ZHAOYI LIU

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♡ RESEARCH INTERESTS

Detecting Industrial Anomalies: Improving the identification and understanding of irregular and unusual signals in different industrial machines and various industrial environments.
My research topics include time-series signal anomaly detection in industrial and medical environments (face domain/distribution-shift, noisy labels challenges), speech enhancement and recognition using microphone arrays, and sound event detection and localization.

🎓 EDUCATION

Catholic University of Leuven Sep. 2021 – Present

Ph.D. in Computer Science

- Ph.D. scholarship recipient student at Catholic University of Leuven

Peking University (Without Entrance Examinations) Sep. 2017 – Jun. 2020

M.S. in Computer Application Technology

- **GPA:**90% **Rank:**Top 4%

University of Electronic Science and Technology of China Sep. 2013 – Jun. 2017

B.S. in Computer Science B.S. in Software Engineering

- **GPA:** 97% **Rank:**Top 2%

PRIMARY PUBLICATION AND PATENT

1. **Zhaoyi Liu**[1],Yuanbo Hou, et al. Acoustic Industrial Anomaly Detection Against Distribution Shifts with Hilbert-Schmidt Independence Criterion-based Masking.*International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2025 [submitted].*
2. **Zhaoyi Liu**[1], Álvaro López-Chilet, et al. SRAD-CLF: Squeak and Rattle Anomaly Detection via Contrastive Learning Framework on Real Industrial Noise Recordings. *European Signal Processing Conference (EUSIPCO) 2024.*
3. Haoyu Tang, **Zhaoyi Liu**[2], et al. Beyond Universal Transformer: Block Reusing with Adaptor in Transformer for Automatic Speech Recognition.*International Symposium on Neural Networks (ISNN) 2024*
4. **Zhaoyi Liu**[1], Yuanbo Hou, et al. CLF-AIAD: A Contrastive Learning Framework for Acoustic Industrial Anomaly Detection. *International Conference on Neural Information Processing (ICONIP) 2023.*
5. Ding K, **Zhaoyi Liu**[1], Lu Q, et al. Towards self-interpretable graph-level anomaly detection. *Advances in Neural Information Processing Systems (NeurIPS), 2023, 36.*
6. **Zhaoyi Liu**[1], Haoyu Tang, et al. Unsupervised Acoustic Anomaly Detection Systems Based on Gaussian Mixture Density Neural Network. *IEEE European Signal Processing Conference (EUSIPCO) 2022.*
7. **Zhaoyi Liu**[1], Sam Michiels, et al. Adapting Pretrained Features for Efficient Unsupervised Acoustic Anomaly Detection. *ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2022.*
8. Yuanbo Hou, **Zhaoyi Liu**[2], et al. CT-SAT: Contextual Transformer for Sequential Audio Tagging. *INTERSPEECH 2022.*
9. **Zhaoyi Liu**[1], Yuexian Zou. Teacher-Group Knowledge Distillation for cross-scenario Acoustic Beamforming [**J**]. *Advances in Deep Learning Based Speech Processing in Neural Network 2022*.
10. **Zhaoyi Liu**[1], Han H, Chen QY, et al. Teacher-Student Learning and Post-Processing for Robust BiLSTM Mask-Based Acoustic Beamforming. *International Conference on Neural Information Processing (ICONIP) 2019*.
11. **Zhaoyi Liu**[1], Yuexian Zou. IKDMM: Iterative Knowledge Distillation Mask Model for Robust Acoustic Beamforming. *ACM International Conference on Multimedia (ACM MM) 2019*.

12. Qiuyuan Chen, **Zhaoyi Liu**[1], et al. Code Generation from Supervised Code Embeddings. *International Conference on Neural Information Processing of the Asia-Pacific Neural Network Society (ICONIP) 2019.*
13. **Zhaoyi Liu**[1], Yuexian Zou.Teacher-Student BLSTM Mask Model for Robust Acoustic Beamforming. *Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA) 2019.*
14. Yuexian Zou, **Zhaoyi Liu**[1], Christian Ritz. Enhancing Target Speech based on Non-linear Soft Masking using a Single Acoustic Vector Sensor [**J**]. *Applied Sciences, vol. 8, no. 9, pp. 1436, 2018.*
15. **Zhaoyi Liu**, Yuexian Zou. 2020. *A medical Interaction Method and System based on Speech Recognition.* CN Patent: 202006458132.1.
16. **Zhaoyi Liu**, Yuexian Zou. 2019. *A set of method, system, computing equipment and storage for speech enhancement.* CN Patent: 201910799126.2
17. **Zhaoyi Liu**, Yuexian Zou. 2019. *A set of method and system for microphone array speech enhancement based on deep Neural Network* CN Patent: 201912357637.6.
18. **Zhaoyi Liu**, Vijay Parthasarathy, etc. 2021. *System and algorithm for improving the accuracy of a noisy far-field speech recognition* US Patent pre-No.497014824.7.

