

SELIN AVIYENTE

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Education:

Ph.D. Electrical Engineering	University of Michigan	2002
M.S. Electrical Engineering	University of Michigan	1999
B.S. Electrical Engineering	Bogazici University	1997

Professional Employment:

2002-present	Assistant Professor, Michigan State University
1999-2002	Graduate Student Research Assistant, University of Michigan
1997-1999	Graduate Student Instructor, University of Michigan

Awards and Honors:

1. NSF CAREER Award 2008.
2. Withrow Teaching Award, Department of Electrical and Computer Engineering, Michigan State University, 03/05.
3. Distinguished Achievement Award, College of Engineering, University of Michigan, 03/01.
4. Barbour Scholar, Rackham School of Graduate Studies, University of Michigan, 09/00-05/01.
5. Miller Fellowship, Department of Electrical Engineering and Computer Science, University of Michigan, 1/99-12/99.
6. Sloan Summer Research Fellowship for Women in Engineering and Sciences, 05/98-09/98.

Publications:

Book Chapters:

[1] W. J. Williams and S. Aviyente, "Spectrogram Decompositions of Time-Frequency Distributions," pp. 260-266, in *Time-Frequency Signal Analysis and Processing*, edited by B.Boashash, Elsevier, 2003.

Journal Papers:

[1] S. Aviyente, L. W. Brakel, R. K. Kushwaha, M. Snodgrass, H. Shevrin and W. J. Williams, "Characterization of Event Related Potentials Using Information Theoretic Distance Measures," *IEEE Transactions on Biomedical Engineering*, vol. 51, pp. 737-743, May 2004.

[2] S. Aviyente and W. J. Williams, "A Centrosymmetric Kernel Decomposition for Time-Frequency Distribution Computation," *IEEE Transactions on Signal Processing*,

vol. 52, pp. 1574-1584, June 2004.

[3] S. Aviyente and W. J. Williams, "Minimum Entropy Time-Frequency Distributions", *IEEE Signal Processing Letters*, vol. 12, no. 1, pp. 37-40, January 2005.

[4] S. Aviyente and W. J. Williams, "Multitaper Marginal Time-Frequency Distributions," *Signal Processing*, vol. 86, no. 2, pp. 279-295, February 2006.

[5] K. Huang and S. Aviyente, "Information Theoretic Wavelet Packet Subband Selection for Texture Classification," *Signal Processing*, vol. 86, no. 7, pp. 1410-1420, July 2006.

[6] S. A. Khayam, H. Radha, S. Aviyente and J. R. Deller, "Markov and multifractal wavelet models for wireless MAC-to-MAC channels," *Performance Evaluation*, vol. 64, no. 4, pp. 298-314, May 2007.

[7] W. Zanardelli, E. Strangas and S. Aviyente, "Identification of Intermittent Electrical and Mechanical Faults in Permanent AC Drives Based on Time-Frequency Analysis," *IEEE Transactions on Industry Applications*, vol. 43, no. 4, pp. 971-980, July-Aug. 2007.

Conference Papers:

[1] S. Aviyente, S. Zaidi and E. Strangas, "Time-Frequency Based Feature Extraction and Classification for Fault Diagnosis in Electric Drives," Asilomar Conference on Signals, Systems and Computers, November 2007.

[2] S. Aviyente and W. S. Evans, "Phase Synchrony Measures for the Study of Functional Brain Networks," Forty-fifth Annual Allerton Conference on Communication, Control, and Computing, September 2007 (invited).

[3] S. H. Zaidi, W. G. Zanardelli, S. Aviyente and E. G. Strangas, "Comparative Study of Time-Frequency Methods for the Detection and Categorization of Intermittent Faults in Electrical Drives," IEEE International Symposium on Diagnostics for Electric Machines, Power Electronics and Drives, September 2007.

[4] K. Huang and S. Aviyente, "Large Margin Dimension Reduction for Sparse Image Classification," *Proceedings of IEEE Statistical Signal Processing Workshop*, August 2007.

[5] S. Aviyente, "Compressed Sensing Framework for EEG Compression," *Proceedings of IEEE Statistical Signal Processing Workshop*, August 2007.

[7] Z. Shan, J. Swary and S. Aviyente, "Underdetermined Source Separation in the Time-Frequency Domain," *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing*, vol. 3, pp. 945-948, 2007.

