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Employment History

Permanent Positions

- 2009-Present R. Jamison and Betty Williams Professor of Engineering
- 2000-Present Professor, Electrical Engineering and Computer Science, Biomedical Engineering, and Statistics.
- 1996 Professor, Electrical Engineering and Computer Science and Biomedical Engineering.
- 1990-1996 Associate Professor, Electrical Engineering and Computer Science.
- 1984-1990 Assistant Professor, Electrical Engineering and Computer Science.

Other Positions

- 2008-2011 Research faculty (Digiteo Chaire d'Excellence), Digiteo Research Park in Information Science and Technology, Paris, FRANCE.
- 2006-2007 Visiting Professor, Massachusetts Institute of Technology, Cambridge, MA. (Sabbatical)
- 2006-2007 Visiting Professor, Boston University, Boston, MA.(Sabbatical)
- 2001 Visiting Professor, Université de Nice-Sophia Antipolis, Sophia-Antipolis, France. (Summer)
- 1999 Visiting Professor, Ecole Nationale Supérieure des Télécommunications (ENST), Paris, France. (Sabbatical)
- 1999 Visiting Scientist, Bell Laboratories, Lucent Technologies, Murray Hill, NJ.
- 1999 Visiting Scientist (Chargé de Recherche), CNRS, Ecole Normale Supérieure (ENS), Lyon, France. (Sabbatical)
- 1993 William Clay Ford Fellow, Scientific Research Laboratory, Ford Motor Co., Dearborn MI. (Summer)
- 1991 - 1992 Visiting Scientist, Ecole Nationale Supérieure des Techniques Avancées, Paris, France. (Sabbatical)
- 1987-1989 Visiting Scientist, M.I.T. Lincoln Laboratory, Lexington, MA. (Summer)

University Education

B.S. in Electrical Engineering, Boston University, *summa cum laude*, (1980)
M.S. in Electrical Engineering and Computer Science, Princeton University, (1982)

Ph.D. in Electrical Engineering and Computer Science, Princeton University, December (1984)

Honors and Awards

Awards

1. R. Jamison and Betty Williams endowed chair in Engineering, 2009-2013.
2. General Dynamics Medal (w/ C. Kreucher and K. Kastella of GD) for best published paper co-authored by GD employee, 2003 and 2005.
3. College of Engineering Research Excellence Award, The University of Michigan, 2003.
4. Distinguished Lecturer, IEEE Signal Processing Society, 2002-2003.
5. IEEE Third Millenium Medal recipient, 2000.
6. Best Paper Award, IEEE Signal Processing Society 1998.
7. Meritorious Service Award, IEEE Signal Processing Society, 1998.
8. Fellow of IEEE, 1997.
9. Research Excellence Award, Dept. of EECS, The University of Michigan, 1995.

Plenary and Keynote Presentations

1. "Geometric entropy minimization", Workshop on Topological and Geometric Data Analysis, Paris, July. 2009.
2. "Rényi entropies for statistical signal processing", IEEE Digital Signal Processing Workshop, San Marco Island, Jan. 2009.
3. "Sparsity Constrained Volumetric Imaging", SIAM Great Lakes Workshop on Applied Mathematics, Ann Arbor, April 2008.
4. "Signal Processing for Integrative Bioinformatics," Workshop on Information Theory and Applications (ITA), UCSD, San Diego CA, Jan 2008
5. "Signal Processing at the Edge," IEEE International Conference on Information, Communications and Signal Processing (ICICS'2007), Singapore, Dec. 2007.
6. "Spanning graphs for dimensionality reduction," IEEE Southwest Symposium on Image Analysis and Interpretation (SSIAI), Denver, March 2006.
7. "Sensor networks for localization and tracking," New York Workshop on Sensor Networks, Rochester, Oct 2005.
8. "Information Theoretic Approaches to Adaptive Sensing and Sensor Management," IEEE Statistical Signal Processing Workshop, June 2005.
9. "Information theoretic criteria for active sensing," Sensor, Signal, and Information Processing (SensIP) Workshop, Tempe AZ, April 2005.
10. "Gene Profiling, Clustering, and Networking," ICASSP 2005, Philadelphia, Mar. 2005.
11. "Statistical Signal Processing for Gene Microarrays," EUSIPCO 2004, Vienna, Sept. 2004.
12. "Genomic Signal Processing with Microarrays," 7th IEEE Intl Symp. on Signal Processing and its Applications, Paris, July 2003.
13. "Entropic graph theory and application," 3rd Workshop on Energy Minimization Methods and Computer Vision and Pattern Recognition, Lisbon, July 2003.

