

# William Clement Karl

Professor

Department of Electrical and Computer Engineering

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## Principal Research Interests:

Multidimensional statistical signal and image processing and estimation, inverse problems, sparsity-based estimation, geometric estimation, applications to biomedical signal and image processing, remote sensing, synthetic aperture radar.

## Education:

<u>University</u>	<u>Degree</u>	<u>Date</u>
Massachusetts Institute of Technology	Ph.D. in Electrical Engineering and Computer Science	1991
Massachusetts Institute of Technology	E.E in Electrical Engineering and Computer Science	1990
Massachusetts Institute of Technology	S.M. in Electrical Engineering and Computer Science	1984
Massachusetts Institute of Technology	S.B. in Aeronautical and Astronautical Engineering	1983

## Boston University Appointments:

<u>Rank</u>	<u>Dates</u>
Professor Electrical and Computer Engineering	2003–present
Professor Biomedical Engineering	2003–present
Associate Professor Electrical and Computer Engineering	2000–2003
Associate Professor Biomedical Engineering	2000–2003
Assistant Professor Electrical and Computer Engineering	1995–2000
Assistant Professor Biomedical Engineering	1996–2000

## Other Appointments:

<u>Position</u>	<u>Institution</u>	<u>Dates</u>
Visiting Scientist	Center for Integration of Medicine and Innovative Technology, Department of Radiology, MGH	2005–Present
Lecturer of Health Sciences and Technology	Harvard-MIT Division of Health Sci. and Tech.	1995–2000
Research Scientist	MIT Laboratory for Information and Decision Systems	1992–1994
Post-doctoral Research Associate	MIT Laboratory for Information and Decision Systems with Prof. Alan Willsky	1991–1992

## Professional Service

- **Selected Society Committee Service**

- IEEE Signal Processing Society Technical Committee Review Committee (2012-2013)
- IEEE Signal Processing Society Conference Board (2012-2014)
- IEEE Signal Processing Society Board of Governors (2011-2013)
- IEEE Transactions on Medical Imaging Steering Committee (2011-2013)
- IEEE Signal Processing Society COS Conference Organizers Orientation and Training Advisory Committee (2010-2011)
- IEEE Signal Processing Society Signal Processing Education Technical Committee BISP Liaison (2009-2011)
- IEEE Signal Processing Society Biomedical Image and Signal Processing Technical Committee (2007-Present)
- IEEE Signal Processing Society Biomedical Image and Signal Processing Technical Committee Vice-chair (2009-2010)
- IEEE Signal Processing Society Intl. Symposium on Biomedical Imaging Steering Committee (2009-2010)
- IEEE Signal Processing Society Image and Multidimensional Signal Processing Technical Committee (2003-2009)

- **Selected Conference and Workshop Organization Service**

- Co-Organizer, Special Session of 2012 IEEE Statistical Signal Processing Workshop on Challenges in High Dimensional Learning (2011-2012)
- Co-Organizer, Special Session of 2012 IEEE Statistical Signal Processing Workshop on Statistical Signal Processing and the Engineering of Materials (2011-2012)
- Technical Program Committee, 2012 IEEE Statistical Signal Processing Workshop
- Americas Liaison, 2012 IEEE Intl. Symposium on Biomedical Imaging
- Organizer, Workshop on Large Data Sets in Medical Informatics. Part of the Institute for Mathematics and Its Applications Thematic Year on the Mathematics of Information (2010-2011)
- Program Committee, IS&T/SPIE Computational Imaging Conference (2012-present)
- General Chair, 2009 IEEE Intl. Symposium on Biomedical Imaging
- IMDSP Technical Committee Reviewer Coordinator, 2005 IEEE Intl. Conf. on Acoustic Speech and Signal Processing
- Technical Program Committee, IEEE Intl. Conf. on Acoustic Speech and Signal Processing (2004, 2005)
- Session Organizer and Chair, IEEE Asilomar Conference on Signals, Systems, and Computers (2002, 2003)
- Technical Program Committee, IEEE Intl. Conf. Image Processing (2000-2005)
- Organizing committee, First SIAM Conf. on Imaging Science (2000-2001)
- Organizing committee, First SIAM Conf. on the Life Sciences (2000-2001)
- Technical Program Committee, SPIE Conference on Battlefield Biomedical Technologies (1998-2000)
- Session Organizer and Chair, 2000 Conf. on Information Sciences and Systems special session on Medical Imaging
- Co-organizer, Int'l Atomic Energy Agency meeting on humanitarian demining (1997)
- Technical Program Committee, IEEE Engineering in Medicine and Biology Society Workshop on Wavelets in Medicine and Biology (1994)

- Session Organizer and Chair, 1993 Conf. on Information Sciences and Systems special session on Geometry and Estimation

- **Editorial Roles**

- Editor-in-Chief, IEEE Transactions on Image Processing (2013-2016)
- Editorial Board, IEEE Transactions on Image Processing (1996-2000)
- Guest Editor, special issue of *Int'l J. Patt. Recog. and Artificial Intelligence* on “Processing, Analysis, and Understanding of MR Images of the Human Brain” (1996-1998)
- Assistant Editor, *Control Systems Newsletter* (1984–1985)

## Honors, Awards, Special Recognition, or other Significant Items

- Advisee won student paper award at 2005 IEEE Intl. Conf. on Acoustics Speech and Signal Processing
- Advisee among top 10 in student paper award competition at 2002 IEEE Intl. Conf. on Image Processing
- 2000 Boston University Departmental Teaching Award
- Nominated for 1999 Boston University Departmental Teaching Award
- Nominated for 1998 Boston University Departmental Teaching Award
- Advisee’s vision system won the 1996 International Aerial Robotics Competition; featured on Discovery Channel
- Elected to Sigma Xi (1985)

## Teaching Experience

- Undergraduate Level
  - Circuits and Electronics
  - Introduction to Digital Signal Processing
  - Signals and Systems
- Graduate Level
  - Recursive Estimation
  - Stochastic Processes, Detection, and Estimation
  - Image Restoration and Reconstruction

# Publications

## Books and Book Chapters

1. T. M. Chin, M. R. Luetzgen, W. C. Karl, and A. S. Willsky, “An Estimation-Theoretic Perspective on Image Processing and the Calculation of Optical Flow,” in *Motion Analysis and Image Sequence Processing*, M. Sezan and R. Lagendijk, eds, Kluwer, March 1993.
2. W. C. Karl, “Regularization in Reconstruction and Restoration,” in *Handbook of Image and Video Processing*, A. Bovik, ed, Academic Press Limited, April, 2000.
3. W. C. Karl, “Regularization in Reconstruction and Restoration,” in *Handbook of Image and Video Processing*, A. Bovik, ed, Academic Press Limited, Second Edition, May 2005.
4. R. A. Weisenseel, W. C. Karl, and R. C. Chan, “Multisensor Data Inversion and Fusion Based on Shared Image Structure,” in *Multi-sensor image fusion and its applications*, R. S. Blum and Z. Liu, ed, CRC Press, 2005.
5. W. C. Karl and E. L. Miller, “Digital Subsurfacing Imaging,” in *Introduction to Subsurface Imaging*, B. Saleh, ed, Cambridge University Press, December, 2010
6. I. Stojanovic, M. Cetin, W. C. Karl, “Sparsity and Compressed Sensing in Mono-static and Multi-static Radar Imaging,” in *Filtering from Undersampled Data with an Introduction to Compressed Sensing*, A. Y. Carmi , L. S. Mihaylova and S. J. Godsill, eds, Springer, September, 2013.

