Amber Afshan

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Education

University of California, Los Angeles GPA: 3.74/4.0
Ph.D. in Electrical and Computer Engineering 2017–Expected Jan, 2022

- Thesis: Towards understanding speaker perception and its applications to automatic speaker recognition: Effects of speaking style variability
- Advisor: Prof. Abeer Alwan

University of California, Los Angeles GPA: 3.74/4.0
M.S. in Electrical Engineering 2015–2017

- Capstone Project: Predicting Clinical Evaluations of children's speech
- Advisor: Prof. Abeer Alwan

National Institute of Technology GPA:8.56/10.0
B.Tech in Electronics and Communication Engineering 2010–2014

- Capstone Project: Texture preserving spatial noise filters
- Advisor: Prof. Sumam David

Industry Experience

Research Intern June-Sep, 2020
Microsoft Corporation Seattle, WA

- Project: Sequence-level confidence classifier and its application to automatic speech recognition (ASR) customization.
- Developed a sequence-level confidence classifier with *scores aligned with ASR accuracy.*
- Designed an approach for ASR customization using confidence scores using *minimal data for maximum gains.*

Student Associate June-Aug, 2018
SRI International Menlo Park, CA

- Project: Microphone placement estimation using single microphone data in distant speech.
- Devised an approach to estimate distance of the source using a *single microphone* as opposed to traditional approaches of using a microphone array.

Student Associate June-Sep, 2017
SRI International Menlo Park, CA

- Project: Acoustic event detection and speaker state detection using acoustics in case of elderly.
- Designed systems to *detect acoustic events* in elderly assist systems to monitor their health and get timely help in case of emergencies.
- Identified features and built a system to detect the *speaker state* in case of elderly speakers.

Interim Engineering Intern June-Sep, 2016
Qualcomm San Diego, CA

- Project: Prototype for an on-chip multi-speaker ASR system with limited availability of data.
- Created an *ASR prototype* with template matching and high efficiency voice activity detection.

Research experience

Graduate Student Researcher Sep 2015-Present
UCLA Speech Processing and Auditory Perception Laboratory Los Angeles, CA

- Advisor: Prof. Abeer Alwan
- Research: Automatic speaker verification, Relation to human speaker perception, Automatic speech recognition, Emotion recognition, Unsupervised pre-training.

Research Intern May 2013-June 2015
Department of Electrical Engineering, Indian Institute of Science Bangalore, KA

- Advisor: Prof. Prasanta Kumar Ghosh
- Research: Acoustic-to-articulatory inversion, Speech recognition using articulators, Acoustic studies of vocal tremor, Electromagnetic articulography.

Research Intern May-July, 2012
Department of Electrical Engineering, Indian Institute of Science Bangalore, KA

- Advisor: Prof. Chandra Sekhar Seelamantula
- Research: Active image shape segmentation using active contours.

Selected Project Descriptions

Speaker perception and automatic speaker recognition: Effects of speaking style variability
PIs: Prof. Abeer Alwan, Prof. Jody Kreiman, and Dr. Alan McCree

- Aim: Speaker profiling by humans and machines and learning from humans to improve automatic speech recognition systems.
- Create *style-robust* speaker verification systems.
- Model *human speaker perception* in relation to speaker acoustic space.
- Re-design speaker recognition algorithms by *borrowing from perception* approaches to boost performance .
- Train distributed deep learning models on multiple GPUs.

Detecting depression using speech
PIs: Prof. Abeer Alwan and Dr. Jonathan Flint

- Aim: To detect major depressive disorders using speech.
- Used *voice quality features to model affect* and use it to detect depression in humans.

Children speech recognition: Low resource ASR
PIs: Prof. Abeer Alwan, Prof. Cynthia Breazeal, and Prof. Alison Bailey

- Aim: Automatic speech recognition of kindergarten aged children.
- Exploring *unsupervised pre-training* for *low-resource* ASR.

Acoustic-to-articulatory inversion
PI: Prof. Prasanta Kumar Ghosh

- Aim: Designing new techniques for subject independent *acoustic-to-articulatory inversion*.
- Analyzing the benefit of *acoustic normalization* on automatic speech recognition using articulators.
- Estimating *optimal sensor placement* to record electromagnetic articulatography data.

Skills

Python, Kaldi, Pytorch, MATLAB, R, HTK, ImageJ, Julia

Journal Publications

[J1] A. K. Pattem, A. Illa, A. **Afshan**, and P. K. Ghosh, "Optimal sensor placement in electromagnetic articulography recording for speech production study", *Computer speech & language*, vol. 47, pp. 157–174, 2018.

[J2] A. **Afshan** and P. K. Ghosh, "Improved subject-independent acoustic-to-articulatory inversion", *Speech Communication*, vol. 66, pp. 1–16, 2015.

Journal Publications: Under review

[U1] A. **Afshan**, J. Kreiman, and A. Alwan, "Speaker discrimination for "easy" versus "hard" voices in style-matched and -mismatched speech", 2021, Manuscript submitted for publication.

[U2] W. Pan, L. Shenhav, A. **Afshan**, A. Alwan, J. Flint, T. Liu, B. Hu, and T. Zhu, "The Discriminatory Power of Vocal Features in Detecting Mental Illnesses Under Complex Context", 2021, Manuscript submitted for publication.

