Curriculum Vitae

WEN ZHANG
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Positions

- ♦ ARC DECRA Fellow (Apr. 2015-present)

 College of Engineering and Computer Science, The Australian National University, Canberra, Australia
- Research Fellow (Apr. 2012-present)
 College of Engineering and Computer Science, The Australian National University, Canberra, Australia
- OCE Postdoctoral Fellowship (Feb. 2010-Mar. 2012)
 CSIRO Process Science and Engineering Division, Lucas Heights Science and Technology Centre, NSW, Australia

Education

- PhD in Electrical Engineering, The Australian National University, Canberra, Australia.
 Thesis: "Measurement and modelling of Head-Related Transfer Function for spatial audio synthesis", December 2010.
- ♦ ME in Electrical Engineering, First-Class Honours, The Australian National University, Canberra, Australia. Thesis: "Space-frequency channel characterization of ultra-wideband wireless communications", December 2005.
- ♦ BE in Telecommunication Engineering, First-Class Honours, Xidian University, Xi'an, China, July 2003.

Research Interests

General: Audio and Acoustics Signal Processing, Array Signal Processing

Detailed: Active Noise Cancellation, Source Localization and Separation, HRTF (Head-Related Transfer Function) Measurement and Modelling, Virtual Acoustics and Surround Sound Systems

Awards, Grants and Scholarships

- ♦ ANU Major Equipment Grant, "Dodecahedron speaker array for 3D sound field control and reproduction", First Chief Investigator with Prof. Thushara D. Abhayapala, A/Prof. Henry Gardner, and Dr. Samantha Bennett, \$50,000, 2015.
- ♦ ARC DECRA Fellowship DE150100363, "The cocktail party problem: Advancing binaural localisation techniques", Sole Chief Investigator, \$330,000, 2015-2017.
- ♦ ARC Discovery Project Grant DP140103412, "Active Sound Control and Noise Reduction over Space", 3rd Chief Investigator with Prof. Thushara D. Abhayapala and Prof. Walter Kellermann, \$370,000, 2014-2016.
- ⋄ Travel Grant, ANU Early Career Researcher Travel Grant to attend 2013 IEEE WASPAA (New Paltz, USA), Oct. 2013.
- ♦ 2008 IEEE ICASSP Student Travel Grant, 2008 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), "Iterative extrapolation algorithm for data reconstruction over sphere", awarded the student travel grant for the high quality of the paper.

- ♦ Australian National University PhD Scholarship, ANU, 2006-2009.
- ♦ Australian National University-National ICT Australia Ltd Supplementary Scholarship, ANU-NICTA, 2006-2009.
- ◇ Travel Grant, ANU Vice-Chancellor's Higher Degree Research Travel Grant (A\$5500) + ACoRN International Attendance and Visit Grant (A\$4000), to attend 2008 IEEE ICASSP (Las Vegas, USA) and visit A/Prof. Ramani Duraiswami at the Perceptual Interfaces and Reality Laboratory, UMIACS, University of Maryland (College Park, USA), Apr. 2008.
- ◇ Travel Grant, ANU Vice-Chancellor's Higher Degree Research Travel Grant (A\$1000) + ACoRN International Attendance and Visit Grant (A\$6000), to attend the 31 Audio Engineering Society conference (London, UK) and visit Dr. Mark Poletti at Gracefield Research Centre, Industrial Research Limited (Lower Hutt, New Zealand), June-July 2007.
- ♦ Travel Grant, ACoRN Domestic Attendance Grant (A\$1500), to attend 2006 Australian Communication Theory Workshop (AusCTW), Adelaide, Jan. 2006.
- ♦ Chancellor's letter of Commendation, ANU, 2004-2005.
- ♦ Third Prize in National Mathematical Contest, China, 2002.

