Bengt Jonas Borgström

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EDUCATION

University of California, Los Angeles

- Ph.D., Electrical Engineering, 2010
  Thesis Title: *Inference of Missing or Degraded Data for Noise Robust Speech Processing*
  Advisor: Abeer Alwan
- M.S., Electrical Engineering, 2005
  Major Field of Study: Signal Processing
  Minor Field of Study: Communication Systems
- B.S., Electrical Engineering, 2004

PROFESSIONAL EXPERIENCE

Massachusetts Institute of Technology Lincoln Laboratory, Lexington, MA

Senior Member of the Technical Staff, Artificial Intelligence Technology and Systems 2016-present & 2010-2012

- Development of novel machine learning solutions for the Department of Defense
- Design of neural network-based solutions for noise suppression and dereverberation of speech signals
- Research lead within the fields of speech, speaker, and spoken language recognition, focusing on robustness to non-ideal conditions
- Development of machine learning systems for processing of Electroencephalogram (EEG) and Magnetoencephalography (MEG) signals for applications such as Auditory Attention Decoding
- Development of signal processing systems for underwater sonar signals

Intellisis Corporation, San Diego, CA

Senior Engineering Scientist, Speech and Language Systems Team 2015-2016

- Development of multi-factor authentication security systems
- Research in noise and channel robustness of speaker verification and speech recognition systems

Broadcom Corporation, Irvine, CA

Principal Scientist, Voice and Audio Processing Team 2012-2015

- Development of low-resource signal processing and machine learning systems for mobile applications
- Design of a multi-microphone noise suppression system for cellular applications
- Research in robust Advanced Driver Assistance Systems for automotive applications

PROFESSIONAL ACTIVITIES

- Senior Member of the IEEE
- Associate Editor for the IEEE Transactions on Audio, Speech, and Language Processing
- Associate Editor for the IEEE Signal Processing Letters
- Selected member of the IEEE Spoken Language Technical Committee
- Forensics and Biometrics Track Chair for the 2018-2022 IEEE HST Conference
- Local Arrangements Chair for the 2021 IEEE WASPAA Conference

PATENTS

1. B. J. Borgström and M. S. Brandstein, *Systems and Methods for Speech Enhancement Using Attention Masking and End-to-End Neural Networks*, Application Filed 2023.

2. B. J. Borgström et al., *Systems and Methods for Improving Model-based Speech Enhancement with Neural Networks*, Granted 2022.

3. R. W. Zopf and B. J. Borgström, *Isolated Word Training and Detection Using Generated Phoneme Concatenation Models of Audio Inputs*, Granted 2020.

4. J. Thyssen and B. J. Borgström, *Single Channel Suppression of Interfering Sources*, Granted 2017.

5. B. J. Borgström, *Adaptive Modulation Filtering for Spectral Feature Enhancement* , Granted 2016.

6. J. Thyseen et al., *Multi-Microphone Source Tracking and Noise Suppression*, Granted 2016.

7. R. Chen et al., *Speaker-Identification-Assisted Speech Processing Systems and Methods*, Granted 2016.

8. R. Chen et al., *Speaker-Identification-Assisted Uplink Speech Processing Systems and Methods*, Granted 2016.

JOURNAL PUBLICATIONS

1. B. J. Borgström and M. Brandstein, *A Multiscale Autoencoder (MSAE) Framework for End-to-End Neural Network Speech Enhancement*, IEEE/ACM Transactions on Audio, Speech, and Language Processing, Vol. 32, pp. 2418-2431, 2024.

2. B. J. Borgström, *A Generative Approach to Condition-Aware Score Calibration for Speaker Verification*, IEEE/ACM Transactions on Audio, Speech, and Language Processing, Vol. 31, pp. 891-901, 2023.

3. B. J. Borgström, *Bayesian Estimation of PLDA in the Presence of Noisy Labels, with Applications to Speaker Verification*, IEEE/ACM Transactions on Audio, Speech, and Language Processing, Vol. 30, pp. 414-428, 2022.

4. B. J. Borgström et al., *Speaker Separation in Realistic Noise Environments with Applications to a Cognitively-Controlled Hearing Aid*, Neural Networks, vol. 140, pp. 136-147, 2021.