## Journal Articles

1. W. C. Karl, J. Greschak, and G. C. Verghese, “Comments on ‘A Necessary and Sufficient Condition for the Stability of Discrete Linear Interval Systems,’ ” *International Journal of Control*, Vol. 39, No. 4, pp. 849–851, 1984.
2. W. C. Karl and G. C. Verghese, “Comments on ‘Sufficient and Necessary Condition for the Asymptotic Stability of Discrete Linear Interval systems,’ ” *International Journal of Control*, Vol. 45, No. 5, pp. 2159–2160, November, 1988.
3. W. C. Karl and G. C. Verghese, “Comments on ‘Robust Stability in Linear State Space Models,’ ” *International Journal of Control*, Vol. 49, No. 3, pp. 1093, 1989.
4. W. C. Karl and G. C. Verghese, “Curvatures of Surfaces and Their Shadows,” *Linear Algebra and its Applications* (Special Issue on Image Reconstruction from Projections), Vol. 130, pp. 231-255, March, 1990.
5. W. C. Karl, S. Leeb, L. Jones, J. Kirtley, and G. C. Verghese, “Applications of Rank-Based Filters in Power Electronics,” *IEEE Transactions on Power Electronics*, Vol. 7, No. 3, pp. 437–443, July 1992.
6. T. M. Chin, W. C. Karl, and A. S. Willsky, “Sequential Filtering for Multi-Frame Visual Reconstruction,” *Signal Processing* special issue on Multidimensional Signal Processing, Vol. 28, No. 3, pp. 311–333, September 1992.
7. W. C. Karl and G. C. Verghese, “A Sufficient Condition for the Stability of Interval Matrix Polynomials,” *IEEE Transactions on Automatic Control* (Special Issue on Meeting the Challenge of Computer Science in the Industrial Applications of Control), Vol. 38, No. 7, pp. 1139–1143, July 1993.
8. M. R. Luetzgen, W. C. Karl, A. S. Willsky, and R. R. Tenney, “Multiscale Representations of Markov Random Fields,” *IEEE Transactions on Signal Processing* special issue on Wavelets and Signal Processing, Vol. 41, No. 12, pp. 3377–3396, December 1993.
9. W. C. Karl, G. C. Verghese, and J. H. Lang, “Control of Vibrational Systems,” *IEEE Transactions on Automatic Control*, Vol. 39, No. 1, pp. 222–226, January, 1994.
10. M. R. Luetzgen, W. C. Karl, and A. S. Willsky, “Efficient Multiscale Regularization with Applications to the Computation of Optical Flow,” *IEEE Transactions on Image Processing*, Vol. 3, No. 1, pp. 41–64, January 1994.

11. W. C. Karl, G. C. Verghese, and A. S. Willsky, "Reconstructing Ellipsoids from Projections," *Computer Vision, Graphics, and Image Processing: Graphical Models and Image Processing*, Vol. 56, No. 2, pp. 124–139, March, 1994.
12. P. Milanfar, W. C. Karl, and A. S. Willsky, "Reconstructing Binary Polygonal Objects from Projections: A Statistical View," *Computer Vision, Graphics, and Image Processing: Graphical Models and Image Processing*, Vol. 56, No. 5, pp. 371–391, September, 1994.
13. T. M. Chin, W. C. Karl, and A. S. Willsky, "Probabilistic and Sequential Computation of Optical Flow using Temporal Coherence," *IEEE Transactions on Image Processing*, Vol. 3, No. 6, pp. 773–788, November, 1994.
14. T. M. Chin, W. C. Karl, and A. S. Willsky, "A Distributed and Iterative Method for Square Root Filtering in Space-Time Estimation," *Automatica*, Vol. 31, No. 1, pp. 67–82, January, 1995.
15. P. Milanfar, G. C. Verghese, W. C. Karl, and A. S. Willsky, "Reconstructing Polygons from Moments with Connections to Array Processing," *IEEE Transactions on Signal Processing*, Vol. 43, No. 2, pp. 432–443, February, 1995.
16. P. W. Fieguth, W. C. Karl, A. S. Willsky, and C. Wunsch, "Multiresolution Optimal Interpolation and Statistical Analysis of TOPEX/POSEIDON Satellite Altimetry," *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 33, No. 2, pp. 280–292, March, 1995.
17. S. Jaggi, W. C. Karl, and A. S. Willsky, "Estimation of Dynamically Evolving Ellipsoids with Applications to Medical Imaging," *IEEE Transactions on Medical Imaging*, Vol. 14, No. 2, pp. 249–258, June, 1995.
18. M. Bhatia, W. C. Karl, and A. S. Willsky, "A Wavelet-Based Method for Multiscale Tomographic Reconstruction," *IEEE Transactions on Medical Imaging*, Vol. 15, No. 1, pp. 92–101, February, 1996.
19. R. W. Stadler, W. C. Karl, and R. S. Lees, "New Methods for Arterial Diameter Measurement from B-Mode Images," *Ultrasound in Medicine and Biology*, Vol. 22, No. 1, pp. 25–34, 1996.
20. R. W. Stadler, W. C. Karl, and R. S. Lees, "The Application of Echo Tracking Methods to Endothelium-Dependent Vasoreactivity and Arterial Compliance Measurements," *Ultrasound in Medicine and Biology*, Vol. 22: No. 1, pp. 35–42, 1996.
21. P. Milanfar, W. C. Karl, and A. S. Willsky, "A Moment-Based Variational Approach to Tomographic Reconstruction," *IEEE Transactions on Image Processing*, Vol. 5, No. 3, pp. 459–470, March, 1996.
22. W. C. Karl, S. R. Kulkarni, G. C. Verghese, and A. S. Willsky, "Local Tests for Consistency of Support Hyperplane Data," *Journal of Mathematical Imaging and Vision* special issue on Topology and Geometry in Computer Vision, Vol. 6, No. 2/3, Pg. 249–267, June, 1996.
23. L. Belcastro, W. C. Karl, and A. S. Willsky, "Tomographic Reconstruction of Polygons from Knot Location and Chord Length Measurements," *Graphical Models and Image Processing*, Vol. 58, No. 3, pp. 233–245, May, 1996.
24. C. H. Fosgate, H. Krim, W. W. Irving, W. C. Karl, A. S. Willsky, "Multiscale Segmentation and Anomaly Enhancement of SAR Imagery," *IEEE Transactions on Image Processing* special issue on Automatic Target Recognition, Vol. 6, No. 1, pp. 7–20, January, 1997.
25. M. Bhatia, W. C. Karl, and A. S. Willsky, "Tomographic Reconstruction and Estimation Based on Multiscale Natural-Pixel Bases," *IEEE Transactions on Image Processing*, Vol 6, No. 3, pp. 463–478, March 1997.
26. J. Kaufhold, M. K. Schneider, W. C. Karl, and A. S. Willsky, "A statistical method for efficient segmentation of MR imagery," *International Journal of Pattern Recognition and Artificial Intelligence* Special issue on Processing of MRI Imagery, Vol. 11, No. 8, pg. 1213–1231, December, 1997.
27. W. C. Karl, D. N. Kennedy, A. J. Worth, H. H. Pien, A. S. Willsky, "Processing of MR Images of the Human Brain," *International Journal of Pattern Recognition and Artificial Intelligence* Special issue on Processing of MRI Imagery, Vol. 11, No. 8, pg. 1157–1160, December, 1997.
28. P. W. Fieguth, W. C. Karl, and A. S. Willsky, "Efficient Multiresolution Counterparts to Variational Methods for Surface Reconstruction," *Computer Vision and Image Understanding*, Vol. 70, No. 2, pg 157–176, May, 1998.

