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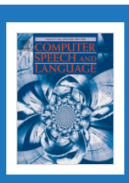
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Guanlong Zhao, Ph.D. 赵冠龙

About

I am a speech researcher and engineer. My research interests broadly focus on the intersection of speech modification and speech perception. I am also interested in speech synthesis (e.g., TTS) and speech recognition (E2E models in particular). Specifically, I spent five years working on topics in accent and voice conversion during my Ph.D. training.

If you would like to reach out to me, my email address is *zhao at aggienetwork dot com*. How do I pronounce my name? In PinYin, it is written as Guàn-Lóng Zhào; the tones are fourth, second, and fourth. Mapping to American English phonemes, it roughly sounds like Guan-Loan Chao. 🌈 Cheers!

Education

Ph.D. in Computer Science, Texas A&M; University, 2020

- Dissertation: Foreign accent conversion with neural acoustic modeling
- Advisor: Dr. Ricardo Gutierrez-Osuna

B.S. in Applied Physics (minor in Computer Science), University of Science and Technology of China, 2015

Work Experience

Software Engineer @ Google (Speech), August 2020–Present

Research and Teaching Assistant @ Texas A&M; University (Department of Computer Science and Engineering), September 2015–May 2020

Software Engineering Intern @ Google (Geo Machine Perception), May–August 2019

Software Engineering Intern @ Google (Speech), June–August 2018

Publications

Journal Articles

1. S. Ding, **G. Zhao**, and R. Gutierrez-Osuna, "Accentron: Foreign accent conversion to arbitrary non-native speakers using zero-shot learning," *Computer Speech & Language*, 2021. (Accepted) demo
2. **G. Zhao**, S. Ding, and R. Gutierrez-Osuna, "Converting foreign accent speech without a reference," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 29, pp. 2367–2381, 2021. pdf demo
3. I. Lučić Rehman, A. Silpachai, J. Levis, **G. Zhao**, and R. Gutierrez-Osuna, "The English pronunciation of Arabic speakers: A data-driven approach to segmental error identification," *Language Teaching Research*, 2020. pdf summary
4. **G. Zhao** and R. Gutierrez-Osuna, "Using phonetic posteriorgram based frame pairing for segmental accent conversion," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 27, no. 10, pp. 1649–1660, 2019. pdf code demo
5. S. Ding, **G. Zhao**, C. Liberatore, and R. Gutierrez-Osuna, "Learning structured sparse representations for voice conversion," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 28, pp. 343–354, 2019. pdf demo
6. S. Ding, C. Liberatore, S. Sonsaat, I. Lučić Rehman, A. Silpachai, **G. Zhao**, E. Chukharev-Hudilainen, J. Levis, and R. Gutierrez-Osuna, "Golden speaker builder–An interactive tool for pronunciation training," *Speech Communication*, vol. 115, pp. 51–66, 2019. pdf code demo

Conference Proceedings

7. A. Hair, **G. Zhao**, B. Ahmed, K. Ballard, and R. Gutierrez-Osuna, "Assessing posterior-based mispronunciation detection on field-collected recordings from child speech therapy sessions," in *Interspeech*, 2021. pp. 2936–2940. pdf
8. A. Silpachai, I. Lučić Rehman, T. A. Barriuso, J. Levis, E. Chukharev-Khudilaynen, **G. Zhao**, and R. Gutierrez-Osuna, "Effects of voice type and task on L2 learners' awareness of pronunciation errors," in *Interspeech*, 2021. pp. 1952–1956. pdf
9. S. Ding, **G. Zhao**, and R. Gutierrez-Osuna, "Improving the speaker identity of non-parallel many-to-many voice conversion with adversarial speaker recognition," in *Interspeech*, 2020. pp. 776–780. pdf code demo video
10. A. Das, **G. Zhao**, J. Levis, E. Chukharev-Hudilainen, and R. Gutierrez-Osuna, "Understanding the effect of voice quality and accent on talker

