

Aren Jansen

CONTACT INFORMATION

Human Language Technology
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RESEARCH INTERESTS

Automatic speech recognition, unsupervised/semi-supervised machine learning, keyword search, spoken document retrieval, information retrieval, multimedia recommendation, time series modeling and analysis, latent structure discovery, scalable algorithms for big data applications, sparse representations and models, novel applications of machine learning

EDUCATION

University of Chicago, Chicago, Illinois USA

Ph.D., Computer Science, 2008

- Advisor: Partha Niyogi
- Thesis: Geometric and Landmark-Based Approaches to Speech Representation and Recognition

M.S., Computer Science, 2005

M.S., Physics, 2003

Cornell University, Ithaca, New York USA

B.A., Physics, 2001

PROFESSIONAL & ACADEMIC EXPERIENCE

Johns Hopkins University, Baltimore, Maryland USA

Senior Research Scientist, Human Language Technology Center of Excellence
Assistant Research Professor, Dept. of Electrical and Computer Engineering

October, 2009 - Present

Research includes the development of zero resource speech technologies that require little or no language-specific resources, the development of novel acoustic models for speech recognition, and various speech retrieval technologies. Academic duties include advising graduate students, serving on thesis committees, and contributing to various undergraduate and graduate courses.

University of Chicago, Chicago, Illinois USA

Postdoctoral Scholar

September, 2008 - September, 2009

Research included studies of novel strategies for automatic speech recognition, including unsupervised acoustic space modeling and point process-based computational models for lexical access.

Graduate Student/Research Assistant

September, 2001 - September, 2008

Activities included Ph.D. research in computer science, graduate-level course work in physics and computer science, and high-energy particle physics research conducted for the KTeV experiment at Fermilab.

Teaching Assistant

September, 2001 - September, 2008

Various duties included discussion section/lab leading, substitute lecturing, assignment preparation, grading, and tutoring. Assisted for two physics courses and ten computer science courses covering C/C++/Java/Web programming, computer systems/architecture, computer graphics, and speech recognition.

Cornell University, Ithaca, New York USA

Research Assistant

May, 1999 - August, 2001

Work conducted for the CLEO-3 particle physics experiment included software engineering and senior-year graduate-level research.

- JOURNAL ARTICLES
1. Aren Jansen and Partha Niyogi. "Intrinsic Spectral Analysis." *IEEE Transactions on Signal Processing*, 2013.
 2. Aren Jansen and Partha Niyogi. "Point Process Models for Spotting Keywords in Continuous Speech." *IEEE Transactions on Acoustics, Speech, and Language Processing*, 2009.
 3. Aren Jansen and Partha Niyogi. "Point Process Models for Event-Based Speech Recognition." *Speech Communication*, 2009.
 4. Aren Jansen and Partha Niyogi. "Modeling the Temporal Dynamics of Distinctive Feature Landmark Detectors for Speech Recognition." *J. Acoust. Soc. Am.*, 124(3):1739–58, September 2008.

