Eric Lawrence Miller

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Research interests

Signal and image processing, tomographic image formation and object characterization, inverse problems, regularization, statistical signal and imaging processing, and computational physical modeling. Applications explored include medical imaging and image analysis, environmental monitoring and remediation, landmine and unexploded ordnance remediation, and automatic target detection and classification.

Education

Massachusetts Institute of Technology   **Cambridge, MA**
PH.D. IN ELECTRICAL ENGINEERING, AUGUST 1994

Thesis with Professor Alan Willsky, "The Application of Multi-scale and Stochastic Techniques to the Solution of Inverse Problems", addressed the use of multiresolution, stochastic modeling and estimation techniques for the solution of inverse problems. Issues explored include regularization, sensor fusion, scale-recursive estimation algorithms and models, and computationally efficient implementations.

Massachusetts Institute of Technology   **Cambridge, MA**
S.M. in Electrical Engineering, February 1992

Thesis with Professor Alan Willsky carried out under auspices of MIT VI-A Cooperative Program with Loral Infrared and Imaging Systems, "Statistical Estimation of Atmospheric Transmission Parameters." Developed phenomenological model of atmospheric radiation propagation. Designed and analyzed algorithms based on model for estimation of parameters governing radiation absorption and scattering.

Massachusetts Institute of Technology   **Cambridge, MA**
S.B. in Electrical Engineering, February 1990

Professional Experience

Tufts University   **Medford, MA**
September 2009 – present, Associate Dean of Research, School of Engineering
January 2007 – present, Professor of Electrical and Computer Engineering
September 2007 – present, Adjunct Professor of Computer Science

Northeastern University   **Boston, MA**
January 2007 – present, Adjunct Professor of Electrical and Computer Engineering

July 2006 – December 2006, Professor of Electrical and Computer Engineering

July 2000 – June 2006, Associate Professor of Electrical and Computer Engineering

Sept. 1994-June 2000, Assistant Professor of Electrical and Computer Engineering

Taught courses include discrete time signals and systems, digital signal processing, multirate filter banks theory, theory and application of linear inverse problems, wavelet signal processing and C programming.

Massachusetts Institute of Technology   **Cambridge, MA**

Fall 1991, Fall 1992 – Summer 1994, Research Assistant in the Laboratory for Information and Decision Systems.

Performed Ph.D. thesis research in area of multi-scale, statistical signal processing.

Spring 1992, Teaching assistant, Recursive Estimation course.

Developed and taught bi-monthly recitations.

Spring 1990 and Spring 1991, Probabilistic Systems Analysis course.

Taught weekly recitation and tutorial sections.

Academic Year 1991. Academic advisor to three members of MIT freshman class.

Counseled in choice of course schedules and aided in determination of academic major.

Schlumberger-Doll Research   **Ridgefield CT**

Summer 1991 and Summer 1992, Summer Intern

Developed statistical estimation algorithms based on multi-scale modeling techniques for the solution of inverse conductivity problem.

Loral Infrared and Imaging Systems   **Lexington MA**

Summers 1988 – 1990, Fall 1990, Co-op student

Master's Thesis research on the problem of statistical estimation of atmospheric transmission parameters in the ultraviolet. Developed single-scatter model of atmospheric radiation propagation. Employed the model and statistical methods for estimation of absorption and scattering parameters.

Awards and Honors

- Elected Member of Electromagnetics Academy, MIT (2005)
- Editor's Citation from American Geophysical Union for "Excellence in refereeing and providing outstanding service to the authors and readers of **Radio Science**," April 23, 2004.
- Honoree at Principal Investigators Reception, Northeastern University, December 2003. The criterion for inclusion in this group was raising of over $1 million in externally supported research funds over the previous five years.
- Outstanding Research Award in the College of Engineering, Northeastern University, June 2002
- Recipient, National Science Foundation Faculty Early Career Development (CAREER) Award, 1996-2000.

- Recipient, Air Force Office of Scientific Research Graduate Fellowship 1992-1995.
- Recipient, Schlumberger - Doll Research Fellowship 1991-1992.
- Member, MIT Chapters Tau Beta Pi, Phi Beta Kappa, Eta Kappa Nu Honor Societies

Refereed Journal Publications
Overview
The research program I have developed has concentrated primary in the area of model-based signal and image processing with an emphasis on inverse problems. The canonical inverse problem is one in which we seek to recover the internal structure of a medium given data collected only at the boundary. Contributions to this field of endeavor can range from the very applied to the highly theoretical. The work in my group represents a balance of these two. The funding I have attracted to support the modeling and algorithm advances made in my group is almost always tied to "real" problems in areas such as landmine and unexploded ordnance remediation, ultrasonic-based image-guided cancer treatment, and diffuse optical brain and breast imaging. The work we have done in the context of these problems ranges from the development of fundamentally new physics-based signal and imaging processing methods (applicable to a wide range of problem areas) to more focused work directed at addressing specific issues for particular applications. In addition to efforts related to physics-based methods, I have also pursued work on a number of signal and image processing projects in areas such as object identification and classification, image segmentation, and magnetic resonance imaging.

I have divided my peer-reviewed journal publications into six areas reflecting the general technical approaches I have explored in the context of these and related application areas. The first three represent themes that I have pursued in areas of multi-scale inversion, the use of geometric parameterizations in inverse problems, and computational modeling methods. The last three areas capture more application-specific efforts in physics-based methods, medical image analysis, and more general signal and image processing.

Multi-scale Modeling and Inversion
1. A. Baussard, E. L. Miller and D. Lesselier, "*Adaptive multi-scale reconstruction of buried targets,*" **Inverse Problems: Special Issue: Electromagnetic characterization of buried obstacles,** vol. 20, no. 6, S1-S15, December 2004.
2. A. Baussard, E. L. Miller, Eric L., and D. Prémel, "*Adaptive B-spline scheme for solving an inverse scattering problem,*" **Inverse Problems**, vol. 20, no. 2, pp. 347-365, April 2004.
3. E. L. Miller, I. Yavuz, L. Nicolaides, and A. Mandelis, "*An adaptive, multi-scale inverse scattering approach to photo-thermal depth profilometry,*" **Circuits, Systems, and Signal Processing: Special issue on Advanced Signal/Image Restoration**, vol. 19, no. 4, pp. 339-363, 2000.
4. M. Belge, M. Kilmer, and E. L. Miller, "*Wavelet domain image restoration with adaptive edge-preserving regularization,*" **IEEE Trans. on Image Processing**, vol. 9, no. 4, pp. 597-608, April 2000.
5. R. Dufour and E. L. Miller, "*Statistical signal restoration with wavelet domain prior models,*" **Signal Processing**, vol. 78, pp. 289-307, 1999.

6. E. L., Miller, "*Efficient computational methods for multi-scale linear Gaussian signal restoration problems*," **IEEE Trans. on Signal Processing**, vol. 47, no. 4, pp. 1184-1188, April 1999.

7. E. L. Miller, L. Nicolaides and A. Mandelis, "*Nonlinear inverse scattering methods for thermal wave slice tomography: A wavelet domain approach*," **Journal of the Optical Society of America (A)**, vol. 15, no. 6, pp. 1545-1556, June 1999.

8. E. L. Miller and A. S. Willsky, "*Multi-scale, statistical anomaly detection analysis and algorithms for linearized inverse scattering problems*," **Multidimensional Systems and Signal Processing Special Issue on Wavelets and Multiresolution Analysis**, vol. 8, no. 1, pp. 151-184, January, 1997.

9. E. L. Miller and A. S. Willsky, "*A multi-scale, statistically-based inversion scheme for the linearized, inverse scattering problem*," **IEEE Trans. on Geoscience and Remote Sensing**, vol. 34, no. 2, pp. 346-357, March 1996.

10. E. L. Miller and A. S. Willsky, "*Wavelet-based methods for the nonlinear inverse scattering problem using the extended Born approximation*," **Radio Science**, vol. 31, no. 1, pp. 51-65, January-February 1996.

11. E. L. Miller and A. S. Willsky, "*A Multi-scale approach to sensor fusion and the solution of linear inverse problems*," **Applied and Computational Harmonic Analysis**, vol. 2, pp. 127-147, 1995.

Geometric Modeling and Inversion

12. B. Ulker Karbeyaz, E. L. Miller, and R. O. Cleveland, "*Geometry-based imaging for ultrasonic monitoring of cancer treatment*," **Journal of the Acoustical Society of America**, vol. 123, no. 5., pp 2944-2956, 2008.

13. M. K. Ben Hadj Miled and E. L. Miller, "*A projection-based level-set approach to enhance conductivity anomaly reconstruction in electrical resistance tomography*," **Inverse Problems**, vol. 23, pp. 2375-2400, 2007.

14. G. Boverman, Q. Fang, E. L. Miller, D. H. Brooks, R. H. Moore, D. B. Kopans and D. A. Boas, "*Estimation and statistical bounds for three-dimensional polar shapes in diffuse optical tomography*," **IEEE Transactions on Medical Imaging**, vol. 27, no. 6, pp. 752-765, June 2008.

15. R. Firoozabadi, E. L. Miller, C. M. Rappaport, and A. W. Morgenthaler, "*Subsurface sensing of buried objects under a randomly rough surface using scattered electromagnetic field data*," **IEEE Transactions on Geoscience and Remote Sensing,** vol. 45, no. 1, pp. 104-117, Jan. 2007.

16. M. El-Shenawee and E. L. Miller, "*Spherical harmonics wideband polarimetric algorithm for shape and location reconstruction of three-dimensional malignant breast cancer tumor*," **IEEE Transactions on Medical Imaging**, vol. 25, no. 10, pp. 1258-1271October 2006.

17. E. L. Miller, M. Cheney, M. Kilmer, G. Boverman, A. Li, and D. Boas, "*Feature-enhancing methods for limited view tomographic imaging problems*," **Subsurface Sensing Technologies and Applications,** vol. 4, no. 4, pp. 327-353, October 2003.

