Heming Wang

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EDUCATION

The Ohio State University, Columbus, OH, USA — August 2018 - Present
Advisor: Prof. DeLiang Wang
Ph.D. student, Computer Science and Engineering

University of Waterloo, Waterloo, ON, Canada — August 2016 - May 2018
Advisor: Prof. Richard Mann & Prof. Edward Vrscay
Master of Mathematics, Applied Mathematics

University of Waterloo, Waterloo, ON, Canada — August 2014 - May 2016
Bachelor of Science, Physics

Harbin Institute of Technology, Harbin, HL, China — August 2012 - May 2014
Electric Science and Technology

PROFESSIONAL SUMMARY

My name is Heming Wang, and I am currently a fifth-year Ph.D. student in Computer Science and Engineering at the Ohio State University, advised by Prof. DeLiang Wang. My research interests focus on speech enhancement, self-supervised learning and generative AI.

PUBLICATIONS

M. Yang, C. Zhang, Y. Xu, Z. Xu, **H. Wang**, B. Raj and D. Yu. "uSee: Unified Speech Enhancement and Editing with Conditional Diffusion Models." *arXiv preprint arXiv:2310.00900*, 2023.

L. Zhang, Y. Qian, L. Yu, **H. Wang**, X. Wang, H. Yang, L. Zhou, S. Liu, Y. Qian and M. Zeng. "Diffusion Conditional Expectation Model for Efficient and Robust Target Speech Extraction." *arXiv preprint arXiv:2309.13874*, 2023.

H. Wang and D. L. Wang. "A Time-Frequency Domain Multi-Path Network for Packet Loss Concealment." in submission to *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), 2023.

H. Wang, M. Yu, H. Zhang, C. Zhang, Z. Xu, M. Yang, Y. Zhang and D. Yu. "Unifying Robustness and Fidelity: A Comprehensive Study of Pretrained Generative Methods for Speech Enhancement in Adverse Conditions." *arXiv preprint arXiv:2309.09028*, 2023.

Z. Xu, Y. Xu, V. Kothapally, **H. Wang**, M. Yang and D. Yu. "SpatialCodec: Neural Spatial Speech Coding" *arXiv preprint arXiv:2309.07432*, 2023.

H. Wang and D. L. Wang. "Cross-Domain Diffusion Based Speech Enhancement for Very Noisy Speech." in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), 2023.

H. Wang, Yao. Q, H. Yang, N. Kanda, P. Wang, T. Yoshioka, X. Wang, Y. Wang, S. Liu, Z. Chen and others. "DATA2VEC-SG: Improving Self-Supervised Learning Representations for Speech Generation Tasks." in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), 2023.

H. Wang, X. Zhang, and D. L. Wang. "Fusing Bone-conduction and Air-conduction Sensors for Complex-Domain Speech Enhancement." *IEEE/ACM Transactions on Audio, Speech, and Language Processing* (**IEEE/ACM TASLP**), Vol. 30, pp. 3134-3143. 2022.

Y. Zhang, **H. Wang**, and D. L. Wang, "Densely-connected Convolutional Recurrent Network for Fundamental Frequency Estimation in Noisy Speech," in the 23th Annual Conference of the International Speech Communication Association (**INTERSPEECH**), pp. 401-405, 2022.

H. Wang, Y. Qian, X. Wang, Y. Wang, C. Wang, S. Liu, T. Yoshioka, J. Li and D. L. Wang, "Improving Noise Robustness of Contrastive Speech Representation Learning with Speech Reconstruction," in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), pp. 6062-6066, 2021.

Y. Wang, J. Li, **H. Wang**, Y. Qian, C. Wang and Y. Wu, "Wav2vec-Switch: Contrastive Learning from Original-noisy Speech Pairs for Robust Speech Recognition," in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), pp. 7097-7101, 2021.

H. Wang, X. Zhang and D. L. Wang, "Attention-based Fusion for Bone-conducted and Air-conducted Speech Enhancement in the Complex Domain," in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), pp. 7757-7761, 2021.

H. Wang and D. L. Wang, "Cross-domain Speech Enhancement With A Neural Cascade Architecture," in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), pp. 7862-7866, 2021.

H. Wang and D. L. Wang, "Neural Cascade Architecture with Triple-domain Loss for Speech Enhancement," in *IEEE/ACM Transactions on Audio, Speech, and Language Processing* (**IEEE/ACM TASLP**), vol. 30, pp. 734-743, 2021.

H. Wang and D. L. Wang, "Towards Robust Speech Super-resolution," in *IEEE/ACM Transactions on Audio, Speech, and Language Processing* (**IEEE/ACM TASLP**), vol. 29, pp. 2058-2066, 2021.

H. Wang and D. L. Wang. "Time-Frequency Loss for CNN Based Speech Super-Resolution," in *IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**), pp. 861-865, 2020.

H. Wang, R. Mann, and E. R. Vrscay, "A Diffusion-Based Two-Dimensional Empirical Mode Decomposition Algorithm for Image Analysis," in *International Conference*

Image Analysis and Recognition (**ICIAR**), pp. 293-305, 2018.

RESEARCH EXPERIENCES

Research Intern — Tencent AI Lab
May-August 2023 — Seattle, Washington, United States

- Nearfield sound resynthesis with vocoder / codec / self-supervised learning models

Research Intern — Microsoft Inc.
May-August 2022 — Seattle, Washington, United States

- Use self-supervised learning to improve generative performance of speech representations

Research Intern — Microsoft Inc.
May-August 2021 — Seattle, Washington, United States

- Use self-supervised learning to improve robust automatic speech recognition

Graduate Research Assistant — The Ohio State University
August 2018 - Present — Columbus, Ohio, USA

- Speech enhancement
- Self-supervised learning
- Generative AI

Graduate Research Assistant — University of Waterloo
August 2016 - May 2018 — Waterloo, Ontario, Canada

- Real-time signal processing for ultrasound
- Empirical mode decomposition for signal analysis
- Bayesian methods for blind source separation

Undergraduate Research Assistant — University of Waterloo
May-August 2015 — Waterloo, Ontario Canada

- Formant synthesis for English vowels
- Real-time spectrum analysis using MyDAQ

COMPUTER SKILLS

Python, C++, Bash, MATLAB, Pytorch, Tensorflow, Keras.

AWARDS

University Fellowship — 2018
The Ohio State University

Entrance Scholarship — 2014
Department of Physics & Astronomy, University of Waterloo

ACADEMIC SERVICES

Reviewer: IEEE/ACM Transactions on Audio, Speech, and Language Processing, IEEE Internet of Things Journal, Cybernetics and Systems, IEEE International Conference on Acoustics, Speech, and Signal Processing