14. "Signal Processing for Genomics," 6th IEEE/URSI Conference on Applications of Signal Processing, Beijing, Aug. 2002.
15. "Statistical Signal Processing for Radio-nucleide Tomography," 1st IEEE Workshop on Sensor, Array and Multichannel Signal Processing, Boston, March 2000.
16. "Applications and Generalizations of the EM Algorithm," 19th Biennial Symposium on Communications, Kingston (Canada), June. 1998.

Festschrift and honorary presentations

1. A. O. Hero, "Inference in structured graphical models," Workshop to honor Alan Willsky, May 2008.
2. A. O. Hero, "Parameter Estimation for Multi-dimensional Filtered Poisson Processes," Workshop to honor Donald Snyder, St. Louis MO, Jan. 2000.
3. A. O. Hero, "Sur un problème d'estimation pour des processus de Poisson composées et filtrés," (In French - English title, "On a problem of estimation for filtered composed Poisson processes") Colloque Picinbono, Paris, May 1999.
4. A. O. Hero, "CFAR Target Detection in Imaging Radar," Symposium to honor Irving Reed, Univ. Southern California, Los Angeles, Nov. 1998.

Research Interests:

Statistical signal processing and imaging, bioinformatics and integrative genomics, biomedical imaging and pattern analysis, wireless sensor networks.

Research Activities:

- I. Publications: over 110 journal and 280 conference papers published.
- II. Patents: 3 patents filed.
- III. Research Grants: Participated as PI or co-PI in over twenty major grants.

I. Publications

Submitted Refereed Journals

1. W.G. Finn, K.M. Carter, R. Raich, A.M. Harrington, S.H. Kroft, and A. O. Hero, "Cytomic profiling of dysplastic and benign granulocyte maturation patterns by statistical manifold embedding of multidimensional flow cytometry data," *Blood*. Submitted June 2009.
2. A.K. Zaas, M. Chen, J. Varkey, T. Veldman, A.O. Hero, J. Lucas, R. Turner, A. Gilbert, C. Oien, B. Nicholson, S. Kingsmore, L. Carin, C.W. Woods, and G.S. Ginsburg, "Peripheral Blood Gene Expression Signatures Characterize Symptomatic Respiratory Viral Infection," *Cell Host and Microbe*. Submitted Mar. 2009.
3. E. Oubel, M. De Craene, A. O. Hero, M. Huguet, G. Avegliano, B. H. Bijnens, A. F. Frangi, "Cardiac motion estimation by joint alignment of tagged MRI sequences," submitted to *IEEE Trans. on Medical Imaging*, Dec. 2008.
4. L. Gallucio, O. Michel, P. Comon, E. Slezak, A. O. Hero, "Initialization free graph based clustering," submitted to *IEEE Trans. on Pattern Analysis and Machine Intelligence (PAMI)*. Dec. 2008.
5. K. Carter, R. Raich, and A.O. Hero, "On Local Dimension Estimation and Its Applications," submitted to *IEEE Trans. on Signal Processing*, Nov. 2008.

Published Refereed Journals

1. N. Dobigeon, J.-Y. Tournet, S. Massaoui, M. Coulon and A.O. Hero, "Joint Bayesian end member extraction and linear unmixing for hyperspectral imagery," *IEEE Trans. on Signal Processing*, to appear 2009.
2. N. Dobigeon, A.O. Hero and J.-Y. Tournet, "Hierarchical Bayesian sparse image reconstruction with application to MRFM," *IEEE Trans. on Image Processing*, to appear 2009. Available on Arxiv as (.html)
3. A. Wiesel and A.O. Hero, 'Decomposable Principal Components Analysis,' *IEEE Trans. on Signal Processing*, to appear 2009. Available on Arxiv (.html)
4. M. Ting, R. Raich and A.O. Hero, "Sparse image reconstruction for molecular imaging," *IEEE Trans. on Image Processing*, to appear 2009.
5. K. S. Xu and A.O. Hero, "Revealing Social Networks of Spammers," *The New Wave*. To appear 2009. (Invited)
6. K. Carter, R. Raich, W.G. Finn and A. O. Hero, "FINE: Fisher information non-parametric embedding," *IEEE Trans. on Pattern Analysis and Machine Intelligence (PAMI)*. To appear 2009.
7. E. Chong, C. Kreucher and A. O. Hero, "Partially Observable Markov Decision Process Approximations for Adaptive Sensing," *Discrete Event Systems*. To appear 2009.
8. J.A. Sidles, J.L. Garbini, L.E. Harrell, A.O. Hero, J.P. Jacky, J.R. Malcomb, A.G. Norman, A.M. Williamson, "Practical recipes for the model order reduction, dynamical simulation, and compressive sampling of large-scale open quantum systems," *New Journal of Physics*, vol. 11, 065002 (96pp), doi: 10.1088/1367-2630/11/6/065002