29. A. Frakt, W. C. Karl, and A. S. Willsky, "A Multiscale Hypothesis Testing Approach to Anomaly Detection and Localization from Noisy Tomographic Data," *IEEE Transactions on Image Processing*, Vol. 7, No. 6, pg 825–837, June, 1998.
30. J. Kaufhold, W. C. Karl, and R. C. Chan, "A Texture-Based Variational Segmentation Method for Ultrasound Blood Vessel Imagery," *Annals of Biomedical Engineering*. Volume 26, Supplement 1, October, 1998.
31. S. Jaggi, W. C. Karl, S. Mallat, and A. S. Willsky, "High Resolution Pursuit for Feature Extraction," *Applied Computational and Harmonic Analysis*, Vol. 5, No. 4, pg 428–449, October, 1998.
32. F. Kamalabadi, W. C. Karl, J. L. Semeter, D. M. Cotton, T. A. Cook, S. Chakrabarti, "A Statistical framework for space-based EUV ionospheric tomography," *Radio Science*, Vol. 34, No. 2, pp. 437–447, March/April, 1999.
33. S. Jaggi, W. C. Karl, S. G. Mallat, and A. S. Willsky, "Silhouette Recognition using High Resolution Pursuit," *Pattern Recognition*, Vol. 23, No. 5., pg. 753–771, May, 1999.
34. M. K. Schneider, P. W. Fieguth, W. C. Karl, and A. S. Willsky, "Multiscale Statistical Methods for the Segmentation and Reconstruction of Signals and Images," *IEEE Transactions on Image Processing*, Vol. 9, No. 3, Pg. 456–468, March, 2000.
35. A. Kannan, M. Ostendorf, W. C. Karl, D. A. Castanon, R. K. Fish, "ML Parameter Estimation of a Multiscale Stochastic Process using the EM Algorithm," *IEEE Transactions on Signal Processing*, Vol. 48, No. 6 pg. 1836–1847, June, 2000.
36. R. Chan, W. C. Karl, and R. S. Lees, "A new model-based technique for enhanced small vessel measurements in X-ray ciné-angiograms," *IEEE Transactions on Medical Imaging*, Vol. 19, No. 3, pg. 243–255, March, 2000.
37. M. Cetin and W. C. Karl, "Feature-enhanced synthetic aperture radar image formation based on non-quadratic regularization," *IEEE Transactions on Image Processing*, Vol. 10, No. 4, pg. 623–631, April, 2001.
38. 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 Dynamic Magnetic Resonance Imaging," *IEEE Transactions on Image Processing*, Vol. 10, No. 74, pg. 1118–1128, July 2001.
39. M. Desai, R. Mangoubi, J. Shah, W. Karl, H. Pien, A. Worth , and D. Kennedy, "Functional MRI Activity Characterization Using Response Time Shift Estimates from Curve Evolution," *IEEE Transactions on Image Processing*, Vol. 21, No. 11, pg. 1402–1412, November 2002.
40. V. Galdi, H. Feng, D. A. Castanon, W. C. Karl, L. B. Felsen, "Multifrequency Subsurface Sensing in the Presence of a Moderately Rough Air-Soil Interface via Quasi-Ray Gaussian Beams," *Radio Science*, Vol. 38, No. 2, VIC 8-1–VIC 8-12, December 2002.
41. H. Feng, W. C. Karl, D. A. Castanon, "A Curve Evolution Approach to Object-Based Tomographic Reconstruction" *IEEE Transactions on Image Processing*, Vol. 12, No. 1, pg, 44-57, January 2003.
42. V. Galdi, J. Pavlovich, W. C. Karl, D. A. Castanon, L. B. Felsen, "Moderately Rough Dielectric Interface Profile Reconstruction via Short-Pulse Quasi-Ray Gaussian Beams," *IEEE Transactions on Antennas and Propagation*, Vol. 51, No. 3, pg. 672–677, March, 2003.
43. V. Galdi, H. Feng, D. A. Castanon, W. C. Karl, L. B. Felsen, "Moderately Rough Surface Underground Imaging via Short-Pulse Quasi-Ray Gaussian Beams," *IEEE Transactions on Antennas and Propagation*, Vol. 51, No. 9, pg. 2304-2318, Sept. 2003.
44. M. Cetin, W. C. Karl, and D. A. Castanon, "Analysis of the Impact of Non-Quadratic Optimization-based SAR Imaging on Feature Enhancement and ATR Performance," *IEEE Trans. Aerospace and Electronic Systems*, Vol. 39, No. 4, pg. 1375-1395, October 2003.
45. R. Weisenseel and W. C. Karl, R. C. Chan, and T. J. Brady, "A Variational Approach to Multi-modality Subsurface Data Inversion and Fusion Based on Shared Image Structure," *Subsurface Sensing Technologies and Applications*, Vol.4, No.4, pgs 373-392, October 2003.
46. A. K. Swan, L. Moiseev, C. R. Cantor, B. Davis, S. B. Ippolito, W. C. Karl, B. B. Goldberg and M. S. Unlu, "Towards nanometer-scale resolution in fluorescence microscopy using spectral self-interference," *IEEE Journal*