5. B. J. Borgström and M. Brandstein, *Speech Enhancement via Attention Masking Network (SEAMNET): An End-to-End System for Joint Suppression of Noise and Reverberation*, IEEE/ACM Transactions on Audio, Speech, and Language Processing, Vol. 29, pp. 515-526, 2021.

6. J. Villalba et al., *State-of-the-art Speaker Recognition with Neural Network Embeddings in the NIST SRE18 and Speakers in the Wild Evaluations*, Computer Speech and Language, Vol. 60, 2020.

7. B. J. Borgström and A. Alwan, *A Unified Framework for Designing Optimal Spectral Magnitude Estimators Assuming Maximum Likelihood Phase Equivalence of Speech and Noise*, IEEE Trans. on Audio, Speech, and Language Processing, Vol. 19, No. 8, pp. 2579-2590 , 2011.

8. B. J. Borgström and A. Alwan, *A Statistical Approach to Mel-Domain Mask Estimation for Missing-Feature ASR*, IEEE Signal Processing Letters, Vol. 17, No. 11, pp. 941-944, 2010.

9. B. J. Borgström and A. Alwan, *HMM-Based Reconstruction of Unreliable Spectrographic Data for Noise Robust Speech Recognition*, IEEE Transactions on Audio, Speech, and Language Processing, Vol. 18, No. 5, pp. 1612-1623, 2010.

10. B. J. Borgström and A. Alwan, *Improved Speech Presence Probabilities Using HMM-Based Inference, with Applications to Speech Enhancement and ASR*, Journal of Selected Topics in Signal Processing, Vol. 4, No. 5, pp. 808-815, 2011.

11. B. J. Borgström and A. Alwan, *Utilizing Compressibility in Reconstructing Spectrographic Data, with Applications to Noise Robust ASR*, IEEE Signal Processing Letters, Vol. 16, Issue 5, pp. 398-401, 2009.

12. P. H. Borgström et al., *NIMS-PL: A Cable-Driven Robot With Self-Calibration Capabilities*, IEEE Trans. Robotics, Vol. 25, No. 5, pp. 1005-1015, 2009.

13. B. J. Borgström and A. Alwan, *A Low-Complexity Parabolic Lip Contour Model With Speaker Normalization for High-Level Feature Extraction in Noise-Robust Audiovisual Speech Recognition*, IEEE Trans. Syst. Man Cybern. Part A, Vol. 38, No. 6, pp. 1273-1280, 2008.

14. P. Oh et al., *Live dynamic imaging of caveolae pumping targeted antibody rapidly and specifically across endothelium in the lung*, Nature Biotechnology, 2007.

15. B. J. Borgström et al., *Rate Allocation for Noncollaborative Multiuser Speech Communication Systems Based on Bargaining Theory*, IEEE Trans. on Audio, Speech, and Language Processing, Vol. 15, No. 4, pp. 1156-1166, 2007.

Conference Publications

1. B. J Borgström and P. Khorrami, *Adaptive Score Calibration for Content-Based Image Retrieval*, ICASSP, 2026.

2. P. Khorrami et al., *Constrained Maximum Likelihood Gaussian Score Fusion for Multimodal Deepfake Detection*, International Workshop on Biometrics and Forensics, 2025.

3. E. Singer et al., *On the Design of the MITLL Trimodal Dataset for Identity Verification*, International Workshop on Biometrics and Forensics, 2023.

4. J. Villalba et al., *Advances in speaker recognition for multilingual conversational telephone speech: The jhu-mit system for nist sre20 cts challenge*, Odyssey 2022.

5. J. Villalba et al., *Advances in Cross-Lingual and Cross-Source Audio-Visual Speaker Recognition: The JHU-MIT System for NIST SRE21*, Odyssey 2022.

6. B. J. Borgström, *Unsupervised Bayesian Adaptation of PLDA for Speaker Verification*, Interspeech, pp. 1039-1043, 2021.

7. B. J. Borgström and P. Torres-Carrasquillo, *Bayesian Estimation of PLDA with Noisy Training Labels, with Applications to Speaker Verification*, ICASSP, pp. 7594-7598, 2020.