18. M. Kilmer, E. L. Miller, A. Barbaro, and D. A Boas, "*Three dimensional shape-based imaging of absorption perturbation for diffuse optical tomography*," **Applied Optics Special Issue on Topics in Biomedical Optics**, vol. 42, no. 16, pp. 3129-3144, June 1, 2003**.**

19. G. Boverman, M. K. ben Hadj Miled, and E. L. Miller, "*Recent work in shape-based methods for diffusive inverse problems*," **Review of Scientific Instruments**, vol. 74, no. 4, pp. 2580-2582, April 2003.

20. M. Kilmer, E. L. Miller, D. A. Boas, and D. H. Brooks, "*A shape-based reconstruction technique for DPDW data*," **Optics Express**, vol. 7, no. 13, pp. 481-491, Dec. 18, 2000.

21. O. Dorn, E. L. Miller, and C. M. Rappaport, "*A shape reconstruction method for electromagnetic tomography using adjoint fields and level sets*," **Inverse Problems: Special issue on Electromagnetic Imaging and Inversion of the Earth Subsurface**, vol. 16, pp. 1119-1156, October 2000.

22. E. L. Miller, M. Kilmer and C. Rappaport, "*A new shape-based method for object localization and characterization from scattered field data*," **IEEE Trans. Geoscience and Remote Sensing: Special issue on Computational Wave Issues in Remote Sensing, Imaging and Target Identification, Propagation, and Inverse Scattering**, vol. 38, no. 4, pp. 1682-1696, July 2000.

Physical Modeling and Computational Methods

23. H. E. Guven, E. L. Miller, and R. O. Cleveland, *Fast computation of the acoustic field for ultrasound elements*, **IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control**, vol. 56, no. 9, pp. 1903-1912, 2009.

24. B. Ulker Karbeyaz, E. L. Miller, and R. O. Cleveland, "*Semi-analytical computation of the acoustic field of a segment of a cylindrically concave transducer in lossless and attenuating media*," **Journal of the Acoustical Society of America**, vol. 21, no. 2, pp. 1226-1237, 2007.

25. T. L. Szabo, B. Ulker Karbeyaz, R. O. Cleveland, and E. L. Miller, "*Determining the pulse-echo electromechanical characteristic of a transducer using flat-plates and point targets,*" **The Journal of the Acoustical Society of America,** vol. 116, no. 1, pp. 90-96, July 2004.

26. M. Kilmer, E. L. Miller, and C. Rappaport, "*QMR-based projection techniques for the solution of non-Hermitian systems with multiple right-hand sides*," **SIAM Journal on Scientific Computing**, vol. 23, no. 3, pp. 761-780, 2001.

27. C. M. Rappaport, M. Kilmer, and E. L. Miller, "*Accuracy considerations in using the PML ABC with FDFD Helmholtz equation computation*," **International Journal of Numerical Modeling, Special issue on the PML**, vol. 13, pp. 471-482, 2000.

28. E. A. Marengo, C. M. Rappaport, and E. L. Miller, "*Optimum PML ABC conductivity profile in FDFD*," **IEEE Trans. on Magnetics**, vol. 35, no. 3, pp. 1506-1509, May 1999.

29. A. Sahin and E. L. Miller, "*Recursive T-matrix methods for scattering from multiple dielectric and metallic objects*," **IEEE Trans. on Antennas and Propagation**, vol. 46, no. 5, pp. 672-678, May 1998.

30. A. Sahin and E. L. Miller, "*Recursive T-matrix methods for metallic scattering problem*," **Microwave and Optical Technology Letters**, vol. 15, no. 6, pp. 360-363, August 1997.

General Physics-Based Signal Processing and Inverse Problems

31. D. Hyde, E. Miller, D. Brooks, and V. Ntziachristos, *Data Specific Spatially Varying Regularization for Multi-Modal Fluorescence Molecular Tomography*, **IEEE Transactions on Medical Imaging**, vol. 29, no. 2, pp. 365-374, Feb. 2010.

32. D. Hyde, R. Schultz, D. Brooks, E. Miller and V. Ntiziachristos, *Performance dependence of hybrid X-ray CT - FMT on the optical forward problem*, **Journal of the Optical Society of America – A,** vol. 26, no. 4, pp 919-923, 2009.

33. D. Hyde, R. De Kleine, S. MacLaurin, E. L. Miller, D. Brooks, T. Krucker, and V. Ntzaichristos, *Hybrid FMT-CT imaging of amyloid-beta plaques in a murine Alzheimer's disease model* , **NeuroImage,** vol. 44, no. 4, pp.1304-1311, Feb. 15, 2009,.

34. Q. Fang, S. A. Carp, J. Selb, G. Boverman, Q. Zhang, D. B. Kopans, R. H. Moore, E. L. Miller, D. H. Brooks, and D. A. Boas, "*Combined optical imaging and mammography of the healthy breast: optical contrast derived from breast structure and compression,*" **IEEE Transactions on Medical Imaging**, vol. 28, no. 1, pp. 30-42, January 2009.

35. A. Aliamiri, J. Stalnaker, and E. L. Miller, "*Statistical classification of buried unexploded ordnance using non-parametric prior models,*" **IEEE Transactions on Geoscience and Remote Sensing**, vol. 45, no. 9, pp. 2794-2806, September 2007.

36. D. Hyde, E. L. Miller, D. H. Brooks, and V. Ntziachristos, "*A statistical approach to inverting the Born ratio,*" **IEEE Transactions on Medical Imaging**, vol. 27, no. 7, pp. 893-905, July 2007.

37. D. Hyde, M. E. Kilmer, D. H. Brooks, and E. L. Miller, "*Analysis and exploitation of matrix structure arising in linearized optical tomographic imaging,*" **SIAM Journal on Matrix Analysis and Applications**, vol. 29, no. 4, pp. 1065-1083, 2007.

38. G. Boverman, Q. Fang, S. A. Carp, E. L. Miller, D. H. Brooks, J. Selb, R. H. Moore, D. B. Kopans and D. A Boas, *"Spatio-temporal imaging of the hemoglobin in the compressed breast with diffuse optical tomography,*" **Physics in Medicine and Biology**, vol. 52, pp. 3619-3641, 2007.

39. A. B. Tarokh and E. L. Miller, "*Subsurface sensing under sensor positional uncertainty,*" **IEEE Transactions on Geoscience and Remote Sensing**, vol. 45, no. 3, pp. 675-688, March 2007.

40. G. Boverman, E. L. Miller, A. Li, Ang, Q. Zhang, T. Chaves, D. H. Brooks, and D A. Boas, "*Quantitative spectroscopic diffuse optical tomography of the breast guided by imperfect a priori structural information,*" **Physics in Medicine and Biology**, vol. 50, no. 17, pp. 3941-3956, September 2005.

41. A. Li, G. Boverman, Y. Zhang, D. Brooks, E. L. Miller, M. E. Kilmer, Q. Zhang, E. M. C. Hillman, and D. A. Boas, "*Optimal linear inverse solution with multiple priors in diffuse optical tomography,*" **Applied Optics** vol. 44, no. 10, pp. 1948-1956, 2005.

42. A. B. Tarokh, E. L. Miller, I. J. Won and H. Huang, "*Statistical classification of buried objects from spatially sampled time or frequency domain electromagnetic induction data,*" **Radio Science**, vol. 39, no. 4, p RS4S05-1-RS4S05-11, July/August, 2004,.

43. M. El-Shenawee and E. L. Miller, "*Multiple-incidence and multi-frequency for profile reconstruction of random rough surfaces using the 3-D electromagnetic Fast multipole model*," **IEEE Trans. Geoscience and Remote Sensing**, vol. 42, no. 11, pp. 2499-2510, November 2004.

44. A. Li, Q. Zhang, J. P. Culver, E. L. Miller and D. A. Boas, "*Reconstructing chromophore concentration images directly by continuous-wave diffuse optical tomography,*" **Optics Letters**, vol. 29, no. 3, pp. 256-258, Feb. 2004.

45. A. Li, E. L. Miller, M. E. Kilmer, T. J. Brukilacchio, T. Chaves, J. Stott, Q. Zhang, R. H. Moore, D. B. Kopans, and D. A. Boas, "*Tomographic optical breast imaging guided by 3-D mammography*," **Applied Optics**, vol. 42, no. 25, pp. 5181-5191, Sept 1, 2003.

46. X. Xu, E. L. Miller, and C. M. Rappaport, "*Minimum entropy regularization in frequency-wavenumber migration to localize subsurface objects*," **IEEE Transactions on Geoscience and Remote Sensing**, vol. 41, no. 8, pp. 1804-1812, August 2003.

47. M. Belge, M. Kilmer, and E. L. Miller, "*Efficient determination of multiple regularization parameters in a generalized L-Curve framework*," **Inverse Problems**, vol. 18, pp. 1161-1183, August 2002.

48. D. A. Boas, D. H. Brooks, E. L. Miller, C. A. DiMarzio, M. Kilmer, R. J. Gaudette, and Q. Zhang, "*Imaging the body with diffuse optical tomography,*" **IEEE Signal Processing Magazine**, vol. 18, no. 6, pp. 57-75, November 2001.

49. M. El-Shenawee, C. Rappaport, E. L. Miller, and M. B. Silevitch, "*Three-dimensional subsurface analysis of electromagnetic scattering from penetrable/PEC objects buried under rough surfaces: use of the steepest descent fast multipole method,*" **IEEE Trans. Geoscience and Remote Sensing**, vol. 39, no. 6, pp. 1174-1182, June 2001.

50. A. Sahin, and E. L. Miller, "*Model-based multiple object detection using high-resolution near field array processing*," **IEEE Transactions on Geoscience and Remote Sensing**, vol. 39 no. 1, January 2001, pp. 136 -141.

51. E. L. Miller, "*Introduction to focus issue on diffuse optical tomography*," **Optics Express**, vol. 7, no. 13, p. 461, Dec. 18, 2000.