Talks and Seminars

- Paper Presentation, "Functional analysis guided approach for sound field reproduction with flexible loudspeaker layouts", at 2013 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), New Paltz, NY, USA, Oct. 2013.
- ♦ Seminar, "Acoustics of Bubbles and Particles in Fluids", Research School of Engineering, ANU, Apr. 2012.
- Paper Presentation, "On measurement of bubble solids mass loading: an acoustic technique", at Flotation'11, Cape Town, South Africa, Nov. 2011.
- ♦ Paper Presentation, "Monitoring of Jameson Cell Flotation Performance by Passive Acoustic Emissions", at Flotation'11, Cape Town, South Africa, Nov. 2011.
- ♦ Paper Presentation, "Modal expansion of HRTFs: Continuous representation in frequency-range-angle", at 2009 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Taipei, Taiwan, Apr. 2009.
- ♦ **Seminar**, "Modal expansion of HRTFs: Continuous representation in frequency-range-angle", RSISE, ANU, Mar. 2009.
- ♦ **Seminar**, "Modal analysis and synthesis of the Head-Related Transfer Function", Perceptual Interfaces and Reality Laboratory, University of Maryland, College Park, USA, Apr. 2008.
- ♦ Paper Presentation, "Iterative extrapolation algorithm for data reconstruction over sphere", at 2008 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Las Vegas, USA, Apr. 2008.
- ♦ **Seminar**, "Horizontal plane HRTF reproduction using continuous Fourier-Bessel functions", Gracefield Research Centre, Industrial Research Limited, Lower Hutt, New Zealand, July 2007.
- Paper Presentation, "Horizontal plane HRTF reproduction using continuous Fourier-Bessel functions", at the 31st Audio Engineering Society (AES) international conference on "New directions in high resolution audio", London, UK, June 2007.
- ♦ **Seminar**, "Continuous functional representation of Head-Related Transfer Function", Canberra Research Lab, National ICT Australia, Canberra, Australia, Dec. 2006.

Professional Activities

- ♦ Editorial board member, Advances in Signal Processing, Horizon Research Publishing (HRPUB), 2013-2016.
- ♦ Editorial board member, Science Journal of Circuits, Systems and Signal Processing, 2013-present.
- Affiliate member, IEEE Signal Processing Society Technical Committee on Audio and Acoustics Signal Processing, 2013-present.
- ♦ Member, Institute of Electrical & Electronics Engineers (IEEE), 2010-Present.
- ♦ Member, Journal of the Acoustical Society of America (JASA), 2010-Present.
- TPC Member, IEEE 4th Joint Workshop on Hands-free Speech Communication and Microphone Arrays (HSCMA), 2014.
- ♦ **TPC Member**, IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), 2015.
- ♦ Reviewer of IEEE Journal of Selected Topics in Signal Processing.
- ♦ Reviewer of IEEE/ACM Transactions on Speech, Audio and Language Processing.
- ♦ Reviewer of EURASIP Journal on Advances in Signal Processing.
- ♦ Reviewer of IEEE Antennas and Wireless Propagation Letters.
- ♦ Reviewer of IEEE Transaction on Vehicular Technology.
- ♦ Reviewer of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2014-2015.
- ♦ Reviewer of European Signal Processing Conference (EUSIPCO), 2012-2014.
- ♦ Reviewer of Acoustics Australia, 2009.
- ♦ Reviewer of Australian Communications Theory Workshop (AusCTW), 2005,2009,2013.
- Visit to A/Prof. Ramani Duraiswami at Perceptual Interfaces and Reality Laboratory, UMIACS, University of Maryland, College Park, USA, Apr. 2008.
- Visit to Dr. Mark Poletti at Gracefield Research Centre, Industrial Research Limited, Lower Hutt, New Zealand, July 2007.