- on selected topics in quantum electronics (JSTQE)* special issue on “Lasers in medicine and biology,” Vol. 9, No. 2, pgs 294-300, March/April 2003.
47. B. J. Davis, W. C. Karl, A. K. Swan, M. S. Unlu, and B. B. Goldberg, “Capabilities and limitations of pupil-plane filters for superresolution and image enhancement,” *Opt. Express* Vol. 12, No. 17, 4150-4156, August, 2004.
  48. Chan, R.C., A.H. Chau, W.C. Karl, S. Nadkarni, A.S. Khalil, N. Iftimia, M. Shishkov, G.J. Tearney, M.R. Kaazempur-Mofrad, and B.E. Bouma, “OCT-based arterial elastography: robust estimation exploiting tissue biomechanics”. *Optics Express*, 2004. 12(19): p. 4558-4572.
  49. W. C. Karl and H. Pien, “High-Resolution Biosensor Spectral Peak Shift Estimation,” *IEEE Trans. on Signal Processing*, Vol. No. 12, pg 4631-4639, Dec, 2005.
  50. Maros Ferencik, Jennifer B. Lisauskas, Ricardo C. Cury, Udo Hoffmann, Suhny Abbara, Stephan Achenbach, W. Clem Karl, Thomas J. Brady, Raymond C. Chan, “Improved vessel morphology measurements in contrast-enhanced multi-detector computed tomography coronary angiography with non-linear post-processing,” *European Journal of Radiology*, Vol. 57, pg. 380-383, March, 2006.
  51. M. Cetin, W.C. Karl, and A. S. Willsky, “A Feature-Preserving Regularization Method for Complex-valued Inverse Problems with Application to Coherent Imaging,” *Optical Engineering*, vol. 54, no. 1, 017003, January 2006.
  52. N. Aggarwal, and W. C. Karl, “Line Detection in Images through Regularized Hough Transform,” *IEEE Transactions on Image Processing*, Vol. 15, No. 3, pg. 582-591, March, 2006.
  53. M. Mendillo, S. Laurent, J. Wilson, J. Baumgardner, J. Konrad, and W. C. Karl, “The sources of sodium escaping from Io revealed by spectral high definition imaging,” *Nature*, Vol. 448, pg. 330-332, July 2007.
  54. B. J. Davis, A. K. Swan, M. S. Unlu, W. C. Karl, B. B. Goldberg, J. C. Schotland, and P. S. Carney, “Spectral self-interference microscopy for low-signal nanoscale axial imaging,” *J. Opt. Soc. Am. A* 24, pg. 3587-3599, 2007.
  55. B. J. Davis, M. Dogan, B. B. Goldberg, W. C. Karl, M. S. Unlu, and A. K. Swan, “4Pi spectral self-interference microscopy,” *J. Opt. Soc. Am. A*, 24, pg. 3762-3771, 2007.
  56. B. J. Davis, M. Dogan, B. B. Goldberg, W. C. Karl, M. S. Unlu, and A. K. Swan, “4Pi spectral self-interference microscopy,” *Virtual Journal of Nanoscale Science and Technology*, Jan, 14, 2008.
  57. H. Feng, D. A. Castanon, W. C. Karl, “Unified Anomaly Suppression and Boundary Extraction in Laser Radar Range Imagery based on a Joint Curve-Evolution and Expectation-Maximization Algorithm,” *IEEE Trans. Image Processing*, Vol 17, No. 5, pg 757-766, May 2008.
  58. Y. Shi and W. C. Karl, “A Real-Time Algorithm For The Approximation Of Level-Set-Based Curve Evolution,” *IEEE Trans. on Image Processing*, Vol. 17, No. 5, Pg 645-656, May, 2008.
  59. I. Stojanovic and W. C. Karl, “Imaging of moving targets with multistatic SAR using an overcomplete dictionary,” *Journal of Selected Topics in Signal Processing*, special issue on MIMO Radar, Vol. 4, No. 1, Pg. 164-176, February 2010.
  60. L. He, B. Orten, S. Do, W. C. Karl, A. Kambadakone, D. Sahani, H. Pien, “A Spatio-Temporal Deconvolution Method to Improve Perfusion CT Quantification,” *IEEE Trans. on Medical Imaging*, Vol. 29, No. 5, Pg. 1182-1191, May 2010.
  61. S. Do, Z. Liang, W. C. Karl, T. Brady, H. Pien, “A decomposition-based CT reconstruction formulation for reducing blooming artifacts,” *Physics in Medicine and Biology*, Vol. 56, No. 22, Pg 7109, 2011
  62. A. Tuysuzoglu, J. M. Kracht, M. Cetin, R. Cleveland, W.C. Karl, “Sparsity Driven Ultrasound Imaging,” *Journal of Acoustical Society of America*, Vol. 131, No. 2, pg. 1271-1281, 2012.
  63. A. Reddington, J. T. Trueb, D. S. Freeman, A. Tuysuzoglu, G. G. Daaboul, C. A. Lopex, W. C. Karl, J. H. Connor, H. Fawcett, M. S. Unlu, “Point of Care Instrument for Viral Diagnostics,” submitted to *IEEE Trans. on Biomedical Engineering*, Special Issue on Point of Care Technologies, Feb. 2013.

64. I. Stojanovic, W. C. Karl, L. Novak, "Interrupted SAR persistent surveillance via group sparse reconstruction of multi-pass data," In revision for IEEE Trans. on Aerospace and Electronic Systems, Special Issue on Compressed Sensing for Radar.
65. I. Stojanovic, M. Cetin, W. C. Karl, "Compressed Sensing of Monostatic and Multistatic SAR," in revision for IEEE Trans on Geoscience and Remote Sensing Letters, Feb 2013.
66. A. Tuysuzoglu, W. C. Karl, and D. A. Castanon, "Graph-cut methods for tomographic inverse problems," in preparation for submission to IEEE Trans. on Image Processing, Feb. 2013.

