

## Curriculum Vitae of Alan V. Oppenheim

Date of Birth: November 11, 1937

Place of Birth: New York, New York      Citizenship: U.S.

Title: Ford Professor of Engineering  
 Professor of Electrical Engineering and Computer Science  
 MIT Department of Electrical Engineering and Computer Science

### Degrees

Massachusetts Institute of Technology	S.B.	1961
Massachusetts Institute of Technology	S.M.	1961
Massachusetts Institute of Technology	Sc.D.	1964
Tel Aviv University	Ph.D. (H)	1995

### Professional Positions

1996 – present	Ford Professor of Engineering, MIT
1990 – 1996	Distinguished Professor. Department of Electrical Engineering and Computer Science, MIT
1976 – 1978	Cecil H. Green Professor of Electrical Engineering
1976 – present	Professor Department of Electrical Engineering and Computer Science, MIT
1978 – 1980	Associate Head Data Systems Division, MIT Lincoln Laboratory
1969 – 1976	Associate Professor Department of Electrical Engineering and Computer Science, MIT
1967 – 1969	Staff Scientist, MIT Lincoln Laboratory
1964 – 1969	Assistant Professor Department of Electrical Engineering, MIT

### Principal Fields of Interest

Signal and Information Processing, Algorithms and Analysis  
 Nonlinear dynamics and chaotic signals  
 Applications of signal processing

## **Honorary Societies**

National Academy of Engineering, Eta Kappa Nu, Tau Beta Pi, Sigma Xi

## Honors and Awards

- 2019 2018-2019 MIT Creative Advising Activity Award
- 2013 Capers and Marion McDonald Award for Excellence in Mentoring and Advising, MIT
- 2010 Graduate Counselor Award Department of Electrical Engineering and Computer Science/Graduate Students Association, MIT  
*“For outstanding mentorship to Graduate Students.”*
- 2010 Honorary Professor, Xi'an Jiaotong University, Xi'an, Shaanxi, P.R. China
- 2009 MIT HKN Award for Teaching Excellence  
*“For outstanding teaching of 6.341 in the fall semester of 2008.”*
- 2007 IEEE Jack S. Kilby Signal Processing Medal  
*“For visionary leadership and exceptional contributions to the field of digital signal processing.”*
- 2006 Graduate Counseling Award Department of Electrical Engineering and Computer Science/Graduate Students Association, MIT  
*“For exceptional academic advising, above and beyond the requirements, leading to a better MIT experience for his advisees.”*
- 2005 IEEE Signal Processing Society, Signal Processing Education Award  
*“For fundamental contributions to digital signal processing education and for defining the way signal processing is taught and practiced around the world.”*
- 2002 IEEE Life Fellow
- 2000 IEEE Third Millennium Medal  
IEEE Signal Processing Society
- 1997 MacVicar Fellow, MIT
- 1996 Bose Award for Excellence in Teaching, MIT
- 1995 Honorary Doctorate, Tel Aviv University
- 1994 Baker Undergraduate Teaching Award, MIT
- 1987 IEEE 1988 Education Medal

*"For leadership in engineering education through teaching, textbooks, and video tape series in digital signal processing."*

- 1987 Elected membership in the National Academy of Engineering
- 1984 IEEE Centennial Medal, Acoustics, Speech and Signal Processing Society  
*"In recognition of your work for and contributions to our Society and its areas of interest."*
- 1981 Graduate Student Council Teaching Award  
Department of Electrical Engineering and Computer Science, MIT
- 1980 IEEE Acoustics, Speech and Signal Processing Society Award  
*"In recognition of sustained leadership in the field of digital signal processing by your innovative research, writing of pioneering textbooks, and inspiring teaching."*
- 1977 IEEE Acoustics, Speech and Signal Processing Society Technical Achievement Award  
*"In recognition of fundamental contributions to the development of homomorphic processing techniques for speech and other signals."*
- 1977 IEEE Fellow  
*"For contributions to digital signal processing and speech communications."*
- 1972 – 1973 Guggenheim Fellow, John Simon Guggenheim Foundation
- 1969 IEEE G-AE Senior Award  
*"For authoring a paper of exceptional merit."*
- 1963 T.V. Shares Award for excellence in teaching  
Department of Electrical Engineering, MIT

### **Advisory and Professional Committee Participation**

- 2016 – 2017 Chair, Israeli Council of Higher Education, Committee for the evaluation of EE departments in Israel
- 2006 – 2009 NAE Peer Committee (Section 7 Electronics, Communication and Information Systems Engineering)

2003 – 2008	GSPx Member, Advisory Board
1992 – 1995	NAE Peer Committee (Section 5 Computer Science and Engineering)
1989 – 1993	FOCUS Advisory Committee Institute for Defense Center for Communications Research
1989 – 1992	Engineering Advisory Council North Carolina State University
1984 – 1985	Sperry Corporation Technical Advisory Board
1993 – 1995	Chairman, IEEE Education Medal Committee
1991 – 1993	Member, IEEE Education Medal Committee
1981 – 1982	Member, IEEE Acoustics, Speech and Signal Processing Technical Committee on Multidimensional Signal Processing
1976 – 1983	IEEE <i>Proceedings</i> Editorial Board
1976	Chairman, IEEE Arden House Workshop on Digital Signal Processing
1976	IEEE Group on Acoustics, Speech and Signal Processing Annual Conference Program Committee
1973 – 1976	Chairman, Digital Signal Processing Committee of the IEEE Group on Acoustics, Speech and Signal Processing
1971 – 1981	Member, Digital Signal Processing Committee of the IEEE Group on Acoustics, Speech and Signal Processing
1971 – 1974	Member of the Administrative Committee of the IEEE Group on Acoustics, Speech and Signal Processing

### **Government Committees**

2009 – 2010	NAE Section 7 Committee on Scope and Name
1984	NSF PYI Award Review Panel
1979 – 1982	Committee on Recommendations for U.S. Army Basic Scientific Research

1979 – 1980                      Defense Advanced Research Projects Agency Independent  
Review Committee for Oceanographic Detection and  
Categorization System

### **Visiting Appointments**

Dec 1992 – Jan 1993              Sackler Scholar  
Mortimer and Raymond Sackler Institute of Advanced Studies  
Tel Aviv, Israel

Apr – May 1984                    Sackler Scholar  
Mortimer and Raymond Sackler Institute of Advanced Studies  
Tel Aviv, Israel

Sep 1983 – Mar 1984              Visiting Scholar  
University of California at San Diego  
San Diego, California

Jun 1980                            Invited Lecturer  
Tsinghua University  
Beijing, People's Republic of China

Jun 1977 – present                Guest Investigator  
Woods Hole Oceanographic Institution  
Woods Hole, Massachusetts

Sep 1972 – Jun 1973              Visiting Scientist  
E.N.S.E.R.G., University of Grenoble,  
Grenoble, France

1973                                 Visiting Professor  
University of Erlangen  
Erlangen, West Germany

### **Industrial Consulting**

2016 – present                      Technical Advisory Board, Lumii Inc.

2015 – present                      Technical Advisory Board, Digital Cognition Technologies, Inc.

2008 – 2013                        Technical Advisory Board, Axis Semiconductor

2001 – 2010                        Transchip, Inc.

2000 – 2004	Thinking Investments, Inc.
1999 – 2001	TechOnLine, Inc.
1997 – 2001	Trakus, Inc.
1996 – 1999	Technical Advisory Board, Libit Signal Processing, Ltd.
1996 – 1997	Goldman Sachs
1996 – 2014	Aptec Group
1990 – 1993	Center for Communications Research
1986 – 1999	Atlantic Aerospace Electronics Corporation
1984 – 1985	MA/COM Linkabit
1982 – 1984	Nippon Schlumberger
1980 – 1990	Texas Instruments
1979 – present	Lockheed Sanders, Inc.
1977 – 1982	Schlumberger-Doll Research Laboratories
1976 – 1977	Acoustic Research, Inc.
1975	Chevron Oil Research Company
1974 – 1977	Stein Associates
1971 – 1985	Computer Signal Processing, Inc.
1971	Naval Underwater Sound Laboratory
1971	Concord Control Company
1966 – present	M.I.T. Lincoln Laboratory
1964 – 1967	Arthur D. Little
1964 – 1965	Raytheon
1963 – 1964	E.G.& G.

## Books And Video Lecture Series

*Signals, Systems and Inference*, Pearson Higher Education, Hoboken, NJ. 2016, (with George C. Verghese).

*6.341x Discrete-Time Signal Processing*, Spring 2015. (Massachusetts Institute of Technology: edX), <https://www.edx.org/course/mitx/mitx-6-341x-discrete-time-signal-4396> (with Thomas A. Baran).

*Discrete-Time Signal Processing*, 3<sup>rd</sup> edition, Prentice-Hall, Inc.: Upper Saddle River, NJ, 2010 (with Ronald W. Schafer).

*OCW 6.011 Introduction to Communication, Control, and Signal Processing*, Spring 2010. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-011-introduction-to-communication-control-and-signal-processing-spring-2010/>. License: Creative Commons BY-NC-SA. (with George C. Verghese).

