

# Matthew Maciejewski

## Curriculum Vitae

10 Essex St, Apt 502  
Cambridge, MA 02139

☎ (970) 631-5566

✉ matt@mmaciejewski.com

## Research Interests

speech separation, speaker diarization, speech enhancement, speaker recognition, corpus enhancement, deep learning, statistical modeling, signal processing

## Education

- 2014–2021 **Ph.D., Electrical and Computer Engineering**, *Johns Hopkins University*, Baltimore, MD.  
Advisors: Sanjeev Khudanpur and Shinji Watanabe
- 2014–2017 **M.S., Electrical and Computer Engineering**, *Johns Hopkins University*, Baltimore, MD.
- 2010–2014 **B.S., Electrical and Computer Engineering**, *Carnegie Mellon University*, Pittsburgh, PA.

## Experience

- 07/2021–Present **Research Scientist**, *Amazon Alexa AI*, Cambridge, MA.  
Research in acoustic event detection and acoustic scene classification.
- 09/2014–07/2021 **Research Assistant**, *Department of Electrical and Computer Engineering, Johns Hopkins University*, Baltimore, MD.  
Research in speech processing with emphasis on conversational speech, primarily far-field speech separation. This also includes speaker diarization, speaker recognition, and speech enhancement, and results in contributions to the Kaldi ASR toolkit.
- 01/2020–04/2020 **CHiME-6 Challenge Participant**, *JHU Center for Language and Speech Processing (CLSP)*, Baltimore, MD.  
Worked on speech separation for the JHU CHiME-6 Challenge submission.
- 09/2019–11/2019 **Research Intern**, *Mitsubishi Electric Research Laboratories (MERL)*, Cambridge, MA.  
Worked on noisy and reverberant speech separation, releasing the WHAMR! corpus and improved performance through cascaded model architecture.
- 05/2018–08/2018 **CHiME-5 Challenge Participant**, *JHU Center for Language and Speech Processing (CLSP)*, Baltimore, MD.  
Worked on dereverberation and speech separation for the Hitachi-JHU CHiME-5 Challenge submission.
- 06/2017–08/2017 **JSALT 2017 Participant**, *Carnegie Mellon University*, Pittsburgh, PA.  
Worked on establishing and improving performance of diarization systems on wide-band, conversational, far-field speech.

- 05/2016–09/2016 **Software Engineer Intern**, *Spoken Communications*, Seattle, WA.  
Made improvements to the speech activity detection system and ported the speaker verification code to a new C++ framework.
- 09/2013–05/2014 **Undergraduate Researcher**, *Carnegie Mellon University*, Pittsburgh, PA.  
Worked on dereverberation of speech signals in binaural recordings.

## Publications

- 2021 **Matthew Maciejewski**, S. Watanabe, S. Khudanpur. *Speaker Verification-Based Evaluation of Single-Channel Speech Separation*. Interspeech. 2021
- 2021 **Matthew Maciejewski**, J. Shi, S. Watanabe, S. Khudanpur. *A Dilemma of Ground Truth in Noisy Speech Separation and an Approach to Lessen the Impact of Imperfect Training Data*. Computer Speech and Language (in review). 2021
- 2021 **Matthew Maciejewski**, J. Shi, S. Watanabe, S. Khudanpur. *Training Noisy Single-Channel Speech Separation with Noisy Oracle Sources: a Large Gap and a Small Step*. IEEE ICASSP. 2021
- 2020 **Matthew Maciejewski**, G. Wichern, E. McQuinn, J. Le Roux. *WHAMR!: Noisy and Reverberant Single-Channel Speech Separation*. IEEE ICASSP. 2020
- 2020 A. Arora, D. Raj, A.S. Subramanian, K. Li, B. Ben-Yair, **Matthew Maciejewski**, P. Želasko, P. Garcia, S. Watanabe, S. Khudanpur. *The JHU Multi-Microphone Multi-Speaker ASR System for the CHiME-6 Challenge*. arXiv. 2020
- 2019 **Matthew Maciejewski**, G. Sell, Y. Fujita, L.P. Garcia-Perera, S. Watanabe, and S. Khudanpur. *Analysis of Robustness of Deep Single-Channel Speech Separation Using Corpora Constructed From Multiple Domains*. IEEE WAS-PAA. 2019
- 2018 N. Kanda, R. Ikeshita, S. Horiguchi, Y. Fujita, K. Nagamatsu, X. Wang, V. Manohar, N.E.Y. Soplin, **Matthew Maciejewski**, S.J. Chen, A.S. Subramanian, R. Li, Z. Wang, J. Naradowsky, L.P. Garcia-Perera, G. Sell. *The Hitachi/JHU CHiME-5 system: Advances in speech recognition for everyday home environments using multiple microphone arrays*. Interspeech. 2018
- 2018 G. Sell, D. Snyder, A. McCree, D. Garcia-Romero, J. Villalba, **Matthew Maciejewski**, V. Manohar, N. Dehak, D. Povey, S. Watanabe, and S. Khudanpur. *Diarization is Hard: Some Experiences and Lessons Learned for the JHU Team in the Inaugural DIHARD Challenge*. Interspeech. 2018
- 2018 **Matthew Maciejewski**, D. Snyder, V. Manohar, N. Dehak, and S. Khudanpur. *Characterizing Performance of Speaker Diarization Systems on Far-field Speech using Standard Methods*. IEEE ICASSP. 2018
- 2018 N. Ryant, E. Bergelson, K. Church, A. Cristia, J. Du, S. Ganapathy, S. Khudanpur, D. Kowalski, M. Krishnamoorthy, R. Kulshreshta, M. Liberman, Y.D. Lu, **Matthew Maciejewski**, F. Metze, J. Profant, L. Sun, Y. Tsaok, Z. Yum. *Enhancement and Analysis of Conversational Speech: JSALT 2017*. IEEE ICASSP. 2018

