

**DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING
UNIVERSITY OF UTAH
SALT LAKE CITY, UTAH 84112**

PERSONAL DATA SHEET

NAME: V. John Mathews

DATE: January 2015

TITLE: Professor

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University of Utah
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EDUCATION:

Ph.D. in Electrical and Computer Engineering, University of Iowa, December 1984. Thesis: "Short-Time Unbiased and Related Spectrum Estimation Algorithms – A Generalization and Analysis"

M.S. in Electrical and Computer Engineering, University of Iowa, December 1981. Thesis: "Fixed Lag Smoothing for Systems with Jump Parameters"

B. E. (Honors) in Electronics and Communication Engineering (Diversified in Communication Engineering), University of Madras, India, 1980.

EXPERIENCE:

University of Utah, Department of Electrical Engineering, Professor, July 1995 - present.

University of Utah, Department of Electrical & Computer Engineering, Director of Engineering Clinics, July 2002 – December 2005.

Yonsei University, Seoul, Korea, Center for Information Technology Visiting Professor, August 2003 – August 2004 (On sabbatical leave from the University of Utah).

IBM T. J. Watson Research Center, Yorktown Heights, New York, Academic Visitor, June-July 2000.

University of Utah, Department of Electrical & Computer Engineering, Chairman, March 2000-June 2003.

University of Utah, Department of Electrical Engineering, Acting Chair, July 1999-February 2000.

University of Utah, Department of Electrical Engineering, Associate Chair, February 1999 - June 1999.

University of Utah, Department of Electrical Engineering, Associate Professor, July 1991 - June 1995.

AT&T Bell Laboratories, Signal Processing Department, Murray Hill, New Jersey, Summer Consultant in the area of image compression, June 1991 - September 1991.

University of Utah, Department of Electrical Engineering, Assistant Professor, June 1985 to June 1991.

University of Iowa, Department of Electrical and Computer Engineering, Visiting Assistant Professor, August 1984 to May 1985.

University of Iowa, Department of Electrical and Computer Engineering, Teaching-Research Fellow, August 1980 to July 1984.

HONORS & PROFESSIONAL SOCIETIES:

Elected Fellow of the IEEE in 2002 “for contributions to the theory and application of nonlinear and adaptive filtering.”

Distinguished Alumnus Award, National Institute of Technology, Trichy, India, 2009.

Engineer of the Year, IEEE Utah Section, 2010.

Engineer of the Year, Utah Engineers Council, 2011.

Distinguished Lecturer, IEEE Signal Processing Society, 2013-2014.

Meritorious Service Award, IEEE Signal Processing Society, 2014.

Vice President – Finance, IEEE Signal Processing Society, 2003-2005.

Vice President – Conferences, IEEE Signal Processing Society, 2009-2011.

Member of the Senior Editorial Board, *IEEE Journal of Special Topics in Signal Processing*, 2006 - 2010.

Member of the Editorial Board, *IEEE Signal Processing Magazine*, 2005 - 2007, 2012-present.

Associate Editor, *IEEE Transactions on Acoustics, Speech and Signal Processing*, 1989-1991.

Associate Editor, *IEEE Signal Processing Letters*, 1993-1998.

Member, Signal Processing Theory and Methods (formerly Digital Signal Processing) Technical Committee, IEEE Signal Processing Society, 1992 - 2001, 2012-present.

Vice Chair, Signal Processing Theory and Methods Technical Committee, IEEE Signal Processing Society, 2013-2014.

Chair, Signal Processing Theory and Methods Technical Committee, IEEE Signal Processing Society, 2015-2016.

Member, Signal Processing Education Technical Committee (formerly Standing Committee on Signal Processing Education), IEEE Signal Processing Society, 1995 - 2001, 2012-present.

Member, Conference Board, IEEE Signal Processing Society, 1996 to 2005, 2009 to 2011 (Chair).

Member, Publication Board, IEEE Signal Processing Society, 2003 to 2005, 2009 to 2011.

Secretary/Treasurer, IEEE Utah Section, 1986-1987.

Faculty Fellow, University of Utah, Autumn 1990, Autumn 1996.

PH. D. STUDENTS SUPERVISED:

Thao Duy Tran, Data Compression of Bauded Signals Using the Baseband Residual Vector Quantization Algorithm, University of Utah, December 1987.

Sung Ho Cho, Convergence Analysis for Efficient Adaptive Filtering Algorithms and Structures, University of Utah, July 1989.

Mushtaq A. Syed, QR-Decomposition Based Algorithms for Nonlinear and Multichannel Adaptive Filtering, University of Utah, June 1992.

Junghsi Lee, Adaptive Polynomial Filtering Algorithms, University of Utah, August 1992.

Thomas M. Panicker, Parallel-Cascade Realizations of Truncated Volterra Systems, University of Utah, March 1998.

Peter J. Hahn, Perceptually Lossless Image Compression, University of Utah, December 1999.

Shan Mo, Adaptive Receivers for Spread Spectrum Multiple Access Communications, University of Utah, December 2001.

Lanka Fernando, Prediction of Maternal-Fetal Diseases Using Ultrasound Signal Processing, August 2003.

Janez Jeraj, Adaptive Estimation and Equalization of Nonlinear Systems, May 2005.

Ying Deng, Adaptive Algorithms for Speech Enhancement, December 2006.

Ashutosh Pandey, Perceptually Motivated Signal Processing for Digital Hearing Aids, May 2011.

Olakunle Eso, Automated Detection of Congenital Heart Diseases Using 4-D Ultrasound, May 2014.

CURRENT PH. D. STUDENTS:

Daimei Zhu, Modulation Identification for Dual Polarized Signals. Expected year of graduation: 2016.

Shreyas Payal, Nonlinear Transducer Distortion Correction, Expected year of graduation: 2016.

Jingru Zhou, Structural Health Monitoring, Expected year of graduation: 2016.

Ahmad Zoubi, Structural Health Monitoring, Expected year of graduation: 2017.

Yi Tang, Modeling Sepsis Patient Response to Medication, Expected year of graduation: 2017

Jacob Nieveen, Neural Decoding for Prosthesis, Expected year of Graduation: 2018.

Khem Poudel, Adaptive control of Quadruped Robots, Expected year of Graduation: 2018.

SUPERVISION OF PH. D. STUDENTS OUTSIDE UNIVERSITY OF UTAH:

Alberto Carini, Adaptive Recursive Filters (April-August 1996, January-April 1997, September -November 1997. Much of the work he performed during the visit formed part of his PhD thesis at the Trieste University, Trieste, Italy.)

Piet Struijk, Signal Processing for Maternal-Fetal Medicine. (Several visits between 2002 and 2006. Four out of the six chapters of his dissertation (Erasmus University, Rotterdam, The Netherlands) was based on the work done during the visits.)

Tang Ying, Independent Component Analysis Algorithms. (Ph. D. Student from China visiting for one year during November 2008 - October 2009.)

Yiman Zhang, Neural Decoding for Prosthetics. (PhD Student from Wuhan University, China visiting currently for one year from September 2014 to August 2015.)

MS STUDENTS SUPERVISED:

Ahmad Naghsh-Nilchi, Joint Estimation of Differential Time Delays and Frequency Offsets, University of Utah, December 1990.

Ramin Baseri, Vector Quantization Employing Perceptual Masking Functions, University of Utah, September 1991.

Osama Haddadin, A Hexagonally Oriented Frequency Selective Human Visual System Model and its Application to Image Coding, University of Utah, August 1992.

Bhupal Dharia, Design of Filter Banks for Subband Coding Systems, University of Utah, March 1994.

K. S. Prashant, Design of a Perceptual Threshold Model and Parallel Algorithms for Image Compression, University of Utah, March 1995.

Peter J. Hahn, Adaptive Methods of Time Delay Estimation for a Passive Sonar Array, University of Utah, August 1996.

Shan Mo, Adaptive Quadratic Preprocessing of Document Images for Binarization, University of Utah August 1997.

