

# CURRICULUM VITA

**Richard M. Stern, Jr.**

Department of Electrical and Computer Engineering  
Carnegie Mellon University  
Pittsburgh, PA 15213  
Phone: (412) 268-2535  
FAX: (412) 268-3890

513 Emerson Street  
Pittsburgh, PA 15206  
Cell phone: (412) 916-7386

**Email:** rms@cs.cmu.edu  
**Citizenship:** U.S.A.

[www.ece.cmu.edu/~rms](http://www.ece.cmu.edu/~rms)

## PROFESSIONAL INTERESTS

Automatic speech recognition, auditory perception, acoustics, signal processing, biomedical instrumentation

## EDUCATION

Ph.D. (1977) Electrical Engineering and Computer Science  
Massachusetts Institute of Technology, Cambridge, MA

M.S. (1972) Electrical Engineering and Computer Sciences  
University of California, Berkeley, CA

S.B. (1970) Electrical Engineering  
Massachusetts Institute of Technology, Cambridge, MA

## EXPERIENCE

1995 - present Professor of Electrical and Computer Engineering  
Carnegie Mellon University.

1988 - present Associate Professor and Professor by Courtesy, Language  
Technologies Institute, Computer Science Department, Biomedical  
Engineering Department

2009 - present Lecturer, School of Music  
Carnegie Mellon University

1995 - 2003 Associate Director of the Information Networking Institute  
Carnegie Mellon University

1982 - 1995 Associate Professor of Electrical and Biomedical Engineering  
Carnegie Mellon University

1985 Visiting Professor in Speech and Communication Sciences, Nippon  
Telegraph and Telephone Electrical Communications Laboratory,  
Tokyo, Japan

1977 - 1982 Assistant Professor of Electrical and Biomedical Engineering  
Carnegie Mellon University

Patent Owner Blitzsafe Texas, LLC – Exhibit 2002

1979 - 1981                      Adjunct Assistant Professor of Otolaryngology  
University of Pittsburgh School of Medicine

1973 - 1976                      Teaching and Research Assistant, Department of Electrical  
Engineering, Massachusetts Institute of Technology

**PROFESSIONAL ACTIVITIES (partial listing)**

Distinguished Lecturer, International Speech Communication Association, 2008-2009.

General Chair, INTERSPEECH International Conference on Spoken Language Processing, September, 2006.

Technical Program Co-Chair, IEEE Workshop on Automatic Speech Recognition and Understanding, December 2005.

Technical Program Chair, 141<sup>st</sup> meeting of the Acoustical Society of America, June 2002.

General Chair, DARPA Spoken Language Technologies Workshop, March, 1994.

Publications Chair, ARPA Spoken Language Technology and Applications Day, April, 1993.

Publications Chair, IEEE Workshop on Applications of Signal Processing to Audio and Acoustics, October, 1993.

Chair, standing DARPA Speech and Natural Language Workshop Organizing Committee, 1991 - 1992.

Secretary, ARPA Spoken Language Coordinating Committee, 1990 - 1995.

General Chair, DARPA Speech and Natural Language Workshop, June, 1990.

International Advisory Board, International Speech Communication Association, 2006 - present.

International Advisory Board, Center for Speech and Language Technologies, Tsinghua University, Beijing, China, 2007 - present.

Chair, Selection Committee for IEEE James L. Flanagan Speech & Audio Processing Award, 2006 - 2008.

IEEE Signal Processing Society Technical Committee on Audio and Electroacoustics, 1991 - 1995.

IEEE Signal Processing Society Technical Committee on Speech, 1993 - 1997.

Editorial board, *Journal of Computer Speech and Language*, 1994 - present.

Editorial board, *Free Speech Journal*, 1996 - 1998.

Ongoing collaborative research in binaural hearing with the Department of Otolaryngology at the University of Connecticut Medical School, Farmington, CT.

Member of Institute of Electrical and Electronics Engineers, Acoustical Society of America,

International Speech Communication Association, Association for Research in Otolaryngology, Audio Engineering Society

Reviewer for National Science Foundation, International Speech Communication Association, IEEE, *J. Acoust. Soc. Amer.*, *Hearing Research*, *IEEE Transactions on Signal Processing*, *IEEE Transactions on Speech and Language*, *IEEE Transactions on Systems, Man, and Cybernetics*, and *Communications of the Association of Computing Machinery*.