52. R. J. Gaudette, D. H. Brooks, C. A. DiMarzio, M. E. Kilmer, E. L. Miller, T. Gaudette, and D. A. Boas, "*A comparison study of linear reconstruction techniques for diffuse optical tomographic imaging of absorption coefficient*," **Physics in Medicine and Biology**, vol. 45, no. 4, pp. 1051-1070, April 2000.

53. A. Sahin, and E. L. Miller, "*Electromagnetic scattering-based array processing methods for near-field object characterization*," **Journal of Electromagnetic Waves and Applications**, vol. 13, pp. 1209-1236, 1999.

54. E. L. Miller, "*Statistically based methods for anomaly characterization in images from observations of scattered radiation*," **IEEE Trans. on Image Processing**, vol. 8, no. 1, pp. 92-101, Jan. 1999.

Medical Image Image Analysis

55. A. Lauric, E. L. Miller, S. Friskin, and A. M. Malek, *Automated Detection of Intracranial Aneurysms Based on Parent Vessel 3D Analysis*, **Medical Image Analysis**, vol. 14. no. 2, pp. 149-159, April 2010.

56. C. Bayan, J. Levitt, E. Miller, D. Kaplan, and I. Georgakoudi, *Fully-automated, quantitative, non-invasive assessment of collagen fiber content and organization in thick specimens*, **Journal of Applied Physics**, Vol. 105, 2009

57. R. Srinivasan, X. Zhou, E. L. Miller, J. Lu, J. Litchman, S. T. C. Wong, "*Automated axon tracking of 3D confocal laser scanning microscopy images using guided probabilistic region merging*," **Neuroinformatics**, vol. 5, no. 3, pp. 189-203, September 2007.

58. J. Cheng, X. Zhou, E. Miller, R. M. Witt, J. Zhu, B. L. Sabatini, and S. T. C. Wong, "*A novel computational approach for automatic dendrite spines detection in two-photon laser scan microscopy*," **Journal of Neuroscience Methods**, pp. 122-134, vol. 165, 2007.

General Image and Signal Processing

59. R. Mittelman and E. L. Miller, *Robust Estimation of a Random Parameter in a Gaussian Linear Model with Joint Eigenvalue and Elementwise Covariance Uncertainties*, **IEEE Transactions on Signal Processing**, vol. 58, no. 3, pp. 1001-1011, March 2010.

60. A. Aghasi, H. Amindavar, E. L. Miller, and J. R. Mohassel, *Flat-Top Footprint Pattern Synthesis Through the Design of Arbitrary Planar-Shaped Apertures*, **IEEE Transactions on Antennas and Propagatio**n, to appear.

61. R. Mittelman, and E. L. Miller, "*Nonlinear filtering using a new proposal distribution and the improved fast gauss transform with tighter performance bounds*," **IEEE Transactions on Signal Processing**, vol. 56, no. 12, pp. 5746-5757, December 2008.

62. A. Jagannathan and E. L. Miller, "*3D surface mesh segmentation using a curvedness-based region growing approach*", **IEEE Transactions on Pattern Analysis and Machine Intelligence,** vol. 29, no. 12, pp. 2195-2204, December 2007.

63. S. Coric, M. Leeser, E. Miller, and M. Trepanier, Marc, "*Parallel-beam backprojection: An FPGA implementation optimized for medical imaging*," **The Journal of VLSI Signal Processing-Systems for Signal, Image, and Video Technology,** vol. 39, no. 3, 2005.

64. X. Xu, E. L. Miller, D. Chen and M. Sarhadi, "*Adaptive two-pass median filter to remove impulse noise in highly corrupted images*," **IEEE Transactions on Image Processing**, vol. 13, no. 2, pp. 238-247, February, 2004.

65. R. Dufour, E. L. Miller, and N. Galatsanos, "*Template matching based object recognition with unknown geometric parameters*," **IEEE Trans. Image Processing**, vol. 11, no. 12, pp. 1385-1396, December 2002.

66. W. S. Hoge, E. L. Miller, H. Lev-Ari, D. H. Brooks, and L. P. Panych, "*A doubly adaptive approach to dynamic MRI sequence estimation*," **IEEE Trans. on Image Processing**, vol. 11, no. 10, pp. 1168 – 1178, October 2002.

67. X. Xu, E. L. Miller, C. Rappaport, and G. Sower, "*Statistical method to detect subsurface objects using array ground penetrating radar data*," **IEEE Trans. Geoscience and Remote Sensing**, vol. 40, no. 4, pp. 963 -976, April 2002**.**

68. W. S. Hoge, E. L. Miller, H. Lev-Ari, D. H. Brooks, W. C. Karl, and L. P. Panych, "*An efficient region of interest acquisition method for magnetic resonance*

imaging," **IEEE Trans. on Image Processing**, vol., 10, no. 7, pp. 1118 -1128, July 2001,.

69. M. Belge and E. L. Miller, "*A sliding window RLS-like adaptive filtering algorithm for filtering α-stable noise*," **IEEE Signal Processing Letters**, vol. 7, no. 4, pp. 86-89, April 2000.

Refereed Conference Publications

70. D. Hyde, E. Miller, D. Brooks, and V. Ntziachristos, *Differential equation-driven regularization for joint FMT-CT imaging*, **Biomedical Imaging: From Nano to Macro, 2009. ISBI '09. IEEE International Symposium on** , vol., no., pp.1267-1270, June 28 2009-July 1 2009

71. A. Vazquez-Reina, E. Miller, and H. Pfister, *Multiphase geometric couplings for the segmentation of neural processes*, **Computer Vision and Pattern Recognition, IEEE Computer Society Conference on**, pp. 2020-2027, 2009.

72. A. Aghasi, E. L. Miller, C. A. Ramsburg, and L. Abriola, *Subsurface Source Zones Reconstruction Using Electrical Impedance Tomography Shape-Based Inversion*, **American Geophysical Union Fall Meeting**, (14-18 December 2009), San Francisco, California

73. A. Aghasi, H. Amindavar, and E. L. Miller, *Flat-top power patterns of arbitrary footprint produced by arrays of arbitrary planar geometry*, (2009) **Proceedings - 2009 13th International Symposium on Antenna Technology and Applied Electromagnetics and the Canadian Radio Sciences Meeting, ANTEM/URSI 2009**, art. no. 4805039.

74. A. Aghasi, H. Amindavar, and E. L. Miller, *Synthesis of planar arrays with arbitrary geometry for flat-top footprint patterns* (2009) **ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing - Proceedings**, art. no. 4960043, pp. 2153-2156.

75. Durning, B., Raymond, J., Chruch C. C., Ceveland, R. O., Miller, E. L., *HIFU lesion characterization on liver: acquisition and results*, in **2008 International Symposium on Therapeutic Ultrasound**, Minneapolis MN, September 10-13, 2008.

76. Hyde, D., Miller, E., Brooks, D., Ntziachristos, V., New *Techniques for Data Fusion in Multimodal FMT-CT Imaging*, **Proceedings of the IEEE International Symposium on Biomedical Imaging 2008**, Paris, France, May 2008.

77. Fang, Q., Carp S. A., Selb, J., Moore R., Kopans D. B., Miller, E. L., Brooks, D. H, and Boas, D. A. , *A Multi-Modality Image Reconstruction Platform for Diffuse Optical Tomography*, in **Biomedical Optics**, OSA Technical Digest (CD) (Optical Society of America, 2008), paper BMD24.

78. Fang, Q., Carp S. A., Selb, J., Moore R., Kopans D. B., Miller, E. L., Brooks, D. H, and Boas, D. A., *Spectrally Constrained Optical Breast Imaging with Co-Registered X-Ray Tomosynthesis*, in **Biomedical Optics**, OSA Technical Digest (CD) (Optical Society of America, 2008), paper BSuB2.

79. Vidolova, E. Z., Carp, S., Miller, E., Boas, D., and Brooks, D., *Hemodynamically Constrained Dynamic Diffuse Optical Tomography under Mammographic*

Compression, in **Biomedical Optics**, OSA Technical Digest (CD) (Optical Society of America, 2008), paper BSuE20.

80. Hyde, D. E. , Schulz, R., Miller, E., Brooks, D., and Ntziachristos, V., *Incorporation of Structural Apriori Information in Fluorescence Molecular Tomography*, in **Biomedical Optics**, OSA Technical Digest (CD) (Optical Society of America, 2008), paper BSuE26.

81. Guven, Emre H., Miller, Eric L., Cleveland, Robin, C., "*Fast computation of spatial transfer function for ultrasound imaging*," **153rd Meeting of the Acoustical Society of America**, Salt Lake City Utah, June 4-8 2007.

82. Durning, Bruno, Miller, Eric L., Cleveland, Robin, C., "*Parametric study of a shape based inversion for detecting HIFU lesion*," **153rd Meeting of the Acoustical Society of America**, Salt Lake City Utah, June 4-8 2007.

83. Aliamiri, Alireza, and Miller, Eric L., "*Random Walk/Markov Chain Model for Sensor Positional Uncertainty with Application to UXO Discrimination*," **International Geoscience and Remoter Sensing Symposium 2007**, July 21-27, 20007, Barcelona Spain.

84. Stalnaker, Jack, and Miller, Eric L., "*Particle Swarm Optimization as an Inversion Tool for a Nonlinear UXO Model***," International Geoscience and Remoter Sensing Symposium 2007**, July 213-27, 20007, Barcelona Spain.

85. Srinivasan, Ranga, Zhou, Xiaobo, Miller, Eric, Lu, Ju, Lichtman, Jeff, and Wong, Stephen, "*3-D Centerline Extraction Of Axons In Microscopic Stacks For The Study Of Motor Neuron Behavior In Developing Muscles*," **2007 IEEE International Symposium on Biomedical Imaging: From Nano to Macro**, Washington D.C., April 12-15, 2007.

86. Mittelman, Roni and Miller, Eric L., "*Fast Gauss Transforms Based n Higher Order Singular Value Decomposition for Nonlinear Filtering*," **2007 IEEE Statistical Signal Processing Workshop**, August 26-29, Madison WI.