## Conference Papers

1. W. C. Karl, S. Leeb, L. Jones, J. Kirtley, and G. C. Verghese, "Applications of a Class of Nonlinear Filters to Problems in Power Electronics," Proc. of 21st Annual IEEE Power Electronics Specialists Conference, San Antonio, TX, pp. 35–42, June 1990.
2. A. B. Dobrzeniecki, W. C. Karl, P. Lipson, and J. D. Pearlman, M.D., "Advances in Quantification, Analysis, and Display of Thallium Myocardial Images," Proc. of the 18th Annual Conf. on Computers in Cardiology, Venice, Italy, pp. 497-500, September 23-26, 1991.
3. P. Milanfar, W. C. Karl, S. R. Kulkarni, and A. S. Willsky, "Geometric Aspects of Tomographic Signal Processing," Proc. 7th IEEE Workshop on Multidimensional Signal Processing, Lake Placid, NY, pp. 6.5, Sept. 1991.
4. P. Milanfar, W. C. Karl, and A. S. Willsky, "Statistical Approaches to the Tomographic Reconstruction of Finitely Parameterized Geometric Objects," in *Neural and Stochastic Methods in Image and Signal Processing*, S. S. Chen, Editor, Proc. SPIE 1992 Int'l. Symposium on Optics, Imaging, and Instrumentation San Diego, CA, Vol. 1766, pp. 166–177, July 20-23, 1992.
5. R. E. Learned, W. C. Karl, and A. S. Willsky, "Wavelet Packet Based Transient Signal Classification," Proc. IEEE Signal Processing Society Int'l Symposium on Time-Frequency and Time-Scale Analysis, Victoria, Canada, pp. 109–112, October 4-6, 1992.
6. M. R. Luetzgen, W. C. Karl, and A. S. Willsky, R. R. Tenney, "Multiresolution Statistical Methods in Image Analysis," in *Intelligent Robots and Computer Vision XI: Biological, Neural Net, and 3-D Methods*, Proc. SPIE, Boston, MA, Vol. 1826, pp. 2–13, November 18-20, 1992.
7. S. Jaggi, W. C. Karl, and A. S. Willsky, "Dynamic Estimation of Left-Ventricular Ejection Fraction," in *Biomedical Image Processing and Biomedical Visualization*, R. S. Acharya and D. B. Goldgof, Eds., Proc. IS&T/SPIE Symposium on Electronic Imaging Science and Technology, San Jose, CA, Vol. 1905, pp. 206–217, January 1993.
8. T. M. Chin, W. C. Karl, A. C. Mariano, and A. S. Willsky, "Square Root Filtering in Time-Sequential Estimation of Random Fields," in *Image and Video Processing*, Proc. 1993 IS&T/SPIE Symposium on Electronic Imaging Science and Technology, San Jose, CA, Vol. 1903, pp. 51–58, February 3-4, 1993.
9. P. Milanfar, W. C. Karl, and A. S. Willsky, "A Geometric Framework for Tomographic Reconstruction," Proc. of the 27th Annual Conf. on Information Science and Systems, Johns Hopkins University, Baltimore, MD, pp. 223-228, March 1993.
10. M. R. Luetzgen, W. C. Karl, A. S. Willsky, and R. Tenney, "Multiscale Representations of Markov Random Fields, with Applications to Texture Labeling," Proc. 1993 IEEE Int'l Conf. on Acoustics, Speech, and Signal Processing, Minneapolis, MN, Vol. 5, pp. 41–44, April 27-30, 1993.
11. M. Bhatia, W. C. Karl, and A. S. Willsky, "A Multiscale Method for Tomographic Reconstruction," in *Mathematical Imaging: Wavelet Applications in Signal and Image Processing*, A. F. Laine, Ed., Proc. SPIE 1993 Int'l. Symposium on Optics, Imaging, and Instrumentation, San Diego, CA, Vol. 2034, pp. 58–69, July 1993.
12. P. Milanfar, M. Bhatia, L. A. Belcastro, S. Jaggi, W. C. Karl, and A. S. Willsky, "Geometric and Multiresolution Statistical Methods for Reconstruction from Projections," Proc. 8th IEEE Workshop on Image and Multidimensional Signal Processing, Cannes, France, pp. 158–159, Sept. 1993.



13. W. W. Irving, M. M. Daniel, P. W. Fieguth, W. C. Karl, and A. S. Willsky, "Efficient Algorithms for Gauss-Markov Random Fields," Proc. 8th IEEE Workshop on Image and Multidimensional Signal Processing, Cannes, France, pp. 160–161, Sept. 1993.
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148. Ivana Stojanovic, W. Clem Karl, Mujdat Cetin, "Compressed sensing of monostatic and multistatic SAR," *Proceedings of SPIE: Algorithms for Synthetic Aperture Radar Imagery XVI*, Vol. 7337, April, 14-16, 2009.
149. Synho Do, Sanghee Cho, W. Clem Karl, Mannudeep K Kalra, Thomas J. Brady, and Homer Pien, "Accurate Model-Based High Resolution Cardiac Image Reconstruction in Dual source CT," 2009 IEEE Intl. Symposium on Biomedical Imaging, Boston MA, June, 2009.
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152. Synho Do, Sanghee Cho, W. Clem Karl, Mannudeep K. Kalra, Thomas J. Brady, and Homer Pien, "CT system response models in iterative reconstruction algorithms for low-dose imaging," in *Proceedings of the 10th International Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine*, Beijing, China, 2009
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156. W. C. Karl, "Object-based tomography for joint segmentation and reconstruction," Invited talk, *Tomography in Materials Science Workshop*, Dayton, OH, Dec 13-15, 2010.
157. L. Eger, W. C. Karl, P. Ishwar, H. Pien, "Classification-aware dimensionality reduction methods for explosives detection using multi-energy X-ray computed tomography," in *Computational Imaging*, C. A. Bouman, I. Pollak, P. J. Wolfe, editors, *Proc. SPIE*, Vol. 7873, SPIE, San Francisco, CA, January 23-27, 2011.

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159. S. Do, W. C. Karl, and H. Pien, "A Novel Hybrid Algorithm for Accelerating CT Reconstructions and Improving Low-Dose Image Quality", IEEE International Symposium Biomedical Imaging (ISBI), Chicago, IL, May 2011.
160. S. Ambwani, W. C. Karl, A. Tawakol and H. Pien, "Joint cardiac and respiratory motion correction and super-resolution reconstruction in coronary PET/CT," IEEE International Symposium Biomedical Imaging (ISBI), Chicago, IL, May 2011.
161. I. Stojanovic, N. Mohan, B. Vakoc, W. C. Karl, "Fast angiographic OCT imaging using sparse representations over learned dictionaries," IEEE International Symposium Biomedical Imaging (ISBI), Chicago, IL, May 2011.
162. L. Eger, S. Do, P. Ishwar, W. C. Karl, H. Pien, "A Learning Based Approach to Explosives Detection Using Multi-Energy X-Ray Computed Tomography," Proc. 2011 IEEE Int'l Conf. on Acoustics, Speech, and Signal Processing, Prague, Czech Republic, May 22-27, 2011.
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165. I. Stojanovic, W. C. Karl, L. Novak, "Reconstruction of interrupted SAR imagery for persistent surveillance change detection," Algorithms for Synthetic Aperture Radar Imagery XIX, Proceedings of SPIE, vol. 8394, Baltimore, April 2012
166. I. Stojanovic, H. Pien, S. Do, W. C. Karl, "Low-Dose X-Ray CT Reconstruction Based on Joint Sinogram Smoothing and Learned Dictionary-Based Representation," IEEE Intl. Symposium on Biomedical Imaging (ISBI), Barcelona, Spain, May 2012.
167. Y. Zhang, W. C. Karl, G. V. Der Wilden, P. Fagenholz, J. Romero, V. Noble, H. Pien, "Automated 3-D Untraocular Ultrasound Detection of Elevated Intracranial Pressure," IEEE Intl. Symposium on Biomedical Imaging (ISBI), Barcelona, Spain, May 2-5, 2012.
168. A. Tuysuzoglu, W. C. Karl, and D. A. Castanon "A Graph-Cut Method for Tomographic Reconstruction," IEEE Workshop on Statistical Signal Processing, Special Session on Signal Processing for Materials Science, Ann Arbor, Michigan, August, 2012
169. Z. Sun; W. C. Karl; P. Ishwar; V. Saligrama, "Sensing Aware Dimensionality Reduction for Nearest Neighbor Classification of High Dimensional Signals," IEEE Workshop on Statistical Signal Processing, Special Session on Signal Processing for Materials Science, Ann Arbor, Michigan, August 5-8, 2012
170. A. Tuysuzoglu, W. C. Karl, D. A. Castanon, S. Unlu, "Joint Reconstruction and Segmentation of Electron tomography data," in *Computational Imaging*, C. A. Bouman, I. Pollak, P. J. Wolfe, editors, Proc. SPIE, Vol. 8657, SPIE, San Francisco, CA, February 3-7, 2013.
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172. K M. Brown, T. Hoehler, F. Bergner, R. Bippus, B. Brendel, S. Zabic, W. C. Karl, S. Singh, A. Padole, S. Do, "Sparse Sampling for CT Dose Reduction," Submitted to the 12th Intl. Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine, Lake Tahoe, CA, June 16-21, 2013.
173. S. Do, W. C. Karl, T. Brady, G. El Fahkri, R. Gupta, "A Non-Uniform Super-Resolution Compressive Sampling Method for Tomographic Imaging," Submitted to the 12th Intl. Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine, Lake Tahoe, CA, June 16-21, 2013.