- PEER-REVIEWED
CONFERENCE
ARTICLES
1. Herman Kamper, Aren Jansen, and Sharon Goldwater. "Fully Unsupervised Small-Vocabulary Speech Recognition Using a Segmental Bayesian Model." *Proceedings of Interspeech*, Dresden, Germany, 2015.
 2. Vince Lyzinski, Gregory Sell, and Aren Jansen. "An Evaluation of Graph Clustering Methods for Unsupervised Term Discovery." *Proceedings of Interspeech*, Dresden, Germany, 2015.
 3. Daniel Renshaw, Herman Kamper, Aren Jansen, and Sharon Goldwater. "A Comparison of Neural Network Methods for Unsupervised Representation Learning on the Zero Resource Speech Challenge." *Proceedings of Interspeech*, Dresden, Germany, 2015.
 4. Maarten Versteegh, Roland Thiollere, Thomas Schatz, Xuan Nga Cao, Xavier Anguera, Aren Jansen, and Emmanuel Dupoux. "The Zero Resource Speech Challenge 2015." *Proceedings of Interspeech*, Dresden, Germany, 2015.
 5. Keith Levin, Aren Jansen, and Ben Van Durme. "Segmental Acoustic Indexing for Zero Resource Keyword Search." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Brisbane, Australia, 2015.
 6. Jonathan Wintrobe, Greg Sell, Aren Jansen, Michelle Fox, Daniel Garcia-Romero, and Alan McCree. "Content-Based Recommender Systems for Spoken Documents." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Brisbane, Australia, 2015.
 7. Herman Kamper, Micha Elsner, Aren Jansen, and Sharon Goldwater. "Unsupervised Neural Network-Based Feature Extraction Using Weak Top-Down Constraints." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Brisbane, Australia, 2015.
 8. Jerome White, Douglas Oard, Aren Jansen, Jiaul Paik, and Rashmi Sankepally. "Using Zero-Resource Spoken Term Discovery for Ranked Retrieval." *Proceedings of NAACL-HLT*. Denver, CO, 2015.
 9. Douglas Oard, Rashmi Sankepally, Jerome White, Aren Jansen, and Craig Harman. "A Test Collection for Spoken Gujarati Queries." *Proceedings of SIGIR*. Santiago, Chile, 2015.
 10. Herman Kamper, Aren Jansen, Simon King, and Sharon Goldwater. "Unsupervised Lexical Clustering of Speech Segments Using Fixed Dimensional Acoustic Embeddings." *Proceedings of the Workshop on Spoken Language Technologies*, Lake Tahoe, CA, 2014.
 11. Jan Trmal, Guoguo Chen, Daniel Povey, Sanjeev Khudanpur, Pegah Ghahremani, Xiaohui Zhang, Chunxi Liu, Aren Jansen, Dietrich Klakow, David Yarowsky, and Florian Metze. "A Keyword Search System Using Open Source Software." *Proceedings of the Workshop on Spoken Language Technologies*, Lake Tahoe, CA, 2014.
 12. Chunxi Liu, Aren Jansen, Guoguo Chen, Keith Kintzley, Jan Trmal and Sanjeev Khudanpur. "Low Resource Open Vocabulary Keyword Search Using Point Process Models." *Proceedings of Interspeech*, Singapore, 2014.

13. Aren Jansen, Daniel Garcia-Romero, Pascal Clark, and Jaime Hernandez-Cordero. "Unsupervised Idiolect Discovery for Speaker Recognition." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Florence, Italy, 2013.
14. Keith Kintzley, Aren Jansen, and Hynek Hermansky. "Featherweight Phonetic Keyword Search for Conversational Speech." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Florence, Italy, 2013.
15. Bogdan Ludusan, Maarten Versteegh, Aren Jansen, Guillaume Gravier, Xuan-Nga Cao, Mark Johnson and Emmanuel Dupoux. "Bridging the Gap between Speech Technology and Natural Language Processing: An Evaluation Toolbox for Term Discovery Systems." *Proceedings of Language Resources and Evaluation Conference*, Reykjavic, Iceland, 2014.
16. Keith Levin, Katharine Henry, Aren Jansen and Karen Livescu. "Fixed-Dimensional Acoustic Embeddings of Variable-Length Segments in Low-Resource Settings." *Proceedings of ASRU*. Olomouc, Czech Republic, 2013. (**Student Paper Award**)
17. Keith Kintzley, Aren Jansen, and Hynek Hermansky. "Text-to-Speech Inspired Duration Modeling for Improved Whole-Word Acoustic Models." *Proceedings of Interspeech*. Lyon, France, 2013.
18. Atta Norouzi, Richard Rose, and Aren Jansen. "Semi-Supervised Manifold Learning Approaches for Spoken Term Verification. ." *Proceedings of Interspeech*. Lyon, France, 2013.
19. Thomas Schatz, Vijayaditya Peddinti, Francis Bach, Aren Jansen, Hynek Hermansky, and Emmanuel Dupoux. "Evaluating Speech Features with the Minimal-Pair ABX Task: Analysis of the Classical MFC/PLP Pipeline." *Proceedings of Interspeech*. Lyon, France, 2013.
20. Aren Jansen, Samuel Thomas, and Hynek Hermansky. "Weak Top-Down Constraints for Unsupervised Acoustic Model Training." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Vancouver, BC, Canada, 2013.
21. Aren Jansen, Emmanuel Dupoux, Sharon Goldwater, Mark Johnson, Sanjeev Khudanpur, Kenneth Church, Naomi Feldman, Hynek Hermansky, Florian Metze, Richard Rose, Michael Seltzer, Pascal Clark, Ian McGraw, Balakrishnan Varadarajan, Erin Bennett, Benjamin Borschinger, Justin Chiu, Ewan Dunbar, Abdellah Fourtassi, David Harwath, Chia-ying Lee, Keith Levin, Atta Norouzi, Vijayaditya Peddinti, Rachael Richardson, Thomas Schatz, and Samuel Thomas. "A Summary of the 2012 CLSP Workshop on Zero Resource Speech Technologies and Models of Early Language Acquisition." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Vancouver, BC, Canada, 2013.
22. Pascal Clark, Harish Mallidi, Aren Jansen, and Hynek Hermansky. "Frequency Offset Correction in Speech without Detecting Pitch." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Vancouver, BC, Canada, 2013.
23. Atta Norouzi, Richard Rose, Sina Hamidi Ghalehjeh, and Aren Jansen. "Zero Resource Graph-Based Confidence Estimation for Open Vocabulary Spoken Term Detection." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Vancouver, BC, Canada, 2013.
24. Aren Jansen, Benjamin Van Durme, and Pascal Clark. "The JHU-HLTCOE Spoken Web Search System for MediaEval 2012." *Proceedings of the MediaEval 2012 Workshop*.
25. Aren Jansen and Benjamin Van Durme. "Indexing Raw Acoustic Features for Scalable Zero Resource Search." *Proceedings of Interspeech*. Portland, Oregon, 2012.
26. Aren Jansen, Samuel Thomas, and Hynek Hermansky. "Intrinsic Spectral Analysis for Zero and High Resource Speech Recognition." *Proceedings of Interspeech*. Portland, Oregon, 2012.