87. Stalnaker, Jack, Aliamiri, Alireza, and Miller, Eric L., "*An enhanced dipole model for UXO discrimination*," **2006 IEEE International Geoscience and Remote Sensing Symposium**, Denver, July 31-August 4, 2006, poster only.

88. Laxminarayan, Srinivas, Diamond, Solomon, Tadmor, Gilead, Miller, Eric, Boas, David Boas, Brooks, Dana H., "*Controlling Dimensionality in a Systems Approach to Dynamic Multimodal Functional Brain Imaging*," **Proceedings of the Fortieth Asilomar Conference on Signals, Systems and Computers**, Monterey CA, October 29-November 1, 2006.

89. Aliamiri, Alireza, Stalnaker, Jack, and Miller, Eric L., "*A Bayesian Approach For Classification Of Buried Objects Using Non-Parametric Prior Model*," **2006 IEEE International Geoscience and Remote Sensing Symposium**, Denver, July 31-August 4, 2006.

90. Miller, Eric L., Cleveland Robin, Ulker Karbeyaz, Basak, Boverman Gregory, Khames, Mohamed, Guven, Emre, "*Geometric Methods for Real World Imaging Problems,*" **151st Meeting of the Acoustical Society of America**, Providence, RI, June 2006.

91. Hyde, Damon, Miller Eric L., Brooks, Dana, and Ntziachristos, Vasilis, "*A Statistical Method for Inverting the Born Ratio*," **2006 IEEE International**

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2. Miller, Eric L., *On the Use of Model-Based, Variational Methods for Segmentation with Applications to Image Analysis and Inverse Problem*, Tufts SIAM Chapter Luncheon Seminar, November 18, 2009.
3. Miller, Eric L., *Issues and Opportunities for Physics-Based Methods in Automatic Target Recognition*, ARO Workshop on Signal and Image Processing, Ann Arbor MI, July 30-31, 2007.
4. Miller, Eric L., *Options for Shape and Multi-parameter Inverse Problems*, Schlumberger-Tufts Computational and Applied Math Seminar, May 3, 2007
5. Miller, Eric L., *Level Set and Level Set-Like Methods for Inverse Problems*, CenSSIS Seminar at RPI, July 19, 2004.
6. Miller, Eric L., *Geometric Methods for Multi-Parameter, Multi-Source Inverse Problems,* Institute for Mathematics and its Applications Hot Topics Workshop on Adaptive Sensing and Multimode Inversion, June 27-30, 2004.
7. Miller, Eric L., *On Some uses of Shape and Geometry in Imaging,* BU Aerospace and Mechanical Engineering Departmental Seminar, April 9, 2004.
8. Miller, Eric L., and Tarokh, Beeta, *A Model-based Statistical Approach to the Localization, Classification and Characterization of UXO and UXO-like Items from Time and Frequency-domain Induction Data*, SERDP/ESTCP Electromagnetic Induction Workshop, Annapolis MD, February 4-5, 2004.
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12. Miller, Eric L., *A Rapid Tour of Variational Inverse Problems*, Massachusetts General Hospital Dept. of Radiation Oncology Seminar Series, December 17, 2002.
13. Miller, Eric L. *Diffuse Wave Tomographic Imaging*, Harvard Division of Engineering and Applied Sciences, November 7, 2002.
14. Miller, Eric L., Khames, Mohamed, Boverman, Gregory, *Geometric Methods for Diffuse Wave Inverse Problems*, IEEE Signal Processing Society Boston Chapter Meeting, March 2002.
15. Miller, Eric L., and Cheney Margaret, *Advanced Methods for Subsurface Target Detection and Classification*, presented at the National Reconnaissance Office Technical Seminar Series, May 2002.
16. Miller, Eric, *Progress in Multi-look Detection and Classification Methods at Northeastern University*, 2001 Forward Looking Mine Detection Workshop, Ft. Belvoir BA, July 2001
17. Miller, Eric, *Limited View Tomographic Imaging*, Boston University Electrical and Computer Engineering Colloquium Lecture Series, October 2000
18. Miller, Eric, Dorn, Oliver, and Rappaport, Carey, *Reduced Order and Object Based Methods for Limited View Tomographic Imaging Problems*, Presented at Idaho National Engineering and Environmental Laboratory Seminar Series, February 2000
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20. Miller, Eric L. *EM and Radar Signal Processing Methods for Buried Object Identification*, JUXOCO workshop on Active Electromagnetics Methods, January 21-22, 1999.
21. Miller, Eric L. *Jumpy wavelet priors: A fine tale guaranteed to keep you on the edge of your seat of coarse*, MIT Stochastic Systems Group, April 1998.
22. Miller, Eric L. *High Resolution Array Processing Methods for Buried Object Detection*, Boston section of the IEEE Geoscience and Remote Sensing Society, October 1996.
23. Miller Eric L. *A Multi-scale and Stochastic Signal Processing Approach to Inverse Scattering Problems*, Center for Interdisciplinary Research in Complex Systems at Northeastern University, February 1996.
24. Miller, Eric L. *A Multi-scale and Stochastic Signal Processing Approach to Inverse Scattering Problems*, University of Rhode Island Electrical Engineering Seminar Series, January 1996
25. Miller, Eric L. *A Multi-scale and Stochastic Signal Processing Approach to Inverse Scattering Problems*, Boston section of the IEEE Signal Processing Society, December 1995.

External Grants and Contracts

1. *High-Throughput and Multimodality Optical Imaging in Computational Biology*
   1.1. Source of Support: NSF
   1.2. Level of funding: Approx. $115,000 for Prof. Miller

1.3.   Role of Prof. Miller: Participant, 0% effort
1.4.   Other participants: Dr. Xiaoyin Xu of Brigham and Women's Hospital is the PI.
1.5.   Summary of Project: Prof. Miller's work on this project involves development of geometric methods for (a) the tracking of neuronal structures in microscopy data stacks and (b) registration of higher resolution structural imagery with lower resolution functional data.

2. *Fiber Optic Raman Imager*
   2.1.   Source of Support: Army Research Office STTR
   2.2.   Level of funding: Approx. $30,000 for Prof. Miller
   2.3.   Role of Prof. Miller: Participant, 11% effort
   2.4.   Other participants: OPTRA, Inc. Topsfield MA is the prime for this project.
   2.5.   Summary of Project: Prof. Miller's work on this project involves the development of regularized, superresolution-type inversion schemes for reconstructing images of chemical concentrations from Raman hyperspectral data cubes.

3. *Awareness and Localization of Explosive Related Threats*
   3.1.   Source of Support: Dept. of Homeland Security
   3.2.   Level of funding: Approx. $180,000 for Prof. Miller
   3.3.   Role of Prof. Miller: Participant, 8% effort
   3.4.   Other participants: This is a DHS center lead by Prof. Michael Silevitch of Northeastern University.
   3.5.   Summary of Project: Prof. Miller's work on this project involves the development of shape-based processing methods for the identification of explosives in checked baggage from dual energy X-ray CT data.

4. *Multi-modal, shape-based Inverse Methods for the Characterization of DNAPL Source Zone DNAPL Source Zone Architecture*
   4.1.   Source of support: NSF
   4.2.   Level of funding: $359,554
   4.3.   Role of Prof. Miller: PI, 4% effort
   4.4.   Other participants: Prof. Linda Abriola (PI), Tufts University, Prof. C. Andrew Ramsburg, Tufts University.
   4.5.   Summary of Project: The primary objective of this research is to develop shape-based image formation methods for the fusion of electrical resistance tomography and hydrological observations for the characterization of DNAPL source zones.

5. *Metric Identification and Protocol Development for Characterizing DNAPL Source Zone Architecture and Associated Plume Response*
   5.1.   Source of support: Strategic Environmental Research and Development Program
   5.2.   Level of funding: Approx. $1.4M
   5.3.   Role of Prof. Miller: Co-PI, 8% effort
   5.4.   Other participants: Prof. Linda Abriola (PI), Tufts University, Prof. C. Andrew Ramsburg, Tufts University, Prof. John Christ, US Air Force Academy, Prof. Kurt Pennell, Georgia Tech.

     5.5.   Summary of Project: The primary objective of this research is to develop and demonstrate a comprehensive approach for field characterization of DNAPL source zones that quantifies the key features that control plume response.

6. *Electrical Impedance Spectroscopic Sensor to Detect Tunnels and Infrastructure in Soil*
    - 6.1.   Source of support: NSF
    - 6.2.   Level of funding: $100,000
    - 6.3.   Role f Prof. Miller: Co-PI, 3% effort
    - 6.4.   Other participants: Ron Gamache (PI), Transtech Systems, Prof. Carey Rapport, Northeastern University, Prof. Sara Wadia-Fascetti, Northeastern University
    - 6.5.   Summary of project: The goal of this project is the development of shape based image formation methods for the detection and characterization of buried tunnels using spectroscopy electrical impedance sensor models and data.

7. *Ultrasonic Image Guidance for HIFU Cancer Treatment*
    - 7.1.   Source of support: NIH-NCI
    - 7.2.   Level of funding: $446,000
    - 7.3.   Role of Prof. Miller: PI, 65% level of effort
    - 7.4.   Other participants: Prof. Robin Cleveland, Boston University, Dr. Charles Church, University of Mississippi, Mr. Jason Raymond, University of Mississippi, Mr. Louis Poulo, Analogic Corp. all combine for the remaining 35% of the effort.
    - 7.5.   Dates of performance: August 2006 – July 2008
    - 7.6.   Summary of project: The goal of this project is the development and experimental validation of method for using diagnostic ultrasound to track the progress of hyperthermia treatment for cancers

8. *Fusion of Electromagnetic and Mechanical Wave Data for Concrete Structure Diagnostics*
    - 8.1.   Source of support: National Science Foundation
    - 8.2.   Level of funding: $315,000
    - 8.3.   Role of Prof. Miller: Co-PI, 10% level of effort
    - 8.4.   Other participants: Prof. Sarah Wadia-Fascetti (PI), Northeastern University, (79%), Prof. Carey Rappaport, Northeastern University,
    - 8.5.   Dates of performance: August 1, 2006 – July 31, 2009
    - 8.6.   Summary of project: Three-year project to use electromagnetic and acoustic sensing technology to non-invasively ascertain the state of civil infrastructure components such as bridge decks.