similarity," in *Interspeech*, 2020. pp. 1763–1767. pdf video

11. **G. Zhao**, S. Ding, and R. Gutierrez-Osuna, "Foreign accent conversion by synthesizing speech from phonetic posteriorgrams," in *Interspeech*, 2019, pp. 2843–2847. pdf code demo slides
12. **G. Zhao**, S. Sonsaat, A. Silpachai, I. Lučić Rehman, E. Chukharev-Hudilainen, J. Levis, and R. Gutierrez-Osuna, "L2-ARCTIC: A non-native English speech corpus," in *Interspeech*, 2018, pp. 2783–2787. pdf data code slides
13. S. Ding, **G. Zhao**, C. Liberatore, and R. Gutierrez-Osuna, "Improving sparse representations in exemplar-based voice conversion with a phoneme-selective objective function," in *Interspeech*, 2018, pp. 476–480. pdf
14. C. Liberatore, **G. Zhao**, and R. Gutierrez-Osuna, "Voice conversion through residual warping in a sparse, anchor-based representation of speech," in *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018, pp. 5284–5288. pdf poster
15. **G. Zhao**, S. Sonsaat, J. Levis, E. Chukharev-Hudilainen, and R. Gutierrez-Osuna, "Accent conversion using phonetic posteriorgrams," in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2018, pp. 5314–5318. pdf code demo poster
16. G. Angello, A. B. Manam, **G. Zhao**, and R. Gutierrez-Osuna, "Training behavior of successful tacton-phoneme learners," in *IEEE Haptics Symposium (WIP)*, 2018. pdf
17. **G. Zhao** and R. Gutierrez-Osuna, "Exemplar selection methods in voice conversion," in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2017, pp. 5525–5529. pdf demo poster

Book Chapter

18. Y. Liu, **G. Zhao**, B. Gong, Y. Li, R. Raj, N. Goel, S. Kesav, S. Gottimukkala, Z. Wang, W. Ren, and D. Tao, "Chapter 10 — Image dehazing: Improved techniques," in *Deep Learning through Sparse and Low-Rank Modeling*: Elsevier, 2019, pp. 251–262. link code

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19. Y. Liu, **G. Zhao**, B. Gong, Y. Li, R. Raj, N. Goel, S. Kesav, S. Gottimukkala, Z. Wang, W. Ren, and D. Tao, "Improved techniques for learning to dehaze and beyond: A collective study," *arXiv preprint arXiv:1807.00202*, 2018. pdf code
20. Y. Liu and **G. Zhao**, "PAD-Net: A perception-aided single image dehazing network," *arXiv preprint arXiv:1805.03146*, 2018. pdf code
21. A. Datta, **G. Zhao**, B. Ramabhadran, E. Weinstein, "LSTM acoustic models learn to align and pronounce with graphemes," *arXiv preprint arXiv:2008.06121*, 2020. (Work done as an intern at Google NYC during summer 2018.) pdf

Abstracts

22. I. Lučić Rehman, A. Silpachai, J. Levis, **G. Zhao**, and R. Gutierrez-Osuna, "Pronunciation errors — A systematic approach to diagnosis," in *L2 Pronunciation Research Workshop: Bridging the Gap between Research and Practice*, 2019, pp. 23–24. pdf
23. S. Sonsaat, E. Chukharev-Hudilainen, I. Lučić Rehman, A. Silpachai, J. Levis, **G. Zhao**, S. Ding, C. Liberatore, and R. Gutierrez-Osuna, "Golden Speaker Builder, an interactive tool for pronunciation training: User studies," in *6th International Conference on English Pronunciation: Issues & Practices (EPIP6)*, 2019, p. 72. pdf
24. S. Ding, C. Liberatore, **G. Zhao**, S. Sonsaat, E. Chukharev-Hudilainen, J. Levis, and R. Gutierrez-Osuna, "Golden Speaker Builder: an interactive online tool for L2 learners to build pronunciation models," in *Pronunciation in Second Language Learning and Teaching (PSLLT)*, 2017, pp. 25–26. pdf

Professional Service

Reviewer for:

- IEEE Transactions on Image Processing
- Heliyon
- Language Learning & Technology
- IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP): 2020, 2022
- International Conference on Advances in Signal, Image and Video Processing (SIGNAL): 2020, 2021
- Annual Conference of the International Speech Communication Association (Interspeech): 2019, 2021
- IEEE Automatic Speech Recognition and Understanding Workshop (ASRU): 2021

Teaching

Teaching Assistant: CSCE 482: Senior Capstone Design (Spring 2016)

Honors

- Graduate Student Travel Award (for Interspeech'19), Department of Computer Science and Engineering, Texas A&M; University, 2019
- Graduate Student Presentation Grant (for ICASSP'17), Office of Graduate and Professional Studies, Texas A&M; University, 2017

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- Outstanding Graduate Award, University of Science and Technology of China, 2015
- Outstanding Undergraduate Student Scholarship, University of Science and Technology of China, 2011–2014
- Second Prize @ Chinese Chemistry Olympiad (Provincial Level), Chinese Chemical Society, 2010

L2-ARCTIC Corpus

The L2-ARCTIC corpus is a multi-purpose non-native English speech dataset. I took a leading role in this project, where I designed the data collection schemes and the annotation standards. I also spent a lot of time manually cleaning the raw speech recordings and performing quality control to ensure that the speech data and annotations were consistent and high-quality. The recordings were collected at Iowa State University (ISU), led by Dr. John Levis and his students in the Department of English. The annotations were mostly done by Alif Silpachai and Ivana Lučić Rehman. The project spanned around two years. We released the first version at Interspeech 2018, and we continued to add more data to the corpus. Its most recent version is almost 2.4x the size of the initial release.