*OCW 6.341 Discrete-Time Signal Processing*, Fall 2005. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-341-discrete-time-signal-processing-fall-2005/>. License: Creative Commons BY-NC-SA.

*OCW 6.011 Introduction to Communication, Control, and Signal Processing*, Spring 2004 and Spring 2005. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-011-introduction-to-communication-control-and-signal-processing-spring-2004-spring-2005/>. License: Creative Commons BY-NC-SA. (with George C. Verghese).

*Discrete-Time Signal Processing*, 2<sup>nd</sup> edition, Prentice-Hall, Inc.: Upper Saddle River, NJ, 1999 (with Ronald W. Schafer and John R. Buck).

*Computer-Based Exercises for Signal Processing Using MATLAB<sup>®</sup> 5*, Prentice-Hall, Inc.: Upper Saddle River, NJ, 1998 (with J. McClellan, C. S. Burrus, T. W. Parks, R. W. Schafer and H. W. Schuessler).

*Signals and Systems*, 2<sup>nd</sup> edition, Prentice-Hall, Inc.: Upper Saddle River, NJ, 1997 (with Alan S. Willsky).

*Computer-Based Exercises for Signal Processing Using MATLAB<sup>®</sup> 5*, Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1994 (with C.S. Burrus, J. McClellan, T. Parks, R. Schafer and H.W. Schuessler).

*Symbolic and Knowledge-Based Signal Processing*, (coeditor), Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1992 (with S. Hamid Nawab).

*Discrete-Time Signal Processing*, Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1989 (with Ronald W. Schafer).

*Advanced Topics in Signal Processing*, (coeditor), Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1988 (with Jae S. Lim).

*Videotape Lecture Series and Study Guide on Signals and Systems: An Introduction to Analog and Digital Signal Processing*, April 1987. <http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/>.

*Signals and Systems*, Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1983 (with Alan S. Willsky).

*Applications of Digital Signal Processing*, (editor) Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1978.

*Videotape Lecture Series and Study Guide on Digital Signal Processing*, September 1975. <http://ocw.mit.edu/resources/res-6-008-digital-signal-processing-spring-2011/>.

*Digital Signal Processing*, Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1975 (with Ronald W. Schafer).

*Papers on Digital Signal Processing*, (editor), MIT Press: Cambridge, Massachusetts, 1969.

*Teacher's Guide to Introductory Network Theory*, Harper and Row, 1965 (with R. Alter).

## **Book Chapters and Special Publications**

“Amar Gopal Bose” in *Memorial Tributes: National Academy of Engineering*, Vol. 19, Washington, D.C., National Academy Press, Copyright 2015.

“Thomas G. Stockham, Jr.,” in *Memorial Tributes: National Academy of Engineering*, Vol. 14, Washington, D.C., National Academy Press, Copyright 2011.

*6.011 Signals, Systems, and Inference*. New Jersey, Prentice Hall Signaling Processing Series. 2015. (with George C. Verghese).

*6.011 Introduction to Communication, Control, and Signal Processing*, Spring 2010. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-011-introduction-to-communication-control-and-signal-processing-spring-2010/>. License: Creative Commons BY-NC-SA. (with George C. Verghese).

*6.341 Discrete-Time Signal Processing*, Fall 2005. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-341-discrete-time-signal-processing-fall-2005/>. License: Creative Commons BY-NC-SA.

6.011 *Introduction to Communication, Control, and Signal Processing*, Spring 2004 and Spring 2005. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-011-introduction-to-communication-control-and-signal-processing-spring-2004-spring-2005/>. License: Creative Commons BY-NC-SA. (with George C. Verghese).

“Chaotic Signals and Signal Processing,” *Digital Signal Processing Handbook*, Chapter 71 in *Nonlinear and Fractal Signal Processing*, edited by Madisetti and Williams. Boca Raton, Florida: CRC Press LLC, 1998 (with K.M. Cuomo).

“Analysis, Synthesis, and Applications of Self-Synchronizing Chaotic Systems,” in *Nonlinear Dynamics and Chaos*, 335-340, 347, 462. Reading, Pennsylvania: Addison-Wesley Publishing Company, 1994 (with K. M. Cuomo).

“Circuit Implementation of Synchronized Chaos with Applications to Communication,” Chapter 15 in *Coping with Chaos*, edited by E. Ott, T. Sauer, and J.A. Yorke, 381-384. New York, New York: John Wiley & Sons, Inc., 1994 (originally published in *Physical Review Letters*, Volume 71, Number 1, pp. 65-68, July 5, 1993).

“Computer-Aided Algorithm Design and Rearrangement,” in *Symbolic and Knowledge Based Signal Processing*, edited by A.V. Oppenheim and S.H. Nawab. Englewood Cliffs, New Jersey: Prentice-Hall, 1992 (with M.M. Covell, C. Myers).

“A Personal View of Education,” in *MIT: Shaping the Future*, edited by K.R. Manning. Cambridge: MIT Press, 1991 (reprinted in *IEEE Signal Processing Magazine*, vol. 9, no. 2, pp. 69-72, April 1992).

“Nonlinear Filtering of Multiplied and Convolved Signals,” originally published in *Proceedings of IEEE* (1968) and reprinted in Section 7, “Image Enhancement,” *Selected Papers on Digital Image Processing, SPIE Milestone Series*, Volume MS 17, pp. 480-507. SPIE Optical Bellingham, Washington: Engineering Press, 1990 (with R.W. Schafer and T.G. Stockham, Jr.).

“Reconstruction of Multidimensional Signals from Zero Crossings,” Chapter 5 in *Image Understanding 1989*, edited by S. Ullman and W. Richards. Norwood, New Jersey: Ablex Publishing Corp., 1990 (with S.R. Curtis).

*Videotape Lecture Series and Study Guide on Signals and Systems: An Introduction to Analog and Digital Signal Processing*, April 1987. <http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/>.

Editor, *Trends & Perspectives in Signal Processing*, 1981-1984.

“A Technique for the Evaluation of Circularly Symmetric Two-Dimensional Fourier Transforms and its Application to the Measurement of Ocean Bottom Reflection Coefficients,” in *Digital*

*Signal Processing*, edited by V. Cappellini and A. Constantinides, 87-95. London: Academic Press, 1980, (with G.V. Frisk and D.R. Martinez), (invited).

*Programs for Digital Signal Processing*, edited by the Digital Signal Processing Committee of the IEEE Acoustics, Speech and Signal Processing Society, (A.V. Oppenheim, member). New York, New York: IEEE Press, 1979.

“Application of Homomorphic Filtering to Seismic Data Processing,” in *Applied Time Series Analysis*, edited by D.F. Findley, 261-286. New York, New York: Academic Press, 1978 (with J. Tribolet), (invited).

“Digital Processing of Speech,” Chapter 3 in *Applications of Digital Signal Processing*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978, (invited).

*Selected Papers in Digital Signal Processing II*, edited by the Digital Signal Processing Committee of the IEEE Acoustics, Speech and Signal Processing Society, (A.V. Oppenheim, Chairman). New York, New York: IEEE Press, 1976.

*Videotape Lecture Series and Study Guide on Digital Signal Processing*, September 1975. <http://ocw.mit.edu/resources/res-6-008-digital-signal-processing-spring-2011/>.

Editor, Prentice-Hall, Inc., *Series on Signal Processing*, May 1975-present.

Guest Editor, *IEEE Proceedings Special Issue on Digital Signal Processing*, April 1975.

“Generalized Linear Filtering,” Chapter 8 in *Digital Processing of Signals*, edited by B. Gold and C. Rader. New York: McGraw-Hill, 1969.

## **Journal Articles**

"Lattice Functions for the Analysis of Analog-to-Digital Conversion," *IEEE Transactions on Information Theory*, Vol. 65, Issue 8, pp. 4915-4923, August 2019 (with Pablo Martinez-Neuvo).

"Delta-Ramp Encoder for Amplitude Sampling and Its Interpretation as Time Encoding," *IEEE Transactions on Signal Processing*, Vol. 67, No. 10, pp. 2516-2527, May 2019 (with Pablo Martinez-Neuvo and Hsin-Yu Lai).

“MOOC Adventures in Signal Processing” *Signal Processing Magazine*, July 2016 (with Thomas Baran, Richard Baraniuk, Paolo Prandoni and Martin Vetterli).

“A Functional Composition Approach to Filter Sharpening and Modular Filter Design”, *IEEE Transactions on Signal Processing* 2016.

A. V. Oppenheim, “Sparse Filter Design Under a Quadratic Constraint: Low-

Complexity-Algorithms,” *IEEE Transactions on Signal Processing*, February 2013, Vol. 61, No. 4, pp. 857-70 (with D. Wei and C. K. Sestok).

“A Branch-and-Bound Algorithm for Quadratically-Constrained Sparse Filter Design,” *IEEE Transactions on Signal Processing*, February 2013, Vol. 61, No. 4, pp. 1006-18 (with D. Wei).

“A Derivation of the Recursive Solution to the Autocorrelation Normal Equations,” *IEEE Signal Processing Magazine*, January 2013, Vol. 30, No. 1, pp. 142-4 (with T. Baran).

“Sparse Filter Design Under a Quadratic Constraint: Low-Complexity-Algorithms,” to appear in *IEEE Transactions on Signal Processing*, 2012 (with D. Wei and C. K. Sestok).