Teren Jameson, Iterative Semi-blind Channel Estimation for Multiple-Input Multiple-Output Wireless Systems, May 2005

POST-DOCTORAL STUDENTS/VISITING SCHOLARS:

Heung-Ki Baik, Adaptive Nonlinear Filters (January-December 1990)

Linshan Li, Adaptive Nonlinear Filters (September 1995 - February 1997)

Jaeha Yoo, Adaptive Speech Enhancement, (April 2000 - March 2002)

Lanka Fernando, Biomedical Signal Processing (August 2003-September 2004)

Moushmi Kar, Hearing Aid Signal Processing (July 2011 - January 2012)

CURRENT AND RECENT FUNDED RESEARCH PROJECTS:

“Acoustic Emission-Based Health Monitoring for Composite Aerospace Structures,” funded by NASA Marshall Space Flight Research Center. Period of Performance - January 15, 2013 - January 14, 2016. Role in the project - Principal Investigator.

“Bayesian Computational Sensor Networks for Aircraft Structural Health Monitoring,” funded by Air Force Office of Scientific Research. Period of Performance - June 16, 2012 - June 14, 2015. Role in the project - Co-Principal Investigator.

“Modulation Identification of Dual-Polarized Signals,” funded by Raytheon Applied Signal Technology. Period of Performance - January 1, 2012 - February 29, 2015. (Expected to be renewed.) Role in the project - Principal Investigator.

“Nonlinear Transducer Distortion Correction,” funded by Harman International. Period of Performance - February 1, 2013 - January 31, 2015. Role in the project - Principal Investigator.

“Biologically-Inspired Hybrid Quadruped Robot Control,” funded by National Science Foundation. Period of Performance - August 15, 2014 - July 31, 2017. Role in the project - Co-Principal Investigator.

“Embodied Neuroprosthesis,” funded by Defense Advanced Research Projects Agency. Expected to start of January 1, 2015. Period of Performance - February 9, 2015 - February 8, 2020. Role in the project - Senior Researcher.

BOOK:

V. J. Mathews and G. L. Sicuranza, *Polynomial Signal Processing*, John Wiley & Sons, New York, 2000.

BOOK CHAPTER:

C. F. N. Cowan, E. J. Coyle, M. Gabbouj, V. J. Mathews, I. Pitas and G. L. Sicuranza, “Fundamentals of Nonlinear Digital Signal Processing,” in *Circuit and Systems Tutorials*, edited by C. Toumazou, pp. 1-70, IEEE ISCAS, 1994.

PAPER IN REPRINT VOLUMES:

D. H. Youn, S. N. Chiou and V. J. Mathews, "Adaptive Phase Transform Processors for Time Delay Estimation," *J. Acoust. Soc. America*, Vol. 80, No. 1, pp. 188-194, July 1986 in *Coherence and Time Delay Estimation*, edited by G. C. Carter, IEEE Press, 1993.

PUBLICATIONS IN REFEREED JOURNALS:

V. J. Mathews and J. K. Tugnait, "Detection and Estimation with Fixed Lag for Abruptly Changing Systems," *IEEE Transactions on Aerospace, Electronic Systems*, Vol. AES-19, No. 5, pp. 730-739, September 1983

D. H. Youn and V. J. Mathews, "Adaptive Realizations of the Maximum Likelihood Processor for Time Delay Estimation," *IEEE Trans. Acoust., Speech, Signal Proc.*, Vol. ASSP-32, No. 4, pp. 938-940, August 1984.

V. J. Mathews and D. H. Youn, "Spectral Leakage Suppression Properties of Linear and Quadratic Windowing," *IEEE Trans., Acoust., Speech, Signal Proc.*, Vol. ASSP-32, No. 5, pp. 1092-1095, October 1984.

V. J. Mathews and D. H. Youn, "Analysis of the Short-Time Unbiased Spectrum Estimation Algorithm," *IEEE Trans., Acoust., Speech, Signal Proc.*, Vol. ASSP-33, No. 1, pp. 136-142, February 1985.

D. H. Youn, V. J. Mathews and S. H. Cho, "An Efficient Lattice Filtering Algorithm for Instantaneous Frequency Estimation," *Signal Processing*, Vol. 10, No. 1, pp. 75-81, January 1986.

D. H. Youn, S. N. Chiou and V. J. Mathews, "Adaptive Phase Transform Processors for Time Delay Estimation," *J. Acoust. Soc. America*, Vol. 80, No. 1, pp. 188-194, July 1986.

V. J. Mathews, D. H. Youn and N. Ahmed, "A Unified Approach to Nonparametric Spectrum Estimation Algorithms," *IEEE Trans. Acoust., Speech, Signal Proc.*, Vol. ASSP-35, No. 3, pp. 338-349, March 1987.

V. J. Mathews and S. H. Cho, "Improved Convergence Analysis of Stochastic Gradient Adaptive Filters Using the Sign Algorithm," *IEEE Trans. Acoust., Speech, Signal Proc.*, Vol. ASSP-35, No. 4, pp. 450-454, April 1987.

V. J. Mathews, "An Efficient FIR Adaptive Filter Using DPCM and the Sign Algorithm," *IEEE Trans. Acoust., Speech, Signal Proc.*, Vol. ASSP-37, No. 1, pp. 128-133, January 1989.

K. A. East, T. D. East, V. J. Mathews and B. T. Waterfall, "Computerized Artifact Rejection for Respiratory Inductance Plethysmography Apnea Monitors," *J. Clinical Monitoring*, Vol. 5, No. 3, pp. 170-176, July 1989.

T. D. Tran, V. J. Mathews and C. K. Rushforth, "A Baseband Residual Vector Quantization Algorithm for Voiceband Data Signal Compression," *IEEE Trans. Communications*, Vol. COM-37, No. 9, pp. 949-955, September 1989.

V. J. Mathews and Z. Xie, "Fixed Point Error Analysis of Stochastic Gradient Adaptive Lattice Filters," *IEEE Trans. Acoust., Speech, Signal Proc.*, Vol. ASSP-38, No. 1, pp. 70-80, January

1990.

S. H. Cho and V. J. Mathews, "Tracking Analysis of the Sign Algorithm in Non-Stationary Environments," *IEEE Trans. Acoust., Speech, Signal Proc.*, Vol. ASSP-38, No. 12, pp. 2046-2057, December 1990.

V. J. Mathews, "Performance Analysis of Adaptive Filters Equipped with the Dual Sign Algorithm," *IEEE Trans. Signal Proc.*, Vol. 39, No. 1, pp. 85-91, January 1991.

V. J. Mathews, "Adaptive Polynomial Filters," *IEEE Signal Processing Magazine*, Vol. 8, No. 3, pp. 10-26, July 1991.

V. J. Mathews, "Multiplication Free Vector Quantization Using the L_1 distortion Measure and its Variants," *IEEE Trans. Image Proc.*, Vol. 1, No. 1, pp. 11-17, January 1992.

M. A. Syed and V. J. Mathews, "Finite Precision Error Analysis of a QR-Decomposition Based Lattice Predictor," *Optical Engineering*, Vol. 31, No. 6, pp. 1170-1180, June 1992.

J. Lee and V. J. Mathews, "A Fast Recursive Least Squares Adaptive Second Order Volterra Filter and its Performance Analysis," *IEEE Trans. Signal Proc.*, Vol. 41, No. 3, pp. 1087-1102, March 1993.

H. K. Baik and V. J. Mathews, "Adaptive Bilinear Lattice Filters," *IEEE Trans. Signal Proc.*, Vol. 41, No. 6, pp. 2033-2046, June 1993.

V. J. Mathews and Z. Xie, "Stochastic Gradient Adaptive Filters with Gradient Adaptive Step Sizes," *IEEE Trans. Signal Proc.*, Vol. 41, No. 6, pp. 2075-2087, June 1993.

M. A. Syed and V. J. Mathews, "QR-Decomposition Based Algorithms for Adaptive Volterra Filtering," *IEEE Trans. Circuits and Systems - I: Fundamental Theory and Applications*, Vol. 40, No. 6, pp. 372-382, June 1993.