We initially designed the corpus for the accent conversion task, and that was why we chose to use the CMU-ARCTIC prompts in the first place. Along the way, we were also working on some projects related to mispronunciation detection (MPD) and realized that there were limited open-source resources for MPD. We noticed that many of the CMU-ARCTIC sentences were hard for the participants to speak, which, on the one hand, made the recording sessions difficult, on the other hand, elicited rich pronunciation errors in non-native speech productions. As a result, we decided to annotate part of the corpus for phonetic errors. All the sentences we annotated were carefully selected by Dr. Levis to reflect the pronunciation issues that might happen given the speakers' native languages.

I use this corpus in all my publications on accent conversion. I found it is well-suited for the task because it allows me to test the algorithms on speakers with different accents, fluency level, age, and gender. I also use this corpus for MPD research. To the best of my knowledge, this is probably the largest open-source annotated MPD corpus. If you are interested in using the corpus for your projects, you can find access guidelines on its official project site. I would be happy to see it being used in more projects. If you have any questions regarding downloading/using the corpus, please feel free to drop me an email.

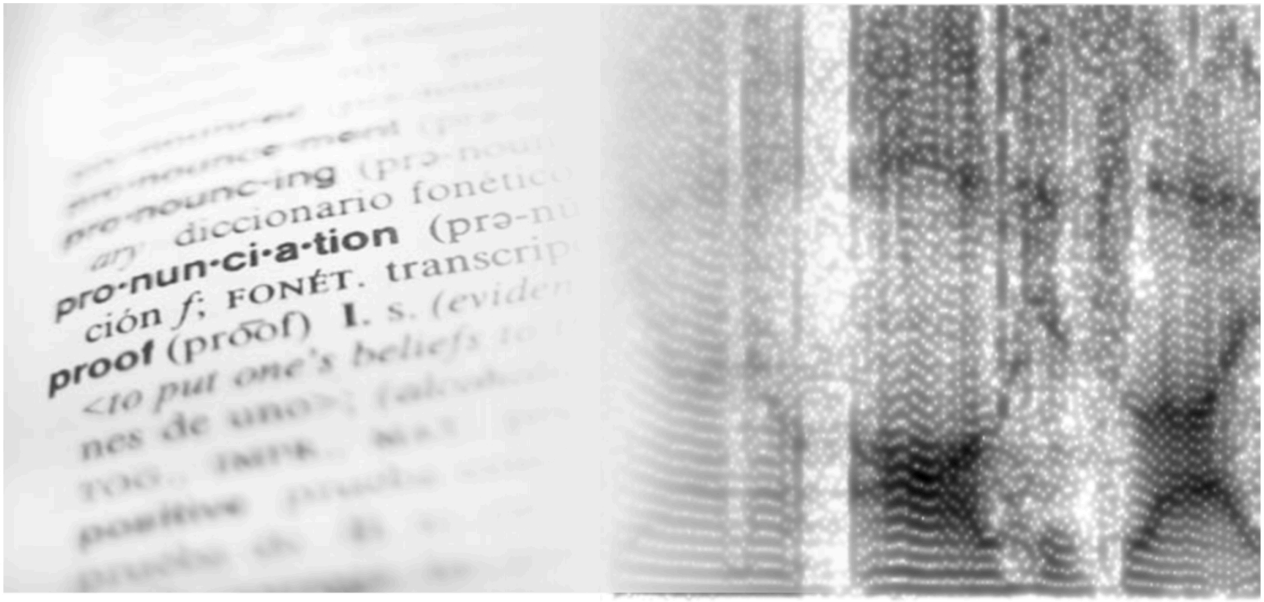
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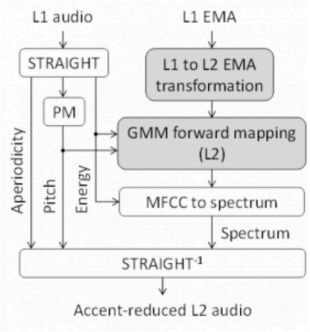
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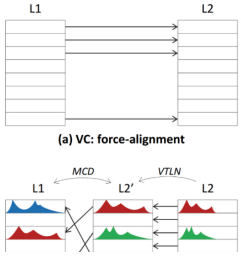
Accent conversion

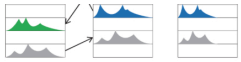
Learners of a second language practice their pronunciation by listening to and imitating utterances from native speakers. Recent research has shown that choosing a well-matched native speaker to imitate can have a positive impact on pronunciation training. Towards this goal, we are developing speech-modification techniques that can generate utterances with the vocal properties of the learner and the accent of a native speaker. This is accomplished by altering both prosodic and segmental characteristics of speech.