9. *Robust Convex Optimization For STAP*
    - 9.1.   Source of support: US Navy, STTR Program.
    - 9.2.   Level of funding: $321,000
    - 9.3.   Role of Prof. Miller: Co-PI, 30% level of effort
    - 9.4.   Other participants: Mr. Ted Wilson (PI), Coherent Systems International Inc., Lexington Park MD. (70%)
    - 9.5.   Dates of performance: July 2006 – December 2007

     9.6.   Summary of project: Phase II effort to explore the development of advances signal and image processing methods for processing Navy radar data.

10. *Development of Knowledge-Based STAP Techniques*
     10.1.   Source of support: US Navy, STTR Program.
     10.2.   Level of funding: $99,575
     10.3.   Role of Prof. Miller: Co-PI, 19% level of effort
     10.4.   Other participants: Mr. Ted Wilson (PI), Coherent Systems International Inc., Lexington Park MD. (79%)
     10.5.   Dates of performance: August 2005 - May 2006
     10.6.   Summary of project: One-year effort to explore the development of advances signal and image processing methods for processing Navy radar data.

11. *Signal Processing for Neuron Tracking*
     11.1.   Source of support: Center for Bioinformatics, Harvard Medical School
     11.2.   Level of funding: $60,000
     11.3.   Role of Prof. Miller: PI, 100% level of effort
     11.4.   Other participants: None
     11.5.   Dates of performance: September 2005 – August 2006
     11.6.   Summary of project: All funds for this project were used to support two research assistants in the development of image processing methods for tracking the structure of neurons in 3D image stacks collected by a two photon laser scanning microscope.

12. *Mapping Backprojection to the Heterogeneous HPC Cluster for SAR Image Formation*
     12.1.   Source of support: Air Force Research Laboratory.
     12.2.   Level of funding: $108,251.
     12.3.   Role of Prof. Miller: Co-PI, 50% level of effort
     12.4.   Other participants: Prof. Miriam Leeser, NU ECE, PI, 50% level of effort.
     12.5.   Dates of performance: June 2004 - May 2005
     12.6.   Summary of project: One-year effort to implement backprojection operation on high performance supercomputer for application to synthetic aperture radar imaging.

13. *Advanced, Model-Based Statistical Processing and Sensor Optimization Methods for Discrimination and Classification of UXO from EMI Data,*
     13.1.   Source of support: Strategic Environmental Research and Development Program
     13.2.   Level of funding: approx. $1.0 M.
     13.3.   Role of Prof. Miller: PI, 92% level of effort
     13.4.   Other participants: Dr. Stephen Norton (Geophex Inc., Raleigh NC), Drs. Eugene Lavely and Peter Weichman (ALPHATECH Inc, Burlington MA) all combine for 8% level of effort.
     13.5.   Dates of performance: July 2004 – June 2007
     13.6.   Summary of project: This contract is for a three year effort to develop and validate a collection of processing methods and models for the discrimination of buried unexploded ordnance from undesired scrap based on observations of time and frequency domain electromagnetic induction sensor data.

14. *Inverse Scattering Models and Algorithms for Functional Brain Imaging with Diffuse Optical Wavefields*
    14.1.   Source of support: National Science Foundation
    14.2.   Level of funding: $296,000
    14.3.   Role of Prof. Miller: PI, 55% level of effort
    14.4.   Other participants: Prof. Misha Kilmer (Tufts Mathematics), 45% of the total effort
    14.5.   Dates of performance: September 2002-August 2005
    14.6.   Summary of project: This grant is supporting the development of inverse scattering algorithms for the identification of functional area in the brain using diffuse optical tomographic sensing technology.

15. *Towards a Unified Approach to Diffuse Wave Imaging*
    15.1.   Source of support: National Science Foundation
    15.2.   Level of funding: $375,000
    15.3.   Role of Prof. Miller: PI, 50% level of effort
    15.4.   Other participants: Prof. Misha Kilmer (Tufts Mathematics), 45% of the total effort
    15.5.   Dates of performance: July 2002-June 2005
    15.6.   Summary of project: This grant is supporting the development of shape-based image formation methods for diffuse wave inverse problems arising in biomedical imaging, nondestructive evaluation, and environmental remediation.

16. Textron Systems Sponsored Research Projects
    16.1.   Source of support: Textron Systems Division
    16.2.   Level of funding: $107,154 (2004), $104,774 (2003), $97,543 (2002), $100,000 (2001), $100,000 (2000), $14,997 (1999), $120,000 (1997), $75,000 (1996). Total funds: $719,468
    16.3.   Role of Prof. Miller: PI, 100% level of effort except as noted below
    16.4.   Other participants: Prof. Michael Silevitch (1999 only), Level of effort: 0 %. Prof. Charles DiMarzio (1996 and 1997), NU-ECE, 33%. Prof. Carey Rappaport, NU –ECE, 33% level of effort in 1996.
    16.5.   Dates of performance: 1997-current
    16.6.   Summary of project: This item represents work funded by Textron Systems Division of Wilmington MA on various signal and image processing problems that has been renewed annual starting in 1999.

17. *Enhanced Technology for Vehicular Demining Sensors and Systems*
    17.1.   Source of support: US Army
    17.2.   Level of funding: $50,000
    17.3.   Role of Prof. Miller: PI, 100% level of effort.
    17.4.   Other participants: None
    17.5.   Dates of performance: November 2000 – October 2001.
    17.6.   Summary of project: This grant supported target detection and classification work related to signal processing for the Army's advanced demining sensing systems.

18. *Implementation of Back Projection on Reconfigurable Hardware*
    18.1.   Source of support: Mercury Computer

18.2. Level of funding: $53,000,

18.3. Role of Prof. Miller: Co-PI, 15% level of effort

18.4. Other participants: Prof. Miriam Leeser, NU ECE, 85%

18.5. Dates of performance: September 2000-August 2001

18.6. Summary of project: This contract is to support the analysis and development of backprojection algorithms for implementation on FPGA hardware.

19. *Advanced Processing Methods for Environmental Remediation*

19.1. Source of support: Department of Energy Idaho National Engineering Laboratory.

19.2. Level of funding: $249,275

19.3. Role of Prof. Miller: PI, 95% level of effort

19.4. Other participants: Prof. Michael Silevitch, 5% level of effort.

19.5. Dates of performance: April 2000 – June 2004

19.6. Summary of project: This contract is to develop new inversion methods for electrical resistance tomography in support of environmental   remediation applications.

20. *A Unified Approach to the Processing and Fusion of Time and Frequency Domain EMI Data for UXO Discrimination*

20.1. Source of support: Strategic Environmental Research and Development Program

20.2. Level of funding: $75,000

20.3. Role of Prof. Miller: PI, 100% level of effort

20.4. Other participants: None

20.5. Dates of performance: July 2001 – June 2002.

20.6. Summary of project: The work on this contract involves the   development and application of estimation and classification   methods to characterize detected metal objects using low frequency   induction sensors.

21. *Proposal for Funding of Patrick Rennich: Fall 1999*

21.1. Source of support: Lincoln Laboratory

21.2. Level of funding: $13,528

21.3. Role of Prof. Miller: PI, 100% level of effort

21.4. Other participants: None

21.5. Dates of performance: November 1999 – January 2000

21.6. Summary of project:

21.7. This grant is to support the Master's Thesis research of a Lincoln Lab employee under Prof. Miller's supervision.

22. *Laser Line Scan System for Underwater Measurements*

22.1. Source of support: Raytheon Corporation, Tewksbury, MA

22.2. Level of funding: $100,000

22.3. Role of Prof. Miller: Co-PI, 50% level of effort

22.4. Other participants: Prof. Charles DiMarzio, NU, ECE 50% level of effort.

22.5. Dates of performance: April 1999 – March 2001.

22.6. Summary of project: This grant is supporting the   development of radiative transfer based physical models and   associated image formation methods for an underwater sensing   system developed by Raytheon.

23. *Characterization Technology and Data Processing for Buried Waste and Pollution Plumes*
    23.1. Source of support: Department of Energy
    23.2. Level of funding: $267,000
    23.3. Role of Prof. Miller: Co-PI, 50% level of effort
    23.4. Other participants: Profs. Carey Rappaport NU-ECE, PI and Fernando Miralles-Wihelm NU-CivE, Co-PI. Total level of their effort was 50%.
    23.5. Dates of Performance: March 1998 - February 2001
    23.6. Summary of project: This grant supported Prof. Miller's RAs and post doc on projects related to subsurface imaging and object detection using electromagnetic probing methods.

24. *Acquisition of a High Performance Computation/Visualization Laboratory for Scientific Research*
    24.1. Source of support: National Science Foundation
    24.2. Level of funding: $2 million
    24.3. Role of Prof. Miller: Co-PI, 0% level of effort
    24.4. Other participants: Prof. Arun Bansil, NU-Physics PI and many other Co-PIs from Northeastern
    24.5. Dates of performance: 1998-2001
    24.6. Summary of project: This was an instrumentation grant from the National Science Foundation to support the purchase of computational infrastructure (workstation network and parallel machine) to be shared between the Department of Electrical and Computer Engineering and the Physics Department at Northeastern. Prof. Miller was responsible for coordinating the ECE contributions to the grant that was primarily assembled by Prof. Arun Bansil of the Physics Department. Additionally, Prof. Miller wrote a short section describing a research project related to the use of a higher performance network and parallel machine for solving large-scale problems arising in imaging from scattered radiation.