- 2016 E. Chodroff, **Matthew Maciejewski**, J. Trmal, S. Khudanpur, J. Godfrey. *New release of Mixer-6: Improved validity for phonetic study of speaker variation and identification*. LREC. 2016
- 2015 H. Hermansky, L. Burget, J. Cohen, E. Dupoux, N. Feldman, J. Godfrey, S. Khudanpur, **Matthew Maciejewski**, S.H. Mallidi, A. Menon, T. Ogawa, V. Peddinti, R. Rose, R. Stern, M. Wiesner, K. Veselý. *Towards machines that know when they do not know: Summary of work done at 2014 Frederick Jelinek Memorial Workshop*. IEEE ICASSP. 2015
- 2015 H.M. Park, **Matthew Maciejewski**, C. Kim, R. Stern. *Robust automatic speech recognition in reverberation: onset enhancement versus binaural source separation*. The Journal of the Acoustical Society of America. 2015
- 2014 H.M. Park, **Matthew Maciejewski**, C. Kim, R. Stern. *Robust speech recognition in reverberant environments using subband-based steady-state monaural and binaural suppression*. Interspeech. 2014

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## Projects

- 03/2020–07/2021 **Semi-Supervised Noisy Speech Separation**, Documented and analyzed degradation in speech separation performance when training on synthetic mixtures of naturally noisy speech. Developed training objectives for learning partitioning of speech and noise without annotation, improving training.
- 07/2019–07/2021 **Condition-Robust Speech Separation**, Produced and released synthetic noisy and reverberant speech separation dataset WHAMR! Developed cascaded models for improved training of speech separation in these conditions.
- 01/2018–07/2021 **Speech Separation across Multiple Domains**, Developed a data cleanup framework for producing high-quality artificial overlap datasets from speech corpora and applied it to the Mixer 6 and CHiME-5 corpora, publicly releasing the subsequent datasets, and evaluated this data with self-implemented systems.
- 05/2017–07/2021 **Far-field Diarization**, Developed diarization systems for wideband far-field speech. Participated in the 2017 JSALT workshop and developed a system establishing baseline performance on the AMI Meeting Corpus. Participated in JHU HLTCOE's submission to the inaugural DIHARD diarization challenge, achieving 1st and 3rd place for the two tracks.
- 09/2017–01/2018 **Diarization in the Kaldi Toolkit**, Led the effort to merge development diarization code into the main Kaldi release. This is available in the `call-home_diarization` example recipe.
- 09/2016–05/2017 **Cleanup and Analysis of Far-Field Speech**, Was involved in an effort to automatically produce high-quality annotation of noisy, far-field speech corpora involving parent and child speech with poor-quality annotation.
- 09/2014–07/2017 **Cleanup, Annotation, and Evaluation Framework from Mixer 6**, Was involved in an effort to use automatic and human effort to improve annotation and transcription of parts of the Mixer 6 corpus. Developed a procedure to prioritize subsets of the corpus for use in speaker recognition evaluation.

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## Software Skills

Programming Python, Bash, Awk, C++

Tools PyTorch, Kaldi ASR, Chainer, Git, MATLAB