8. J. Villalba et al., *Advances in Speaker Recognition for Telephone and Audio-Visual Data: the JHU-MIT Submission for NIST SRE19*, Odyssey, pp. 273-280, 2020.

9. J. Villalba et al., *State-of-the-Art Speaker Recognition for Telephone and Video Speech: The JHU-MIT Submission for NIST SRE18*, Interspeech, pp. 1488-1492, 2019.

10. Fred Richardson et al., *The MIT Lincoln Laboratory / JHU / EPITA-LSE LRE17 System*, Odyssey, pp. 54-59, 2018.

11. B. J. Borgström et al., *Improving Statistical Model-Based Speech Enhancement with Deep Neural Networks*, IWAENC, pp. 471-475, 2018.

12. B. J. Borgström et al., *Improving the Effectiveness of Speaker Verification Domain Adaptation with Inadequate In-domain Data*, Interspeech, 2016.

13. J. Thyssen et al., *A Novel Time-Delay-of-Arrival Estimation Technique for Multi-microphone Audio Processing*, ICASSP, pp. 21-25, 2015.

14. B. J. Borgström and A. McCree, *Supervector Bayesian Speaker Comparison*, ICASSP, pp. 7693-7697, 2013.

15. B. J. Borgström and A. McCree, *Discriminatively Trained Bayesian Speaker Comparison with I-vectors*, ICASSP, pp. 7659-7662, 2013.

16. A. McCree and B. J. Borgström, *Supervector LDA: A New Approach to Reduced-Complexity I-vector Language Recognition*, Interspeech, pp. 46-49, 2012.

17. W. M. Campbell, et al., *Exploring the Impact of Advanced Front-end Processing on NIST Speaker Recognition Microphone Tasks*, Odyssey, pp. 180-186, 2012.

18. B. J. Borgström and A. McCree, *Linear Prediction Modulation Filtering for Speaker Recognition of Reverberant Speech*, Odyssey, pp. 187-193, 2012.

19. B. J. Borgström and A. McCree, *The Linear Prediction Inverse Modulation Transfer Function (LP-IMTF) Filter, with Applications to Speaker Recognition*, ICASSP, pp. 4065-4068, 2012.

20. B. J. Borgström and A. Alwan, *Log-Spectral Amplitude Estimation With Generalized Gamma Distributions For Speech Enhancement*, ICASSP, pp. 4756-4759, 2011.

21. B. J. Borgström et al., *Efficient HMM-Based Estimation of Missing Features, with Applications to Packet Loss Concealment*, Interspeech, pp. 2394-2397, 2010.

22. L. N. Tan, et al., *Voice Activity Detection Using Harmonic Frequency Components in Likelihood Ratio Test*, ICASSP, pp. 4466-4469, 2010.

23. V. Mitra et al., *A noise-type and level-dependent MPO-based speech enhancement architecture with variable frame analysis for noise-robust speech recognition*, Interspeech, 2009.

24. B. J. Borgström and A. Alwan, *An Efficient Approximation of the Forward-Backward Algorithm to Deal with Packet Loss, with Applications to Remote Speech Recognition*, ICASSP, pp. 4425-4428, 2008.

25. B. J. Borgström and A. Alwan, *HMM-based Estimation of Unreliable Spectral Components for Noise Robust Speech Recognition*, Interspeech, pp. 1769-1772, 2008.

26. B. J. Borgström and A. Alwan, *A Packetization and Variable Bitrate Interframe Compression Scheme for Vector Quantizer-based Distributed Speech Recognition*, Interspeech, pp. 578-581, 2007.

27. J. Xue et al., *Acoustically-Driven Talking Face Synthesis using Dynamic Bayesian Networks*, ICME, pp. 1165-1168, 2006.

TEXTBOOK CHAPTERS

1. P. Torres-Carrasquillo and B. J. Borgström, *Automatic Spoken Dialect Identification*, in Similar Languages, Varieties, and Dialects, Cambridge Press, 2021.

2. B. J. Borgström et al., *Error Recovery: Channel Coding and Packetization*, in Automatic Speech Recognition on Mobile Devices and over Communication Networks, Springer Press, 2008.