25. *An Integrated Approach to the Detection, Localization, and Classification of Mines*
    25.1. Source of support: Army Research Office
    25.2. Level of funding: $5 million
    25.3. Role of Prof. Miller: Co-PI, 11% level of effort
    25.4. Other participants: see below
    25.5. Dates of performance: 1997-2002
    25.6. Summary of project: This was a project supported by the Army Research Office under the Multidisciplinary University Research Initiative (MURI) led by Prof. Carey Rappaport (PI, NU-ECE) and a dozen other faculty from four universities and four industrial partners. This grant supported Prof. Miller's work in the areas of fast computational models, inverse scattering, and statistical signal processing methods for the detection, localization, and characterization of buried landmines given data from electromagnetic and acoustic sensing systems.

26. *An Integrated Approach to the Study of Inverse Methods in Electrical Engineering*
    26.1. Source of support: National Science Foundation CAREER Development Program

26.2. Level of funding: $200,000
26.3. Role of Prof. Miller: PI, 100% level of effort
26.4. Dates of project: August 1996 – July 2000
26.5. Summary of project: This grant supported both research and course development work of Prof. Miller   in the general area of inverse methods in electrical engineering.

27. *Integrated Reduced Target Automatic Target Recognition*
27.1. Source of support: Air Force Office of Scientific Research
27.2. Level of funding: $5 million
27.3. Role of Prof. Miller: Co-PI, 6% level of effort
27.4. Other participants: see below.
27.5. Dates of project: 1995-2000
27.6. Summary of project: This was a project supported by the Air Force Office of Scientific Research under the Multidisciplinary University Research Initiative (MURI) led by Prof. David Castanon (BU-ECE) and including roughly a dozen other faculty from Boston University, Northeastern, MIT, University of Minnesota, NYU, and Stanford   University. Prof. Miller used this funding to provide summer support for himself as well as fulltime support   for one graduate student. The work performed under this contract was primarily concerned with the exploration of methods to   regularize linear inverse problems.

28. *Enhanced Research in Ground-Penetrating Radar and   Multi-Sensor Fusion with Applications to the Detection and Visualization of Buried Waste*
28.1. Source of support: Department of Energy
28.2. Level of funding: $200,000
28.3. Role of Prof. Miller: Co-PI, 12.5 % level of effort
28.4. Other participants: see below
28.5. Dates of project: 1995-1996
28.6. Summary of project: This was a joint effort among seven investigators from Northeastern University's Center for Electromagnetic Research. For Prof. Miller, this funding supported the development of computationally efficient physical models and   advanced sensor array processing methods for the detection and   localization of buried objects from ground penetrating radar type data.

Internal Grants and Contracts

1. *Image processing Tools for Quantification of Knee Cartilage in MRI Data Stacks*
1.1. Source of Support: Tufts Clinical and Translational Sciences Institute
1.2. Level of funding: $20,000
1.3. Role of Prof. Miller: PI
1.4. Other participants: Prof. Timothy McAlindon, Zucker Chair of Rheumatology and Professor of Medicine, Tufts School of Medicine
1.5. Dates of Project: 9/1/09 – 8/31/10
1.6. Summary of project: Development and transition to Prof. McAlindon's group a set of processing tools for the semi-automated quantification of cartilage structure from three dimensional stacks of MRI imagery of the human knee.

2. *Center for Subsurface Sensing and Imaging Systems (CenSSIS)*
   2.1. Source of support: CenSSIS is a National Science Foundation (NSF) Engineering Research Center. The lead institution is Northeastern University and the other academic participants are Boston University, Rensselaer Polytechnic Institute, and the University of Puerto Rico at Mayagueuz. While the ultimate source of the funds is the NSF, disbursement to individual projects is done internally to the center.
   2.2. Level of funding: Prof. Miller and his research group have been supported by CenSSIS from 1998 through the current time. The total value of funds that have gone to Prof. Miller and the students in his group is about $790,000.
   2.3. Role of Prof. Miller: Prof. Miller runs a CenSSIS project at Northeastern concerned with the development of imaging algorithms. In addition to supporting himself and his research assistants, that project also supports Prof. Dana Brooks (NU-ECE) and a number of his students as well as two external researchers: Prof. Misha Kilmer (Tufts, Mathematics) and Prof. Magda El-Shenawee (University of Arkansas, Electrical Engineering). To be clear, the funding level quoted in the previous paragraph does not include the portion of the overall project that goes to Prof. Brooks', Prof. Kilmer's or Prof. El-Shenawee's research programs.
   2.4. Other participants: The overall PI of CenSSIS is Prof. Michael Silevitch. The Center as a whole involved tens of faculty from the four partner academic institutions. Prof. Miller's primary collaborators are Prof. Brooks, Kilmer, and El-Shenawee.
   2.5. Dates of project: Including the initial NU-based "seed" phase of CenSSIS, the center has run from about 1998 to the present time.
   2.6. Summary of project: Prof. Miller's role in CenSSIS has been to coordinate the Northeastern University research program in imaging algorithms development and validation. He and his students have worked with researchers from Massachusetts General Hospital, Boston University Dept. of Mechanical and Aerospace Engineering, Tufts University, and the University of Arkansas on projects related to imaging using diffuse optical wavefields, ultrasonics, and radar with applications in breast cancer detection, image guided cancer treatment, and underground imaging.
3. *Integration of Undergraduates into the Synthesis of Scientific Software Systems*
   3.1. Source of support: Northeastern University Provost's Office Program in Undergraduate Research
   3.2. Level of funding: $9,000
   3.3. Role of Prof. Miller: PI, 100% level of effort
   3.4. Other participants: none
   3.5. Dates of project: December 2002-November 2003
   3.6. Summary of project: This grant was used to partially support the efforts of three ECE undergraduates to work with Prof. Miller's research group as co-op students on CenSSIS related software development.
4. *Anomaly Detection and Localization in Three Dimensions*
   4.1. Source of support: Northeastern College of Engineering Bellamy Philip Memorial Fund for Engineering

4.2.　　Level of support: $5,000
4.3.　　Role of Prof. Miller: PI, 100% level of effort
4.4.　　Other participants: none
4.5.　　Dates of project: Summer 1996
4.6.　　Summary of project: This grant supported graduate student research during the summer of 1996.

Teaching Activities

Tufts University (2007 – present)
1.　EE 293: Mathematical Methods in Image Processing (Spring 2009)
2.　EE 104: Probabilistic Systems Analysis (Fall 2008, Fall 2009)
3.　EE 193: Applied Probability and Statistics for Engineers (Fall 2007)
4.　EN 74: Introduction to Image Processing (Fall 2007, Fall 2009)
5.　EE 133: Digital Image Processing (Spring 2007, Spring 2008, Spring 2009)
6.　ECE U692: Subsurface Sensing and Imaging (Spring 2006)

Northeastern University (1994-2006)
1.　ECE U464: Linear Systems (Fall 2004, Spring 2005, Fall 2005, Fall 2006)
2.　ECE G410: Modern Signal Processing (Spring 2004)
3.　ECE G398 (ECE 3557, ECE 3694) Special Topics in Signal Processing: Inverse Problems in Engineering and the Applied Sciences (Winter 1997, Fall 2002, Fall 2003)
4.　ECE 1456, Undergraduate level Digital Signal Processing (Spring 1995, Winter 1996, Spring 1996, Spring 2000, Winter 2003)
5.　ECE 3321: Graduate Level Digital Signal Processing (Spring 1997, Winter 1998, Winter 1999, Winter 2000, Spring 2000, Fall 2001)
6.　ECE 3890: Advanced seminar in signals and communications (Spring 2001)
7.　GE 1101, Engineering Problem Solving and Computation (Fall 1996, Fall 1997, Spring 1998, Spring 2001)
8.　ECE 3558: Digital Filter Banks and Wavelets (Spring 1998, Spring 1999, Winter 2001)
9.　ECE 3557, Special Topics in Signal Processing: Filter Banks and Wavelets (Fall 1995)
10.　ECE 1733: Linear System II, honors section (Winter 1995)
11.　ECE 1333: Linear Systems II (Fall 1994)

Student Advising
Graduated Ph.D. Students
1.　Roni Mittelman, *Topics in Nonlinear and Robust Estimation Theory*, Dept. of ECE Northeastern University, August 2009.
2.　Jie Cheng, *Automated detection and time lapse analysis of dendritic spines in laser scanning microscopy images*, Dept. of ECE Northeastern University, April 2009.

3. Damon Hyde, *Statistical Modeling and Structured Regularization for Fluorescence Molecular Tomography*, Dept. of ECE, Northeastern University, December 2008.
4. Gregory Boverman. *Shape and Pixel Based Methods for Diffuse Optical Tomographic Imaging with Applications to Breast Tumor Detection*, Dept. of ECE, Northeastern University, June 2007.
5. Reza Firoozabadi, *Physics-Based Solutions to Inverse Problems with Application in Biomedical Imaging and Environmental Remediation,* Dept. of ECE, Northeastern University, January 2007.
6. Alireza Aliamiri. *Statistical methods for unexploded ordnance discrimination*, Dept. of ECE, Northeastern University, January 2007.
7. Basak Ulker Karbeyaz, *Modeling and Geometric Inverse Methods for Wideband Ultrasonic Imaging*, Dept. of ECE, Northeastern University, September 2005.
8. Anupama Jagannathan, *Segmentation and recognition of 3D point clouds within graph-theoretic and thermodynamic frameworks*, Dept. of ECE, Northeastern University, August 2005.
9. Ashley Beeta Tarokh, *Shape-based methods for linear inverse problems*, Dept. of ECE, Northeastern University, July 2005.
10. Xiaoyin Xu, *Statistical Methods in Subsurface Object Detection and Localization from Ground Penetrating Radar*, Dept. of ECE, Northeastern University, December 2002.
11. Roger Dufour, *Target Classification and Parameter Estimation with a Deformable Template Library*, Dept. of ECE, Northeastern University, May 2003.
12. Wm. Scott Hoge, *An Adaptive Signal Processing Approach to Dynamic Magnetic Resonance Imaging*, Dept. of ECE, Northeastern University, June 2001.
13. Murat Belge, *Multi-scale and Curvature Methods for the Regularization of Linear Inverse Problems*, Dept. of ECE, Northeastern University, August 1999.
14. Adnan Sahin, *Near Field Forward Scattering, and Object-Based Localization Algorithms for Subsurface Objects*, Dept. of ECE, Northeastern University, August 1998.

