarship, NTU Research Student Scholarship
ICASSP Travel Grants

Nanjing University of Posts and Telecommunications (NUPT), China *Sep, 2007 - Jun, 2011*

Bachelor of Engineering in Automation

Excellent Student Leader for excellent performance at NUPT (2008 - 2009, for top 2% students)

School Scholarship for excellent performance at NUPT (2007 - 2009)

Honorable Mention Prize for Mathematical Contest in Modeling (MCM) 2010

Second Prize in China Undergraduate Mathematical Contest in Modeling (CUMCM) 2009

Work Experience:

Member of Technical Staff, Software in Maxim Integrated, US *Jul, 2016-present*

Conduct research and development work on 3D audio for mobile and VR/AR applications

Research Fellow/Project Officer in Nanyang Technological University, Singapore *Feb, 2015-Jul, 2016*

Led a team of researchers to develop active noise control techniques to abate urban noise problems and improve the aural comfort of residents in indoor and outdoor environments;

Built experimental platform and led active noise control system design, hardware development, algorithm research, measurements and listening tests, successfully implemented 8-channel ANC system at mid-term;

Project management with progress updates, equipment purchase, budgeting, claim, and reporting;

Contributed to the proposal on augmented urban soundscape awarded L2NIC grant worth S\$900mil.

General Assistant at Nanjing International Center for Entrepreneurs (NICE) *Feb, 2011-Sep, 2011*

Assisted Dr. Zhu, director of NICE, with the daily routine at NICE;

Acted as the contact person of Nanjing-US Projects such as Citrix R&D center, Smart Grid Base, etc.;

Acting director of "Zijin Talents Park"; contacted the government, and raised funding for startups.

Research Publications:

My research work aims at improving human's listening experience, with a focus on the following aspects:

- Enhancing the audio reproduction quality by decoupling the audio content with the audio playback system configurations, through primary ambient extraction approaches;

- Personalization of audio reproduction to match each listener's listening profile, through HRTF measurement and individualization approaches;
- Mitigating annoying noise from the environment perceived by the listener, through active noise control approaches.

My work has been published in IEEE Signal Processing Magazine (IF: 5.9, 1st in signal and information processing area), IEEE/ACM Transactions on Audio, Speech, and Language Processing (TASLP, IF: 2.5, 1st research journal in acoustic, audio signal processing), IEEE Signal Processing Letters, and ICASSP (premier signal processing conference), etc. I have also been invited to present a tutorial on assistive listening at APSIPA ASC 2015. Detailed publications are listed below:

Journal papers

- [1] J. He, W. S. Gan, and E. L. Tan, "**Time-shifting based primary-ambient extraction for spatial audio reproduction**," IEEE/ACM Trans. Audio, Speech, Lang. Process., vol. 23, no. 10, pp. 1576-1588, Oct. 2015.
- [2] J. He, E. L. Tan, and W. S. Gan, "**Primary-ambient extraction using ambient spectrum estimation for immersive spatial audio reproduction**," IEEE/ACM Trans. Audio, Speech, Lang. Process., vol. 23, no. 9, pp. 1431-1444, Sept. 2015.
- [3] J. He, W. S. Gan, and E. L. Tan, "**Primary-ambient extraction using ambient phase estimation with a sparsity constraint**," IEEE Signal Process. Letters, vol. 22, no. 8, pp. 1127-1131, Aug. 2015.
- [4] K. Sunder, J. He, E. L. Tan, and W. S. Gan, "**Natural sound rendering for headphones: Integration of signal processing techniques**," IEEE Signal Process. Magazine, vol. 32, no. 2, pp. 100-113, Mar. 2015.
- [5] J. He, E. L. Tan, and W. S. Gan, "**Linear estimation based primary-ambient extraction for stereo audio signals**," IEEE/ACM Trans. Audio, Speech, Lang. Process., vol. 22, no. 2, pp. 505-517, Feb. 2014.
- [6] J. He, R. Ranjan, W. S. Gan, and K. Sunder, "**Scalable data reusing normalized LMS for acoustic system identification with short-duration signals**," under review.