M. A. Syed and V. J. Mathews, "Lattice Algorithms for Adaptive Volterra Filtering," *IEEE Trans. Circuits and Systems - II: Analog and Digital Signal Processing*, Vol. 41, No. 3, pp. 202-214, March 1994.

J. Lee and V. J. Mathews, "A Stability Theorem for Bilinear Systems," *IEEE Trans. Signal Proc.*, Vol. 41, No. 7, pp. 1871-1873, July 1994.

J. Lee and V. J. Mathews, "A Stability Result for RLS Adaptive Bilinear Filters," *IEEE Signal Processing Letters*, Vol. 1, No. 12, pp. 191-193, December 1994.

J. N. Bradley, T. G. Stockham, Jr., and V. J. Mathews, "An Optimal Design Procedure for In-band Vector Quantized Subband Coding," *IEEE Trans. Communications*, Vol. 43, No. 2, pp. 523-533, February 1995.

V. J. Mathews, "Orthogonalization of Correlated Gaussian Signals for Volterra System Identification," *IEEE Signal Processing Letters*, Vol. 2, No. 10, pp. 188-190, October 1995.

V. J. Mathews, "Adaptive Volterra Filters Using Orthogonal Structures," *IEEE Signal Processing Letters*, Vol. 3, No. 12, pp. 307-309, December 1996.

- V. J. Mathews and P. J. Hahn, "Vector Quantization Using the L_∞ Distortion Measure," *IEEE Signal Processing Letters*, Vol. 4, No. 2, p. 33-35, February 1997.
- A. Carini, G. L. Sicuranza and V. J. Mathews, "On the Inversion of Certain Nonlinear Systems," *IEEE Signal Processing Letters*, Vol. 4, No. 12, pp. 334-336, December 1997.
- T. M. Panicker, V. J. Mathews and G. L. Sicuranza, "Adaptive Parallel Cascade Truncated Volterra Filters," *IEEE Trans. Signal Processing*, Vol. 46, No. 10, pp. 2664-2673, October 1998.
- S. Mo and V. J. Mathews, "Adaptive Binarization of Document Images Using Quadratic Filters," *IEEE Trans. Image Processing*, Vol. 7, No. 7, pp. 992-999, July 1998.
- T. M. Panicker and V. J. Mathews, "Parallel-Cascade Realizations and Approximations of Truncated Volterra Systems," *IEEE Trans. Signal Proc.*, Vol. 46, No. 10, pp. 2829-2832, October 1998.
- A. Carini, V. J. Mathews and G. L. Sicuranza, "Sufficient Stability Bounds for Slowly-Varying Discrete-Time Recursive Linear Filters and Their Applications in Adaptive IIR Filtering," *IEEE Trans. Signal Proc.*, Vol. 46, No. 9, pp. 2561-2567, September 1999.
- L. Li and V. J. Mathews, "Efficient block-adaptive parallel-cascade quadratic filters," *IEEE Trans. Circuits and Systems II – Analog and Digital Signal Processing*, Vol. 46, No. 4, pp. 468-472, April 1999.
- A. Polesel, G. Ramponi and V. J. Mathews, "Image Enhancement via Adaptive Unsharp Masking," *IEEE Trans. Image Processing*, Vol. 9, No. 3, pp. 505-510, March 2000.
- P. C. Struijk, N. T. C. Ursem, V. J. Mathews, E. B. Clark, B. B. Keller and J. W. Wladimiroff, "Power Spectrum Analysis of Heart Rate and Blood Flow Velocity Variability Measured in Umbilical Artery and Uterine Artery in Early Pregnancy. A Comparative Study," *Ultrasound in Obstetrics and Gynecology*, Vol. 17, No. 4, pp. 316-321, April 2001.
- N. Kalouptsidis, P. Koukoulas, and V. J. Mathews, "Blind Identification of Bilinear Systems," *IEEE Trans. Signal Processing*, Vol. 51, No. 2, pp. 484-499, Feb 2003.
- K. L. Fernando, V. J. Mathews, M. W. Varner and E. B. Clark, "Robust Estimation of Fetal Heart Rate Variability Using Doppler Ultrasound," *IEEE Trans. Biomedical Engineering*, Vol. 50, No. 8, pp. 950-957, August 2003.
- K. L. Fernando, V. J. Mathews, and E. B. Clark, "Mean Frequency Estimation of Narrowband Signals," *IEEE Signal Processing Letters*, Vol. 11, No. 2, pp. 175-178, Feb. 2004.
- K. L. Fernando, V. J. Mathews, and E. B. Clark, "A mathematical basis for the application of the modified geometric method to maximum frequency estimation," *IEEE Trans. Biomedical Engineering*, vol. 51, no. 11, pp. 2085-2088, November 2004.
- P. C. Struijk, P.A. Stewart, K. L. Fernando, V.J. Mathews, T.Loupas, E.A.P. Steegers, J.W. Wladimiroff, "Wall shear stress and related hemodynamic parameters in the fetal descending aorta derived from high spatio-temporal resolution color Doppler velocity profiles," *Ultrasound in Medicine and Biology*, vol. 11, pp. 1441-1450, Nov. 2005.
- J. Jeraj and V. J. Mathews, "A stable adaptive Hammerstein filter employing partial orthogonal-

ization of the input signal,” *IEEE Trans. Signal Processing*, vol. 54, no. 4, pp. 1412-1420, April 2006.

J. Jeraj and V. J. Mathews, “Stochastic mean-square performance analysis of an adaptive Hammerstein filter,” *IEEE Trans. Signal Processing*, vol. 54, no. 4, pp. 2168-2177, June 2006.

Y. Deng, V. J. Mathews and B. Farhang-Boroujeny, “Low-Delay Nonuniform Pseudo QMF Banks with Application to Speech Enhancement”, *IEEE Transactions on Signal Processing*, vol. 55, no. 5, pp. 2110-2121, May 2007.

P. C. Struijk, K. L. Fernando, V. J. Mathews, E.A.P. Steegers, J. W. Wladimiroff, E.B. Clark and M.W. Varner, “Application of the Magnitude-Squared Coherence Function Between Uterine and Umbilical Flow Velocity Waveforms for Predicting Placental Dysfunction: A Preliminary Study,” *Ultrasound in Medicine and Biology*, vol. 33, no. 7, pp. 1057-1063, 2007.

H. I. K. Rao, V. J. Mathews and Y. -C. Park, “A Minimax Approach for the Joint Design of Acoustic Crosstalk Cancellation Filters,” *IEEE Transactions on Audio, Speech and Language Processing*, vol. 15, no. 8, pp. 2287 - 2298, Nov. 2007

P. C. Struijk, V. J. Mathews, T. Loupas, P. A. Stewart, E. B. Clark, E. A. P. Steegers and J. W. Wladimiroff, “Blood Pressure Estimation in the Human Fetal Descending Aorta,” *Ultrasound in Obstetrics and Gynecology*, vol. 32, no. 5, pp. 673-681, October 2008.

A. Pandey and V. J. Mathews, “Low-delay signal processing for digital hearing aids,” *IEEE Trans. on Audio, Speech and Language Proc.*, vol. 19, no. 4, pp. 2287-2298, May 2011.

M.A. Frankel, B.R. Dowden, V.J. Mathews, R.A. Normann, G.A. Clark, S.G. Meek, “Multiple-Input Single-Output Closed-Loop Isometric Force Control Using Asynchronous Intrafascicular 1 Multi-Electrode Stimulation,” *IEEE Trans Neural Systems Rehab Eng.*, vol. 19, no. 3, pp. 325-332, June 2011.

A. Pandey and V. J. Mathews, “Adaptive Gain Processing With Offending Frequency Suppression for Digital Hearing Aids,” *IEEE Trans. on Audio, Speech and Language Proc.*, vol. 20, no. 3, pp. 1043 - 1055, March 2012.