“Back to the Future,” *Proceedings of the IEEE*, September 2012, Vol. 100, No. 9, pp. 2575-9.

“Algorithm Kings,” *IEEE Solid-State Circuits Magazine*, Spring 2012, Vol. 4, No. 2, pp. 34-7.

“Quantization and Compensation in Sampled Interleaved Multi-Channel Systems,” *IEEE Transactions on Signal Processing*, January 2012, Vol. 60, No. 1, pp. 129-138 (with Shay Maymon).

“Sinc Interpolation of Nonuniform Samples,” *IEEE Transactions on Signal Processing*, October 2011, Vol. 59, No. 10, pp. 4745-58, (with Shay Maymon).

“Selecting the Lorenz Parameters for Wideband Radar Waveform Generation,” *International Journal of Bifurcation and Chaos*, September 2011, Vol. 21, No. 9, pp. 2539-45, (with M. S. Willsey and K. M. Cuomo).

“Quasi-Orthogonal Wideband Radar Waveforms Based on Chaotic Systems,” *IEEE Transactions on Aerospace and Electronic Systems*, July 2011, Vol. 47, No. 3, pp. 1974-84, (with M. S. Willsey and K. M. Cuomo).

“Linear Programming Algorithms for Sparse Filter Design,” *IEEE Transactions on Signal Processing*, March 2010, (with T. Baran and D. Wei).

“Causal Compensation for Erasures in Frame Representations,” *IEEE Transactions on Signal Processing*, March 2008, Vol. 56, No. 3, pp. 1053-82, (with P. Boufounos and V.K. Goyal).

“Quantization Noise Shaping on Arbitrary Frame Expansions,” *EURASIP Journal on Applied Signal Processing*, vol. 2006, Article ID 53807, 12 pages, 2006, (with Petros T. Boufounos).

“One Plus One Could Equal Three (and Other Favorite Clichés),” *IEEE Signal Processing Magazine*, November 2006, Vol. 23, No. 6, pp. 10-2.

“Pre-Compensation for Anticipated Erasures in LTI Interpolation Systems,” *IEEE Transactions in Signal Processing*, January 2006, Vol. 54, pp. 325-35, (with S.R. Dey and A.I. Russell).

“Global Network Analysis of Phenotypic Effects: Protein Networks and Toxicity Modulation in *Saccharomyces Cerevisiae*,” *Proceedings of the National Academy of Sciences*, December 2004, Vol. 101 No. 52, (with M.R. Said, T.J. Begley, D.A. Lauffenburger and D. Samson).

“From Frequency to Quefrequency: A History of the Cepstrum,” *IEEE Signal Processing Magazine*, September 2004, Vol. 21, pp. 95-106, (with R. W. Schafer).

“Orthogonal and Projected Orthogonal Matched Filter Detection,” *IEEE Signal Processing Magazine*, April 2004, Vol. 84, pp. 677-693, (with Y. C. Eldar and D. Egnor).

“Randomized Data Selection in Detection with Applications to Distributed Signal Processing”, *Proceedings of the IEEE* (invited paper), August 2003, Vol. 91, No. 8 (with M.R. Said and C.K. Sestok).

“MMSE Whitening and Subspace Whitening”, *IEEE Transactions on Information Theory*, July 2003, Vol. 49, No. 7 (with Y.C. Eldar).

“Covariance Shaping Least-Squares Estimation,” *IEEE Transactions on Signal Processing*, March 2003, Vol. 51, No. 3 (with Y.C. Eldar).

“Quantum Signal Processing,” *IEEE Signal Processing Magazine*, November 2002, Vol. 19, No. 6 (with Y. C. Eldar).

“Orthogonal Multiuser Detection,” *IEEE Signal Processing*, February 2002, Vol. 82, No. 2 (with Y. C. Eldar).

“Generalized Frequency Modulation,” *IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications*, December 2001, Vol. 48 No. 12, (with W. P. Torres and R. R. Rosales)

“Covariance Shaping Least-Squares Estimation,” *IEEE Transactions on Signal Processing*, September 2001 (with Y. C. Eldar).

“MMSE Whitening and Subspace Whitening,” submitted to *IEEE Transactions on Signal Processing*, July 2001 (with Y. C. Eldar).

“Sequential Signal Encoding from Noisy Measurements Using Quantizers with Dynamic Bias Control,” *IEEE Transactions on Information Theory*, March 2001, vol. 47, no. 3, pp. 978-1002, (with H. C. Papadopoulos and G. W. Wornell).

“Filter Bank Reconstruction of Bandlimited Signals From Nonuniform and Generalized Samples,” *IEEE Transactions on Signal Processing*, Oct. 2000, Vol. 48, No. 10, pp. 2864-2875, (with Y. C. Eldar).

- “Circuit Implementations of Soliton Systems,” *International Journal of Bifurcation and Chaos*, 1999, Vol. 9, No. 4, pp. 571-590 (with A.C. Singer).
- “Detection and Estimation of Multiplexed Soliton Signals,” *IEEE Transactions on Signal Processing*, October 1999, Vol. 47, No. 10, pp. 2768 – 2782 (with A. C. Singer and G.W. Wornell).
- “Approximate Signal Processing,” *VLSI Signal Processing Journal*, January 1997, Vol. 15, No. 1-2, pp. 177-200 (with J. Winograd, J.T. Ludwig, S.H. Nawab, A. Chandrakasan).
- “Nonlinear Autoregressive Modeling and Estimation in the Presence of Noise,” *Digital Signal Processing*, October 1994, Vol. 4, No. 4, pp. 207-221 (with G. Wornell and A. Singer).
- “Single-Sensor Active Noise Cancellation Based on the EM Algorithm,” *IEEE Transactions of Speech and Audio Processing*, April 1994, Vol. 2, No. 4, (with E. Weinstein, K. Zangi, M. Feder, and D. Gauger).
- “Iterative and Sequential Algorithms for Multi-Sensor Signal Enhancement,” *IEEE Transactions on Signal Processing*, March 1994, Vol. 42, No. 3, (with E. Weinstein, M. Feder and J. Buck).
- “Robustness and Signal Recovery in a Synchronized Chaotic System,” *International Journal of Bifurcation and Chaos*, December 1993, Vol. 3, No. 6, pp. 1629-1638 (with K. Cuomo and S. Strogatz)
- “Synchronization of Lorenz-based Chaotic Circuits, with Applications to Communications,” *IEEE Transactions on Circuits and Systems*, October 1993, Vol. 40, No. 10, pp. 626-633 (with K. Cuomo and S. Strogatz).
- “Multi-Channel Signal Separation Based on Decorrelation,” *IEEE Transactions on Speech and Audio Processing*, October 1993, Vol. 1, No. 4, pp. 405-413 (with E. Weinstein and M. Feder).
- “Circuit Implementation of Synchronized Chaos with Applications to Communications,” *Physical Review Letters*, July 5, 1993, Vol. 71, No. 1, pp. 65-68 (with K. Cuomo).
- “Geometric Distortions in Side-Scan Sonar Images: A Procedure for Their Estimation and Correction,” *IEEE Journal of Oceanic Engineering*, July 1992, Vol. 17, No. 3, pp. 252-268 (with D.T. Cobra and J.S. Jaffe).
- “Wavelet-Based Representations for a Class of Self-Similar Signals with Application to Fractal Modulation,” *IEEE Transactions Information Theory-Special Issue on Wavelet Transforms and Multiresolution Signal Analysis*, March 1992, Vol. 38, No. 2, pp. 785-800 (with G.W. Wornell).
- “Estimation of Fractal Signals from Noisy Measurements Using Wavelets,” *IEEE Transactions on Signal Processing*, March 1992, Vol. 40, No. 3, pp. 611-623 (with G.W. Wornell).