## Patents and Disclosures

- R. W. Stadler, W. C. Karl, R. S. Lees, “Method and Apparatus for Estimating the Diameter of an Artery Using B-Mode Ultrasonic Images,” submitted January 27, 1995. Patent #5,495,852, issued March 5, 1996.
- H. Pien, W. C. Karl, A. Sacramone, J. You, M. Zhang, D. Stefanscu, M. Leventon, “Systems and methods for real-time matching of large image databases,” Provisional Patent Application, 21 Sept 2000, Docket No. 19785-501.
- Y. Shi and W. C. Karl, “Fast Level Set Method without Solving PDEs”, U.S. Patent Application No. 60/651,403.
- W. C. Karl, Z. Liang , H. Pien, T. Brady, “A method for super resolution processing and degradation artifact removal from medical images,” United States Patent Number 7,689,017. March 30, 2010.
- H. Pien, W. C. Karl, D. Puff, P. Li, B. Cunningham, “Method and Apparatus for Biosensor Spectral Shift Detection,” , United States Patent Number 7,718,440. May 18, 2010.
- W. C. Karl, Z. Liang , H. Pien, T. Brady, “Decomposition based medical image processing,” United States Patent Number 8,031,927. October 4, 2011.
- S. Do, H. Pien, W. C. Karl, M. Kalra, “LARA: low amperage, reduced angle for low-dose CT imaging,” Patent Disclosure. 2010.
- C. Genick, L. Laing, P. Li, T. Smith, L. Madison, W. C. Karl, B. Lin, “Methods for screening cells and antibodies,” United States Patent Number 8,202,735. June 19, 2012
- B. Cilingiroglu, A. Tuysuzoglu, M. S. Unlu, B. Goldberg, W. C. Karl, J. Konrad, “Dictionary-based Image Reconstruction for Resolution Improvement in Integrated Circuit Imaging,” Patent Disclosure. 2013.

## Grant Activity

\$14M total

1. Title: A Comprehensive and Integrated Approach to Reduced Signature Target Recognition.  
Agency: AFOSR – Multidisciplinary University Research Initiative  
Role: Co-Principal investigator  
Amount: \$7,000,000  
Grant Period: 2/1/95-1/31/02
2. Title: Anatomic Morphologic Analysis of MR Brain Images  
Agency: NIH via MGH  
Role: Principal investigator  
Amount: \$219,820  
Grant Period: 7/1/95-6/30/98
3. Title: Dynamical Adaptive MRI using Feedback Control and Selective Excitation  
Agency: Brigham and Womens Hospital  
Role: Principal investigator  
Amount: \$19,845  
Grant Period: 9/1/95-8/31/96
4. Title: Information Fusion for Pose Determination  
Agency: ARO – STTR via Alphatech  
Role: Co-Principal investigator  
Amount: \$40,589  
Grant Period: 10/1/96-7/31/97
5. Title: MURI: Sensor Management and Information Fusion for Detection, Localization, and Classification of Mines  
Agency: ARO – Multidisciplinary University Research Initiative via Northeastern

- Role: Co-Principal investigator  
Amount: \$498,123  
Grant Period: 2/1/97-1/31/02
6. Title: Target Classification in MRI using Hypothesis Testing and Selective Excitation  
Agency: Brigham and Womens Hospital  
Role: Principal investigator  
Amount: \$19,845  
Grant Period: 9/1/96-8/31/97
  7. Title: Multiresolution Information Fusion  
Agency: ARO – STTR via Alphatech  
Role: Co-Principal investigator  
Amount: \$75,959  
Grant Period: 9/1/97-8/31/99
  8. Title: Acquisition of Computer Facilities to Support an Interdisciplinary Multidata Signal and Image Processing Laboratory  
Agency: NSF – Major Research Instrumentation  
Role: Co-Principal investigator  
Amount: \$265,271  
Grant Period: 9/1/98 – 8/30/01
  9. Title: Anatomic Morphologic Analysis of MR Brain Images  
Agency: NIH – NINDS/Human Brain Project (via MGH)  
Role: Principal Investigator  
Amount: \$1,600,785 (\$312,962 to BU)  
Grant Period: 9/1/98–8/31/02
  10. Title: An Engineering Research Center for Subsurface Sensing and Imaging  
Agency: NSF (via Northeastern)  
Role: Investigator  
Amount: \$12,500,000 (\$678,717 to BU)  
Grant Period: 9/1/00–8/31/05
  11. Title: Nanometer Resolution Spectral Self-interference Fluorescence Microscopy  
Agency: NSF – IDBR  
Role: Co-Principal Investigator  
Amount: \$497,734  
Grant Period: 4/1/02–3/31/04
  12. Title: Nanoscale Imaging of Subcellular Processes  
Agency: NIH  
Role: Co-Principal Investigator  
Amount: \$1,705,715  
Grant Period: 09/30/02–08/31/05
  13. Title: Anatomic Morphologic Analysis of MR Brain Images  
Agency: NIH – NINDS/Human Brain Project (via MGH)  
Role: Principal Investigator  
Amount: \$2,530,068 (\$359,809 to BU)  
Grant Period: 9/1/02–8/31/06
  14. Title: Adaptive Feedback Algorithms for Sensor Management and Processing  
Agency: ARPA (via Alphatech)  
Role: Co-Principal Investigator  
Amount: \$305,998  
Grant Period: 6/1/02–11/31/04