Conference papers

- [7] J. He, W. S. Gan, and E. L. Tan, "**Can we 'hear' the shape of a person: anthropometry estimation via head-related transfer functions**," in Proc. AES Headphone conference, Aalborg, Denmark, Aug. 2016.
- [8] J. He, and W. S. Gan, "**Informed hybrid primary ambient extraction for spatial audio reproduction**," in Proc. AES Headphone conference, Aalborg, Denmark, Aug. 2016.
- [9] R. Ranjan, J. He, and W. S. Gan, "**Fast continuous acquisition of HRTF in 2D for human subjects with unconstrained random head movements**," in Proc. AES Headphone conference, Aalborg, Denmark, Aug. 2016.
- [10] J. He, B. Lam, T. Murao, R. Ranjan, and W. S. Gan, "**Symmetric design of multiple-channel active noise control system for open windows**," in Proc. Inter.noise 2016, Hamburg, Germany, Aug. 2016, pp.472-481.
- [11] B. Lam, J. He, T. Murao, C. Shi, W. S. Gan, and S. Elliott, "**Feasibility of the full-rank fixed-filter approach in the active control of noise through open windows**," in Proc. Inter.noise 2016, Hamburg, Germany, Aug. 2016, pp. 493-500.
- [12] R. Ranjan, J. He, B. Lam, T. Murao, and W. S. Gan, "**Selective active noise control systems for open windows using sound classification**," in Proc. Inter.noise 2016, Hamburg, Germany, Aug. 2016, pp.482-492.
- [13] T. Murao, M. Nishimura, J. He, B. Lam, R. Ranjan, C. Shi, and W. S. Gan, "**Feasibility study on the perfectly decentralized control system for active acoustic shielding**," in Proc. Inter.noise 2016, Hamburg, Germany, Aug. 2016, pp.462-471.
- [14] J. He, R. Ranjan, and W. S. Gan, "**Fast continuous HRTF acquisition with unconstrained movements of human subjects**," in Proc. ICASSP, Shanghai, China, Mar. 2016, pp. 321-325.

- [15] J. He, and W. S. Gan, “**Applying primary ambient extraction for immersive spatial audio reproduction**,” 2015 Asia Pacific Signal and Information Processing Association (APSIPA) Annual Summit and Conference (invited), Hong Kong, Dec. 2015.
- [16] S. Fasciani, J. He, B. Lam, T. Murao, and W. S. Gan, “**Comparative study of cone-shaped versus flat-panel speakers for active noise control of multi-tonal signals in open windows**,” in Proc. Intersound 2015, San Francisco, CA, Aug. 2015.
- [17] J. He, W. S. Gan, and E. L. Tan, “**On the preprocessing and postprocessing of HRTF individualization based on sparse representation of anthropometry features**,” in Proc. ICASSP, Brisbane, Australia, Apr. 2015, pp. 639-643. (*SPS travel grant*)
- [18] J. He, and W. S. Gan, “**Multi-shift principal component analysis based primary component extraction for spatial audio reproduction**,” in Proc. ICASSP, Brisbane, Australia, Apr. 2015, pp. 350-354. (*SPS travel grant*)
- [19] J. He, W. S. Gan and Y. K. Chong, “**Study on the use of error term in parallel-form narrowband feedback active noise control systems**,” in Proc. 2014 Asia Pacific Signal and Information Processing Association (APSIPA) Annual Summit and Conference (invited), Cambodia, Dec. 2014.
- [20] J. He, W. S. Gan, and E. L. Tan, “**A study on the frequency-domain primary-ambient extraction for stereo audio signals**,” in Proc. ICASSP, Florence, Italy, 2014, pp. 2892-2896. (*SPS travel grant*)
- [21] J. He, E. L. Tan, and W. S. Gan, “**Time-shifted principal component analysis based cue extraction for stereo audio signals**,” in Proc. ICASSP, Vancouver, Canada, 2013, pp. 266-270.
- [22] J. He, B. Lam, C. Shi, D. Shi, and W. S. Gan, “**Performance analysis of the symmetric multichannel active noise control systems for open windows**,” Submitted to ICASSP 2017.
- [23] D. Shi, J. He, C. Shi and W. S. Gan, “**Multiple parallel branch with folding architecture for multichannel filtered-x least mean square algorithm**,” Submitted to ICASSP 2017.