27. Keith Kintzley, Aren Jansen, and Hynek Hermansky. "MAP Estimation of Whole-Word Acoustic Models with Dictionary Priors." *Proceedings of Interspeech*. Portland, Oregon, 2012. (**Student Paper Award**)
28. Keith Kintzley, Aren Jansen, Ken Church, and Hynek Hermansky. "Inverting the Point Process Model for Fast Phonetic Keyword Search." *Proceedings of Interspeech*. Portland, Oregon, 2012.
29. Atta Norouzian, Aren Jansen, Richard Rose, and Samuel Thomas. "Exploiting Discriminative Point Process Models for Spoken Term Detection." *Proceedings of Interspeech*. Portland, Oregon, 2012.
30. Samuel Thomas, Sriram Ganapath, Aren Jansen, and Hynek Hermansky. "Data-Driven Posterior Features for Low Resource Speech Recognition Applications." *Proceedings of Interspeech*. Portland, Oregon, 2012.
31. Aren Jansen and Benjamin Van Durme. "Efficient Spoken Term Discovery Using Randomized Algorithms." *Proceedings of ASRU*. Hawaii, USA, 2011.
32. Damianos Karakos, Mark Dredze, Kenneth Church, Aren Jansen, and Sanjeev Khudanpur. "Estimating Document Frequencies in a Speech Corpus." *Proceedings of ASRU*. Hawaii, USA, 2011.
33. Aren Jansen and Ken Church. "Towards Unsupervised Training of Speaker Independent Acoustic Models." *Proceedings of Interspeech*. Florence, Italy, 2011.
34. Michael A. Carlin, Samuel Thomas, Aren Jansen, and Hynek Hermansky. "Rapid Evaluation of Speech Representations for Spoken Term Discovery." *Proceedings of Interspeech*. Florence, Italy, 2011.
35. Keith Kintzley, Aren Jansen, and Hynek Hermansky. "Event Selection from Phone Posteriorgrams Using Matched Filters." *Proceedings of Interspeech*. Florence, Italy, 2011.
36. Aren Jansen. "Whole Word Discriminative Point Process Models." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Prague, Czech Republic, 2011.
37. Geoffrey Zweig, Patrick Nguyen, Dirk Van Compernelle, Kris Demuyne, Les Atlas, Pascal Clark, Greg Sell, Meihong Wang, Fei Sha, Hynek Hermansky, Damianos Karakos, Aren Jansen, Samuel Thomas, Sivaram G.S.V.S., Sam Bowman, and Justine Kao. "Speech Recognition with Segmental Conditional Random Fields: A Summary of the JHU CLSP 2010 Summer Workshop." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Prague, Czech Republic, 2011.
38. Aren Jansen, Nima Mesgarani, and Partha Niyogi. "Point Process Models of Spectro-Temporal Modulation Events for Speech Recognition." *Proceedings of the Asilomar Conference on Signals, Systems, and Computers*. Pacific Grove, CA, USA, 2010.
39. Mark Dredze, Aren Jansen, Glen Coppersmith, and Ken Church. "NLP on Spoken Documents without ASR." *Proceedings of EMNLP*. Cambridge, MA, 2010.
40. Aren Jansen, Ken Church, and Hynek Hermansky. "Towards Spoken Term Discovery at Scale with Zero Resources." *Proceedings of Interspeech*. Makuhari, Japan, 2010
41. Aren Jansen and Partha Niyogi. "Detection-Based Speech Recognition with Sparse Point Process Models." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Dallas, Texas, USA, 2010.
42. Aren Jansen and Partha Niyogi. "Robust Keyword Spotting with Rapidly Adapting Point Process Models." *Proceedings of Interspeech*. Brighton, England, 2009.
43. Aren Jansen and Partha Niyogi. "A Hierarchical Point Process Model for Speech Recognition." *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*. Las Vegas, Nevada, USA, 2008.

