

# KAI ZHEN

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## POSITIONS HELD

### Amazon.com, Inc.

- Applied Scientist  
◦ Alexa Edge ML team, Pittsburgh, PA Apr. 2021 – present
- Applied Scientist Intern  
◦ Alexa Edge ML team, Pittsburgh, PA Summer 2020
  - Supervisors: Athanasios Mouchtaris, Hieu Duy Nguyen, Feng-Ju (Claire) Chang
  - Project: Network Compression for On-Device ASR Solutions

### Indiana University

- Research Assistant Jan. 2018 – Mar. 2021
  - Project: Audio Signal Analysis/Synthesis Technology Based on Machine Learning
- Teaching Assistant Aug. 2015 – Dec. 2017
  - Department of Computer Science
  - Intelligent Systems Engineering Department

### LinkedIn Corporation

- Machine Learning & Relevance Intern  
◦ Ads-AI Group, Mountain View, CA Summer 2019
  - Supervisors: Sara Smoot, Lijun Peng, Hiroto Udagawa
  - Project: Ads Response Rate Prediction with BERT Enriched Semantic Features
- Company Standardization Group, New York City, NY Summer 2018
  - Supervisors: Xiaoqiang Luo, Deirdre Hogan
  - Project: Relevance Ranking via Non-Categorical User Inputs for LinkedIn Resume Builder

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## EDUCATION

### Ph.D., dual major in Computer Sciences and Cognitive Science May. 2021

- Indiana University, Bloomington, United States
- Committee: Minje Kim (chair), Robert Goldstone (co-chair), Donald Williamson, Yi Shen
- Dissertation: "Neural Waveform Coding: Scalability, Efficiency and Psychoacoustic Calibration"  
<Outstanding Dissertation Award (IU Cognitive Science)>

### M.S., major in Computer Science Jul. 2015

- Tsinghua University, Beijing, China

### B.S., major in Software Engineering (Summa Cum Laude) Jul. 2012

- Xidian University, Xi'an, China
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## PROFESSIONAL ACTIVITIES

### Conference Reviewer

- IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA) - 2021
  - Technical Program Committee Member
- IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) - 2019, 2020, 2021
- IEEE International Conference on Data Mining (ICDM), 2020
- Association for the Advancement of Artificial Intelligence (AAAI) - 2017, 2018

### Journal Reviewer

- European Association for Signal Processing (EURASIP) Journal on Audio, Speech, and Music Processing
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## PUBLICATIONS

### In Progress

- [S001] **Kai Zhen**, Jongmo Sung, Mi Suk Lee, Seungkwon Beack, and Minje Kim, "Scalable and Efficient Neural Speech Coding", in submission to *IEEE/ACM Transactions on Audio, Speech, and Language Processing (IEEE/ACM TASLP)*.

### International Journal Articles

- [J001] **Kai Zhen**, Mi Suk Lee, Jongmo Sung, Seungkwon Beack, and Minje Kim, "[Psychoacoustic Calibration of Loss Functions for Efficient End-to-End Neural Audio Coding](#)," *IEEE Signal Processing Letters (SPL)* 27 (2020): 2159-2163.

### Referred International Conference Proceedings

- [C005] **Kai Zhen**, Hieu Duy Nguyen, Feng-Ju (Claire) Chang, Athanasios Mouchtaris, "[Sparsification via Compressed Sensing for Automatic Speech Recognition](#)," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Toronto, ON, Canada, June 6-12, 2021.
- [C004] Haici Yang, **Kai Zhen**, Seungkwon Beack, Minje Kim, "[Source-Aware Neural Speech Coding for Noisy Speech Compression](#)," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Toronto, ON, Canada, June 6-12, 2021.
- [C003] **Kai Zhen**, Mi Suk Lee, Jongmo Sung, Seungkwon Beack, and Minje Kim, "[Efficient And Scalable Neural Residual Waveform Coding with Collaborative Quantization](#)," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Barcelona, Spain, May 4-8, 2020.
- [C002] **Kai Zhen**, Mi Suk Lee, Minje Kim, "[A Dual-Staged Context Aggregation Method towards Efficient End-To-End Speech Enhancement](#)," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Barcelona, Spain, May 4-8, 2020.
- [C001] **Kai Zhen**, Jongmo Sung, Mi Suk Lee, Seungkwon Beack, and Minje Kim, "[Cascaded Cross-Module Residual Learning towards Lightweight End-to-End Speech Coding](#)," In *Proc. Annual Conference of the International Speech Communication Association (Interspeech)*, Graz, Austria, September 15-19, 2019.