Current Ph.D. Students

1. Jincheng Pang, Thesis topic: Automatic segmentation of Cartilage Structure in the Knee from 3D MRI Data, Dept. of ECE, Tufts University.
2. Bilal Ahmed. Thesis topic: Machine Learning Methods for Hydrological Inverse Problems. Dept. of CS, Tufts University
3. Alex Lauric. Thesis topic: Intracranial Aneurysms Analysis. Dept. of CS, Tufts University
4. Amelio Vasquez. Thesis topic: Active contour and statistical methods for segmentation of neuronal processes. Dept. of CS, Tufts University
5. Bradley Gaynor. Thesis topic: Vision-aided navigation. Dept. of ECE, Tufts University
6. Alireza Aghasi. Thesis topic: Shape evolution methods for multi-sensor fusion of electrical and hydrological data. Dept. of ECE, Tufts University
7. Ted Wilson. Thesis topic: Robust Methods in Space-Time Adaptive Radar Signal Processing. Dept. of ECE, Tufts University

8. Emre Gueven. Thesis topic: Physics- and shape-based ultrasound imaging for guidance of cancer therapy. Dept. of ECE Northeastern University

Graduated MS Thesis Students

1. Fridrik Laruson, *Hyperspectral Imaging for Diffuse Optical Tomography*, Dept. of ECE, Tufts University, September 2009.
2. Leah Ultring, *A Multiple Target Range and Range-Rate Tracker Using an Extended Kalman Filter and a Multilayered Association Scheme*, Dept. of ECE, Tufts University, June 2008
3. Olusola Akapo, *Cell Segmentation Using a Charged Parametric Active Contour*, Dept. of ECE, Tufts University, June 2008
4. Ranga Sharath Srinivasan, *3-D Centerline Extraction Of Axons In Confocal Microscopic Stacks*, Dept. of ECE, Northeastern University, December 2007.
5. Andrey Krokhin, *Super-resolution processing of infrared imagery,* Dept. of ECE, Northeastern University, September 2005.
6. Damon Hyde, *Improving Forward Matrix Generation and Utilization for Time Domain Diffuse Optical Tomography*, Dept. of ECE, Northeastern University, September 2004.
7. Greg Boverman, *Modeling and Nonlinear Inversion for Frequency Domain Diffuse Optical Tomography*, Dept. of ECE, Northeastern University, June 2003.
8. Beeta Tarokh, *A Unified Approach to Statistical Classification of Buried Objects from Spatially Sampled Electromagnetic Induction Data*, Dept. of ECE, Northeastern University, May 2003.
9. Anupama Jagannathan, *Wavelet-based Graph Theoretic Methods for Image Segmentation*, Dept. of ECE, Northeastern University, August 2002.
10. Tzipora Halevi, *Statistical Methods for Object Detection in a Three Dimensional Volume*, Dept. of ECE, Northeastern University, August 1997.
11. Roger Dufour. *Statistical Estimation with 1/f-Type Models*, Dept. of ECE, Northeastern University, May 1997.

Current MS Thesis Students

Graduated MS Project Students

1. Doria Jianu, *Statistical characterization of intracranial vasculature branching structure from 3D imagery*, Dept. of CS, Tufts University, August 2009.
2. Libby Schundler, *Tomographic Plume Reconstruction Using Regularization Techniques*, Dept. of ECE, Tufts University, August 2008.
3. Bryan Barnett, *Radar Tracking of Ballistic Objects using the Extended Kalman Filter and Unscented Kalman Filter*, Dept. of ECE, Tufts University, August 2008.
4. Matthew Dorsch, A *Prototype of a Stereo Vision Based Virtual Modeling Application*, Dept. of ECE, Tufts University, January 2008.
5. Xin Li, *Adaptive basis methods and edge preserving regularization for linearized inverse scattering problems*, Dept. of ECE, Northeastern University, June 2001.
6. Pengyu Shi, *Recursive processing methods for object detection and shape determination from laser-induced acoustic scattering data,* Dept. of ECE, Northeastern University, June, 1999.

7. Patrick Rennich, *Volumetric registration for fMRI*, Dept. of ECE, Northeastern University, June 2001.
8. Mustafa Ozdemir, *Estimation theoretic methods for object characterization from low frequency electromagnetic data*, Dept. of ECE, Northeastern University, June 2001.
9. Ibrahim Yavuz, *Basis adaptive methods for linear inverse problems*, Dept. of ECE, Northeastern University, December 1999.
10. Xiaoyin Xu, *Modeling and detection methods for rapidly moving objects*, Dept. of ECE, Northeastern University, March 1998.

BS Honors Project

1. Mr. Matthew Emerson, *Statistically based Method for Anomaly Characterization in Images*, Dept. of ECE, Northeastern University, June 1996.

Engineering-Coop Advising (Northeastern University)

1. Mr. Sean Mayo: Project title: Design and Implementation of Processing and Modeling Tools for Processing of Electromagnetic Induction Data. January 2006-June 2006
2. Mr. Joe Ash: Project title: Design and Implementation of Processing and Modeling Tools for Processing of Electromagnetic Induction Data. July 2005-December 2005
3. Mr. Michael Mazzello: Project title: Design and Implementation of Processing and Modeling Tools for Processing of Electromagnetic Induction Data. January 2005–June 2005
4. Mr. Yves Meyer: Project title: Design and Implementation of Processing and Modeling Tools for Processing of Electromagnetic Induction Data. July 2004-December 2004
5. Mr. Derek Uluski. Project title: Distributed Computing Methods for Nonlinear Inverse Scattering Problems. January 2002-August 2003.
6. Mr. Kyle Guilbert. Project title: An Object Oriented Toolbox for Diffuse Wave Modeling and Inversion. January 2002-August 2003.
7. Mr. Benjamin Yuen. Project title: A Graphical User Interface for Diffuse Wave Imaging Toolbox. January 2002-August 2003.
8. Mr. Michael Fitzgibbons. Project title: Analysis and Optimization of Jammer Excision Methods for Next Generation GPS. June 1999 - December 1999.

Other Student Supervisory Activities

Tufts University
1. Jason Nochlin. Project Topic: Segmentation and texture analysis of MRI data for the quantification of osteoarthritis in the knee, 2009-2010. Mr. Nochline began this project as an independent study during the spring of 2009 and was supported as a Tufts Summer Scholar in the summer of 2009. Over the 2009-2010 academic year, he pursued this project as an Honor's Thesis.
2. Victor Huang. Project topic: Segmentation of collagen fibers in multi-photon microscopy imagery, 2008. Mr. Huang worked on this project as an independent study over the spring 2008 semester and with support from the Tufts Summer Scholars program during the summer of 2008.

Northeastern University

3. Corey Ashby. Project topic: Matlab toolbox for Unexploded Ordnance Processing, 2004. Mr. Ashby was a participant in the NSF-supported Louis Stokes Alliance for Minority Participation (LSAMP) project at Northeastern.
4. Alexandre Baussard, Project title: Inverse scattering problems in electromagnetic imaging, December 2001, Summer 2002. Dr. Baussard was a Ph.D. student at SATIE - ENS de Cachan in Paris France who spent two weeks in December 2001 and all of the summer in 2002 doing research in my group on a class of multi-scale methods for solving inverse problems. I served on his thesis committee at ENS de Cachan.
5. David Gohier, Project topic: Regularization Methods for Linear Inverse Problems, Summer 2002. Mr. Gohier was a French undergraduate who spent the summer working with me to fulfill an externship requirement for his program at L'Ecole Nationale Supérieure de Physique de Grenoble
6. Huei Shuan Liu, Project topic: Born-based modeling for Multiview Tomography Toolbox, Summer 2002. Ms. Liu was a CenSSIS-supported NSF REU.
7. Claire Tarrade, Project topic: Implementation of a Multiview Tomography Toolbox in C++. Ms. Tarrade was a French undergraduate who spent the summer working with me to fulfill an externship requirement for his program at L'Ecole Nationale Supérieure de Physique de Grenoble

Member of Thesis Committee

1. Mr. Scott Winton (MS, 1999)
2. Mr. Kadagattur G. Srinidhi (Ph.D., 1999)
3. Mr. Edwin Marengo (Ph.D., 1997)
4. Mr. Alexis Tzannes (Ph.D., 1997)
5. Ms. Ilene Herranz (MS, 1997)
6. Mr. Ross Demming (Ph.D., 1996)
7. Mr. Santosh K. Chandwani (MS, 1996)
8. Mr. Scott M. Griebel (MS, 1996)
9. Ms. Maya El-Bar (MS, 1995)
10. Mr. Kevin Reilly (MS, 1995)
11. Mr. Costa Zervos (MS, 1995)
12. Mr. Haifeng Qiu (MS, 1995)
13. Mr. Hong Liu (Ph.D., 1995)
14. Mr. Charles A. DiMarzio (Ph.D., 1995)

Departmental, College, and University Service
2009-2010

1. Chair, Junior Faculty Search Committee, Dept. of ECE, Tufts University
2. Member, Tufts University School of Engineering Curriculum Task Force
3. Member, Tufts University School of Engineering Graduate Committee
4. Member, Tufts University Research Council
5. Member, Review Panel for Northeastern Association of Graduate Schools Master's Thesis Award.
6. Member, Review Panel for Tufts University Goldwater Scholarship Applicants
7. Member, Tufts University Committee on Conflict of Interest in Research