A. Carini, G. L. Sicuranza and V. J. Mathews, “Efficient adaptive identification of linear-in-the-parameters nonlinear filters using periodic input sequences,” *Signal Processing*, vol. 93, no. 5, pp. 1210-1220, May 2013.

P. Struijk, H. Migchels, V. J. Mathews, P. A. Stewart, E. B. Clark, C. L. deKorte and F. K. Lotgering, “Fetal aortic distensibility, compliance, and pulse pressure assessment during the second half of pregnancy,” *Ultrasound in Medicine and Biology*, vol. 39, no. 11, pp. 1966-1975, 2013.

S. M. Brown, Q. Tate, J. P. Jones, D. B. Knox, K. B. Kuttler, M. Lanspa, M. T. Rondina, C. K. Grissom, S. Behera, V. J. Mathews and A. Morris, “Initial fractal exponent of heart rate variability is associated with success of early resuscitation in patients with severe sepsis or sepsis shock: A prospective cohort study,” *Journal of Critical Care*, vol. 28, pp. 959-963, 2013.

S. M. Brown, Q. Tate, J. P. Jones, K. B. Kuttler, M. Lanspa, M. T. Rondina, C. K. Grissom and V. J. Mathews, “Coefficient of variation of heart rate variability is associated with early vassopressor independence in severe sepsis and septic shock,” *Journal of Intensive Care Medicine*, vol. 29, 2014.

M.A. Frankel, V.J. Mathews, G.A. Clark, R.A. Normann and S.G. Meek, "Closed-Loop Control of Paralyzed Limb Motion using Asynchronous Intrafascicular Multi-Electrode Stimulation," submitted to *IEEE Trans Neural Systems Rehab Eng.*, 2014.

PLENARY TALKS:

V. J. Mathews and G. L. Sicuranza, "Volterra and General Polynomial Filtering," *IEEE Winter Workshop on Nonlinear Digital Signal Processing*, Tampere, Finland, January 1993.

V. J. Mathews, "Signal Processing in Maternal-Fetal Medicine," *Fourteenth European Signal Processing Conference*, September 6, 2006, Florence, Italy.

V. J. Mathews, "Adaptation and Equalization of Nonlinear Systems," *Int. Conf. on Multimedia Technology*, Ningbo, China, Oct. 30, 2010.

V. J. Mathews, "Restoration of Motor Skills in Patients with Diseases of the Central Nervous System," *8th International Symposium on Image and Signal Processing and Analysis*, Trieste, Italy, September 4, 2013.

V. J. Mathews, "Restoration of Motor Skills in Patients with Diseases of the Central Nervous System," *22nd Signal Processing and Communications Applications Conference*, Trabzon, Turkey, April 25, 2014.

V. J. Mathews, "Signal Processing for Diagnostic Medicine," *The 3rd IEEE Workshop on Bio-Inspired Signal and Image Processing*, Vilnius, Lithuania, May 5, 2014.

V. J. Mathews, "Signal Processing for Structural Health Monitoring," *Signal and Image Processing Symposium*, Kyoto, Japan, November 13, 2014.

PUBLICATIONS IN CONFERENCE PROCEEDINGS:

V. J. Mathews and J. K. Tugnait, "Detection and Estimation with Fixed Lag for Abruptly Changing Systems," *Proc. 20th Annual Allerton Conf. Control, Communication and Computing*, pp. 545-554, Urbana-Champaign, Illinois, October 6-8, 1982.

D. H. Youn and V. J. Mathews, "On Using the Short-Time Unbiased Spectrum Estimation Algorithm for Estimating Time Delays and Magnitude-Squared Coherence Functions," *Proc. ASSP Workshop on Spectrum Estimation II*, pp. 60-64, Tampa, Florida, November 10-11, 1983.

D. H. Youn, S. N. Chiou and V. J. Mathews, "Adaptive Realizations of Phase Transform for Time Delay Estimation," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 15.10.1-4, San Diego, California, March 1984.

D. H. Youn, K. K. Yu and V. J. Mathews, "Adaptive Nonlinear Digital Filter with Sequential Regression Algorithm," *Proc. 22nd Annual Allerton Conf. Control, Communication and Computing*, pp. 152-161, Urbana-Champaign, Illinois, October 3-5, 1984.

D. H. Youn, V. J. Mathews and S. H. Cho, "An Efficient Algorithm for Lattice Filter/Prediction," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 1181-1184, Tampa, Florida, March 26-29, 1985.

- V. J. Mathews, R. W. Waite and T. D. Tran, "Predictive Vector Quantization of Images Using a Constrained 2-D Autoregressive Predictor," *Proc. 20th Annual Asilomar Conf. Signals, Systems and Computers*, Pacific Grove, California, pp. 243-247, November 10-12, 1986.
- V. J. Mathews and S. H. Cho, "Convergence Analysis for LMS Adaptive Filters Using the Sign Algorithm," *Proc. Platinum Jubilee Conf. Systems and Signal Proc.*, pp. 63-66, Indian Institute of Science, Bangalore, India, December 11-13, 1986.
- V. J. Mathews, R. W. Waite and T. D. Tran, "Image Compression Using Vector Quantization of Linear (One-Step) Prediction Errors," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 733-736, Dallas, Texas, April 6-9, 1987.
- V. J. Mathews, "Adaptive Filters Requiring Zero Multiplications," *Proc. Midwest Symp. Circuits, Systems*, pp. 471-474, Syracuse, New York, August 17-18, 1987.
- V. J. Mathews, "A Fast, Recursive Least Squares Nonlinear Adaptive Filter," *Proc. 21st Annual Asilomar Conf. Signals, Systems and Computers*, pp. 156-160, Pacific Grove, California, November 1987.
- T. D. Tran, V. J. Mathews, and C. K. Rushforth, "A Baseband Residual Vector Quantization Algorithm for Banded Signal Compression," *Proc. GLOBECOM 87*, pp. 458-462, Tokyo, Japan, November 15-18, 1987.
- T. D. Tran, V. J. Mathews, and C. K. Rushforth, "A New Carrier Frequency Estimator for Modem Signals," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 1886-1889, New York, April 11-14, 1988.
- S. H. Cho and V. J. Mathews, "Multiplication-Free Adaptive Filters," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 1576-1579, New York, April 11-14, 1988.
- V. J. Mathews and J. Lee, "A Fast Recursive Least Squares Second Order Volterra Filter," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, New York, pp. 1383-1386, April 11-14, 1988.
- V. J. Mathews and M. Khorchidian, "Multiplication-Free Vector Quantization Using the L_1 Distortion Measure and its Variants," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 1747-1750, Glasgow, May 23-26, 1989.
- S. H. Cho and V. J. Mathews, "Tracking Analysis of the Sign Algorithm in Non-Stationary Environments," *Proceedings of the 32nd Midwest Symposium on Circuits and Systems*, pp. 869-872, Urbana-Champaign, Illinois, August 14-15, 1989.
- V. J. Mathew and Z. Xie, "Stochastic Gradient Adaptive Filters with Gradient Adaptive Step Sizes," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, pp. 1385-1388, Albuquerque, New Mexico, April 3-6, 1990.
- M. A. Syed and V. J. Mathews, "Lattice and QR-Decomposition Based Algorithms for Recursive Least Squares Adaptive Nonlinear Filters," *Proc. IEEE Int. Symp. Circuits and Systems*, New Orleans, Louisiana, May 1990.
- H. K. Baik, V. J. Mathews and R. T. Short, "Adaptive Lattice Bilinear Filter," *Proceedings of the SPIE Conference on Advanced Signal Processing Algorithms, Architectures and Implementations*,

San Diego, June 1990.

H. K. Baik and V. J. Mathews, "Adaptive Algorithms for Identifying Recursive Nonlinear Systems," *Proc IEEE Int. Conf. Acoust., Speech, Signal Proc.*, Toronto, Canada, pp. 2077-2080, May 1991.

V. J. Mathews and T. K. Moon, "Parameter Estimation for a Bilinear Time Series Model," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, Toronto, Canada, pp. 3513-3516, May 1991.