### Peer Reviewed Workshops & Forums

- [W004] **Kai Zhen**, Hieu Duy Nguyen, Feng-Ju (Claire) Chang, Athanasios Mouchtaris. Network Sparsification for On-Device ASR. *Amazon Machine Learning Conference (AMLC) Workshop on Network Inference Optimization*, 2020.
- [W003] **Kai Zhen**, Aswin Sivaraman, Jongmo Sung, Minje Kim. [On Psychoacoustically Weighted Cost Functions Towards Resource-efficient Deep Neural Networks for Speech Denoising](#). *The 7th Annual Midwest Cognitive Science Conference*, 2018.
- [W002] Peter Miksza, Kevin Watson, **Kai Zhen**, Sanna Wager, Minje Kim. Relationships between experts' subjective ratings of jazz improvisations and computational measures of melodic entropy. *The Improvising Brain III: Cultural Variation and Analytical Techniques Symposium*, Atlanta, GA, in Feb, 2017.
- [W001] **Kai Zhen** and David Crandall. [Finding egocentric image topics through convolutional neural network based representations](#) (extended abstract). In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop on Egocentric Computer Vision*, 2016.

### Patents

- [P004] Mi Suk Lee, Jongmo Sung, Minje Kim, **Kai Zhen**., "[Audio signal encoding method and audio signal decoding method, and encoder and decoder performing the same](#)," U.S. Patent Application No. 16/543,095
- [P003] Minje Kim, Aswin Sivaraman, **Kai Zhen**, Jongmo Sung, et al, "[Audio signal encoding method and apparatus and audio signal decoding method and apparatus using psychoacoustic-based weighted error function](#)", *US Patent Application*, US 2019 / 0164052 A1.
- [P002] Minje Kim, **Kai Zhen**, Mi Suk Lee, et al, "Apparatus and Method for Speech Processing Using a Densely Connected Hybrid Neural Network," *US Patent Application* (pending), 2019
- [P001] Minje Kim, **Kai Zhen**, Mi Suk Lee, "Scalable and Efficient Neural Waveform Coding with Collaborative Quantization," *US Patent Application* (pending), 2019
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## HONORS, AWARDS & SCHOLARSHIP

Outstanding Dissertation Award	Apr. 2021
• Given by <a href="#">Cognitive Science Program at Indiana University</a>	
Top-Rated Intern Poster	Aug. 2020
• <a href="#">Among 17 interns receiving the highest rate out of more than 180 participants</a>	
Summa Cum Laude	Jul. 2012
• Graduate with honor from Xidian University	
China National Scholarship	Nov. 2010, Nov. 2011
• For the effort on maintaining top-tier GPA and mathematical contest in modeling (MCM)	

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## INVITED TALKS

[T003] [Microsoft Research Talks](#), September, 2020

- [Video link](#)

[T002] IU Hearing Sciences Seminar, March, 2019

[T001] IU Grey Matters, Graduate and Post-doc Colloquium, March, 2019

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## TEACHING & TUTORING

### Graduate Level

- "Machine Learning for Signal Processing" (ENGR-E 599, ISE IU), Fall 2017
- "Elements of Artificial Intelligence" (CSCI-B 551, CS IU), Fall 2016
- "Computer Vision" (CSCI-B 657, CS IU), Spring 2016
- "Data Structures" (ENGR-E 599, ISE IU), Fall 2015

### Undergraduate Level

- "Introduction of Artificial Intelligence" (CSCI-B 351, CS IU), Spring 2017
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## CRAFTSMANSHIP

### Deep Learning/Artificial Intelligence (over 4 years experience)

- TensorFlow, PyTorch, etc;
- recommendation, feature learning, autoregressive modeling, recognition, etc

### Audio Signal Processing (over 4 years experience)

- bitrate efficient and scalable audio/speech coding, speech enhancement;
- subjective/objective audio quality assessment;
- psychoacoustic models and optimization skills;
- end-to-end speech recognition (RNN-Transducer).

### Machine Learning (over 5 years experience)

- regression (GLMix) and classification (decision trees, SVM);
- dimension reduction (PCA/ICA/NMF/ISOMAP);
- clustering analysis (k-means, GMM);
- topic modeling (LDA).

### Big Data Processing (acquired from 2 summer internships)

- Hadoop, HDFS, Spark (PySpark).
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