2008-2009

8. Chair, Search Committee for Howell Endowed Chair, Dept. of ECE, Tufts University
9. Organizer of Tufts University Electrical and Computer Engineering Department Qualifying Exam
10. Member, Tufts University School of Engineering Curriculum Task Force
11. Member, Tufts University School of Engineering Graduate Committee
12. Member of organizing committee, Preparing Future Faculty Workshop

2007-2008

13. Member, Tufts University Civil and Environmental Engineering Department Structures Faculty Search Committee
14. Organizer of Tufts University Electrical and Computer Engineering Department Qualifying Exam
15. Member, Tufts University School of Engineering Curriculum Task Force
16. Member, Tufts University School of Engineering Graduate Committee

2005-2006

17. Member, Northeastern University Wide Ad Hoc Committee on Information Systems
18. Member, Northeastern University Wide Academic Computing Users Group Committee
19. Member and Chair (January 2006 – June 2006), ECE Computer Committee
20. Member, ECE Distinguished Speaker Committee
21. Member, ECE Undergraduate Study Committee
22. Member, Ph.D. Qualifying Exam Committee in Signals and Systems
23. Liaison between ECE Department and University Library

2004-2005

1. Member and Chair, External Search Committee for ECE Chair:
2. Liaison between ECE Department and University Library
3. Member, Northeastern University Wide Ad Hoc Committee on Information Systems
4. Member, ECE Computer Committee
5. Member, ECE Hiring Committee
6. Member, Ph.D. Qualifying Exam Committee in Signals and Systems

2003-2004

1. Liaison between ECE Department and University Library
2. Member, Northeastern University Wide Ad Hoc Committee on Information Systems
3. Member, Northeastern University-wide Committee to Evaluate the Dean of the Northeastern Libraries
4. Member, ECE Tenure and Promotions Committee

2002-2003

1. Member, Ph.D. Qualifying Exam Committee in Signals and Systems
2. Member, ECE Tenure and Promotions Committee

2001-2002

1. Organizer, Signals and Systems Faculty: Responsible for coordinating qualifying exam in signals and systems area.
2. Member, College of Engineering Faculty Council
3. Member, ECE Educational Program Committee

1999-2000

1. Member and Chair, ECE Departmental Council
2. Member, ECE Graduate Affairs Committee
3. Member, ECE Web Site Committee

1998-1999

1. Member and Chair, ECE Departmental Council

1997-1998

1. Organizer, Seminar Series for Communications and Digital Signal Processing Laboratory
2. Member, Graduate Affairs Committee
3. Member, ECE Chair Search Committee
4. Director, Computing Facilities for Communications and Digital Signal Processing Lab. 1997

1996-1997

1. Member, Graduate Affairs Committee
2. Member, Departmental Computer Advisory Committee

1995-1996

1. Member, the Ph.D. Qualifying Exam Committee
2. Member, Graduate Affairs Committee
3. Member, Circuits and Systems sub-committee for the revision of the undergraduate curriculum

1994-1995

1. Member, Ph.D. Qualifying exam committee

Professional Service

Editorial Responsibilities

1. Guest Editor, **IEEE Transactions on Geoscience and Remote Sensing Special Issue on IGARSS 2008**, 2008-2009
2. Associate Editor, **IEEE Transactions on Geoscience and Remote Sensing,** July 2003-present.
3. Guest Editor, **Optics Express** special issue on Diffuse Optical Tomography and Related Inverse Problems, December 2000.
4. Associate Editor for Image Analysis, **IEEE Transactions on Image Processing,** October 1999-September 2003.

Conference Organization

1. Local arrangements chair**, 2009 IEEE International Symposium on Biomedical Imaging**, Boston MA
2. Co-General Chair (with Prof. John Kerekes of RIT) for the 2008 **International Geoscience and Remote Sensing Symposium 2008** , Boston MA
3. Member, Technical Organizing Committee, **IS&T & SPIE 20th Annual Symposium on Electronic Imaging Science and Technology** and organizer of **Computational Imaging VII Conference** with Profs. Charles Bouman and Ilya Pollak of Purdue University, San Jose, CA, January 2009

4. Member, Technical Organizing Committee, **IS&T & SPIE 20th Annual Symposium on Electronic Imaging Science and Technology** and organizer of **Computational Imaging VI Conference** with Profs. Charles Bouman and Ilya Pollak of Purdue University, San Jose, CA, January 2008

5. Member, Technical Organizing Committee, **IS&T & SPIE 19th Annual Symposium on Electronic Imaging Science and Technology** and organizer of **Computational Imaging V Conference** with Profs. Charles Bouman and Ilya Pollak of Purdue University, San Jose, CA, January 2007

6. Member, Technical Organizing Committee, **IS&T & SPIE 18th Annual Symposium on Electronic Imaging Science and Technology** and organizer of **Computational Imaging IV Conference** with Profs. Charles Bouman and Ilya Pollak of Purdue University, San Jose, CA, January 2006

7. Member, Technical Organizing Committee, **IS&T & SPIE 17th Annual Symposium on Electronic Imaging Science and Technology** and organizer of **Computational Imaging III Conference** with Prof. Charles Bouman of Purdue University, San Jose, CA, January 2005

8. Member, Technical Organizing Committee, **IS&T & SPIE 16th Annual Symposium on Electronic Imaging Science and Technology** and organizer of **Computational Imaging II Session** with Prof. Charles Bouman of Purdue University, San Jose, CA, January 2004

9. Organizer and Chair of Session "Statistical Signal Processing with Applications to Subsurface Sensing," **2003 IEEE AP-S International Symposium and URSI National Radio Science Meeting**, Columbus, Ohio, June 22-27, 2003

10. Local events coordinator, **Progress in Electromagnetics Research Symposium**, Boston, MA, July 2000.

11. Chairman of the "Progress in Inverse Methods I" session**, Progress in Electromagnetics Research Symposium**, Boston, MA, July 2000.

12. Chairman of the "Remote Sensing and Geophysical Problems" session, **Progress in Electromagnetics Research Symposium**, Boston, MA, July 2000.

13. Member, technical committee, **IEEE International Conference on Image Processing**, Vancouver BC, September 2000.

14. Chairman of the "Image Restoration I" session at **IEEE International Conference on Image Processing**, Vancouver BC, September 2000.

15. Member, Program Committee, "Subsurface Sensing Technologies and Applications," **SPIE International Symposium on Optical Science, Engineering, and Instrumentation**, San Diego, July 2000.

16. Co-Chairman of the "Radar II" session at **SPIE AeroSense Symposium, Detection Technologies for Mines and Minelike Targets**, Orlando, FL., April 1999.

17. Chairman of the "Wavelet-Based Image Restoration" session **at IEEE International Conference on Image Processing**, Chicago, IL. October 1998.

18. Member, technical program committee, **IEEE International Conference on Image Processing**, Chicago, IL October 1998.

19. Co-Chairman of the "Electromagnetics Methods I" session at **SPIE AeroSense Symposium, Detection Technologies for Mines and Minelike Targets**, Orlando, FL., April 1998.

20. Chairman of the "Imaging Holography and Tomography" session at **Progress in Electromagnetics Research Symposium**, Boston, MA, July 1997.

21. Member of technical program committee**, Progress in Electromagnetics Research Symposium**, Boston, MA, July 1997.

Short Course Development

1. Co-developer and instructor (with Prof. Leslie Collins of Duke University) of short course "Statistical Signal and Image Processing for Landmine Detection," taught at **SPIE AeroSense Symposium**, Orlando FL., April 1999 and April 2000.

Reviewing Responsibilities

1. Member, NIH Study Section on Electromagnetic Devices, 2009.
2. Member, NIH Study Section on Electromagnetics, 2008.
3. Member, NSF Panel Review, June 2007, June 2004, March 2003, June 2001, March 1999
4. Reviewer for U.S. Civilian Research & Development Foundation (CRDF), May 2005, May 2002, May 2001.
5. Reviewer for Strategic Environmental Research and Development Program proposals in Munitions Management, 2007
6. Reviewer for Army Research Office Program in Information and Signal Processing, 2007
7. Reviewer for Department of Energy SBIR program, 2007
8. Reviewer for NSF Theoretical Physics Program, March 2000.
9. Reviewer, DEPSCor white papers, August 1999.
10. Reviewer for text "*Introduction to Wavelets and Wavelet Transforms: A Primer,*" by C. Sidney Burrus, Ramesh A. Gopinath, and Haitao Guo, Prentice Hall, 1998.
11. Technical reviewer for
    11.1. **IEEE Transactions on Signal Processing**
    11.2. **IEEE Transactions on Image Processing**
    11.3. **IEEE Transactions on Antennas and Propagation**
    11.4. **IEEE Transactions on Microwave Theory and Techniques**
    11.5. **IEEE Transactions on Geoscience and Remote Sensing**
    11.6. **IEEE Geoscience and Remote Sensing Letters**
    11.7. **IEEE Antennas and Wireless Propagation Letters**
    11.8. **IEE Proceedings on Image, Vision and Signal Processing**
    11.9. **Medical Image Analysis**
    11.10. **Journal of the Optical Society of America**
    11.11. **Journal of the Acoustic Society of America**
    11.12. **Radio Science**
    11.13. **Applied Optics**
    11.14. **Electron Letters**
    11.15. **Computer Journal**
    11.16. **Inverse Problems**
    11.17. **Optics Express**
    11.18. **Optics Letters**
    11.19. **Journal of Porous Media**
    11.20. **Journal of Thermophysics**
    11.21. **Subsurface Sensing Technologies and Applications**

11.22. **1998 International Conference on Image Processing**
11.23. **2000 International Conference on Image Processing**
11.24. **2002 International Conference on Image Processing**
11.25. **2004 International Conference on Image Processing**

Miscellaneous
1.   Treasurer, Boston Section of IEEE, 1996-1997.

Academic and Professional Activities
- Senior Member, IEEE, 2004-present
- Member, IEEE, 1995-2004
- Student Member, IEEE, 1991-1994
- Member, SIAM 2002-present
- Member, Optical Society of America, 1998-present
- Member, American Society for Engineering Education, 1998-2000