Peer-reviewed Conference Publications

[C1] A. **Afshan**, K. Kumar, and J. Wu, "Sequence-level Confidence Classifier for ASR Utterance Accuracy and Application to Acoustic Models", in *Proceedings of Interspeech*, 2021, pp. 4084–4088.

[C2] R. Fan, A. **Afshan**, and A. Alwan, "Bi-APC: Bidirectional Autoregressive Predictive Coding for Unsupervised Pre-Training and its Application to Children's ASR", in *Proceedings of ICASSP*, IEEE, 2021, pp. 7023–7027.

[C3] A. **Afshan**, J. Guo, S. J. Park, V. Ravi, A. McCree, and A. Alwan, "Variable frame rate-based data augmentation to handle speaking-style variability for automatic speaker verification", in *Proceedings of Interspeech*, 2020, pp. 4318–4322.

[C4] A. **Afshan**, J. Kreiman, and A. Alwan, "Speaker discrimination in humans and machines: Effects of speaking style variability", in *Proceedings of Interspeech*, 2020, pp. 3136–3140.

[C5] A. Bailey, A. Martin, A. Pogossian, M. Perez, G. Yeung, A. Alwan, and A. **Afshan**, "Early Literacy and Oral Language Ties: Extending the range of human-computer interface for early assessment", in *AERA*, 2020.

[C6] V. Ravi, R. Fan, A. **Afshan**, H. Lu, and A. Alwan, "Exploring the Use of an Unsupervised Autoregressive Model as a Shared Encoder for Text-Dependent Speaker Verification", in *Proceedings of Interspeech*, 2020, pp. 766–770.

[C7] S. J. Park, A. **Afshan**, J. Kreiman, G. Yeung, and A. Alwan, "Target and Non-Target Speaker Discrimination by Humans and Machines", in *Proceedings of ICASSP*, IEEE, 2019, pp. 6326–6330.

[C8] V. Ravi, S. J. Park, A. **Afshan**, and A. Alwan, "Voice Quality and Between-Frame Entropy for Sleepiness Estimation", in *Proceedings of Interspeech*, 2019, pp. 2408–2412.

[C9] G. Yeung, A. **Afshan**, M. Quintero, A. Martin, S. Spaulding, H. W. Park, A. Bailey, C. Breazeal, and A. Alwan, "Towards the development of personalized learning companion robots for early speech and language assessment", in *AERA*, 2019.

[C10] G. Yeung, A. L. Bailey, A. **Afshan**, M. Tinkler, M. Q. Pérez, A. Martin, A. A. Pogossian, S. Spaulding, H. W. Park, M. Muco, *et al.*, "A robotic interface for the administration of language, literacy, and speech pathology assessments for children", in *Proceedings of SLaTE, Interspeech*, 2019, pp. 41–42.

[C11] A. **Afshan**, J. Guo, S. J. Park, V. Ravi, J. Flint, and A. Alwan, "Effectiveness of Voice Quality Features in Detecting Depression", in *Proceedings of Interspeech*, 2018, pp. 1676–1680.

[C12] S. J. Park, A. **Afshan**, Z. M. Chua, and A. Alwan, "Using Voice Quality Supervectors for Affect Identification", in *Proceedings of Interspeech*, 2018, pp. 157–161.

[C13] G. Yeung, A. **Afshan**, K. E. Ozgun, C. Kaewtip, S. M. Lulich, and A. Alwan, "Predicting Clinical Evaluations of Children's Speech with Limited Data Using Exemplar Word Template References", in *Proceedings of SLaTE, Interspeech*, 2017, pp. 161–166.

[C14] A. **Afshan** and P. K. Ghosh, "Better acoustic normalization in subject independent acoustic-to-articulatory inversion: benefit to recognition", in *Proceedings of ICASSP*, IEEE, 2016, pp. 5395–5399.

[C15] J. Guo, G. Yeung, D. Muralidharan, H. Arsikere, A. **Afshan**, and A. Alwan, "Speaker Verification Using Short Utterances with DNN-Based Estimation of Subglottal Acoustic Features", in *Proceedings of Interspeech*, 2016, pp. 2219–2222.

Conference Publications: Under review

[M1] A. **Afshan** and A. Alwan, "Attention-based conditioning methods using variable frame rate for style-robust speaker verification", Manuscript submitted for publication.

Teaching

Graduate Teaching Assistant at University of California, Los Angeles

- Digital Signal Processing — Fall 2020, Fall 2019 & Winter 2018
- Advanced Digital Speech Processing — Spring 2020
- Digital Speech Processing — Winter 2019
- Mathematics for Life Scientists — Winter 2017
- Speech and Image Processing Systems Design — Spring 2016 & Fall 2016
- Systems and Signals — Spring 2017

Awards and Honors

- Finalists for ISCA best student paper award — Interspeech, 2020
- Interspeech student travel grant — Sep, 2018
- Qualcomm Innovation Fellowship: *Semi-finalist* — 2018
- Young Female Researchers in Speech Science & Technology, Interspeech — 2016 & 2017
- National Overseas Scholarship, MHRD, India — 2015–2017

Professional Service

Reviewer

- IEEE Signal Processing Letters
- Psychiatry Research, Elsevier
- International Conference on Signal Processing & Communications