## HONORS AND AWARDS

Fellow, Institute of Electrical and Electronics Engineers (IEEE)

Fellow, International Speech Communication Association (ISCA)

Fellow, Acoustical Society of America (ASA)

Distinguished Lecturer of the International Speech Communication Association, 2008 to 2009

Allen Newell Award for Research Excellence, Carnegie Mellon University Department of Computer Science, 1992

IEEE Student Branch Award for Teacher of the Year, Carnegie Mellon University Department of Electrical Engineering, 1979

## PUBLICATIONS AND PAPERS

### Papers in Archival Journals

STERN, R. M., COLBURN, H. S., BERNSTEIN, L. R., AND TRAHOTIS, C. (2018). "Current fMRI data do not constrain how the human midbrain represents interaural time delay," *Journal of the Association for Research in Otolaryngology* (submitted for publication).

DIETZ, M., LESTANG, J.-H., MAJDAK, P., STERN, R. M., MARQUARDT, T., EWERT, S. D., HARTMANN, W. M., and GOODMAN, D. F. M. (2017). "A Framework for Testing and Comparing Binaural Models," *Hearing Research* **360**:92-106.

DE LA CALLE SILOS, F., and STERN, R. M. (2017). "Synchrony-based feature extraction for robust automatic speech recognition," *IEEE Signal Processing Letters* **24**:1158-1162.

FREDES, J., NOVOA, J., KING, S., STERN, R. M., and BECERRA YOMA, N. (2017). "Locally-normalized filter banks applied to deep neural network-based robust speech recognition," *IEEE Signal Processing Letters* **24**:377-381.

KIM, C., and STERN, R. M. (2016). "Power-normalized cepstral coefficients (PNCC) for robust speech recognition," *IEEE Trans. on Audio, Speech, and Language Processing* **24**:1315-1329.

CHO, B. J., KWON, H. Cho, J.-W., KIM, C., STERN, R. M. and PARK, H.-M. (2016). "A subband-based stationary-component suppression method using harmonics and power ratio for reverberant speech recognition," *IEEE Signal Processing Letters*, **23**:780-784.

ROMIGH, G. D., BRUNGART, D. S., STERN, R. M., and SIMPSON, B. D. (2015). "Efficient real spherical harmonic representation of head-related transfer functions," *IEEE Journal of Selected Topics in Signal Processing*, **9**: 921-930, August 2015.

POBLETE, V., ESPIC, F., KING, S., STERN, R. M., HUENEPAN, F., and BECERRA YOMA, N. (2015). "A perceptually-motivated low-complexity channel normalization technique applied to speaker verification." *Computer Speech and Language*, **31**:1-27, 2015.

POBLETE, V., BECERRA YOMA, N., and STERN, R. M. (2014). "Optimizing the parameters characterizing sigmoidal rate-level functions based on acoustic features," *Speech Communication*, **56**:19-34, January 2014.

HERMANSKY, H., COHEN, J. R., and STERN, R. M. (2013). "Perceptual properties of current speech recognition technology," *Proc. IEEE* **101**:1968-1985, September 2013.

STERN, R. M., and MORGAN, N. (2012). "Hearing is believing: biologically-inspired methods for robust speech recognition," *IEEE Signal Processing Magazine* **29**:34-43, November, 2012.

CHIU, Y.-H. B., RAJ, B., and STERN, R. M. (2012). "Learning-based auditory encoding for robust speech recognition," *IEEE Trans. on Audio, Speech, and Language Processing* **20**:900-914, March 2012.

KIM, W., and STERN, R. M. (2011). "Mask classification for missing-feature reconstruction for robust speech recognition," *Speech Communication*, **53**:1-11, January 2011.

PARK, H.-M., and STERN, R. M. (2009). "Spatial Separation of Speech Signals using Continuously-Variable Weighting Factors Estimated from Comparisons of Zero Crossings," *Speech Communication Journal*, **51**(1):15-25, January 2009.

SELTZER, M. L., and STERN, R. M. (2006). "Subband Likelihood-Maximizing Beamforming for Speech Recognition in Reverberant Environments," *IEEE Transactions of Speech, Language, and Audio Processing* **14**(6): 2109-2121, November 2006.

RAJ, B., and STERN, R. M. (2005). "Missing-Feature Methods for Robust Automatic Speech Recognition," *IEEE Signal Processing Magazine*, September 2005.

KIM, N. S., LIM, W., and STERN, R. M. (2005). "Feature compensation based on switching linear dynamic model," *IEEE Signal Processing Letters*, **12**(6): 473-476.

SELTZER, M. L., RAJ, B., and STERN, R. M. (2004). "Likelihood-Maximizing Beamforming for Robust Hands-Free Speech Recognition," *IEEE Transactions of Speech and Audio Processing*, **12**(5): 489-498, September 2004.