Books, thesis, reports, tutorials, etc.

- [24] J. He, “**Spatial audio reproduction with primary ambient extraction**,” SpringerBriefs in Signal Processing. DOI: 10.1007/978-981-10-1551-9. Springer, Singapore, 2017.
- [25] W. S. Gan and J. He, “**Assisted Listening for headphones and hearing aids: Signal Processing Techniques**,” Tutorial at APSIPA ASC 2015, Hong Kong.
- [26] J. He, “**Spatial audio reproduction using primary ambient extraction**,” PhD thesis, School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore, Mar. 2016. Available: <https://repository.ntu.edu.sg/handle/10356/66031>
- [27] J. He, “**3D sound effects analysis, synthesis, and application design – a primary ambient extraction approach**,” Progress report for qualifying examination, PhD, School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Jun. 2013.
- [28] J. He, and W. S. Gan, “**Spatial audio reproduction using primary ambient extraction**,” APSIPA eNewsLetter, pp. 8-13, Jun. 2016.
- [29] D. H. Nguyen, J. He, K. K. Phyo, and W. S. Gan, “**Real-time audio signal processing platform for natural 3D sound rendering**,” presented in ICASSP 2016 Show & Tell, Shanghai, China, Mar. 2016.
- [30] J. He, D. H. Nguyen, R. Ranjan, K. Sunder, and W. S. Gan, “**Real-time natural 3D sound rendering system for headphones**,” Demo in AES Headphone Technology Conference, Aalborg, Denmark, Aug. 2016.

Invited talks:

- 7 April, 2016, “Natural 3D sound rendering for headphones”, Oculus, Redmond, WA, USA.
- 26 Jun, 2015, “Natural sound rendering for headphones”, Department of acoustics and signal processing,

Aalto University, Finland.

24 Jun, 2015, "Natural binaural rendering", CVSSP, University of Surrey, UK,

23 Jun, 2015, "Immersive 3D sound rendering for headsets", ISVR, University of Southampton, UK.

Membership: IEEE, SPS, APSIPA

Reviewer (average review time < 1 week):

IEEE/ACM Transactions on Audio, Speech, Language Processing, IEEE Signal Processing Letters

The Journal of the Acoustical Society of America, Journal of Audio Engineering Society, IET Signal Processing

The IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences

ICASSP, APSIPA ASC, etc.

Research Projects:

Abating urban noise pollution using active noise control (ANC)

Jun, 2014-present

Research on ANC techniques; designed and implemented real-time ANC using LabVIEW; designed measurement setup and conducted measurements on noise reduction performance using microphone arrays; supervised undergraduate students with final year projects on ANC.

3D Audio Headphones

Jan, 2012-present

Developed an advanced headphone system with natural 3D sound, embedded head-tracking, real-time processing, and also works with VR headsets.

Demonstrated the system at international conferences (ICASSP 2016 in Shanghai, and 2016 AES Headphone technology conference at Denmark).

Fast and convenient measurement for Head-related transfer function (HRTF)

Jul, 2015-present

Proposed and implemented (using NI LabVIEW) a fast continuous HRTF measurement system with head-tracking incorporated, acquired HRTFs in a few seconds while free movements of subjects.

Hatphone, a wearable home theater

Jul, 2014-May, 2016

Supervised undergraduate students with final year project; developed a new wearable sound reproduction system to improve near-field listening experience.

Immersive 3D sound loudspeaker system (i3D)

Jan, 2012-Oct, 2015

Apply primary ambient extraction for i3D; assisted in the real-time implementation using DSP; measured the frequency responses; processed audio/video tracks for demo; conducted subjective listening tests.

Skills:

Language Skills: Mandarin: Native English: Fluent

Technical/Computer Skills

Programming Languages: C/C++, MATLAB, HTML5, JavaScript, MySQL, PHP

Project management: Redmine, SVN

Conduct acoustic measurement, testing, and subjective listening test

Hardwares and Softwares:

- Adobe Premiere, Audition, Audacity
- B&K data acquisition system, HATS, and PULSE, Head Acoustics
- LabVIEW and NI DAQ devices
- TI DSP and Code Composer Studio (CCS), Arduino, Leap motion
- Comsol