15. Title: Segmentation and Reconstruction of Scenes with Dynamic Objects  
Agency: NSF  
Role: Co-Principal Investigator  
Amount: \$24,480  
Grant Period: 05/01/03–04/30/06
16. Title: Foundations of Automatic Target Recognition  
Agency: AFOSR  
Role: Principal Investigator  
Amount: \$231,817  
Grant Period: 09/01/03–08/31/06
17. Title: Distributed Methods for Statistical Decision Making in Networked Environments  
Agency: NSF  
Role: Co-Principal Investigator  
Amount: \$372,652  
Grant Period: 08/01/04–07/31/07
18. Title: Foundations of Automatic Target Recognition  
Agency: AFOSR  
Role: Principal Investigator  
Amount: \$247,272  
Grant Period: 12/01/06–11/30/09
19. Title: Integrated Fusion, Performance Prediction, and Sensor Management for Automatic Target Exploitation (MURI)  
Agency: DOD/AFOSR via Ohio State  
Role: Co-Principal Investigator  
Amount: \$5,525,211 (\$500,000 BU portion)  
Grant Period: 05/01/06–04/30/11
20. Title: Center of Excellence: ALERT (Awareness and Localization of Explosives-Related Threats)  
Agency: Department of Homeland Security  
Role: Co-Principal Investigator (with Saligrama, Castanon)  
Amount: \$1,000,000 (BU Portion)  
Grant Period: 9/1/07-8/31/11
21. Title: SWARM Program  
Agency: Department of Homeland Security via Raytheon  
Role: Principal Investigator  
Amount: \$130,624  
Grant Period: 4/1/10-12/31/10
22. Title: ISBI 2009  
Agency: National Institutes of Health  
Role: Principal Investigator  
Amount: \$20,000  
Grant Period: 2/9/09-3/31/10
23. Title: A Biomedical Imaging Acceleration Testbed  
Agency: National Science Foundation  
Role: Co-Principal Investigator  
Amount: \$1,970,374 (BU Portion \$257,241)  
Grant Period: 9/1/09-8/31/12
24. Title: MRI: Next-generation imaging spectrometer based on a tunable liquid crystal filter  
Agency: National Science Foundation  
Role: Co-Principal Investigator

Amount: \$839,232  
Grant Period: 12/31/09-11/31/12

25. Title: ISBI 2012  
Agency: National Science foundation  
Role: Principal Investigator  
Amount: \$15,000  
Grant Period: 1/1/12-12/31/12
26. Title: ISBI 2012  
Agency: National Institutes of Health  
Role: Principal Investigator  
Amount: \$30,000  
Grant Period: 4/1/12-3/31/13
27. Title: CIF: Sensing Aware Decision Making for High-Dimensional Signals  
Agency: NSF  
Role: Co-Principal Investigator  
Amount: \$499,997 Grant Period: 9/1/12-8/31/2015
28. Title: Research and Development of Reconstruction Advances in CT-Based Object Detection Systems Agency:  
Department of Homeland Security via NEU  
Role: Co-Principal Investigator  
Amount: \$125,000 Grant Period: 7/1/12-12/31/2013

#### **Pending Proposals:**

1. Title: Minimizing Patient Radiation Dose in Pediatric CT Imaging  
Agency: NIH via Children's Hospital Boston  
Role: Principal Investigator  
Submitted: 9/12/12  
Amount: \$803,296

### **Doctoral Theses Supervision**

1. P. Milanfar, "Geometric Aspects of Tomographic Signal Processing," MIT Dept of Elec. Eng. and Comp. Sci., May 1993. Co-advised with Prof. A. Willsky.
2. M. Bhatia, "Multiresolution Methods for Tomographic Reconstruction," MIT Dept of Nuclear Eng., August 1994. Co-advised with Prof. A. Willsky.
3. R. Stadler, "Early Detection and Monitoring of Atherosclerosis Through Non-Invasive Evaluation of Endothelial Function," Harvard-MIT Division of Health Sciences and Technology, Medical Engineering and Medical Physics Program, June 1996. Co-advised with Dr. R. Lees.
4. S. Jaggi, "Multiscale Estimation of Object Shape," MIT Dept of Elec. Eng. and Comp. Sci., Jan. 1997. Co-advised with Prof. A. Willsky.
5. L. Zhao, "Optimization of hyperpolarized noble gas MRI," BU BME Dept., September, 1999. Co-advised with Dr. L. Panych.
6. F. Kamalabadi, "Space-Based Ionospheric Tomography using Extreme Ultraviolet Emissions," BU ECE Dept., Aug. 2000. Co-advised with Prof. Chakrabarti.
7. J. Kaufhold, "Efficient Statistical Methods for the Segmentation of MRI Images of the Brain," Doctoral thesis, BU BME Dept., Sept. 2000.
8. M. Cetin, "A Statistical Tomographic Approach to Synthetic Aperture Radar Signal Processing," Doctoral thesis, BU ECE Dept., March, 2001.

9. W. Hoge, "An adaptive signal processing approach to dynamic magnetic resonance imaging," Doctoral thesis, Northeastern University, ECE Dept., May 2001. Co-advised with E. Miller.
10. R. Chan, "Non-Invasive Ultrasound Monitoring of Regional Carotid Wall Structure and Deformation Atherosclerosis," Doctoral thesis, Harvard-MIT Division of Health Sciences and Technology, Medical Engineering and Medical Physics Program, June, 2001. Co-advised with Dr. R. Lees.
11. R. Weisenseel, "Exploiting Shared Image Structure Fusion in Multi-Modality Data Inversion for Atherosclerotic Plaque Characterization," Doctoral thesis, BU ECE Dept., January 2004.
12. S. Laurent, BU, ECE Dept. "Design of a High-Definition Imaging (HDI) Analysis Technique Adapted to Challenging Environments", January, 2005.
13. Y. Shi, "Object-Based Dynamic Imaging with Level-Set Methods," Doctoral thesis, BU ECE Dept., May, 2005.
14. B. Davis, "Analysis of Multi-Channel Microscopy: Spectral Self-Interference, Multi-Detector Confocal, and 4pi Systems," Doctoral thesis, BU, ECE Dept., March, 2006.
15. A. Litvin, "Statistical shape and appearance models for segmentation and classification," Doctoral thesis, BU ECE Dept., May, 2006.
16. J. Pavlovich, "Physics-based subsurface information extraction by parametric inversion," Doctoral thesis, BU, ECE Dept., January, 2007
17. Z. Liang, "Artifact Reduction in Cardiac MDCT," Doctoral thesis, BU, BME Dept., August, 2008.
18. B. Orten, "Development of Advanced CT Perfusion Imaging Algorithms for Functional Assessment of Tumors," Doctoral thesis, BU, ECE Department, July, 2011.
19. S. Ambwani, "Advanced Image Processing in Cardiac PET/CT to Enhance Early Detection of Coronary Artery Diseases," Doctoral thesis, BU, ECE Department, September, 2011
20. I. Stojanovic, "Sparse multistatic radar imaging of stationary and moving scenes," Doctoral thesis, BU, ECE Department, December, 2011
21. L. Eger, "Exploiting Energy Diversity in Multi-energy CT for Detection of Explosives," Doctoral thesis, BU, ECE Department, In progress.
22. Z. Sun, "Efficient methods for high-dimensional classification," Doctoral thesis, BU, ECE Department, In progress.
23. A. Tuysuzoglu, "Graph-cut approaches for linear inverse problems," Doctoral thesis, BU, ECE Department, In progress.
24. B. Cilingiroglu, "Super-resolution Optical Reconstruction for VLSI Device Fault Determination," Doctoral thesis, BU, ECE Department, In progress.