[8] S. Aviyente, W. S. Evans, E. M. Bernat and S. Sponheim, "A Time-Varying Phase Coherence Measure for Quantifying Functional Integration in the Brain," *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing*, vol. 4, pp. 1169-1172, 2007.

- [9] S. Aviyente, F. Ahmad, and M. G. Amin, "Information Theoretic Measures for Change Detection in Urban Sensing Applications," *Proceedings of IEEE Workshop on Signal Processing Applications for Public Security and Forensics*, 2007.
- [10] S. Aviyente, "Information Theoretic Measures for Quantifying the Integration of Neural Activity," *Information Theory and Applications Workshop*, pp. 20-26, February 2007 (invited).
- [11] K. Huang, M. Yan and S. Aviyente, "Edge-directed inference for microaneurysms detection in digital fundus images", *Proceedings of SPIE Medical Imaging 2007, Vol. 6512*, February 2007
- [12] K. Huang and S. Aviyente, "Sparse Representation for Signal Classification," *Proceedings of Advances in Neural Information Processing Systems 19*, MIT Press, 2006.
- [13] M. Al-Khassaweneh and S. Aviyente, "Image Watermarking in the Autocorrelation Domain," *Proceedings of ACM Multimedia Conference*, pp. 53-58, 2006.
- [14] K. Huang and S. Aviyente, "Rotation Invariant Texture Classification with Ridgelet Transform and Fourier Transform", *Proceedings of IEEE International Conference on Image Processing*, 2006.
- [15] S. Aviyente, E. Bernat, S. Malone and W. Iacono, "Analysis of Event-Related Potentials Using PCA and Matching Pursuit on the Time-Frequency Plane," *IEEE International Conference of the Engineering in Medicine and Biology Society*, pp. 2454-2457, 2006.
- [16] S. Aviyente, "Time-frequency decomposition based on information," *Proceedings of SPIE, Advanced Signal Processing Algorithms, Architectures and Implementations*, vol. 6313, 63130R 2006.
- [17] S. Aviyente, F. Ahmad and M. G. Amin, "Information Theoretic Measures for Through-the-Wall Surveillance," *IEEE Workshop on Sensor Array and Multi-channel Processin*, pp. 626-630, 2006.
- [18] M. Al-Khassaweneh and S. Aviyente, "Robust Watermarking in the Wigner Domain," *Proceedings of IEEE International Conference on Multimedia and Expo*, 2006.
- [19] M. Al-Khassaweneh and S. Aviyente, "Spatially Adaptive Wavelet Thresholding for Image Watermarking," *Proceedings of IEEE International Conference on Multimedia and Expo*, 2006.
- [20] Z. Shan and S. Aviyente, "Jensen-Renyi Divergence for Source Separation on the Time-Frequency Plane," *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing*, vol. 3, pp. 424-427, 2006.
- [21] Z. Shan and S. Aviyente, "Source Separation in the Time-Frequency Domain by Maximizing an Information-Theoretic Criterion," *Proceedings of the IEEE International Conference on Electro/Information Technology*, pp. 43-48, 2006.

- [22] M. Al-Khassaweneh and S. Aviyente, "Embedding Multi-Bit Message in the Joint Time-Frequency Domain," *Proceedings of the IEEE International Conference on Electro/Information Technology*, pp. 516-519, 2006.
- [23] Z. Shan and S. Aviyente, "Information-Theoretic Nonstationary Source Separation," *International Conference on Independent Component Analysis and Blind Signal Separation*, pp. 885-892, 2006.
- [24] M. Al-Khassaweneh and S. Aviyente, "Image Watermarking Based on Wavelet Hard Thresholding," *Proceedings of European Signal Processing Conference*, September 2005.
- [25] M. Al-Khassaweneh and S. Aviyente, "A Time-Frequency Based Perceptual and Robust Watermarking Scheme," *Proceedings of European Signal Processing Conference*, September 2005.
- [26] S. Aviyente, "Information-Theoretic Signal Processing on the Time-Frequency Plane and Applications," *Proceedings of European Signal Processing Conference*, September 2005.
- [27] W. G. Zanardelli, E. G. Strangas and S. Aviyente, "Intermittent Fault Identification for Permanent Magnet AC Drives Based on the Short-Time Fourier Transform," *IEEE International Symposium on Diagnostics for Electrical Machines, Power Electronics and Drives*, pp. 3-8, September 2005.
- [28] K. Huang and S. Aviyente, "Statistical Partitioning of Wavelet Subbands for Texture Classification," *Proceedings of IEEE International Conference on Image Processing*, vol. 1, pp. 441-444, September 2005.
- [29] Z. Shan and S. Aviyente, "Adaptive Minimum Entropy Decomposition on the Time-Frequency Plane," *Proceedings of IEEE Workshop on Statistical Signal Processing*, pp. 861-864, July 2005.
- [30] W. G. Zanardelli, E. G. Strangas and S. Aviyente, "Failure Prognosis for Permanent Magnet AC Drives Based on Wavelet Analysis," *International Electric Machines and Drives Conference*, pp. 64-70, May 2005.
- [31] Z. Shan and S. Aviyente, "Image Denoising Based on the Wavelet Co-Occurrence matrix," *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing*, vol. 2, pp. 645-648, March 2005.
- [32] K. Huang and S. Aviyente, "Mutual Information Based Subband Selection for Wavelet Packet Based Image Classification," *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing*, vol. 2, pp. 241-244, March 2005.
- [33] S. Aviyente, "A Measure of Mutual Information on the Time-Frequency Plane," *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing*, vol. 4, pp. 481-484, March 2005.