M. A. Syed and V. J. Mathews, "Finite Precision Error Analysis of a QR-Decomposition Based Lattice Predictor," *Proc. SPIE Conf. on Adaptive Signal Processing*, San Diego, California, July 1991.

J. Lee and V. J. Mathews, "Output-Error Adaptive Bilinear Filters," *Proc. Twenty Fifth Asilomar Conf. Signals, Systems and Computers*, Pacific Grove, California, pp. 207-211, November 1991.

R. Baseri and V. J. Mathews, "Vector Quantization of Images using Visual Masking Functions," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, San Francisco, California, pp. III 365-368, March 1992.

A. R. Naghsh-Nilchi and V. J. Mathews, "An Efficient Algorithm for Joint Estimation of Differential Time Delays and Frequency Offsets," *Proc. IEEE Int. Conf. Acoust., Speech, Signal Proc.*, San Francisco, California, pp. V 309-312, March 1992.

O. S. Haddadin, V. J. Mathews, and T. G. Stockham, "Subband Vector Quantization of Images using Hexagonal Filter Banks," *Proc. Data Compression Conference*, Snowbird, Utah, March 1992.

M. A. Syed and V. J. Mathews, "QR-Decomposition Based Algorithms for Adaptive Volterra Filtering," *Proceedings of IEEE Int. Symp. Circuits and Systems*, pp. 2625-2628, San Diego, California, May 1992.

J. Lee and V. J. Mathews, "A Stability Theorem for Bilinear Systems," *Proc. IEEE Winter Workshop on Nonlinear Digital Signal Processing*, Tampere, Finland, January 1993.

J. Lee and V. J. Mathews, "On Extended Least Squares Bilinear Filtering Algorithms," *Proc. IEEE Int. Conf. Acoustics, Speech, Signal Proc.*, Minneapolis, April 1993.

V. J. Mathews and J. Lee, "Techniques for Bilinear Time Series Analysis," *Proc. Twenty Seventh Annual Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, California, November 1993.

J. Lee and V. J. Mathews, "Adaptive Bilinear Predictors," *Proc. ICASSP '94*, Adelaide, Australia, April 1994.

G. K. Ma, J. Lee and V. J. Mathews, "A Fast RLS Bilinear Filter for Channel Equalization," *Proc. ICASSP '94*, Adelaide, Australia, April 1994.

V. J. Mathews and J. Lee, "Adaptive Algorithms for Bilinear Filtering," *Proc. SPIE Annual Meeting; Conference on Advanced Signal Processing: Algorithms, Architectures and Implementations V*, San Diego, July 24-29, 1994.

J. Lee and V. J. Mathews, "A Stability Condition for Time Varying Bilinear Systems," *Proc. EUSIPCO 94*, Edinburgh, September 1994.

- K. S. Prashant and V. J. Mathews, "A Massively Parallel Algorithm for Vector Quantization," *Proc. of the 1995 NASA Space and Earth Sciences Workshop*, Salt Lake City, Utah, March 1995.
- K. S. Prashant, V. J. Mathews and P. J. Hahn, "A New Model of Perceptual Threshold Functions for Application in Image Compression Systems," *Proceedings of the IEEE Data Compression Workshop*, Snowbird, Utah, March 1995.
- J. T. Yoo, G. C. Gopalakrishnan, K. F. Smith and V. J. Mathews, "High Speed Counterflow-Clocked Pipelining Illustrated on the Design of HDTV Subband Vector Quantizer Chips," *Proc. Conference on Advanced Research in VLSI*, Chapel Hill, North Carolina, March 1995.
- J. Lee and V. J. Mathews, "Output-Error LMS Bilinear Filters with Stability Monitoring" *Proceedings of ICASSP 95*, Detroit, May 1995.
- V. J. Mathews, "Adaptive Volterra Filters Using Orthogonal Structures," *Proceedings of ICASSP 95*, Detroit, May 1995.
- S. Mo and V. J. Mathews, "Adaptive Binarization of Document Images," *Proceedings of the IEEE Workshop on Nonlinear Signal and Image Processing*, Neos-Marmaras, Halkidiki, Greece, June 1995.
- S. C. Douglas and V. J. Mathews, "Stochastic Gradient Adaptive Step Size Algorithms for Adaptive Filtering," *Proceedings of the International Conference on Digital Signal Processing*, Limassol, Cyprus, June 26-28, 1995.
- V. J. Mathews, "Vector quantization of images using the L_∞ distortion measure," *Proceedings of the IEEE International Conference on Image Processing*, Washington, D. C., October 1995.
- P. J. Hahn, V. J. Mathews and T. D. Tran, "Adaptive realization of a maximum likelihood time delay estimator," *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing*, Atlanta, May 1996.
- T. M. Panicker and V. J. Mathews, "Parallel-cascade realizations and approximations of truncated Volterra systems," *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing*, Atlanta, May 1996.
- T. M. Panicker, V. J. Mathews and G. L. Sicuranza, "Parallel-Cascade Adaptive Volterra Filters," *Proc. EUSIPCO 1996*, Trieste, Italy, September 1996.
- P. J. Hahn and V. J. Mathews, "Perceptually Lossless Image Compression," *Proc. Data Compression Industry Workshop*, March 24, 1997, Snowbird, Utah.
- T. M. Panicker and V. J. Mathews, "A Fast Gauss-Newton Parallel-Cascade Adaptive Truncated Volterra Filter," *Proc. ICASSP 97*, Munich, April 1997.
- A. Carini, V. J. Mathews and G. L. Sicuranza, "Sufficient Stability Bounds for Slowly-Varying Discrete-Time Recursive Linear Filters," *Proc. ICASSP 97*, Munich, April 1997.
- A. Polesel, G. Ramponi and V. J. Mathews, "Adaptive Unsharp Masking for Contrast Enhancement," *IEEE Int. Conf. Image Processing*, Santa Barbara, California, September 1997.
- A. Carini, G. L. Sicuranza and V. J. Mathews, "On the Inversion of Certain Nonlinear Systems,"

IEEE Nonlinear Signal and Image Processing Workshop, September 1997.

C. Schlegel and V. J. Mathews, "Computationally Efficient Multiuser Detection for Coded CDMA," *Int. Conf. Universal Personal Communications*, San Diego, October 1997.

T. M. Panicker and V. J. Mathews, "An extended Kalman filter for parallel-cascade truncated Volterra systems," *Thirty-First Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, California, November 1997.

A. Carini, G. L. Sicuranza and V. J. Mathews, "Equalization and Linearization of Nonlinear Systems," *IEEE Int. Conf. Acoustics, Speech, Signal Proc.*, Seattle, May 1998.

H. J. Sung, Y. C. Park, D. H. Youn and V. J. Mathews, "An Optimum Space-Time MTI Processor for Airborne Radar," *IEEE Int. Conf. Acoustics, Speech, Signal Proc.*, Seattle, May 1998.

L. Li and V. J. Mathews, "Frequency-Domain Realizations of Adaptive Parallel-Cascade Quadratic Filters," *IEEE Int. Conf. Acoustics, Speech, Signal Proc.*, Seattle, May 1998.

S. Mo, C. B. Schlegel and V. J. Mathews, "A Blind Adaptive Projection Receiver," *IEEE Digital Signal Processing Workshop*, Bryce Canyon National Park, Utah, August 1998.

P. J. Hahn and V. J. Mathews, "A Perceptually-Tuned Image Compression System," *IEEE Digital Signal Processing Workshop*, Bryce Canyon National Park, Utah, August 1998.

C. B. Schlegel, S. Mo, and V. J. Mathews, "Blind Multiuser Detection of Coded CDMA," *IEEE Int. Symp. Information Theory*, Boston, 1998.

P. J. Hahn and V. J. Mathews, "An Analytical Model of the Perceptual Threshold Function for Multichannel Image Compression," *IEEE Int. Conf. Image Processing*, Chicago, 1998.