Teaching and Supervision Experience

- Training, Foundation of University Teaching and Learning, Centre for Higher Education, Learning and Teaching, ANU, Oct.-Nov. 2012.
- ♦ Training, The Graduate Teaching Programme, Research Student Development Centre, ANU, June-Oct. 2006.
- ♦ Course Coordinator/Lecturer, CECS, ANU, Advanced Topics in Telecommunications (ENGN 8637)—Audio and Speech Signal Processing, July-Oct. 2013.
- ♦ Lecturer, CECS, ANU, Discrete-time Signal Processing (ENGN 4537/6537), Feb-Jun. 2013-present.
- ♦ HDR Student Supervision, Mr. Dumidu Talagala, PhD (co-supervisor), Array Signal Processing Algorithms for Localization and Equalisation in Complex Acoustic Channels, ANU, 2012-2013.
- ♦ HDR Student Supervision, Mr. Hanchi Chen, PhD (co-supervisor), Active Noise Cancellation, ANU, 2013-present.
- HDR Student Supervision, Mr. Xiang Wu, PhD (co-supervisor), Binaural Source Separation and Localization,
 ANU, 2013-present.
- ♦ HDR Student Supervision, Mr. Fei Ma, PhD (main supervisor), TBA, ANU, 2015-present.

Journal Publications

- [J1] W. Zhang, R.A. Kennedy, and T.D. Abhayapala, "Efficient continuous HRTF model using data independent basis functions: Experimentally guided approach", in *IEEE Trans. Audio, Speech, and Language Processing*, vol. 17, no. 4, pp. 819-829, May 2009.
- [J2] W. Zhang, T.D. Abhayapala, R.A. Kennedy, and R. Duraiswami, "Insights into head-related transfer function: Spatial dimensionality and continuous representations", in *Journal of the Acoustical Society of America*, vol. 127, no. 4, pp. 2347-57, Apr. 2010.
- [J3] W. Zhang, M. Zhang, R.A. Kennedy and T.D. Abhayapala, "On high resolution head-related transfer function measurements: An efficient sampling scheme", in *IEEE Trans. Audio, Speech, and Language Processing*, vol. 20, no. 2, pp. 575-584, Feb. 2012.
- [J4] W. Zhang, S.J. Spencer, and P. Coghill, "An acoustic technique for measurement of bubble solids mass loading (a) Fundamental study of single bubble", in *Minerals Engineering*, vol. 36-38, pp. 45-52, Oct. 2012.
- [J5] S.J. Spencer, R. Bruniges, G. Roberts1, V. Sharp, A. Catanzano, W.J. Bruckard, K.J. Davey and W. Zhang, "An acoustic technique for measurement of bubble solids mass loading (b) Monitoring of Jameson Cell flotation performance by passive acoustic emissions", in *Minerals Engineering*, vol. 36-38, pp. 21-30, Oct. 2012.
- [J6] W. Zhang, S.J. Spencer, and P. Coghill, "Characterisation of acoustic emissions resulting from particle collision with a stationary bubble", in *Journal of the Acoustical Society of America*, vol. 133, no. 5, pp. 2523-2527, May 2013.
- [J7] D. Talagala, W. Zhang, and T.D. Abhayapala, "Broadband DOA estimation using sensor arrays on complex-shaped rigid bodies", in *IEEE Trans. Audio, Speech, and Language Processing*, vol. 21, no. 8, pp. 1573-1585, Aug. 2013.
- [J8] D. Talagala, W. Zhang, T.D. Abhayapala, and A. Kamineni, "Binaural sound source localization using the frequency diversity of the head-related transfer function", in *Journal of the Acoustical Society of America*, vol. 135, no. 3, pp. 1207-1217, March 2014.
- [J9] W. Zhang, and T.D. Abhayapala, "Three dimensional sound field reproduction using multiple circular loudspeaker arrays: Functional analysis guided approach", in *IEEE/ACM Trans. Audio, Speech, and Language Processing*, vol. 22. no. 7, pp. 1184-1194, July 2014.
- [J10] D. Talagala, W. Zhang, and T.D. Abhayapala, "Efficient multi-channel adaptive room compensation for spatial sound-field reproduction using a modal decomposition", in *IEEE/ACM Trans. Audio, Speech, and Language Processing*, vol, 22, no. 10, pp. 1522-1532, Oct. 2014.
- [J11] T. Betlehem, W. Zhang, M. Poletti, and T.D. Abhayapala, "Personal sound zones: Delivering interface free audio to multiple listeners", in *IEEE Signal Processing Magazine*, vol. 32, no. 2, pp. 81-91, March 2015.
- [J12] B. Bu, T. Abhayapala, C. Bao, and W. Zhang, "Parameterization of the three-dimensional room transfer function in horizontal plane", in *Journal of the Acoustical Society of America Express Letters*, vol. 138, no. 3, EL286, Sep. 2015.
- [J13] H. Chen, T.D. Abhayapala, and W. Zhang, "Theory and design of compact hybrid microphone arrays on two-dimensional planes for three-dimensional soundfild analysis", vol. 138, no. 5, pp. 3081-3092, Nov. 2015.