- [34] S. Khayam, S. Aviyente and H. Radha, "On Long-Range Dependence in High Bitrate Wireless Residual Channels," *Proceedings of Conference on Information Sciences and Systems*, March 2005.
- [35] M. Al-Khassaweneh and S. Aviyente, "A Time-Frequency Inspired Robust Image Watermarking," *Asilomar Conference on Signals, Systems and Computers*, vol. 1, pp. 392-396, November 2004.
- [36] K. Huang and S. Aviyente, "Combining Generalized Gaussian Density and Energy Distribution in Wavelet Packet Analysis for Texture Classification," *Asilomar Conference on Signals, Systems and Computers*, vol. 2, pp. 2094-2098, November 2004.
- [37] K. Huang and S. Aviyente, "Choosing Best Basis in Wavelet Packets for Fingerprint Matching", in *Proceedings of IEEE International Conference on Image Processing*, vol. 2, pp. 1249-1252, October 2004.
- [38] M. Al-Khassaweneh and S. Aviyente, "Robust Watermarking on the joint spatial-spectral domain", in *Proceedings of IEEE DSP Workshop*, pp. 279-301, August 2004.
- [39] S. Aviyente, "Towards a theory of information processing on the time-frequency plane", in *Proceedings of SPIE, Advanced Signal Processing Algorithms, Architectures and Implementations*, vol. 5559, pp. 232-240, August 2004.
- [40] S. Aviyente, "Information processing on the time-frequency plane," in *Proceedings of ICASSP 2004*, vol. 2, pp. 617-620, May 2004.
- [41] K. Huang and S. Aviyente, "Fingerprint Verification Based on Wavelet Subbands," in *Proceedings of SPIE Defense and Security Symposium*, vol. 5404, pp. 30-38, April 2004.
- [42] S. Aviyente and W. J. Williams, "Entropy based detection on the time-frequency plane," in *Proceedings of ICASSP 2003*, vol. 6, pp. 441-444, 2003.
- [43] S. Aviyente, "Divergence measures for time-frequency distributions," in *Proceedings of IEEE International Symposium on Signal Processing and Applications*, vol. 1, pp. 121-124, 2003.
- [44] S. Aviyente, "Information theoretic signal detection on the time-frequency plane," in *Proceedings of SPIE, Advanced Signal Processing Algorithms, Architectures and Implementations*, vol. 5205, pp. 86-93, 2003.
- [45] S. Aviyente, "An information theoretic approach to digital watermarking," in *Proceedings of SPIE, Visual Communications and Image Processing*, vol. 5150, pp. 842-850, 2003.
- [46] W. J. Williams and S. Aviyente, "Spectrogram decomposition of time-frequency distributions," in *IEEE-Sixth International Symposium on Signal Processing and its Applications*, vol. 2, pp. 587-590, 2001.

[47] S. Aviyente and W. J. Williams, "Minimum entropy approach to denoising time-frequency distributions," in *SPIE-Advanced Signal Processing Algorithms, Architectures and Implementations*, vol. 4474, pp. 57-67, 2001.