## Doctoral Theses Reader

1. M. Luetttgen, "Image Processing with Multiscale Stochastic Models," May 1993. (MIT EECS Dept.)
2. P. Fieguth, "Multiscale Estimation of Space-Time Processes with Applications in Physical Oceanography," May 1995. (MIT EECS Dept.)
3. W. Irving, "Multiscale Stochastic Realization and Model Identification with Applications to Large-Scale Estimation Problems," August 1995. (MIT EECS Dept.)
4. H. Gudbjartsson, "Steady State Free Precession Magnetic Resonance Imaging of Flow and Diffusion," February, 1996. (Harvard-MIT Health Sciences and Technology Prog.)
5. M. Bélanger, "Reliable Detection of Atherosclerotic Lesions using 99mTc-Labeled Low Density Lipoproteins," expected completion date May 1997. (Harvard-MIT Health Sciences Technology Prog.)
6. I. Bechwati, "Multiobject Tracking with Coupling Constraints," December, 1996.

7. A. Kannan, "Incremental Adaptation of Spectral Trajectory Models for Continuous Speech Recognition," BU ECE, May, 1997.
8. J. Winograd, "Incremental Refinement Structures for Approximate Signal Processing," BU ECE, June, 1997.
9. J. Semeter, "Ground-based Tomography of Atmospheric Optical Emissions," BU ECE, June, 1997
10. G. Bonmassar, "The Exponential Chirp Transform for Log-Polar Sampled Images," BU ECE, September, 1997.
11. R. Iyer, "Using Out-of-Domain Data to Improve Statistical Language Models," BU ECE, December, 1997.
12. L. Maas, "Processing Strategies for Functional Magnetic Resonance Imaging Data Sets," December, 1998. (Harvard-MIT Health Sciences and Technology Prog.)
13. Izhak Shaik, Doctoral Thesis reader, "Syllable-based Acoustic Modeling in Automatic Speech Recognition."
14. Michiel A. U. Bacchiani, Doctoral Thesis reader, "Using Automatically Derived Units in Automatic Speech Recognition," April, 1999.
15. Soontorn Orintara, Doctoral Thesis reader, "Regular Linear Phase Perfect Reconstruction Filter Banks for Image Compression," April, 2000.
16. Lingmin Meng, "A View-Based Hierarchical Statistical Approach To Face Detection," March, 2001, Doctoral Thesis reader.
17. Zhengrong Ying, "Statistical Approaches for Partially Occluded Object Recognition," August, 2001, Doctoral Thesis reader.
18. H. Feng, "Image Reconstruction using Object-Based Regularization and Tomographic Flows" BU, ECE Dept., May, 2002.
19. Nikola Bozinovic, "Advanced Motion Modeling for 3-D Video Coding," BU, ECE Dept. Doctoral Thesis reader. 2006.
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30. Paul Debitetto, "Robust Hierarchical Image-augmented Navigation in Urban Terrain with 3D Landmarks," BU, ECE Dept. Doctoral Thesis reader. August, 2011.
31. Ke Chen, BU, ECE Dept. Doctoral Thesis reader. 2012.



## Masters Theses Supervision

1. S. Jaggi, "Estimation of Dynamically Evolving Ellipsoids with Applications to Cardiac Imaging," MIT EECS Dept., September 1992. Co-advised with Prof. A. Willsky.
2. L. Belcastro, "Tomographic Reconstruction of Polygons from Knot Locations and Chord Length Measurements," MIT EECS Dept., September 1993. Co-advised with Prof. A. Willsky.
3. I. Polyak, "Robust Spline Approximations Using Wavelet Extrema," MIT EECS Dept., December 1994. Co-advised with Prof. A. Willsky.
4. H. Wexler, "The Effects of Microscanning on Infrared Image Aliasing and Spatial Resolution," MIT EECS Dept., June 1995.
5. T. Ideker, "Offset Correction Techniques for Imaging Sensors Using Random Dither Information," MIT EECS Dept., June 1995.
6. R. Chan, "Quantification of Coronary Artery Disease via Coronary Angiography," MIT EECS Dept., January 1996. Co-advised with Dr. B. Lees.
7. A. Frakt, "Multiresolution Approaches to the Detection and Localization of Anomalies in Tomographic Data," MIT EECS Dept., August 1996. co-advised with Prof. A. Willsky.
8. M. Saeed, "Maximum Likelihood Parameter Estimation of Mixture Models and its Application to Image Segmentation and Restoration," MIT EECS Dept., June 1997.
9. M. Bosse, "A Vision Augmented Navigation System for an Autonomous Helicopter," BU ECE Dept., September, 1997.
10. M. Emerson, "Statistical Feature Extraction for Early Diagnosis of Colorectal Cancer," MIT EECS Dept., September 1998.
11. N. Aggarwal, "A Statistical-based Approach for Enhanced Line Detection in Imagery," September 1999.
12. I. Stojanovic, "Non-conventional Image Formation for SAR", BU, ECE Department, May, 2007.
13. K. Pegors, "Sparse Methods for ISAR Image Reconstruction of Ships," BU, ECE Department, May, 2010.
14. A. Tuysuzoglu, "Superresolution in Ultrasound Imaging" BU, ECE Department, May, 2010.
15. L. Eger, "Recursive dual-energy tomography," BU, ECE Department, May 2010.
16. Y. Zhang, "3D ultrasound image segmentation and feature extraction for intracranial pressure detection," BU, ECE Department, December, 2011.

## Masters Thesis Reader

1. R. Bates, "Reducing the Effects of Telephone Channel Distortion and Additive Noise on Continuous Speech Recognition," August 1996.
2. M. Sousa, "Application of Wavelet-Based Denoising/Deblurring Algorithms to MRI's," June 1996.
3. M. Schneider, "Multiscale Methods for the Segmentation of Images," (MIT EECS) June, 1996.
4. J. Isidoro, (BU Computer Science), August, 1999.
5. S. Sethi, (BU Computer Science), June, 2000.
6. T. Debus, (BU AME), January, 2000.
7. Y. Glina, (NEU EE), May, 2000.
8. M. Siddiqui, December, 2001.
9. S. Chang, "Mine Detection based on Ground Penetrating Radar using Feature Extraction," November, 2002.
10. D. Sherrill, "Automatic monitoring of functional motor activities," December, 2002.

11. P. Laplume, "SPIDR Signal Theory," June, 2003.
12. Erhan Ermis, May 2005.
13. Brandon Itkowitz, "Teleoperation of Concentric Tube Manipulators," December, 2007.

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  - ECE Faculty Search Chair (2010-2012)
  - ECE Planning Committee (1998-2004, 2010-2012)
  - ECE Chair Search Committee (2007-2009, 2010-Present)
  - ECE Appointment, Promotion and Tenure Committee (1996-1997,2003-2010)
  - ECE Search Committee (2004-2010)
  - ISS Area Coordinator (1998-2006, 2010-Present)
  - EK100 Undergraduate Advisor (1996-2000,2003-2007)
  - ECE Information Technology Committee (2000-2003)
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- College of Engineering
  - Chair, COE Appointment, Promotion and Tenure Committee (2006-2007)
  - COE Appointment, Promotion and Tenure Committee (2004-2005, 2011-2012)
  - Area Representative, College of Engineering Executive Committee Retreat (2010)
  - Departmental Faculty Career Liaison (2009)
  - Deans Research and Advisory Committee (2008-2009)
  - College of Engineering Math Qualification Committee (2000)