- “Sequential Algorithms for Parameter Estimation Based on the Kullback-Liebler Information Measure,” *IEEE Transactions on Acoustics, Speech and Signal Processing*, September 1990, Vol. 38, No. 9, pp. 1652-1654 (with E. Weinstein and M. Feder).
- “Reconstruction of Two-Dimensional Signals from Level Crossings,” *Proceedings of the IEEE*, January 1990, Vol. 78, No. 1, pp. 31-55 (with A. Zakhor), (invited paper).
- “Maximum Likelihood Noise Cancellation using the EM Algorithm,” *IEEE Transactions on Acoustics, Speech and Signal Processing*, February 1989, Vol. ASSP-37, No. 2, pp. 204-216 (with M. Feder and E. Weinstein).
- “Quantization Errors in the Computation of the Discrete Hartley Transform,” *IEEE Transactions on Acoustics, Speech and Signal Processing*, November 1987, Vol. ASSP-35, No. 11, pp. 1592-1602 (with A. Zakhor).
- “Reconstruction of Nonperiodic Two-Dimensional Signals from Zero Crossings,” *IEEE Transactions on Acoustics, Speech and Signal Processing, Correspondence*, June 1987, Vol. ASSP-35, No. 6, pp. 890-893 (with S.R. Curtis and S. Shitz).
- “Reconstruction of complex-valued propagating wave fields using the Hilbert-Hankel transform,” *Journal of the Optical Society of America A*, January 1987, Vol. 4, pp. 247-266 (with M.S. Wengrovitz and G.V. Frisk).
- “Reconstruction of multidimensional signals from zero crossings,” *Journal of the Optical Society of America A*, January 1987, Vol. 4, pp. 221-231 (with S.R. Curtis).
- “Signal Reconstruction from Fourier Transform Sign Information,” (with S.R. Curtis and J.S. Lim), *IEEE Transactions on Acoustics, Speech and Signal Processing*, June 1985, Vol. ASSP-33, No. 3, pp. 643-657.
- “A Hybrid Numerical/Analytic Technique for the Computation of Wave Fields in Stratified Media Based on the Hankel Transform,” *Journal of the Acoustical Society of America*, July 1984, Vol. 76, No. 1, pp. 222-243 (with D.R. Mook and G.V. Frisk).
- “Signal Synthesis and Reconstruction from Partial Fourier Domain Information,” *Journal of the Optical Society of America*, November 1983, Vol. 73, No. 11, pp. 1413-1420 (with J.S. Lim and S.R. Curtis).
- “Signal Reconstruction from Signed Fourier Transform Magnitude,” *IEEE Transactions on Acoustics, Speech and Signal Processing*, October 1983, Vol. ASSP-31, No. 5, pp. 1286-1293 (with P.L. Van Hove, M.H. Hayes and J.S. Lim).
- “Time-Varying Parametric Modeling of Speech,” *Signal Processing*, May 1983, Vol. 5, No. 3, pp. 267-285 (with M. Hall and A. Willsky).

“Knowledge-Based Signal Processing,” *Trends & Perspectives in Signal Processing*, July 1982, Vol. 2, No. 3, pp. 1-6 (with G.E. Kopec and R. Davis).

“Iterative Procedures for Signal Reconstruction from Fourier Transform Phase,” *Journal of Optical Engineering*, January/February 1982, Vol. 21, No. 1, pp. 122-127 (with M.H. Hayes and J.S. Lim).

“Iterative Techniques for Minimum Phase Signal Reconstruction from Phase or Magnitude,” *IEEE Transactions on Acoustics, Speech and Signal Processing*, December 1981, Vol. ASSP-29, No. 6, pp. 1187-1193 (also in *Lincoln Laboratory Technical Note No. 1980-34*, August 1, 1980) (with T.F. Quatieri).

“The Importance of Phase in Signals,” *IEEE Proceedings Special Issue on Digital Image Processing*, May 1981, Vol. 69, No. 5, pp. 529-541 (with J.S. Lim) (invited).

“A New Technique for Blind Deconvolution,” *Journal of Optical Engineering*, Vol. 20, pp. 281-284, March/April 1981 (with S. Pohlig, D. Dudgeon, J. Lim and A. Filip).

“Signal Reconstruction from Phase or Magnitude,” *IEEE Transactions on Acoustics, Speech and Signal Processing*, December 1980, Vol. ASSP-28, No. 6, pp. 672-680 (also *Lincoln Laboratory Technical Note No. 1979-64*, September 18, 1979), (with M.H. Hayes and J.S. Lim).

“Computation of the Hankel Transform Using Projections,” *Journal of the Acoustical Society of America*, August 1980, Vol. 68, No. 2, pp. 523-529 (with G.V. Frisk and D.R. Martinez).

“A Technique for Measuring the Plane Wave Reflection Coefficient of the Ocean Bottom,” *Journal of the Acoustical Society of America*, August 1980, Vol. 68, No. 2, pp. 602-612 (with G.V. Frisk and D.R. Martinez).

“Reduction of Quantization Noise in PCM Speech Coding,” *IEEE Transactions on Acoustics, Speech and Signal Processing Letters*, February 1980, Vol. ASSP-28, No. 1, pp.107-110 (also in *Lincoln Laboratory Technical Note No. 1979-47*, May 21, 1979) (with J.S. Lim).

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"A New Technique for the Design of Nonrecursive Digital Filters," *Proceedings of the Fifth Annual Princeton Conference on Information Sciences and Systems*, Princeton, New Jersey, March 25-26, 1971, pp. 64-72, (with E. Hofstetter and J. Siegel), (invited).

"Digital Signal Processing - Today and Tomorrow," *Proceedings of the 1970 IEEE International Symposium on Circuit Theory*, pp. 85-86, December 14-16, 1970, (invited).

"Speech Compression Using Fine Grain Spectral Analysis," *1969 International Communications Conference*, Boulder, Colorado, June 1969, (with C. Rader), (invited).

"Theory and Implementation of Discrete Hilbert Transform," *Proceedings of the 1969 Polytechnic Institute of Brooklyn Symposium*, Brooklyn, New York, 1969, (with B. Gold and C. Rader), (invited).

"A Speech Analysis-Synthesis System Based on Homomorphic Filtering," *Seventy-Sixth Meeting of the Acoustical Society of America*, November 1968, Cleveland, Ohio.

"Applications of Homomorphic Filtering," *Proceedings of the IEEE International Convention*, March 1968, (with T. Stockham), (invited).

"Homomorphic Analysis of Speech," *1968 Conference on Speech Communication and Processing*, Boston, Massachusetts, (with R. Schafer).

"Deconvolution of Speech," *Seventy-Third Meeting of the Acoustical Society of America*, April 1967, New York.

"Optimum Homomorphic Filters," *First Annual IEEE Communications Convention*, June 1965, Boulder, Colorado.

"Superposition in a Class of Nonlinear Systems," *Proceedings of the IEEE International Convention*, March 1964, New York.

## **Technical Reports**

"Parameter Estimation for Autoregressive Gaussian-Mixture Processes: The EMAX Algorithm," *RLE Technical Report No. 611*, Research Laboratory of Electronics, MIT, Cambridge, MA, December 1996 (with S.M. Verbout, J.M. Ooi, and J.T. Ludwig).

"Synchronized Chaotic Circuits and Systems for Communications," *RLE Technical Report No. 575*, Research Laboratory of Electronics, MIT, Cambridge, MA, November 1992 (with Kevin Cuomo).

"Multi-Channel Signal Separation Based on Decorrelation," *RLE Technical Report No. 573*, Research Laboratory of Electronics, MIT, Cambridge, MA, March 1992 (with E. Weinstein and M. Feder).

"Spread Spectrum Modulation and Signal Masking Using Synchronized Chaotic Systems," *RLE Technical Report No. 570*, Research Laboratory of Electronics, MIT, Cambridge, MA, February 1992 (with K.M. Cuomo and S.H. Isabelle).

"Signal Enhancement Using Single and Multi-Sensor Measurements," *RLE Technical Report No. 560*, Research Laboratory of Electronics, MIT, Cambridge, MA, November 1990 (with E. Weinstein and M. Feder).

"Signal Reconstruction from Fourier Transform Sign Information," *RLE Technical Report No. 500*, Research Laboratory of Electronics, MIT, Cambridge, MA, May 1984 (with S.R. Curtis and J.S. Lim).

"Variable Cutoff Digital Filters," *Lincoln Laboratory Technical Memo No. 24L-0017*, April 1975.

"Computer Generated Speech Spectrograms," *MIT Lincoln Laboratory Technical Note No. 1969-55*, November 1969.

"Superposition in a Class of Nonlinear Systems," *RLE Technical Report No. 432*, Research Laboratory of Electronics, MIT, Cambridge, MA, March 31, 1965.

**Doctoral Theses Supervised at Massachusetts Institute of Technology, MIT  
Department of Electrical Engineering and Computer Science (EECS)**

G. Su, *Composition Structures For System Representation*, May 2017

P. Martinez-Nuevo, *Amplitude Sampling For Signal Reconstruction*, August 2016

T. Lahlou, *Decentralized Signal Processing Systems with Conservation Principles*, June 2016.

S. Demirtas, *Functional Composition and Decomposition For Signal Processing*, May, 2015.

Thomas A. Baran, *Conservation in Signal Processing Systems*, Ph.D., June 2012.

Zahi Nadim Karam, *Subspace and Graph Methods to Leverage Auxiliary Data for Limited Target Data Multi-Class Classification, Applied to Speaker Verification*, Ph.D.,

June 2011.

Shay Maymon, *Sampling and Quantization for Optimal Reconstruction*, Ph.D., June 2011.

Dennis Wei, *Design of Discrete-Time Filters for Efficient Implementation*, Ph.D., June 2011.

Sourav R. Day, *Randomized Sampling and Multiplier-Less Filtering*, Ph.D., February 2008.

Petros T. Boufounos, *Quantization and Erasures In Frame Representations*, Sc.D., January 2006.

Maya R. Said, *Signal Processing in Biological Cells: Proteins, Networks, and Models*, Sc.D., February 2005.

Charles Sestok, *Data Selection in Binary Hypothesis Testing*, Ph.D., December 2003.

Andrew I. Russell, *Regular and Irregular Signal Resampling*, Ph.D., June 2002.

Yonina C. Eldar, *Quantum Signal Processing*, Ph.D., December 2001.

Wade P. Torres, *Generalized Frequency Modulation*, Ph.D., September 2001.

Li Lee, *Distributed Signal Processing*, Ph.D., June 2000.