♡ Honors and Awards

Ph.D scholarship recipient student at Catholic University of Leuven 2021-Present
Outstanding Graduate of Peking university, **Top 5%**, Peking University 2020
Outstanding Graduate of University of Electronic Science and Technology of China, **Top 5%**, UESTC 2017
2nd Prize of the 2nd Sichuan Province "Internet+" College Student Innovation and Entrepreneurship Competition of the Fengyungu Cup, **Top 2%**, China Ministry of Education 2016
The Top-Class People's Scholarship, **Top 2%**, UESTC 2016, 2014
National Scholarship, **Top 2%**, China Ministry of Education 2013, 2015

Major Academic and Industrial Project

Squeak and Rattle Project 2021.11 – Present

funded by the Frod & KU Leuven

- Building low-cost microphone arrays recording systems in combination with 5G be used to wirelessly capture audio traces of sufficient quality to diagnose squeak and rattle problems in vehicles under test.
- Focus on acoustic anomaly detection in vehicle manufacturing. Deep earning be used to automatically diagnose squeak and rattle problems from recorded audio traces.

AR/VR Auditory Perception and Interaction Project 2017.09 – 2020.07

funded by the Shenzhen government

- Focus on adding the real-recording noisy data to the deep neural network's training process, which can eliminate the mismatch between the simulated data and the real-recording data to improve the robustness of the speech enhancement algorithm in practical applications.
- The WER of this algorithm is reduced to 8.7%, which is a relative decrease of 7% compared with the state-of-the-art ASR front-end in 2019.

Voice Interaction of Robots for Bank Scene Service Project 2018.06– 2020.07

funded by the AOTO corporation

- Research on the blind source microphone array enhancement algorithm, especially combining the deep neural network method with the traditional array beamforming method. And aiming at the problem of the poor generalization ability of multi-channel speech enhancement in real-world cross-scenarios, I propose a method based on teacher group knowledge distillation.
- The WER of this algorithm is relatively reduced by 12.3% compared with the SOTA in 2020. Meanwhile, this method is also applied to the self-built bank record database for testing, in which the WER result is reduced to 10% compared with the baseline.

Research Service

Session Chair

- **Session ThuB4: Neural Network Models** in the International Conference on Neural Information Processing (ICONIP) 2023.

Reviewer

- The International Conference on Neural Information Processing (ICONIP)
- Conference of the International Speech Communication Association (INTERSPEECH)
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
- APSIPA Transactions on Signal and Information Processing Journal
- IEEE Internet of Things Journal

Main Internship Experience

SAP Corporation (Chengdu Research and Development Department) 2016.01 – 2016.06

Software Engineering Intern CSC Core Development Team

- My work is focused on cloud development of SAPUI5 and HANA in the INM project team.
- Participated in the development of iBeacon about "Smart exhibition visit" software, which has actually been put into use.

HITACH (Research and Development in Tokyo) 2016.12 – 2017.03

Research Assistant Intern WITMED Team

- My research is focused on the recognition of medical influences such as tumor slices.
- The main innovation in the research work during the internship was to identify different skin cancer cell formation stages.

Tencent Corporation (AI Lab) 2019.03 – 2019.07

Research assistant intern Speech recognition department

- My work is focused on researching the End-to-End speech recognition algorithm.
- The main innovation in the research work during the internship was to design a new attention mechanism for the E2E ASR to improve the robustness of the language model and the acoustic model.

Zoom (Language and Video Communication department) 2020.12 – 2021.09

Research assistant intern

- My work is focused on researching the End-to-End speech recognition algorithm.
- The main innovation in the research work during the internship was to design a new attention mechanism for the E2E ASR to improve the robustness of the language model and the acoustic model.