9. K. Carter, R. Raich, W.G. Finn and A. O. Hero, "Information preserving component analysis: data projections for flow cytometry analysis," *IEEE Journ. of Selected Topics in Signal Processing*, vol. 3, no. 1, pp. 148-158, Jan. 2009.
10. E. Bashan, R. Raich., and A. O. Hero, "Optimal two-stage search for sparse targets using convex criteria," *IEEE Trans. on Signal Processing*, vol. 56, no. 11, pp. 5389-5402, Nov. 2008.
11. W.G. Finn, K. Carter, R. Raich, L. Stoolman and A. O. Hero, "Analysis of Clinical Flow Cytometric Immunophenotyping Data by Clustering on Statistical Manifolds: Treating Flow Cytometry Data as High-Dimensional Objects," *Cytometry: Part B - Clinical Cytometry*, vol. 76B, pp. 1-7, Jan 2009. Published online: Jul 18 2008. (Selected as the featured paper - with our figures on the cover - for this issue of *Cytometry*).
12. A. Rao, A. O. Hero III, D.J. States, and J.D. Engel, "Using Directed Information to Build Biologically Relevant Influence Networks," in *Journal on Bioinformatics and Computational Biology* (<http://www.worldscinet.com/jbcb/jbcb.shtml>) vol. 6, no.3, pp. 493-519, June 2008.
13. S. Chretien and A. O. Hero, "On EM algorithms and their proximal generalizations," *ESAIM Journ. on Probability and Statistics* (<http://www.esaim-ps.org>), vol. 12, pp. 308-326, 2008.
14. W.G. Finn, K. Carter, R. Raich, L. Stoolman and A. O. Hero, "Analysis of Clinical Flow Cytometric Immunophenotyping Data by Clustering on Statistical Manifolds: Treating Flow Cytometry Data as High-Dimensional Objects," *Cytometry: Part B - Clinical Cytometry*, Feb. 2008.
15. A. Rao, A. O. Hero III, D.J. States, and J.D. Engel, "Using Directed Information to Build Biologically Relevant Influence Networks," to appear in *Journal on Bioinformatics and Computational Biology* (<http://www.worldscinet.com/jbcb/jbcb.shtml>), 2008.
16. S. Chretien and A. O. Hero, "On EM algorithms and their proximal generalizations," *ESAIM Journal on Probability and Statistics* (<http://www.esaim-ps.org>), to appear 2008.
17. D. Zhu and A.O. Hero, "Bayesian Hierarchical Model for Large-Scale Covariance Matrix Estimation," *Journal of Computational Biology (JCB)*, Vol. 14, No. 10: 1311-1326, Dec 2007.
18. C. M. Kreucher, A. O. Hero III, K. D. Kastella, and M. R. Morelande, "An Information Based Approach to Sensor Management in Large Dynamic Networks," *IEEE Proceedings*, vol. 95, no. 5, pp. 978-999, May 2007.
19. R. Rangarajan, A.O. Hero and R. Raich, "Optimal Sequential Energy Allocation for Inverse Problems," *IEEE Journ. Selected Topics in Signal Processing (JSTSP)*, vol. 1, no. 1, pp. 67-78, June 2007.
20. M.-F. Shih and A. O. Hero, "Hierarchical inference of unicast network topologies based on end-to-end measurements", *IEEE Journal on Signal Processing*, vol. 55, No. 5, pp. 1708-1718, May 2007.
21. C. M. Kreucher, A. O. Hero III, K. D. Kastella, and M. R. Morelande, "An Information Based Approach to Sensor Management in Large Dynamic Networks," *IEEE Proceedings*, vol. 95, no. 5, pp. 978-999, May 2007.
22. R. Rangarajan, A.O. Hero and R. Raich, "Optimal Sequential Design of Experiments for Estimation in Linear Models," *IEEE Journ. Special Topics in Signal Processing (JSTSP)*, vol. 1, no. 1, pp. 67-78, June 2007.
23. D. Blatt and A. O. Hero, "On tests for global maximum of the log-likelihood function," *IEEE Trans. on Info Theory*, *IEEE Trans. on Info Theory* , vol. 53, no. 7, pp. 2510-2526, 2007.
24. P.-J. Chung., J.F. Böhme, C.F. Mecklenbräuker, A. O. Hero, "Detection of the Number of Signals Using the Benjamini-Hochberg Procedure," *IEEE Trans on Signal Processing*, vol 55, no 6. pp 2497-2508, June 2007.