Richard J. Barron, *Systematic Hybrid Analog/Digital Signal Coding*, Ph.D., June 2000.

Shawn M. Verbout, *A Framework for Non-Gaussian Signal Modeling and Estimation*, Ph.D., February 1999.

John R. Buck, *Single Mode Excitation in the Shallow Water Acoustic Channel Using Feedback Control*, Ph.D., June 1996.

Andrew C. Singer, *Signal Processing and Communication with Solitons*, Ph.D., June 1996.

Steven H. Isabelle, *Signal Processing Applications of Chaotic Dynamical Systems*, Ph.D., 1995.

Kevin M. Cuomo, *Applications of Synchronization in Chaotic Systems*, Ph.D., February 1994.

Jacek Jachner, *High-Resolution Direction Finding for Multi-Dimensional Scenarios*, Ph.D., February 1994.

Michael D. Richard, *State and Parameter Estimation with Chaotic Systems*, Ph.D., February 1994.

- Kambiz C. Zangi, *Active Noise Cancellation*, Ph.D., February 1994.
- James C. Preisig, *Adaptive Matched Field Processing in an Uncertain Propagation Environment*, Ph.D., January 1992.
- Gregory W. Wornell, *Synthesis, Analysis, and Processing of Fractal Signals*, Ph.D., September 1991.
- Daniel T. Cobra, *Estimation and Correction of Geometric Distortions in Side-Scan Sonar Images*, Ph.D., March 1990.
- Tae H. Joo, *Detection Statistics for Multichannel Data*, Ph.D., December 1989.
- Michele Mae Covell, *An Algorithm Design Environment for Signal Processing*, Ph.D., December 1989.
- Avideh Zakhor, *Reconstruction of Multidimensional Signals from Multiple Level Threshold Crossings*, Ph.D., December 1987.
- Meir Feder, *Statistical Signal Processing Using a Class of Iterative Estimation Algorithms*, Sc.D., September 1987.
- Cory S. Myers, *Signal Representation for Symbolic and Numerical Processing*, Ph.D., August 1986.
- Webster P. Dove, *Knowledge-Based Pitch Detection*, Ph.D., June 1986.
- Michael S. Wengrovitz, *The Hilbert-Hankel Transform and its Application to Shallow Water Ocean Acoustics*, Sc.D., January 1986.
- Evangelos E. Miliotis, *Signal Processing and Interpretation using Multilevel Signal Abstractions*, Ph.D., May 1986.
- Susan R. Curtis, *Reconstruction of Multidimensional Signals from Zero Crossings*, Ph.D., June 1985.
- Douglas R. Mook, *The Numerical Synthesis and Inversion of Acoustic Fields Using the Hankel Transform with Application to the Estimation of the Plane Wave Reflection Coefficient of the Ocean Bottom*, Sc.D., January 1983.
- Andrew L. Kurkjian, *The Estimation of the Cylindrical Wave Reflection Coefficient*, Ph.D., July 1982.
- Hamid Nawab, *Signal Estimation from Short-Time Spectral Magnitude*, Ph.D., May 1982.

Thomas F. Quatieri, Jr., *Phase Estimation with Application to Speech Analysis-Synthesis*, Sc.D., November 1979.

Jae S. Lim, *Enhancement and Bandwidth Compression of Noisy Speech by Estimation of Speech and its Model Parameters*, Sc.D., August 1978.

Michael R. Portnoff, *Time-Scale Modification of Speech Based on Short-Time Fourier Analysis*, Sc.D., April 1978.

Jose M. Tribolet, *Seismic Applications of Homomorphic Signal Processing*, Sc.D., May 1977.

Dan Dudgeon, *Two-Dimensional Recursive Filtering*, Ph.D., June 1974.

Ronald Crochiere, *Digital Network Theory and its Application to the Analysis and Design of Digital Filters*, Ph.D., April 1974.

Russell M. Mersereau, *Digital Reconstruction of Multidimensional Signals from their Projections*, Sc.D., January 1973.

Joseph Siegel, *Analytical Equiripple Nonrecursive Approximations to Ideal Low-Pass Digital Filters*, Ph.D., June 1972.

Ronald W. Schafer, *Nonlinear Filtering of Convolved Signals*, Sc.D., February 1968.

**Doctoral Theses Reader for Massachusetts Institute of Technology, MIT  
Department of Electrical Engineering and Computer Science (EECS)**

Scott Velazquez, *Hybrid Filter Banks for Analog/Digital Conversion*, Ph.D., June 1997.

Susie Wee, *Scalable Video Coding*, Ph.D. June 1996.

Paul Beckman, *Fault Tolerant Algorithms and Architectures for Digital Signal Processing*, Ph.D., September 1992.

Thrasylvoulos Nicholaou Pappas, *Estimation of Coronary Artery Dimensions from Angiograms*, Ph.D., April 1987.

Daniel W. Griffin, *Multi-Band Excitation Vocoder*, Ph.D., February 1987.

Andre A. Merab, *Exact Reconstruction of Ocean Bottom Velocity Profile from Monochromatic Scattering Data*, Sc.D., January 1987.

D. Israelevitz, *Reconstruction of a Multidimensional Sequence from the Fourier Transform Magnitude*, Ph.D., June 1986.

G.L. Duckworth, *Processing and Inversion of Arctic Ocean Refraction Data*, Ph.D., September 1983

Bruce R. Musicus, *Iterative Algorithms for Optimal Signal Reconstruction and Parameter Estimation Given Noisy and Incomplete Data*, Ph.D., September 1982.

Naveed A. Malik, *One and Two Dimensional Maximum Entropy Spectral Estimation*, Sc.D., November 1981.

Monson H. Hayes, III, *Signal Reconstruction from Phase or Magnitude*, Sc.D., June 1981.

Gary Kopec, *A Modular Signal Processing Programming Language System*, Ph.D., June 1980.

Robert P. Bishop, *Modeling the Charge Transfer Process in Charge Coupled Devices*, Sc.D., January 1980.

David V. James, *High Speed Computer Network for Music Synthesis*, Ph.D., February 1979.

Victor Zue, *Acoustic Characteristics of Stop Consonants: A Controlled Study*, Ph.D., May 1976.

Anthony E. Filip, *Estimating the Impulse Response of a Linear Shift-Invariant Image Degrading System*, Ph.D., February 1973.

Mark Medress, *Computer Recognition of Single Syllable English Words*, Ph.D., September 1969.

**Masters and Engineers Theses Supervised at Massachusetts Institute of Technology,  
MIT**

**Department of Electrical Engineering and Computer Science (EECS)**

C. Medlock, “*Reverse Engineering of ROC Curves*” Thesis, August 2017.

H.Yu, *Reconstruction Methods for Level-Crossing Sampling*, Thesis, June 2016.

Tarek Aziz Lahlou, *Parameter Recovery for Transient Signals*, Thesis, June 2013.

Guolong Su, *Polynomial Decomposition Algorithms in Signal Processing*, Thesis, June 2013.

Xue Feng, *Sparse Equalizer Filter Design for Multi-path Channels*, Thesis, June 2012.

Joseph G. McMichael, *Timing Offset and Quantization Error Trade-Off in Interleaved Multi-Channel Measurements*, Thesis, June 2011.

Kwang Siong Jeremy Leow, *Reconstruction from Non-uniform Samples*, Thesis, February 2010.

Jonathan P. Kitchens, *Acoustic Vector-Sensor Array Performance*, Thesis, June 2008.

Archana Venkataraman, *Signal Approximation using the Bilinear Transform*, Thesis, August 2007.

Thomas Baran, *Design and Implementation of Discrete-Time Filters for Efficient Sampling Rate Conversion*, Thesis, February 2007.

Dennis Wei, *Sampling Based on Local Bandwidth*, Thesis, February 2007.

M. Willsey, *Quasi-Orthogonal Wideband Radar Waveforms Based on Chaotic Systems*, Thesis, December 2006.

Zahi Karam, *Computation of the One-Dimensional Unwrapped Phase*, Thesis, January 2006.

Alaa Kharbouch, *A Bacterial Algorithm for Surface Mapping Using a Markov Modulated Markov Chain Model of Bacterial Chemotaxis*, Thesis, January 2006.

Turek Daniel, *Design of Efficient Interpolation Filters for Integer Upsampling*, Thesis, May 2004.

Sourav Dey, *Digital Pre-Compensation for D/A Converters: The "Missing Pixel" Problem*, Thesis, M. Eng., December 2003.

Petros Boufounos, *Signal Processing for DNA Sequencing*, M.Eng., June 2002.

Maya Said, *Discrete-Time Randomized Sampling*, M.Eng., January 2001.

Charles Sestok, *Speech Enhancement with Spectral Magnitude Side Information*, S.M., February 1999.

Alan Seefeldt, *Enhancement of Noise-Corrupted Speech Using Sinusoidal Analysis-Synthesis*, M.Eng., May 1997.

Richard Barron, *Channel Equalization for Self-Synchronizing Chaotic Systems*, M.Eng., May 1996.

Amy Singer, *Applying Top-Down Design of DSP Systems to RASSP*, M.Eng., May 1996.