A. Carini, V. J. Mathews and G. L. Sicuranza, "Exact and p th order equalization and linearization of recursive polynomial systems," *Thirty-Second Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, California, November 1998.

S. Mo, C. B. Schlegel and V. J. Mathews, "A Blind Projection Receiver for Coded CDMA Systems," *IEEE Int. Conf. Acoustics, Speech, Signal Proc.*, Phoenix, March 1999.

S. Mo and V. J. Mathews, "An Adaptive Channel Estimator for CDMA Systems in Multipath Fading Channels," *IEEE International Conference on Acoustics, Speech and Signal Processing*, Salt Lake City, May 2001.

N. Kalouptsidis, P. Kakoulas and V. J. Mathews, "Blind Identification of Bilinear Systems," *IEEE International Conference on Acoustics, Speech and Signal Processing*, Salt Lake City, May 2001.

K. L. Fernando, V. J. Mathews and E. B. Clark, "Mean Frequency Estimation of Narrowband Signals and its Application to Doppler Ultrasound Blood Velocity Waveform Estimation," *IEEE International Conference on Acoustics, Speech and Signal Processing*, Vol. 2, pp. 1317-1320, May 2002.

J. Jeraj, V. J. Mathews and J. Dubow, "A Stable Adaptive Hammerstine Filter Employing Partial Orthogonalization of the Input Signals," *IEEE International Conference on Acoustics, Speech and Signal Processing*, Vol. 2, pp. 1349-1352, May 2002.

K. L. Fernando, V. J. Mathews, and E. B. Clark, "Reconstruction of Maximum Blood Velocity Waveforms from Doppler Ultrasound Measurements," *Proc. Engineering in Medicine and Biology, 2002, 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society*, vol 1, pp. 124-125, October 2002.

K. L. Fernando, V. J. Mathews M. W. Varner and E. B. Clark, "Robust Estimation of Fetal Heart Rate Variability Using Doppler Ultrasound," *Proc. IEEE International Conf. Acoustics, Speech, and Signal Processing*, pp. II - 257-260, Hong Kong, April 2003.

J. Jeraj and V. J. Mathews, "Stochastic mean-square performance analysis of an adaptive Hammerstine filter," *Proc. IEEE International Conf. Acoustics, Speech, and Signal Processing*, vol. 2, pp. 725-728, Montreal, Canada, May 2004.

K. L. Fernando, V. J. Mathews M. W. Varner and E. B. Clark, "Prediction of pregnancy-induced hypertension using coherence analysis," *Proc. IEEE International Conf. Acoustics, Speech, and Signal Processing*, vol. 5, pp. 433-436, Montreal, Canada, May 2004.

S. Balasubramanian, B. Farhang-Boroujeny and V. J. Mathews, "Pilot embedding for channel estimation and tracking in OFDM systems," *Proc. IEEE Global Telecommunications Conference*, vol. 2, pp. 1244-1248, Dallas, December 2004.

J. Jeraj and V. J. Mathews, "Identification of nonlinear, memoryless systems using Chebyshev nodes," *Proc. IEEE International Conf. Acoustics, Speech, and Signal Processing*, vol. 4, pp. 93-96, Philadelphia, March 2005.

A. Pandey and V. J. Mathews, "Howling Suppression in Hearing Aids using Least-Squares Estimation and Perceptually Motivated Gain Control", *Proc. IEEE Int. Conf. Acoustics, Speech & Signal Proc.*, vol. 5, pp. 149-152, Toulouse, France, April 2006.

H. Rao, V. J. Mathews and Y.-C. Park, "Inverse Filter Design Using Minimax Approximation Techniques for 3-D Audio", *Proc. IEEE Int. Conf. Acoustics, Speech & Signal Proc.*, vol. 5, pp. 353-356, Toulouse, France, April 2006.

Y. Deng, V. J. Mathews and B. Farhang-Boroujeny, "The Design of Low-Delay Nonuniform Pseudo QMF Banks," *Proc. Fourteenth European Signal Processing Conference*, Florence, Italy, September 4-8, 2006.

Y. Deng and V. J. Mathews, "Subband Particle Filtering for Speech Enhancement," *Proc. Fourteenth European Signal Processing Conference*, Florence, Italy, September 4-8, 2006.

H. Rao, V. J. Mathews and Y.-C. Park, "A Joint Minimax Approach for Binaural Rendering of Audio Through Loudspeakers", *Proc. IEEE Int. Conf. Acoustics, Speech & Signal Proc.*, Hawaii, April 2007.

A. Pandey, V. J. Mathews, M. Nilsson, "Adaptive Gain Processing to Improve Feedback Cancellation in Digital Hearing Aids," *Proc. IEEE Int. Conf. Acoustics, Speech & Signal Processing*, Las Vegas, April 2008.

A. Pandey and V. J. Mathews, "Improving adaptive feedback cancellation through offending frequency suppression," *Proc. IEEE Int. Conf. Acoustics, Speech, Signal Processing*, Dallas, March 15-19, 2010.

A. Carini, V. J. Mathews and G. L. Sicuranza, "Efficient NLMS and RLS algorithms for a class of nonlinear filters using periodic inputs," *Proc. IEEE Int. Conf. Acoustics, Speech, Signal Processing*, Prague, May 22-27, 2011.

A. Pandey and V. J. Mathews, "Offending frequency suppression with a reset algorithm to improve feedback cancellation in digital hearing aids," *Proc. IEEE Int. Conf. Acoustics, Speech, Signal Processing*, Prague, May 22-27, 2011.

M.A. Frankel, G.A. Clark, S.G. Meek, R.A. Normann and V.J. Mathews, "Adaptive Parameter Selection for Asynchronous Intrafascicular Multi-Electrode Stimulation," *Proc. IEEE Int. Conf. Acoustics, Speech, Signal Processing*, Kyoto, Japan, March 25-30, 2012.

D. Zhu and V. J. Mathews, "Blind identification of QAM signals using a likelihood-based algorithm," *Proc. IEEE Workshop on Digital Signal Processing and Signal Processing Education*, pp. 158-163, Napa Valley, California, August 11-14, 2013.

D. Zhu, V. J. Mathews and D. H. Detienne, "A phase likelihood-based algorithm for blind identification of PSK signals," *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing*, Florence, Italy, May 4-9, 2014.

H. Dantas, S. Kellis, V. J. Mathews and B. Greger, "Neural decoding using a nonlinear generative model for brain-computer interface," *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing*, Florence, Italy, May 4-9, 2014.

S. S. Payal, V. J. Mathews, A. Iyer, R. Lambert and J. Hutchings, "Equalization of excursion and current-dependent nonlinearities in loudspeakers," *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing*, Florence, Italy, May 4-9, 2014.

S. Kim, B. Uprety, V. J. Mathews and D. O. Adams, "Numerical Simulation and Experimental Validation of Lamb Wave Propagation Behavior in Composite Plates," *Proc. Review of Progress in Quantitative Nondestructive Evaluation*, Boise, ID, July 20-25, 2014.

B. Uprety, S. Kim, V. J. Mathews and D. O. Adams, "A Comparative Evaluation of Piezoelectric Sensors for Acoustic Emission-Based Impact Location Estimation and Damage Classification in Composite Structures," *Proc. Review of Progress in Quantitative Nondestructive Evaluation*, Boise, ID, July 20-25, 2014.

J. Zhou, V. J. Mathews and D. O. Adams, "Impact Location Estimation in Anisotropic Structures," *Proc. Review of Progress in Quantitative Nondestructive Evaluation*, Boise, ID, July 20-25, 2014.

V. J. Mathews, "Damage Mapping in Structural Health Monitoring Using a Multi-Grid Architecture," *Proc. Review of Progress in Quantitative Nondestructive Evaluation*, Boise, ID, July 20-25, 2014.

J. Zhou, V. J. Mathews and D. O. Adams, "Impact Location Estimation in Anisotropic Media," accepted for presentation at the *IEEE International Conference on Acoustics, Speech and Signal Processing*, Brisbane, Australia, April 2015.