25. H. Neemuchwala, A. Hero, and P. Carson, "Image registration in high dimensional space," *International Journal of Imaging Systems and Technology*, vol. 16, No. 5, pp. 130-145, Mar 2007 (Invited)
26. A. Rao, A. O. Hero III, D.J. States, and J.D. Engel, "Motif Discovery in Tissue-Specific Regulatory Sequences Using Directed Information," *EURASIP Journal on Bioinformatics and Systems Biology*, vol. 2007, article ID 13853, 13 pages, 2007.
27. A. Rao, A. O. Hero III, D.J. States, and J.D. Engel, "Inferring Time-varying Network Topologies from Gene Expression Data," *EURASIP Journal on Bioinformatics and Systems Biology*, vol. 2007, article ID 51947, 12 pages, 2007.
28. D. Blatt, A. O. Hero and H. Gauchman, "A convergent incremental gradient algorithm with a constant stepsize," *SIAM Journal on Optimization*, Vol. 18, No. 1, pp. 29-51, Feb 2007.
29. M. Godavarti and A.O. Hero, "Training in multiple-antenna Rician fading wireless channels with deterministic spectral component," Vol. 6, No. 1, pp. 110-119, Jan. 2007.
30. C. Kreucher, D. Blatt, A. Hero, and K. Kastella, "Adaptive Multi-modality Sensor Scheduling for Detection and Tracking of Smart Targets," *Digital Signal Processing*, Digital Signal Processing, vol. 16, no. 5, pp. 546-567, Sept. 2006.
31. D. Justice and A. O. Hero, "Estimation of message source and destination from link intercepts", *IEEE Trans. on Information Forensics and Security*, vol 1, no. 3, pp. 374-385, Sept. 2006.
32. M. Akimoto, H. Cheng, D. Zhu, J. A. Brzezinski, R. Khanna, E. Filippova, E. C.T. Oh., Y. Jing, J-L Linares, S. Zarepars, A. J. Mears, A. O. Hero, T. Glaser, and A.Swaroop, "Targeting of green fluorescent protein to new-born rods by Nrl promoter and temporal expression profiling of flow-sorted photoreceptors," *Proceedings of the National Academy of Sciences (PNAS)*. Vol 103, No. 10, pp. 3890-3895, March 7 2006.
33. D. Justice and A.O. Hero, "A binary linear programming reformulation of the graph edit distance for graph recognition," *IEEE Trans. on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 28, no. 8, 1200-1214, Aug 2006.
34. S. Ahn, J.A. Fessler, D. Blatt, and A. Hero, "Convergent incremental optimization transfer algorithms: application to tomography", *IEEE Trans. on Medical Imaging*, vol. 25, no. 3, pp.283-296, March 2006.
35. D. Blatt and A. O. Hero, "Energy based sensor network source localization via projection onto convex sets (POCS)," *IEEE Trans. on Signal Processing*, vol. 54, no. 9, pp. 3614-3619, 2006 (Corresp).
36. M. Ting, A. O. Hero, D. Rugar, C.-Y. Yip and J. Fessler, "Near optimal signal detection for finite state Markov signals with application to magnetic resonance force microscopy," *IEEE Trans. on Signal Processing*, vol. 54, no. 6, pp. 2049-2062, June 2006.
37. J. Costa, N. Patwari and A. O. Hero, "Distributed multidimensional scaling with adaptive weighting for node localization in sensor networks," *ACM Journal on Sensor Networking*. vol. 2, No. 1, pp 39-64, Feb. 2006.
38. D. Zhu, A.O. Hero, H. Cheng, R. Khanna and A. Swaroop, "Network constrained clustering for gene microarray data," *Bioinformatics*, Vol. 21 no. 21 2005, pp. 4014-4020, Sept. 2005.
39. D. Zhu, A.O. Hero, Z.S. Qin, A. Swaroop, "High throughput screening of co-expressed gene pairs with controlled False Discovery Rate (FDR) and Minimum Acceptable Strength (MAS)," *Journal of Computational Biology*, Vol. 12, No. 7, 1027-1043, Sept. 2005. Supplemental tables: .
40. M. Godavarti and A. O. Hero, "Partial update LMS algorithms," *IEEE Trans. on Signal Processing*, vol. 53, No. 7, pp. 2382-2399, July 2005.
41. N. Patwari, J. Ash, S. Kyperountas, S. Kyperountas, A. O. Hero, L. Moses, N. S. Correal, "Locating the nodes: Cooperative localization in wireless sensor networks," *IEEE Signal Processing Magazine*, vol. 22, no. 4, pp 54-69, July 2005.