Chalee Asavathiratham, *Digital Audio Filter Design Using Frequency Transformations*, M.Eng., May 1996.

Li Lee, *A Frequency Warping Approach to Speaker Normalization*, M.Eng., February 1996.

Stanley W. Brown, *A Feasibility Analysis of Single-Sensor Active Noise Cancellation in the Interior of an Automobile*, S.M., June 1995.

Alan Edward Freedman, *Transmission Channel Compensation in Self-Synchronizing Chaotic Systems*, M.Eng., June 1995.

Shawn M. Verbout, *Signal Enhancement for Automatic Recognition of Noisy Speech*, S.M., May 1994.

Brian M. Perreault, *A Single Sensor Control Algorithm for Active Noise Cancellation*, S.M., September 1993.

Saurav Dev Bhatta, *Imaging Ice-cracks Using Diffraction Tomography*, S.M., May 1993.

James M. Njeru, *A Tomographic Ocean Sound Speed Profile from a Long Vertical Acoustic Array*, S.M., February 1992.

Andrew C. Singer, *Codebook Prediction*, S.M., January 1992.

John R. Buck, *Implementation and Evaluation of a Dual-Sensor, Time-Adaptive EM Algorithm for Signal Enhancement*, S.M., August 1991.

John M. Richardson, *A Code-Division Multiple Beam Underwater Imaging System*, S.M., September 1989.

Lawrence Mark Candell, *Aspect Angle Estimation Using A Moving Antenna Array*, S.B. Management Science (1988) and S.M., June 1989.

Joseph E. Bondaryk, *Reconstruction of Nonlinearly Distorted Images From Zero Crossings*, S.M., January 1988.

Daniel J. Harasty, *Television Signal Deghosting By Noncausal Recursive Filtering*, S.M., August 1987.

Anthony J. Silva, *Reconstruction of Undersampled Periodic Signals*, S.M., January 1986.

Avideh Zakhor, *Error Properties of Hartley Transform Algorithms*, S.M., June 1985.

Evangelos E. Milios, *Speech Synthesis Using the Phase of the Long-Time Fourier Transform of the LPC Residual Signal*, S.M., May 1983.

Webster P. Dove, *Event Compression Using Recursive Least Squares Signal Processing*, S.M., July 1980.

David R. Martinez, *Algorithm for Computation of the Acoustic Plane/Wave Reflection Coefficient of the Ocean Bottom*, E.E., June 1979.

Antonio Ruiz, *Windowing Effects in Short-Time Homomorphic Deconvolution*, S.M., February 1978.

Anthony P. Holt, *A Variable Cutoff Filter Using Digital Frequency Warping*, S.M., September 1976.

Gary Kopec, *Speech Analysis by Homomorphic Prediction*, S.M., November 1975.

Ronald H. Frazier, *An Adaptive Filtering Approach Toward Speech Enhancement*, S.M. and E.E., June 1975.

Steven Bates, *A Hardware Realization of a PCM-ADPCM Code Converter*, S.B. and S.M., June 1975.

Bernard Mezrich, *Computer-Generated Movies for the Course 'Digital Processing of Signals'*, S.M., February 1973.

J. Hu, *Frequency Sampling Design of Two-Dimensional Finite Impulse Response Digital Filters*, S.M., September 1972.

David Chan, *Roundoff Noise in Cascade Realization of Finite Duration Impulse Response Digital Filters*, S.M. and S.B., September 1972.

H. DuB. Montgomery, Jr., *A Digital Algorithm for Moderate-Speed, Binary Frequency Modulation*, S.M., June 1972.

Henry Sunkenberg, *Continuously Variable Digital Filters*, S.M., February 1972.

Richard Hankins, *Design Procedures for Equiripple Nonrecursive Digital Filters*, S.M., February 1972.

James L. Caldwell, *Implementation of Short-Time Homomorphic Dereverberation*, S.M. and S.B., September 1971.

Marion Loren Wood, Jr., *Computer Generated Speech Spectrograms and Cepstrograms*, S.M., June 1971.

Vaden C. Shields, *Recovery of Speech in Noise by Digital Comb Filtering*, S.M., September 1970.

Roy Quick, *Helium Speech Translation Using Homomorphic Techniques*, S.M., June 1970.

David Chanoux, *A Method of Digital Filter Synthesis*, S.M., June 1969.

Mark Medress, *Noise Analysis of a Homomorphic Automatic Volume Control System*, E.E. and S.M., February 1968.

E.M. Portner, *The Effects of Noise on Cepstral Detection of Echoes*, S.M. and E.E., September 1967.

J.J. Wolf, *A Homomorphic Model for the Equal-Loudness Curves of the Ear*, S.M., February 1967.

C.J. Weinstein, *Short-Time Fourier Analysis and its Inverse*, S.M., February 1967.

J.F. Kososki, *Spectrum Analysis of the Logarithm of a Function*, S.M., September 1966; E.E., June 1967.

Edmund Jeenicke, *Convolution and Superposition in a Class of Nonlinear Systems*, S.M., June 1965.

J.B. Young, Jr., *The Stability of a Class of Nonlinear Feedback Systems*, S.M., June 1964; E.E., June 1965.

**Bachelors Theses Supervised at Massachusetts Institute of Technology, MIT  
Department of Electrical Engineering and Computer Science (EECS)**

James W. Fleming, *Editing, Updating, and Translating of Student and TA Manuals for Use in 6.341*, S.B., June 1990.

John R. Buck, *Using Matlab To Teach 6.341 On Athena*, S.B., June 1989.

Mitchell R. Steinberg, *Experimental Aspects of Image Reconstruction from Threshold Crossings (and other fun & games)*, S.B., June 1985.

Samuel Holtzman Dantus, *A Speech Pre-Emphasis Filter*, S.B., May 1977.

William J. Ezell, *Computer Animation of Educational Films*, S.B., May 1976.

Christopher B. Roberts, *Analysis of a Non-Recursive Programmable Digital Filter*, S.B., August 1975.

### **Invited Lectures and Talks (Partial List)**

Invited presentation, for two panels on “The History of DSP and Future Research”, DSP50 Rice University, Houston, TX, April 26, 2019.

Invited presentation, “In Honor of Gene Frantz,” Gene Frantz Innovator’s Challenge and DSP Academic Symposium, Texas Instruments, Dallas, Texas, January 14, 2013.

Invited presentation, “Back to the Future,” Yizhak and Chaya Weinstein Research Institute for Signal Processing, Tel-Aviv University, Tel Aviv, Israel, June 26, 2012.

Invited presentation and discussion, “The Texas Instruments Leadership University (TI-LU) Program at MIT,” Texas Instruments Worldwide Leadership University Conference, Xi’an, China, October 31, 2011.

Keynote talk, “Signal Processing Research at MIT,” Texas Instruments Worldwide Leadership University Conference, Xi’an, China, November 3, 2011.

Invited presentation, “Sampling Sampling,” Department of Electrical and Computer Engineering Seminar, Ben Gurion University, Beer-Sheva, Israel, June 19, 2008.

Keynote talk, “One Plus One Could Equal Three,” Third European DSP Education and Research Symposium, Tel Aviv, Israel, June 18, 2008.

Invited presentation, “Sampling Sampling,” Faculty of Engineering Seminar, Tel Aviv University, Tel Aviv, Israel, June 16, 2008.

Invited presentation, “Sampling Sampling,” Pixel Club Seminar, Computer Science Department, Technion, Haifa, Israel, June 15, 2008.

Invited presentation, “Sampling Sampling,” William Mong Distinguished Lecture Series, Faculty of Engineering, University of Hong Kong, March 27, 2008.

Invited presentation, “One Plus One Could Equal Three,” KAIST Seminar, Daejeon, South Korea, March 24, 2008.

Invited presentation, “One Plus One Could Equal Three,” Center for Applied Mathematics Colloquium, Cornell University, Ithaca, NY, February 22, 2008.

Keynote talk, “Sampling Sampling,” Fifteenth Annual Workshop on Adaptive Sensor Array Process, MIT Lincoln Laboratory, Lexington, MA, June 5, 2007.

Invited presentation, “One Plus One Can Equal Three (Or Anything Else You’d Like It To Be),” Center for Applied Mathematics Colloquium Series, Cornell University, Ithaca, NY, October 20, 2006.

Invited presentation, “One Plus One Can Equal Three (Or Anything Else You’d Like It To Be),” Distinguished Lecture Series – Electrical & Computer Engineering Seminar Series, Carnegie Mellon University, Pittsburgh, PA, March 9, 2006.

Keynote talk, Signal and Imaging Sciences Workshop, Lawrence Livermore National Laboratory, Livermore, CA, November 19, 2004.

Invited plenary talk, “Things My Mother Never Told Me (About Doing Research),” DSP/SPE Workshop, IEEE Signal Processing Society, Taos, NM, August 2, 2004.

Invited plenary panel, Texas Instruments Development Conference, Houston, TX, February 19, 2004.

Invited plenary talk, “DSP Applications”, Streaming Systems Workshop, Endicott House, Dedham, MA, August 23, 2003.

Keynote address, “Digital Signal Processing: How Did We Get Where We’re Going?” GSPx & International Signal Processing Conference, Hotel Intercontinental—Dallas, TX, Tuesday, April 1, 2003.