Conference Publications

- [C1] W. Zhang, T.D. Abhayapala, and J. Zhang, "Frequency dependency in UWB channel modelling", in Proc. 8th International Symposium on DSP and Communication Systems (DSPCS'2005) & 4th Workshop on the Internet, Telecommunications and Signal Processing (WITSP'2005), Sunshine Coast, Australia, Dec. 2005, pp. 248-252.
- [C2] W. Zhang, T.D. Abhayapala, and J. Zhang, "UWB Spatial-frequency channel characterization", in *Proc. 63rd IEEE Vehicular Technology Conference (VTC)*, vol. 6, Melbourne, Australia, May 2006, pp. 2732-2736.
- [C3] W. Zhang, T.D. Abhayapala, and R.A. Kennedy, "Horizontal plane HRTF reproduction using continuous Fourier-Bessel functions", in Proc. the 31st Audio Engineering Society (AES) international conference on "New directions in high resolution audio", London, UK, Jun. 2007, pp. 9 pages.
- [C4] W. Zhang, R.A. Kennedy, and T.D. Abhayapala, "Signal estimation from incomplete data on the sphere", in Proc. IEEE 9th Australian Communication Theory Workshop (AusCTW'07), Christchurch, New Zealand, Feb. 2008, pp. 39-44.