42. M. Godavarti, A. O. Hero, and T. Marzetta, "Min-Capacity of a Multiple-Antenna Wireless Channel in a Static Rician Fading Environment," *IEEE Trans. on Wireless Communications*, vol. 4, no. 4, pp. 1715-1723, July 2005.
43. C. Kreucher, K. Kastella, and A. Hero, "Multitarget Tracking using a Particle Filter Representation of the Joint Multitarget Probability Density," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 39, No. 4, pp. 1396-1414, October 2005. General Dynamics Medal Paper Award for 2005.
44. H. Neemuchwala, A. O. Hero, and P.L. Carson, "Image matching using alpha-entropy measures and entropic graphs," *Journ. of Signal Processing (Special Issue on Content-based Visual Information Retrieval)*, vol 85, pp. 277-296, 2005.
45. C. Kreucher, D. Blatt, A. Hero, and K. Kastella, "Adaptive Multi-modality Sensor Scheduling for Detection and Tracking of Smart Targets" *Digital Signal Processing*, vol. 15, no. 4, July 2005.
46. C. Kreucher, K. Kastella, and A. Hero, "Sensor Management Using An Active Sensing Approach," *Signal Processing*, Vol. 85, No. 3, pp. 607-624, March 2005.
47. C. Vignat, A. O. Hero and J. Costa, "About closedness by convolution of the Tsallis maximizers," *Physica A*, Vol. 340, Issue 1-3, pp. 147-152, Sept. 2004.
48. S. Zarepari, A.O. Hero, D.J. Zack, R. Williams, A. Swaroop, "Seeing the Unseen: Microarray-based Gene Expression Profiling in Vision," *Invest Ophthalmol Vis Sci.*, Vol. 45, No. 8, pp. 2457-2462, Aug 2004
49. J. Costa and A. O. Hero, "Geodesic entropic graphs for dimension and entropy estimation in manifold learning," *IEEE Trans. on Signal Process.*, Vol. 52, No. 8, pp. 2210-2221, Aug. 2004.
50. P.-J. Chung, J. Böhme, and A. O. Hero, "Tracking of multiple moving sources using recursive EM algorithm," *EURASIP Journ. of Applied Signal Processing (JASP)*, Vol. 2004, No. 8, pp. 2-11, 2004.
51. S. Yoshida, A. J. Mears, J. S. Friedman, T. Carter, S. He, E. Oh, Y. Jing, R. Farjo, G. Fleury, C. Barlow, A. O. Hero, A. Swaroop, "Expression profiling of the developing and mature Nrl-/- mouse retina: Identification of retinal disease candidates and transcriptional regulatory targets of Nrl," *Human Molecular Genetics*, vol. 13, no. 14, pp. 1497-1503, 2004.
52. M. Godavarti and A. O. Hero, "Convergence of differential entropies," *IEEE Trans. on Info Theory*, Vol 50, No. 1, pp. 171-176, Jan. 2004.
53. A. Hero and G. Fleury, "Pareto-optimal methods for gene ranking," *Journ. of VLSI Signal Processing*, vol. 38, pp. 259-275, 2004.
54. Vision, J. Li and A. O. Hero, "A fast spectral method for active 3D shape reconstruction," *Journal of Mathematical Imaging and Vol. 20*, pp. 73-87, Jan. 2004.
55. G. Fleury, A. Hero, S. Zarepari, and A. Swaroop, "Gene Discovery Using Pareto Depth Sampling Distributions," *Journ. of Franklin Institute*, vol. 341, No. 1-2, pp. 55-75, Jan-Mar 2004.
56. A. Hero, G. Fleury, A. Mears and A. Swaroop, "Multicriteria Gene Screening for Analysis of Differential Expression with DNA Microarrays," *EURASIP Journ. of Applied Signal Processing (JASP)*, Vol. 2004, No. 1, pp. 43-52, 2004.
57. A. O. Hero, "Secure Space-Time Communication," *IEEE Trans. on Info Theory*, Vol. 49, No. 12, pp. 1-16, Dec. 2003.
58. N. Patwari, A. O. Hero, M. Perkins, N. S. Correal and R. J. O'Dea, "Relative location estimation in sensor networks," *IEEE Trans. on Signal Processing*, Special Issue on Signal Processing in Networking, vol. 51, No. 9, pp. 2137-2148, Aug. 2003.
59. M.F. Shih and A. O. Hero, "Unicast-based inference of network link delay distributions using mixed finite mixture models," *IEEE Trans. on Signal Processing*, Special Issue on Signal Processing in Networking, vol. 51, No. 9, pp. 2219-2228, Aug. 2003.
60. R. Gupta and A.O. Hero, "High Rate Vector Quantization for Detection," *IEEE Trans. on Info Theory*, vol. 49, No. 8, pp. 1951-1969, Aug. 2003.