Invited presentation, “Digital Signal Processing: How Did We Get Where We’re Going?” Golden Anniversary Lecture Series, University of Illinois at Urbana-Champaign, Champaign, IL, October 19, 2001.

Keynote address, “Alphabet Soup: What’s Cooking in DSP,” ADI SHARC Conference, Northeastern University, Boston, MA, September 10, 2001.

Keynote address, “ $1 + 1 = 3$ ,” Opening of the Signal Processing Institute, Tel Aviv University, Tel Aviv, Israel, May 17, 2001.

Invited panelist, panel discussion on “Signal Processing at the Junction of Two Millennia,” International Conference on Acoustics, Speech and Signal Processing, Istanbul, Turkey, June 2000.

Invited plenary talk, “Digital Signal Processing: How Did We Get to Where We’re Going?” Texas Instruments DSPS Fest ’99, Houston, TX, August 4-6, 1999.

Colloquium, “Digital Signal Processing: How Did We Get to Where We’re Going?” MIT, Cambridge, MA, February 22, 1999.

Invited presentation, “Digital Signal Processing: How Did We Get to Where We’re Going?” Tel Aviv University, Tel Aviv, Israel, January 1999.

Invited plenary talk, “Digital Signal Processing: How Did We Get to Where We’re Going?” International Conference on Acoustics, Speech and Signal Processing, Seattle, WA, May 12, 1998.

Invited panelist, "What Makes MIT Education So Special?" MIT, Cambridge, MA, May 17, 1997.

Invited presentation, "Advanced Signal Processing," Lockheed Martin Day at MIT, Technology for the Next Generation of Satellites (2000-2010), MIT, Cambridge, MA, February 19, 1997.

Keynote address, "How Did We Get to Where We're Going?" International Conference on Signal Processing Applications & Technology, World Trade Center, Boston, MA, October 7-10, 1996.

Invited presentation, "Chaos, Fractals, and Signal Processing," Third Biennial Mini Conference on Acoustics, Speech, and Signal Processing, Northeastern University, Weston, MA, April 19-20, 1991.

Invited presentation, "Representation, Synthesis, and Processing of Self-Similar Signals," Symposium on the Applications of Wavelets to Signal Processing, Wright-Patterson AFB, Ohio, March 20-22, 1991.

Invited presentation, "Nonlinear Techniques for Signal Enhancement," Nonlinear Techniques for Noise Reduction Meeting, Second Seminar on Nonlinear Signal Processing, sponsored by Science Applications International Corporation (SAIC), Washington, DC, December 3, 1990.

Invited presentation, "Fractal Signal Modeling and Processing using Wavelets," Fourth Digital Signal Processing Workshop, Mohonk Mountain House, New Paltz, NY, September 16-19, 1990 (with G. W. Wornell).

Invited presentation, "Wavelet-Based Representations in Fractal Signal Modeling," the JASON Group (DoD), General Atomics Corporation, San Diego/LaJolla, CA, July 19, 1990 (with G. W. Wornell).

Poster session, "Wavelet-Based Representations for Fractal Modeling," NSF/CBMS Regional Conference on Wavelets, University of Lowell, Lowell, MA, June 11-15, 1990 (with G. W. Wornell).

Invited presentation, "Estimation of Fractal Signals from Noisy Measurements," given at the Lockheed Corporation meeting entitled "Applying Chaos & Nonlinear Methods to Signal Processing," Holiday Inn, Fair Oaks, VA, June 7-8, 1990 (with G. W. Wornell).

Group Leader, DSP Group, IEEE Workshop on Future Directions in Circuits, Systems, and Signal Processing, The Sheraton New Orleans Hotel, New Orleans, LA, May 4-5, 1990.

Short Course, "Digital Signal Processing," Texas Instruments, Inc., Dallas, TX, January 9-11, 1990.

Invited presentation, "Noise Cancellation," SRS-IX Speech Research Symposium, Sheraton Inn, Colorado Springs, CO, December 6-7, 1989.

Short Course, "Digital Signal Processing Fundamentals," Sheraton Lexington Inn, Lexington, MA, June 5-6, 1989.

Short Course, "Digital Signal Processing," Texas Instruments, Inc., Richardson, TX, January 25-27, 1989.

Invited Tutorial, "Digital Signal Processing," Second Joint Meeting of the Acoustical Societies of America and Japan, Sheraton-Waikiki Hotel, Honolulu, HI, November 14-18, 1988 (Tutorial given on November 14, 1988).

Short Course, "Digital Signal Processing Fundamentals," Hyatt Regency Hotel, Cambridge, MA, August 8-9, 1988 (Note: Short course was part of series entitled "Signal Processing Fundamentals, Advanced Topics, and Applications," August 8-17, 1988).

Short Course, "Digital Signal Processing," Texas Instruments, Inc., Dallas, TX, January 12-15, 1988 (with J. S. Lim).

Short Course, "Digital Signal Processing," AT&T Bell Laboratories, Reading, PA, November 17-20, 1987.

"Methods For Noise Cancellation Based On The EM Algorithm," International Conference on Acoustics, Speech, and Signal Processing, Dallas, TX, April 6-9, 1987 (with M. Feder and E. Weinstein).

Colloquium, Texas Instruments, Inc., Dallas, TX, February 23, 1987.

"Methods for Noise Cancellation based on the E-M Algorithm," presented at the SRS-V Symposium, Washington, DC, February 18-19, 1987 (with M. Feder).

Short Course, "Hardware Architectures for Digital Signal Processing," Texas Instruments, Inc., Dallas, TX, January 21-23, 1987 (with B. R. Musicus).

Short Course, "Digital Signal Processing," AT&T Bell Laboratories, Reading, PA, December 9-12, 1986.

"Numerical and Symbolic Signal Representation," Special Distinguished Lecture, 1986 ASILOMAR Conference on Signals, Systems, and Computers, Pacific Grove, CA, November 9-12, 1986.

“Signal Processing and Representations,” 40th Anniversary Symposium In Electronics, Research Laboratory of Electronics, M.I.T., Cambridge, MA, October 31, 1986.

“Symbols and Signals,” Guest Speaker, Eighth Annual Sanders Associates, Inc., Distinguished Technical Achievement Awards, South Nashua, NH, October 28, 1986.

“Reconstruction of Undersampled Periodic Signals,” Digital Signal Processing Workshop, Chatham, MA, October 19-22, 1986 (with A. J. Silva).

Reviewed Small Business Innovative Research (SBIR) Proposals, submitted to the Directorate for Computer and Information Science and Engineering, National Science Foundation, Washington, DC, September 29, 1986.

“Signal Processing Short Courses,” Cambridge, MA, June 10-14, 1985.

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, January 21-23, 1985.

“Signal Processing Short Courses,” Cambridge, MA, June 11-22, 1984.

“Applications and Computation of the Hankel Transform,” Mortimer and Raymond Sackler Institute of Advanced Studies, Tel Aviv University, Tel Aviv, Israel, May 3, 1984.

“Applications and Computation of the Hankel Transform,” Technion-Israel Institute of Technology, Haifa, Israel, April 26, 1984.

“Signal Reconstruction from Partial Information,” Technion-Israel Institute of Technology, Haifa, Israel, April 25, 1984.

“Signal Reconstruction from Partial Information,” Mortimer and Raymond Sackler Institute of Advanced Studies, Tel-Aviv University, Tel-Aviv, Israel, April 12, 1984.

“Digital Processing of Speech and Pictures,” Mortimer and Raymond Sackler Institute of Advanced Studies, Tel-Aviv University, Tel-Aviv, Israel, April 5, 1984.

Seminar, “Signal Reconstruction from Partial Fourier Domain Information,” University of California, San Diego, CA, February 3, 1984.

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, January 16-18, 1984.

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, November 14-15, 1983.

“Signal Reconstruction from Partial Fourier Domain Information,” L'Aquila Workshop on Digital Signal Processing, L'Aquila, Italy, September 6-8, 1983 (poster session) (with J. S. Lim and S. R. Curtis).

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, June 22-24, 1983.

“Digital Signal Processing Short Course,” Andover, MA, June 13-17, 1983 (with L. J. Griffiths, J. S. Lim, and B. R. Musicus).

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, November 17-19, 1982 and November 22-23, 1982 (with L. J. Griffiths and B. R. Musicus).

Session Chairman, IEEE International Conference on Acoustics, Speech, and Signal Processing, Paris, France, May 3-5, 1982.

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, November 4-10, 1981 (with J. H. McClellan).

Chairman, “Current Trends in Signal Processing,” Industrial Liaison Program Symposium, M.I.T., Cambridge, MA, May 14, 1981 (with J. Cafarella and G. Kopec).

“Digital Signal Processing Short Course,” Texas Instruments, Inc., Dallas, TX, October 29-31, 1980, and November 3-4, 1980 (with J. H. McClellan).

“An Overview of Classical and High Resolution Spectral Estimation,” invited talk presented at the L'Aquila Workshop on Digital Signal Processing, L'Aquila, Italy, September 9-11, 1980.

“Importance of Phase in Signals,” poster session presented at the L'Aquila Workshop on Digital Signal Processing, L'Aquila, Italy, September 9-11, 1980 (with J. S. Lim).