- [C5] W. Zhang, R.A. Kennedy, and T.D. Abhayapala, "Iterative extrapolation algorithm for data reconstruction over sphere", in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Las Vegas, USA, Apr. 2008, pp. 3733-3736.
- [C6] R.A. Kennedy, W. Zhang, and T.D. Abhayapala, "Spherical harmonic analysis and model-limited extrapolation on the sphere: Integral equation formulation", in *Proc. the 2nd International Conference on Signal Processing and Communication Systems*(ICSPCS'2008), Gold Coast, Australia, Dec. 2008, pp. 6 pages.
- [C7] W. Zhang, T.D. Abhayapala, R.A. Kennedy, and R. Duraiswami, "Modal expansion of HRTFs: Continuous representation in frequency-range-angle", in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Taipei, Taiwan, Apr. 2009, pp. 285-288.
- [C8] M. Zhang, W. Zhang, R.A. Kennedy, and T.D. Abhayapala, "HRTF measurement on KEMAR manikin", in Proc. ACOUSTICS 2009 (Australian Acoustical Society), Adelaide, Australia, Nov. 2009, pp. 8 pages.
- [C9] M. Zhang, R.A. Kennedy, T.D. Abhayapala, and W. Zhang, "Internal structure identification of random process using principal component analysis", in *Proc. the 4th International Conference on Signal Processing and Communication Systems (ICSPCS'2010)*, Gold Coast, Australia, Dec. 2010, pp. 6 pages.
- [C10] M. Zhang, R.A. Kennedy, T.D. Abhayapala, and W. Zhang, "Statistical method to identify key anthropometric parameters in HRTF individualization", in Proc. the 3rd Joint Workshop on Hands-free Speech Communication and Microphone Arrays (HSCMA'11), Edinburgh, UK, May 2011, pp. 213-218.
- [C11] D. Talagala, W. Zhang, and T.D. Abhayapala, "Active acoustic echo cancellation in spatial sound field reproduction", in Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Vacouver, Canada, May 2013, pp. 620-624.
- [C12] D. Talagala, W. Zhang, and T.D. Abhayapala, "Robustness analysis of room equalization for soundfield reproduction within a region", *International Congress on Acoustics (ICA)*, Montreal, Canada, June 2013. (invited paper)
- [C13] W. Zhang, T.D. Abhayapala, R.A. Kennedy, and M. Zhang, "Towards optimal functional representation of head-related transfer functions in the horizontal plane", *International Congress on Acoustics (ICA)*, Montreal, Canada, June 2013. (invited paper)
- [C14] W. Zhang, T.D. Abhayapala, and F.M. Fazi, "Functional analysis guided approach for sound field reproduction with flexible loudspeaker layouts", in *Proc. IEEE Workshop on Applications of Signal Processing to Audio and Acoustics* (WASPAA), New Paltz, NY, USA, Oct. 2013, pp. 1-4.
- [C15] R.A. Kennedy, W. Zhang, and T.D. Abhayapala, "Comparison of spherical harmonics based 3D-HRTF functional models", in Proc. International Conference on Signal Processing and Communication Systems (ICSPCS), Gold Coast, Australia, Dec. 2013, pp. 7 pages.
- [C16] D. Talagala, X. Wu, W. Zhang, and T.D. Abhayapala, "Binaural localization of speech sources in the median plane using Cepstral HRTF extraction", in *Proc. European Signal Processing Conference (EUSIPCO)*, Lisbon, Portugal, Sep. 2014, pp. 2055-2059.
- [C17] W. Zhang, and T.D. Abhayapala, "2.5D sound field reproduction in higher order Ambisonics", in *Proc. International Workshop on Acoustic Signal Processing (IWAENC)*, French Riviera, France, Sep. 2014, pp. 342-346.
- [C18] H. Chen, T.D. Abhayapala, and W. Zhang, "Enhanced sound field reproduction within prioritized control region", in Proc. INTER-NOISE and NOISE-CON Congress and Conference, Melbourne, Australia, Oct. 2014, vol. 249, no. 3, pp. 4055-4064.
- [C19] X. Wu, D. Talagala, W. Zhang, and T.D. Abhayapala, "Binaural localization of speech sources in 3D using a composite feature vector of the HRTF", in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brisbane, Australia, April 2015, pp. 2654-2658.
- [C20] H. Chen, T.D. Abhayapala, and W. Zhang, "3D sound field analysis using circular higher-order microphone array", in *Proc. European Signal Processing Conference (EUSIPCO)*, Nice, France, Sep. 2015, pp. 1158-1162.
- [C21] J. Zhang, W. Zhang and T.D. Abhayapala, "Noise Cancellation over Spatial Regions using Adaptive Wave Domain Processing", accepted for publication in Proc. IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), New Paltz, NY, USA, Oct. 2015.
- [C22] H.Chen, P. Samarasinghe, T.D. Abhayapala and W. Zhang, "Spatial Noise Cancellation Inside Cars: Performance Analysis and Experimental Results", accepted for publication in *Proc. IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, New Paltz, NY, USA, Oct. 2015.

[C23] H.Chen, P. Samarasinghe, T.D. Abhayapala and W. Zhang, "Estimation of the direct-to-reverberant energy ratio using a spherical microphone array", accepted for presentation at *The Acoustic Characterisation of Environments* (ACE) Challenge workshop during WASPAA, New Paltz, NY, USA, Oct. 2015.

Patent

- [P1] H. Chen, T.D. Abhayapala, and W. Zhang, "Planar sensor array", Australian Provisional Patent Application No. 2014902837, 23 July 2014.
- [P2] S. Spencer, P.J. Coghill, and W. Zhang, "A method and a device for acoustic estimation of bubble properties", Australian Provisional Patent Application No. 2014903402, 27 August 2014.
- [P3] S. Spencer, P.J. Coghill, and W. Zhang, "Acoustic estimation of bubble properties and liquid like mediums", Australian Provisional Patent Application No. 2014905193, 22 December 2014.