61. A. O. Hero, B. Ma, O. Michel and J. Gorman, "Applications of entropic spanning graphs," *IEEE Signal Proc. Magazine (Special Issue on Mathematics in Imaging)*, Vol 19, No. 5, pp 85-95, Sept. 2002.
62. D. W. Bliss, K. W. Forsythe, A. O. Hero, A. F. Yagulalp, "MIMO Environmental Capacity Sensitivity," *IEEE Trans. on Signal Processing*, Vol. 50, No. 9, pp. 2128-2142, Sept. 2002.
63. Mark Coates, Alfred Hero, Robert Nowak, Bin Yu, "Internet Tomography," *IEEE Signal Processing Magazine (Special Issue on Network Traffic: Scaling and Complexity)*, Vol. 19, No. 3, pp. 47-65, May 2002.
64. H.S. Kim and A. O. Hero, "Comparison of GLR and invariance detectors under structured clutter covariance," *IEEE Trans. on Image Processing*, Vol IP-10, No. 10, pp. 1509-1520, Oct. 2001.
65. O. Michel, A. O. Hero and P. Flandrin, "Graphes de représentation minimaux, entropies et divergences: applications," (English title: "Minimal spanning graphs, entropies and divergences: applications") *Traitement du Signal*, Vol 17, No. 4, 2000.
66. A. O. Hero and T. L. Marzetta, "Cut-off rate and signal design for the quasi-static Rayleigh fading space-time channel," *IEEE Trans. on Inform. Theory*, Vol IT-47, No 6, pp. 2400-2416, July 2001.
67. B. Ma, S. Lakshmanan, and A. O. Hero, "Simultaneous detection of lane and pavement boundaries using model-based multisensor fusion," *IEEE Transactions on ITS (Intelligent Transportation Systems) special issue on Vision Applications and Technology for Intelligent Vehicles - Part II: Vehicles*, Vol ITS-1, No. 3, pp. 135-147, Sept. 2000.
68. R. Gupta and A. O. Hero, "Power-performance tradeoffs and optimal bit allocation in reduced resolution adaptive filtering," *IEEE Trans. on Sig. Proc.*, Vol. SP-48, No. 10, pp. 2772-2784, Sept. 2000.
69. S. Chretien and A. O. Hero, "Kullback proximal algorithms for maximum likelihood estimation," *IEEE Trans. on Inform. Theory*, Vol IT-46, No. 5, pp. 1800-1810, Aug. 2000.
70. W.J. Williams, E. Zalubas and A.O. Hero, "Word spotting in bitmapped fax documents," *Information Retrieval*, vol 2, pp. 207-226, May 2000.
71. A. C. Sauve, A. O. Hero, W. L. Rogers, S. Wilderman and N. H. Clinthorne, "3D reconstruction for a Compton SPECT camera model," *IEEE Trans. on Nuclear Science*, Vol. 46, No. 6, pp. 2075-2084, Nov. 1999.
72. O. Michel, A. O. Hero and A.-E. Badel, "Tree structured non-linear signal modeling and prediction," *IEEE Trans. on Signal Processing*, Vol. SP-47, No. 11, pp. 3027-3041, Nov. 1999.
73. A. O. Hero and O. Michel, "Asymptotic theory of greedy approximations to minimal K-point random graphs," *IEEE Trans. on Information Theory*, Vol. IT-45, pp. 1921-1939, Sept. 1999.
74. A. O. Hero, "Sur un problème d'estimation pour des processus de Poisson composés et filtrés," (In French - English title, "On a problem of estimation for filtered composed Poisson processes") *Traitement du Signal*, Vol. 15, No. 6, pp. 493-502, May 1999.
75. A. O. Hero, R. Piramuthu, J. A. Fessler and S. R. Titus, "Minimax emission computed tomography using high-resolution anatomical side information and B-spline models," *IEEE Trans. on Information Theory (Special issue on Multiscale Statistical Signal Analysis and its Applications)*, Vol 45, No. 3, pp. 920-938, April 1999.
76. I. Sharfer and A. O. Hero, "A maximum likelihood digital receiver using the EM algorithm and the discrete wavelet transform," *IEEE Transactions on Signal Processing*, Vol. 47, No. 3, pp. 813-825, Mar. 1999.
77. A.O. Hero (Ed.) "Highlights of Statistical Signal and Array Processing," with the IEEE SSAP Technical Committee, *IEEE Signal Processing Magazine*, Vol 15, No. 5, pp. 21-66, Sept. 1998.
78. A.-E. Badel, O. Michel, and A.O. Hero, "Comparaison de systèmes et arbres de regression," (In French - English title, "Comparison of systems and regression trees") *Traitement du Signal*, July 1998.