[48] S. Aviyente and W. J. Williams, "Information bounds for random signals in time-frequency plane," in *Proceedings of ICASSP 2001*, vol. 6, pp. 3549-3552, 2001.

[49] S. Aviyente and W. J. Williams, "Multitaper Reduced Interference Distribution," in *Proceedings of the Tenth IEEE Workshop Statistical Signal and Array Processing, 2000*, pp. 569-573, 2000.

[50] S. Aviyente and W. J. Williams, "Discrete scale vectors and decomposition of time-frequency kernel," *SPIE-Advanced Signal Processing Algorithms, Architectures and Implementations*, vol. 4116, pp. 100-109, 2000.

[51] S. Aviyente and W. J. Williams, "Improved Frequency Marginal Estimates for time-frequency distributions," in *Proceedings of ICASSP 2000*, vol. 2, pp. 641-644, 2000.

[52] W. J. Williams and S. Aviyente, "Minimal Window Time-Frequency Distributions," *SPIE-Advanced Signal Processing Algorithms, Architectures and Implementations*, vol. 3807, pp. 146-158, 1999.

[53] W. J. Williams and S. Aviyente, "Optimal Window Time-Frequency Distribution Decompositions," *32nd Asilomar Conference on Signals, Systems and Computers*, pp. 817-821, 1998.

Funded Projects:

1. CAREER: Integrated Research and Education in Functional Brain Networks, NSF, \$400,000, 3/1/08-2/28/13
2. Signal Processing for Quantifying the Functional Integration in the Brain, NSF, \$155,473, 9/1/07-8/31/10
3. Research Gift for Biomedical Signal and Image Processing, Siemens Corporate Research, \$30,000, 07/06.
4. Comprehensive Fingerprint Identification, Michigan Economic Development Corporation, \$150,000, 07/03-12/06.
5. Speech Synthesis for Distance Cueing in Audio Displays, IC-Tech, Air Force STTR, \$35,340, 08/05-04/06.
6. A joint time-frequency approach to digital watermarking, Intramural Research Grants Program, MSU, \$50,000, 12/03-06/05.

Courses Taught at MSU:

1. ECE 360, Signals and Linear Systems, Fall 2002.
2. ECE 457, Communication Systems, Spring 2003, 2004, 2005.
3. ECE 458, Communication Systems Lab, Spring 2003.
4. ECE 802-606, Time-Frequency and Wavelet Analysis, Fall 2003, Spring 2006, Spring 2008.
5. ECE 280, Analytical Methods in Electrical Engineering, Fall 2004.

6. ECE 366, Introduction to Signal Processing, Fall 2006, Honors Section, Fall 2005, Fall 2007.
7. ECE 202, Circuits and Systems II, Spring 2007.

Professional Activities:

University Service:

1. Member, Faculty and Academic Council (AY06-07)
2. Member, ECE Graduate Studies Committee (AY02-03,03-04,04-05)
3. Member, ECE Awards Committee (AY03-04,04-05)
4. Member, ECE Undergraduate Studies Committee (AY05-06)
5. Reviewer, MSU Intramural Research Grants Program (Fall 2002, 2004, 2005)
6. Departmental Coordinator for MSU Science, Engineering and Technology Day, 2004-2007.
7. Departmental Coordinator for Future Engineers Open House, 2007.

Professional Society Service:

8. Reviewer, IEEE Transactions on Signal Processing (2000-present)
9. Reviewer, IEEE Signal Processing Letters (2003-present)
10. Reviewer, IEEE Transactions on Image Processing (2004-present)
11. Reviewer, IEEE Transactions on Information Forensics and Security (2005-present)
12. Reviewer, Signal Processing (2006-present)
13. Reviewer, EURASIP Journal of Applied Signal Processing (2003-present)
14. Reviewer, IEE Proceedings in Vision, Image, and Signal Processing (2003)
15. Reviewer, IEEE International Conference on Acoustics, Speech and Signal Processing (2000,2005)
16. Session Chair, European Signal Processing Conference, 2005.
17. Session Chair, IEEE Conference on Electro-Information Technology (EIT) 2006.
18. Program Committee Member, IEEE Conference on Electro-Information Technology (EIT) 2006.
19. Special Session Organizer and Session Chair, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2007.
20. Technical Program Committee Member, EUSIPCO 2007, ELECO 2007, IEEE ICSPC 2007, ACM Multimedia Modeling Conference (MMM) 2008.