44. Aren Jansen and Partha Niyogi. "Semi-Supervised Learning of Speech Sounds." *Proceedings of Interspeech*. Antwerp, Belgium, 2007.
45. Aren Jansen and Partha Niyogi. "Intrinsic Fourier Analysis on the Manifold of Speech Sounds." *Proceedings of the International Conference on Acoustics Speech, and Signal Processing*. Toulouse, France, 2006. **(Student Paper Award)**

TECHNICAL
REPORTS AND
THESES

1. Douglas W. Oard, Jerome White, Jiaul Paik, Rashmi Sankepally and Aren Jansen. "The FIRE 2013 Question Answering for the Spoken Web Task." *Fifth Forum for Information Retrieval Evaluation*. New Delhi, India, 2013.
2. Aren Jansen and Partha Niyogi. "An Experimental Evaluation of Keyword-Filler Hidden Markov Models." Tech. Report TR-2009-02. Dept. of Computer Science, Univ. of Chicago, 2009.
3. Aren Jansen and Partha Niyogi. "Point Process Models for Spotting Keywords in Continuous Speech." Tech. Report TR-2008-09. Dept. of Computer Science, Univ. of Chicago, 2008.
4. Aren Jansen and Partha Niyogi. "Point Process Models for Event-Based Speech Recognition." Tech. Report TR-2008-04. Dept. of Computer Science, Univ. of Chicago, 2008.
5. Aren Jansen and Partha Niyogi. "A Probabilistic Speech Recognition Framework Based on the Temporal Dynamics of Distinctive Feature Landmark Detectors." Tech. Report TR-2007-07. Dept. of Computer Science, Univ. of Chicago, 2007.
6. Aren Jansen and Partha Niyogi. "A Geometric Perspective on Speech Sounds." Tech. Report TR-2005-08. Dept. of Computer Science, Univ. of Chicago, 2005. (Journal article in preparation)
7. Aren Jansen. "Geometric and Landmark-Based Approaches to Speech Representation and Recognition." Ph.D. Thesis, Dept. of Computer Science, Univ. of Chicago, 2008.
8. Aren Jansen. "The Manifold Nature of Vowel Sounds." Master's Paper, Dept. of Computer Science, Univ. of Chicago, 2005.

HONORS AND
AWARDS

Paper Awards:

- 2013 IEEE Workshop on Automatic Speech Recognition and Understanding (ASRU)
- 2012 Conference of the International Speech Communication Association (Interspeech)
- 2006 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

University of Chicago:

- University of Chicago nominee for the 2008 ACM Doctoral Dissertation Award
- GAANN Fellowship Recipient, 2001 & 2002

Cornell University:

- Graduated *Magna Cum Laude* in Physics with distinction in all subjects
- Awarded 2001 Paul Hartman Prize in Experimental Physics for quality of undergraduate research and lab work
- Two-time recipient of the Hellen and Arnoldus Goudsmit scholarship, 1999 & 2000

PROFESSIONAL
SERVICE

Co-Organizer, 2015 ICASSP Special Session on Speech Processing for Languages without Written Forms
 Co-Lead, 2014 HLTCOE SCALE Workshop on Content-Based Recommendation for Spoken Documents
 Co-Lead, 2012 CLSP Summer Workshop on Zero Resource Speech Technologies
 Technical Program Organizer, 2013 IEEE Workshop on Automatic Speech Recognition and Understanding
 NSF Panelist

Regular reviewer for the following journals and international conferences:

- *Computer Speech and Language*
- *HLT/NAACL*
- *Journal of the Acoustical Society of America*
- *IEEE International Conference on Acoustics, Speech, and Signal Processing*
- *IEEE Signal Processing Letters*
- *IEEE Transactions on Audio, Speech, and Language Processing*
- *IEEE Transactions on Neural Networks*
- *IEEE Transactions on Pattern Analysis and Machine Intelligence*
- *IEEE Transactions on Signal Processing*
- *IEEE Workshop on Automatic Speech Recognition and Understanding*
- *Interspeech*
- *Neural Computation*
- *Speech Communication*