Our articulatory-based accent conversion is a two-step process. In the first stage, we build an articulatory synthesizer for the nonnative learner. In the next step, we drive the synthesizer with articulatory gestures recorded from a native speaker.



We have also developed an accent conversion method that relies exclusively on acoustic information. The technique is based on the standard voice conversion model but uses a different pairing of source-target frames. Unlike conventional voice conversion, where the source-target mapping is trained on **time-aligned** source and target spectral vectors from parallel utterances, in our approach the mapping is trained on pairs selected based on their **acoustic similarity** following vocal tract length normalization.





(a) Conventional approach to voice conversion; source and target utterances are paired based on their ordering in a forced-aligned parallel corpus. (b) Our approach to accent conversion: source and target utterances are paired based on their acoustic similarity following vocal-tract-length normalization (VTLN). MCD: Mel Cepstral Distortion

2021

Ding, S.; Zhao, G.; Gutierrez-Osuna, R.

Accentron: Foreign accent conversion to arbitrary non-native speakers using zero-shot learning Journal Article Forthcoming

In: Computer Speech & Language, Forthcoming.

Links | BibTeX

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Effects Of Voice Type And Task On L2 Learners' Awareness Of Pronunciation Errors Inproceedings

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2020

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Improving the Speaker Identity of Non-Parallel Many-to-Many Voice Conversion with Adversarial Speaker Recognition Inproceedings

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Lučić, I.; Silpachai, A.; Levis, J.; Zhao, G; Gutierrez-Osuna, R.

The English Pronunciation of Arabic Speakers - A Data-Driven Approach to Segmental Error Identification Journal Article

In: Language Teaching Research, 2020.

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2019

Ding, S.; Zhao, G; Liberatore, C.; Gutierrez-Osuna, R.

Learning Structured Sparse Representations for Voice Conversion Journal Article

In: IEEE Transactions on Audio, Speech and Language Processing, 28 , pp. 343-354, 2019.

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Ding, S.; Liberatore, C.; Sonsaat, S.; Lučić, I.; Silpachai, A.; Zhao, G; Chukharev-Hudilainen, E.; Levis, J.; Gutierrez-Osuna, R.

Golden speaker builder – An interactive tool for pronunciation training Journal Article

In: Speech Communication, 115 , pp. 51-66, 2019.

Links | BibTeX

Zhao, G; Ding, S.; Gutierrez-Osuna, Ricardo

Foreign Accent Conversion by Synthesizing Speech from Phonetic Posteriorgrams Inproceedings

In: Proc. Interspeech, 2019.

Links | BibTeX

Ding, S.; Gutierrez-Osuna, Ricardo

Group Latent Embedding for Vector Quantized Variational Autoencoder in Non-Parallel Voice Conversion Inproceedings

In: Proc. Interspeech, 2019.

Links | BibTeX

Zhao, G; Gutierrez-Osuna, R

Using Phonetic Posteriorgram Based Frame Pairing for Segmental Accent Conversion **Journal Article**

In: IEEE/ACM Transactions on Audio, Speech, and Language Processing, 27 (10), pp. 1649-1660, 2019, ISSN: 2329-9290.

Abstract | Links | BibTeX

2018

Levis, J.; Chukharev-Hudilainen, E.; Gutierrez-Osuna, R.; Lucic, I.; Silpachai, A.; Sonsaat, S.

Golden Speaker: Learner Experience with Computer-assisted Pronunciation Practice **Inproceedings**

In: Proc. Pronunciation in Second Language Learning and Teaching Conference, 2018.

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Ding, S.; Liberatore, C.; Gutierrez-Osuna, R.

Learning Structured Dictionaries for Exemplar-based Voice Conversion **Inproceedings**

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Zhao, G; Sonsaat, S; Silpachai, A; Lucic, I; Chukharev-Hudilainen, E; Levis, J; Gutierrez-Osuna, R

L2-ARCTIC: A Non-Native English Speech Corpus **Inproceedings**

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Improving Sparse Representations in Exemplar-Based Voice Conversion with a Phoneme-Selective Objective Function **Inproceedings**

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Accent conversion using phonetic posteriorgrams **Inproceedings**

In: Proc. ICASSP, 2018.

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Liberatore, C; Zhao, G; Gutierrez-Osuna, R

Voice Conversion through Residual Warping in a Sparse, Anchor-Based Representation of Speech **Inproceedings**

In: Proc. ICASSP, 2018.

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2016

Aryal, S; Gutierrez-Osuna, R

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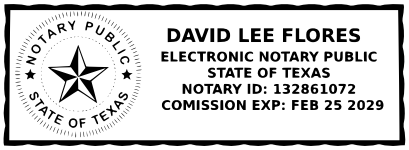
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STATE OF Texas }

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The foregoing instrument was subscribed and sworn before me this date of 01/05/2026, by Mina Ching

This notarial act was an online notarization.



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