OBUCHI, Y., HATAOKA, N., and STERN, R. M. (2004), "Normalization of Time-Derivative Parameters for Robust Speech Recognition in Small Devices," *IEICE Trans. on Information and Systems*, **87-D**(4): 1004:1011, April 2004.

RAJ, B., SELTZER, M. L., and STERN, R. M. (2004), "Reconstruction of Missing Features for Robust Speech Recognition," *Speech Communication Journal*, **43**(4): 275-296, September 2004.

SELTZER, M. L., RAJ, B., and STERN, R. M. (2004). "A Bayesian Framework for Spectrographic Mask Estimation for Missing Feature Speech Recognition," *Speech Communication Journal*, **43**(4): 379-393, September 2004.

SINGH, R., RAJ, B., and STERN, R. M. (2001), "Automatic Generation of Sub-Word Units for Speech Recognition Systems," *IEEE Trans. on Speech and Audio Proc.* **10**(2):89-99.

HUERTA, J. M., and STERN, R. M. (2001). "Distortion-Class Modeling for Robust Speech Rec-

ognition under GSM RPE-LTP Coding," *Speech Communication Journal*, **34**:213-225 (invited paper).

MORENO, P. J., RAJ, B., and STERN, R. M. (1998). "Data-Driven Environmental Compensation for Speech Recognition: A Unified Approach," *Speech Communication Journal*, **24**: 267-85.

STERN, R. M., and SHEAR, G. D. (1996a) "Lateralization and Detection of Low-Frequency Binaural Stimuli: Effects of Distribution of Internal Delay," *J. Acoust. Soc. Amer.* **100**: 2278-2288.

STERN, R. M., and SHEAR, G. D. (1996b) "Lateralization and Detection of Low-Frequency Binaural Stimuli: Specification of the Extended Position-Variable Model," *Physics Auxiliary Publication Service*, AIP document E-JASMA-100-2278- 0.175MB via <http://www.aip.org/epaps/epaps.html>.

TRAHIOTIS, C., and STERN, R. M. (1994) "Across-Frequency Interaction in Lateralization of Complex Binaural Stimuli," *J. Acoust. Soc. Amer.* **96**: 3804- 3806 (L).

STERN, R. M., ZEPPEFELD, T., and SHEAR, G. D. (1991). "Lateralization of Rectangularly-Modulated Noise: An Explanation for Counterintuitive Reversals," *J. Acoust. Soc. Amer.* **90**: 1901-1907.

COAST, D. A., STERN, R. M., CANO, G. G., and BRILLER, S. A. (1990). "An Approach to Cardiac Arrhythmia Analysis Using Hidden Markov Models," *IEEE Trans. Biomed. Eng.* **37**: 826-836.

TRAHIOTIS, C., and STERN, R. M. (1989). "Lateralization of Bands of Noise: Effects of Bandwidth and Differences of Interaural Time and Phase," *J. Acoust. Soc. Amer.* **86**: 1285-1293.

RUDNICKY, A. I., and STERN, R.M. (1989). "Spoken Language Research at Carnegie Mellon," *Speech Technology Magazine* **4**: 38-43.

STERN, R. M., ZEIBERG, A. S., and TRAHIOTIS, C. (1988). "Lateralization of Complex Binaural Stimuli: A Weighted Image Model," *J. Acoust. Soc. Amer.* **84**, 156-165.

STERN, R. M., and LASRY, M. J. (1987). "Dynamic Speaker Adaptation for Feature-Based Isolated Letter Recognition," *IEEE Trans. on Acoustics, Speech, and Signal Processing* **35**: 751-763.

STERN, R. M., and COLBURN, H. S. (1985). "Lateral-Position Models of Interaural Discrimination," *J. Acoust. Soc. Amer.* **77**: 753-755.

STERN, R. M., and COLBURN, H. S. (1985). "Subjective Lateral Position and Interaural Discrimination," *Physics Auxiliary Publication Service*, AIP document no. PAPS JASMA-77-753-29.

LASRY, M. J., and STERN, R. M. (1984). "A Posteriori Estimation of Correlated Jointly Gaussian Mean Vectors," *IEEE Trans. on Pattern Anal. and Mach. Intel.* **6**: 530-535.

CROWLEY, J. L., and STERN, R. M., Jr. (1984). "Fast Computation of the Difference of Low Pass (DOLP) Transform," *IEEE Transactions on Pattern Analysis and Machine Intelligence* **6**: 212-222.

STERN, R. M., Jr., SLOCUM, J. E., and PHILLIPS, M. S. (1983). "Interaural Time and Amplitude Discrimination in Noise", *J. Acoust. Soc. Amer.* **73**:1714-1722.

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