CONFERENCE ABSTRACTS:

M.A. Frankel, V.J. Mathews, S.G. Meek, G.A. Clark, and R.A. Normann, "Adaptive filtering

optimization of stimulation parameters for multi-electrode interleaved stimulation,” *5th Annual Mountain West Biomedical Engineering Conference*, Park City, USA, Sep. 11-12, 2009.

M. A. Frankel, V. J. Mathews, S. G. Meek, G. A. Clark, and Normann, R.A., “Adaptive Filtering Optimization for Multi-Electrode Interleaved Stimulation Parameters,” *Neuroscience 2009*, October 17-21, Chicago, IL, USA.

M.A. Frankel, V.J. Mathews, S.G. Meek, G.A. Clark, and R.A. Normann, “Optimization of interleaved stimulation parameters for multi-electrode arrays,” *Neural Interfaces Conference 2010*, Long Beach, USA, Jun. 21-23, 2010.

M.A. Frankel, V. J. Mathews, S.G. Meek, B.R. Dowden, G. A. Clark, and R.A. Normann,, “Closed-loop isometric force control of the feline gastrocnemius muscle using interleaved intrafascicular multi-electrode stimulation,” *6th Annual Mountain West Biomedical Engineering Conference*, Park City, USA, Sep. 10-11, 2010.

M.A. Frankel, V.J. Mathews, S.G. Meek, B.R. Dowden, G.A. Clark, and R.A. Normann, “Closed-loop isometric force control of the feline gastrocnemius muscle using interleaved intrafascicular multi-electrode stimulation,” *Neuroscience 2010*, San Diego, USA, Nov. 13-17, 2010.

Q. Tate, S. M. Brown, J. Jones, K. Kuttler, Y. Li, C. K. Grissom, V. J. Mathews, “Predicting Early Vasopressor Independence with Coarsely Sampled Arterial Blood Pressure in Severe Sepsis and Septic Shock,” *34th Annual Conference of the Shock Society*, Newport, Virginia, June 11-14, 2011.

S. M. Brown, S. Behera, J. P. Jones, M. J. Lanspa, C. K. Grissom, K. G. Kuttler, B. Briggs, N. Kumar N, and V. J. Mathews, “The Short-term Fractal Exponent of Heart-Rate Variability Is Associated with Mortality in Severe Sepsis and Septic Shock,” *International Conference on Complexity in Acute Illness*, Bonn, Germany, September 8-11, 2011.

P. C. Struijk, H. Migchels, V. J. Mathews, P. A. Stewart, E. B. Clark, C. L. de Korte, and F. K. Lotgering, “Fetal aortic intima media thickness (IMT) and inner diameter assessment by decomposing the unprocessed radio frequency derived ultrasound wall reflection into two Gaussian pulses,” *21st World Congress on Ultrasound in Obstetrics and Gynecology*, Los Angeles, CA, September 18-22, 2011. (This paper was the short oral presentation award winner in the area of imaging technologies in obstetrics & gynecology.)

S. Behera, S. M. Brown, J. Jones, M. Lanspa, K. Kuttler, V. J. Mathews, “Normalized Low Frequency Power of Heart Rate Variability Correlates Negatively With the SOFA Score in Severe Sepsis and Septic Shock,” *Chest 2011*, Honolulu, Hawaii, October 22-26, 2011.

M.A. Frankel, B.R. Dowden, D.H. Hilgart, V.J. Mathews, G.A. Clark, and R.A. Normann, “Closed-loop PID control of ankle plantar-flexion angle using asynchronous intrafascicular multi-electrode stimulation,” *Neuroscience 2011*, Washington D.C., USA, Nov. 12-17, 2011.

M.A. Frankel, S.G. Meek, V.J. Mathews, G.A. Clark, and R.A. Normann, “Evoking precise limb motion using real-time feedback-controlled asynchronous intrafascicular multi-electrode stimulation,” *Neuroscience 2012*, New Orleans, USA, October 2012.

M.A. Frankel, S.G. Meek, V.J. Mathews, G.A. Clark, R.A. Normann, “Closed-loop asynchronous intrafascicular multi-electrode stimulation to control paralyzed limb position,” *International Func-*

tional Electrical Stimulation Society Conference on Smart Machines-Neural Evolution, Banff, Canada, Sep. 9-12, 2012.

M.A. Frankel, S.G. Meek, V.J. Mathews, G.A. Clark, and R.A. Normann, "Evoking precise limb motion using real-time feedback-controlled asynchronous intrafascicular multi-electrode stimulation," *Neural Interfaces Conference 2012*, Salt Lake City, USA, Jun. 18-20, 2012.

PATENTS:

K. L. Fernando, V J. Mathews, E. B. Clark, and M. W. Varner, "Method and apparatus for predicting maternal hypertension during pregnancy using coherence analysis of maternal and fetal blood velocity waveforms," U. S. Patent #7,374,539, May 20, 2008.

C. L. Davis, J. D. Kearns, V. J. Mathews, "Transducer health diagnostics for structural health monitoring (SHM) systems," U. S. Patent #7,487,059, February 3, 2009.

V. J. Mathews, "Model-based dissimilarity indices for health monitoring systems," U. S. Patent #7,720,626, May 18, 2010.

V. J. Mathews, "Compensating for temperature effects in a health monitoring system," U. S. Patent #8,127,610, March 6, 2012.

V. J. Mathews, "Change mapping for structural health monitoring ," U. S. Patent #8,412,470 April 2, 2013.

A. Pandey and V. J. Mathews, "Offending frequency suppression in hearing aids ," U. S. Patent #8,630,437, January 14, 2014.

V. J. Mathews and J. B. Ihn, "Reducing the ringing of actuator elements in ultrasound based health monitoring systems," U. S. Patent #8,694,269, April 8, 2014.

WORKSHOPS/TUTORIALS CONDUCTED:

"Fundamentals of Nonlinear Digital Signal Processing," with C. F. N. Cowan, E. J. Coyle, M. Gabbouj, I. Pitas and G. L. Sicuranza at the *IEEE International Symposium on Circuits and Systems*, London, May 30, 1994.

"Polynomial Signal Processing," at National Chiou Tung University, Hsinchu, Taiwan, June 21-23, 1994.

"Theory and Applications of Adaptive Polynomial Filters," as part of the one-day educational seminar on *Recent Trends in Adaptive Filtering* in Philadelphia on October 25, 1995, organized by the Philadelphia Signal Processing Chapter of the IEEE. The other invited speakers were Ron Fante, John Proakis and Neil Bershad.

"Adaptive Filters," a two-day Workshop at the University of South Australia, Adelaide, July 2002.

"Fundamentals of Adaptive Filters," at *IEEE Emerging Signal Processing Applications Conference*, Las Vegas, NV, January 10, 2012. (Presented with Dr. Akihiko Sugiyama, NEC, Japan.)

ORGANIZATION OF CONFERENCES:

As a member of the Digital Signal Processing Technical Committee (and later the Signal Processing Theory and Methods Technical Committee) of the IEEE Signal Processing Society, I have been involved with the selection of papers in the adaptive filtering area for the *IEEE International Conferences on Acoustics, Speech and Signal Processing (ICASSP)* in 1993 – 2001. I was involved in the same way with ICASSP 1990.

Member, Organizing committee of the *1995 IEEE Workshop on Nonlinear Signal and Image Processing*, Neos Marmaras, Halkidiki, Greece, June 20-22, 1995. Organized a special session on Polynomial Signal Processing at the Workshop with Professor G. L. Sicuranza.

Member, organizing committee of the *1994 IEEE Digital Signal Processing Workshop*, Yosemite Lodge, California, October 2-5, 1994. In charge of the publication of the Workshop Proceedings. Also, chaired the session on *Nonlinear Systems, Chaos and Fractals* at the Workshop.

University host and member in charge of local arrangements of the *NASA Workshops on Earth and Space Science Data Compression* at the University of Utah on April 2, 1994 and March 27, 1995. I was on the organizing committee for the Workshop in 1996 also, which was held in Snowbird, Utah.