“Digital Processing of Speech,” Kodak, Inc., Rochester, NY, March 21, 1980.

“Advanced Topics in Digital Signal Processing Course,” Sanders Associates, Nashua, NH, February 21-May 7, 1980 (with J. H. McClellan).

“Digital Signal Processing Short Course,” Houston, TX, January 21-25, 1980 (with J. H. McClellan and T. Parks).

“Digital Signal Processing Short Course,” Fairchild Semiconductor, Portland, ME, November 5-9, 1979.

“Application of Digital Signal Processing to Speech and Image Processing,”

Seminar at MITRE Corporation, Rome Air Development Center, Rome, NY, June 28, 1979.

“Some New Approaches to Image Restoration,” National Aeronautics and Space Administration Seminar, Greenbelt, MD, April 10, 1979.

Seminar, “Phase in Speech and Pictures,” University of Southern California, Los Angeles, CA, February 26, 1979.

“Digital Signal Processing Short Course,” Sanders Associates, Nashua, NH, October 30, 1978 - January 29, 1979.

“Talk is Cheap,” Plenary Session, 1978 IEEE Conference on Decision and Control (including the 17th Symposium on Adaptive Processes), San Diego, CA, January 10-12, 1979.

“Phase in Speech and Pictures,” Geophysics Department Seminar, University of British Columbia, Vancouver, British Columbia, Canada, January 10, 1979.

“Digital Signal Processing Short Course,” Svenska Radio AB, Stockholm, Sweden, September 4-6, 1978.

“Digital Signal Processing Short Course,” Etudes et Productions Schlumberger, Paris, France, August 24-29, 1978 (with J. H. McClellan).

“Digital Signal Processing Short Course,” Houston, TX, June 12-16, 1978 (with J. H. McClellan and T. Parks).

“Speech Processing,” M.I.T. Technology Day, Cambridge, MA, June 9, 1978.

“Digital Signal Processing Course,” in collaboration with the Canadian Society of Exploration Geophysicists, Calgary, Canada, January 23-25, 1978.

“Deconvolution of Seismic Data Using Homomorphic Filtering,” International Symposium on Computer-Aided Seismic Analysis and Discrimination, Falmouth, MA, June 9-10, 1977 (with J. Tribolet).

“Short Course on Digital Signal Processing,” Dallas, TX, June 1-3, 1977.

“Recent Trends in Signal Processing,” Special European Program, for the Industrial Liaison Office, M.I.T., presented in Zurich, Switzerland, January 17-21, 1977.

“Two Short Courses: Microprocessors and Digital Signal Processing,” Florence, Italy, January 10-15, 1977 (with H. D. Toong).

“Application of Homomorphic Deconvolution to Seismology,” Seminar at the Institut fur Technische Physik an der E.T.H., Zurich, Switzerland, June 14, 1976.

Chairman, Signal Processing Symposium, for the Industrial Liaison Office, M.I.T., Cambridge, MA, April 27, 1976.

“Deconvolution by Homomorphic Prediction,” 29th Annual Midwestern Exploration Meeting, Dallas, TX, March 1976 (with J. Tribolet and G. Kopec).

“Digital Processing of Signals,” a three-part course for Office of Continuing Studies, Rice University, Houston, TX, December 8-9, 1975.

“Deconvolution by Homomorphic Prediction,” Society of Exploration Geophysicists 45th Annual International Meeting, Denver, CO, October 12-18, 1975 (with J. Tribolet and G. Kopec).

“Digital Processing of Speech,” Digital Signal Processing Lecture Series sponsored by the Boston IEEE, M.I.T., Cambridge, MA, May 19, 1975.

“Theory and Applications of Homomorphic Filtering,” Rome Air Development Center, Rome, NY, May 16, 1975.

“Digital Processing of Speech,” Distinguished Lecture Series, Department of Electrical Engineering, State University of New York, Buffalo, NY, May 2, 1975.

Chairman, Session on Digital Filters, 1975 IEEE International Symposium on Circuits and Systems, Boston, MA, April 22-23, 1975.

“Reconstruction of Multidimensional Signals from their Projections,” Los Alamos Scientific Laboratory, Los Alamos, NM, January 30, 1975.

“Lectures on Homomorphic Filtering,” Chevron Oil Field Research Company, La Habra, CA, January 26-29, 1975.

“Current Research in Digital Signal Processing at M.I.T.,” Summer School on Circuit Theory, Prague, Czechoslovakia, September 2-6, 1974.

“Homomorphic Signal Processing,” Amoco Production Company Research Center, Tulsa, OK, July 29, 1974.

“Theories and Applications of Homomorphic Filtering,” McMaster University, Hamilton, Ontario, Canada, June 10, 1974.

“Pole-Zero Modeling Using Cepstral Prediction,” 1974 IEEE Arden House Workshop on Digital Signal Processing, January 16, 1974 (with J. M. Tribolet).

Four lectures on digital signal processing: “General Digital Signal Processing Activities”; “Digital Frequency Warping”; “Digital Filter Structures”; and, “Three-Dimensional Reconstruction”; presented at Linkoping University, Linkoping, Sweden, June 5-8, 1973.

“Lectures on Digital Signal Processing,” University of Grenoble, Grenoble, France, May-June 1973.

“Image Processing,” Special Lectures on Signal Processing, L'Ecole Superieure de Physique de Marseilles, Marseilles, France, May 16, 1973.

“Digital Processing of Images,” University of Nice, Nice, France, May 15, 1973.

“Digital Processing of Speech,” University of Nice, Nice, France, May 14, 1973.

“Speech Processing Activities at M.I.T.,” Institute for Technical Physics, Polytechnic Institute of Zurich, Zurich, Switzerland, May 7, 1973.

“Special Lectures on Digital Signal Processing,” presented as Visiting Professor, University of Erlangen, Erlangen, West Germany, April 1-15, 1973.

“Computer Generated Movies,” Imperial College, London, England, March 29, 1973.

“Signal Processing Activities at M.I.T.,” Imperial College, London, England, March 28, 1973.

“Theory and Applications of Digital Signal Processing,” Institute for Signal Processing, Federal Polytechnic Institute of Lausanne, Lausanne, Switzerland, March 6, 1973.

“Digital Processing of Speech and Pictures,” Polytechnic of Central London, London, England, February 27, 1973.

“Digital Frequency Warping,” Instituto di Onde Elettromagnetiche, Florence, Italy, September 25, 1972.

“Applications of Digital Filters,” Session Chairman, Florence Seminar on Digital Filtering, Florence, Italy, September 22, 1972.

“Applications of Homomorphic Filtering,” 1972 Program in Systems Theory, Rensselaer Polytechnic Institute, Troy, New York, July 26, 1972.

“Generalized Linear Filtering,” 1972 Summer Program in Systems Theory, Rensselaer Polytechnic Institute, Troy, New York, July 26, 1972.

“Advanced Signal Processing Techniques,” M.I.T.-I.L.O. Symposium, Cambridge, MA, May 4, 1972.

“Application of Digital Signal Processing to Speech Analysis,” M.I.T.-I.L.O. Symposium, Cambridge, MA, February 16, 1972.

“Speech Processing by Computer,” Program of Visiting Lecturers, University of Rhode Island, December 1, 1971.

“Speech Processing by Computer,” Princeton University Seminars in Engineering and the Life Sciences, Princeton, NJ, May 13, 1971.

“Applications of Digital Filtering,” Institut de Recherche D'Informatique et D'Automatique, Rocquencourt, France, April 1, 1971.

“Finite Register Length Effects in Digital Filtering and the Fast Fourier Transform,” Institut de Recherche D'Informatique et D'Automatique, Rocquencourt, France, March 30, 1971.

“Digital Processing of Signals,” Istituto di Elettrotecnica, Genova, Italy, March 26, 1971.

“Representation and Implementation of Nonrecursive Digital Filters,” pre-NEREM Seminar on Digital Signal Processing, Boston, MA, November 3, 1970.

“Lectures on Digital Signal Processing,” lectures given at the Technical University of Berlin, M.I.T.-T.U.B. Exchange Program, June 1970.

“Six Lectures on Digital Signal Processing,” Bell Aerospace Corporation, Buffalo, NY, January 29 - February 6, 1970.

“Digital Linear Systems,” Digital Signal Processing Lecture Series sponsored by the Boston IEEE, January 1970.

Chairman, Digital Signal Processing Session, NEREM Conference, Boston, MA, November 6, 1969.

“Computer Generated Spectrogram,” IEEE Arden House Workshop on Digital Filtering, Harriman, NY, January 14, 1969.

“Speech Processing Using the Fast Fourier Transform,” IEEE Workshop on FFT Processing, Harriman, NY, October 6, 1968.

“Lectures on Digital Signal Processing,” lectures given at the Technical Institute of Berlin, M.I.T.-T.U.B. Exchange Program, June 1968.

“Deconvolution of Speech,” Department of Communications Sciences, University of Michigan, Ann Arbor, MI, January 23, 1968.

“Homomorphic Signal Processing,” lectures given at the Technical University of Berlin,  
M.I.T.-T.U.B. Exchange Program, June 1967.