Member, International Scientific Committee, *European Signal Processing Conference*, Trieste, Italy, September 1996. Also, Chaired a session on Nonlinear Processing at the Conference.

Corresponding Member of the Organizing Committee, *Sixth International Conference on Image Processing and its Applications*, Dublin, Ireland, July 1997.

General Chair, *Eighth IEEE Digital Signal Processing Workshop*, Bryce Canyon National Park, Utah, August 1998.

General Chair, *IEEE International Conference on Acoustics, Speech and Signal Processing*, Salt Lake City, Utah, May 2001.

General Chair, *IEEE Thematic Meetings in Signal Processing*, Dallas, March 15, 2010.

General Chair, *IEEE Thematic Meetings in Signal Processing*, Brussels, Belgium, October 11, 2011.

INVITED TALKS:

“Adaptive Nonlinear Filters” at the Department of Electrical Engineering, Indian Institute of Science, Bangalore, India on December 27, 1991.

“On Vector Quantization, Subband Coding and Models of the Human Visual System” at the Goddard Space Flight Center, Greenbelt, Maryland as part of the *Advances in Computational Science Seminar Series* on February 13, 1992.

“Subband Vector Quantization Using Visual Masking Functions” at the Media Technology Laboratory, HP Laboratories, Palo Alto, California on August 26, 1992.

“On Some Advances in Alpha-Beta Trackers” at the IBM, Manassas Division, Manassas, Virginia on September 22, 1993.

“Image Compression Using Models of the Human Visual System” at the IEEE Philadelphia Section meeting in Philadelphia, Pennsylvania on September 23, 1993.

“Adaptive Polynomial Filters” at the *Workshop on Nonlinear Filtering* organized by the Center for Information Processing Research, University of California, Santa Barbara on November 5, 1993.

“Polynomial Signal Processing,” at the IEEE Utah Signal Processing and Communication Chapter Meeting, June 7, 1994.

“Some Recent Advances in Multiple Access Communication Systems,” a tutorial seminar given at Fort Meade under the auspices of the Center for Research in Signal Processing, November 21, 1995.

“Perceptually-Tuned Image Compression” given at the following venues during June – September 1997:

Department of Electrical Engineering, Indian Institute of Technology, Bombay,
Korea Electrical Power Research Institute, Taejon, Korea,
Department of Electronic Engineering, Chonbuk National University, Chonju, Korea,
Electronic Technology Research Institute, Taejon, Korea,
Department of Electronic Engineering, Hanyang University, Ansan, Korea, and
Artificial Brain Sciences Institute, RIKEN, Wako-Shi, Japan

“Polynomial Signal Processing,” given at the following venues during June – September 1997:

Department of Digital Signal Processing, NEC Labs, Kawasaki, Japan,
Department of Electrical Engineering, Seoul National University, Seoul, Korea, and
Artificial Brain Sciences Institute, RIKEN, Wako-Shi, Japan

“Adaptive Receivers for Multiuser Communications” at the University of Trieste in March 1998.

A series of the following three talks on polynomial signal processing given at IBM T. J. Watson Research Center, Yorktown Heights, New York during June-July 2000:

“An Overview of Polynomial Signal Processing”

“Adaptive Polynomial Filters”

“Equalization and Stability of Polynomial and Related Systems”

“An Overview of Polynomial Signal Processing,” Department of Electrical & Computer Engineering, Utah State University, Logan, Utah, September 24, 2002.

“Decoding biologic signals: early markers of maternal-fetal disease,” given to the *17th Annual Biologic Basis of Pediatric Practice Symposium*, Deer Valley, Utah, September 13, 2003.

“Prediction of maternal-fetal diseases using signal processing,” given at the College of Information and Communications, Hanyang University, Seoul, Korea, December 10, 2003.

“Prediction of maternal-fetal diseases using signal processing,” given at the Department of Electronic Engineering, Korea University, Seoul, Korea, March 4, 2004.

“Adaptation and equalization of nonlinear systems,” given at Microsoft Research, Redmond, WA on August 10, 2005.

“Adaptation and equalization of nonlinear systems,” given at ArrayComm, San Jose, CA on November 17, 2006.

“ECE Education in the 21st Century: Challenges and Opportunities,” given at the National Institute of Technology, Tiruchirappalli, India on December 10, 2007.

“Sensor Signal Processing for Aerospace Structural Health Management,” given to *Ubiquitous Computing: Sensors and Wireless Sensor Networks Workshop*, Cairo, Egypt on December 29, 2008.

“Signal Processing in Maternal-Fetal Medicine,” given at Philips Innovation Center, Bangalore, India on July 29, 2010.

“Adaptation and equalization of nonlinear systems,” given at Indian Institute of Science, Bangalore, July 29, 2010.

“Structural Health Management for Aerospace Applications,” given at the National Institute of Technology, Tiruchirappalli, India on July 30, 2010.

“Signal Processing in Maternal-Fetal Medicine,” given to IEEE Signal Processing Society Chapter, Hyderabad, India on August 2, 2010.

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at Indian Institute of Science, Bangalore, India on July 19, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at Rajiv Gandhi Institute of Technology, Kotayam, India on July 22, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at Indian Institute of Technology, Hyderabad, India on July 25, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given to IEEE Signal Processing Chapter, Hyderabad, India on July 25, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given to IEEE Signal Processing Society Chapter, Pune, India on July 26, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Universidad Carlos III de Madrid, Madrid, Spain on September 6, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Universidad Politécnica de Valencia, Valencia, Spain on September 9, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at The Centre Tecnològic de Telecomunicacions de Catalunya, Barcelona, Spain on September 10, 2013. (IEEE Signal Processing Society

Distinguished Lecture)

“Signal Processing for Structural Health Monitoring,” given at Loughborough University, Leicester, UK on September 12, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at Loughborough University, Leicester, UK on September 12, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given to Imperial College, London on September 13, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at North Carolina State University, Raleigh, North Carolina on November 15, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Imperial College, London on September 13, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at North Carolina State University, Raleigh, North Carolina on November 15, 2013. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given to IEEE Signal Processing Society Chapter, Minneapolis on March 9, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Mayo Clinic, Rochester, Minnesota on March 10, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at Mayo Clinic, Rochester, Minnesota on March 10, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at Iowa State University, Ames, Iowa on March 11, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Structural Health Monitoring,” given at University of Iowa, Iowa City on March 12, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given to IEEE Wisconsin Section, Madison, Wisconsin on March 13, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at the University of Athens, Greece on April 28, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Riga Technical University, Latvia on April 30, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Tallinn University of Technology, Tallinn, Estonia on May 2, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at the Universidade de Brasilia, Brazil on June 9, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Universidade Federal do Rio de Janeiro, Brazil on June 11, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Structural Health Monitoring,” given at Universidade de Sao Paulo, Brazil on June 13, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Structural Health Monitoring,” given at Georgia Tech University, Atlanta, GA on September 19, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Equalization and Adaptation of Nonlinear Systems,” given at Victoria University, Wellington, New Zealand on October 13, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at Callahan Innovations, Wellington, New Zealand on October 14, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at University of Canterbury, Christchurch, New Zealand on October 15, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at University of Melbourne, Australia on October 17, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at University of Adelaide, Australia on October 20, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at James Cook University, Townsville, Australia on October 22, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Structural Health Monitoring,” given at Queensland University, Brisbane, Australia on October 24, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given at NEC Research, Tokyo, Japan on November 10, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Structural Health Monitoring,” given to Tokyo Section of IEEE Signal Processing on November 10, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Restoration of Motor Skills in Patients with Disorders of the Central Nervous System,” given at RIKEN, Japan on November 11, 2014. (IEEE Signal Processing Society Distinguished Lecture)

“Signal Processing for Diagnostic Medicine,” given to Sendai Chapter of IEEE Signal Processing Society on November 12, 2014. (IEEE Signal Processing Society Distinguished Lecture)