79. D. Goeckel, A. O. Hero, and W. E. Stark, "Data-recursive algorithms for blind channel identification in oversampled communication systems." *IEEE Transactions on Signal Processing*, Vol. 46, No. 8, pp. 2217-2220, Aug. 1998.
80. W.J. Williams, E. Zalubas, R. M. Nickel, and A.O. Hero, "Scale and translation invariant methods for enhanced time-frequency pattern recognition," *Journ. Multidimensional Systems and Signal Processing*, vol 9, pp. 465-473, Nov. 1998.
81. A.O. Hero, "Discussion on The EM algorithm – an old folk-song sung to a fast new tune," X.-L. Meng and D. van Dyk, *Journal of the Royal Statistical Society, Ser. B*, Vol 59, No. 3, pp. 511-567, 1997.
82. A. Badel, O. Michel and A. O. Hero, "Arbres de regression: Modélisation non-parametrique et analyse des séries temporelles," (In French - English title, "Regression trees for non-parametric modeling and time series analysis") *Traitement du Signal*, Vol. 14, No. 2, pp. 117-133, 1997.
83. A.O. Hero, M. Usman, A.C. Sauve and J.A. Fessler, "Recursive algorithms for computing the Cramer-Rao bound," *IEEE Trans. on Signal Processing*, Vol. SP-45, Vol. 3, pp. 803-807, Mar. 1997 (Corresp.).
84. A.O. Hero, J.A. Fessler, and M. Usman, "Exploring estimator bias-variance tradeoffs using the uniform CR bound," *IEEE Trans. on Signal Processing*, Vol. SP-44, No. 8, pp. 2026-2041, Aug. 1996. (**Best Paper Award, IEEE Signal Processing Society**)
85. R. Goyal, A.O. Hero and F. Morady, "Simulation of cardiac memory in a computer model using reactive coupling," *Journal of Electrocardiology*, Vol. 28, pp. 180-183, 1995.
86. J.A. Fessler and A.O. Hero, "Penalized maximum likelihood image reconstruction using space alternating generalized EM algorithms," *IEEE Trans. on Image Processing*, Vol 4, No. 10, pp. 1417-1429, Oct 1995.
87. B. Baygün and A.O. Hero, "Optimal simultaneous detection and estimation under a false alarm constraint," *IEEE Trans. on Inform. Theory*, Vol. 41, No. 3, pp. 688-703, May 1995.
88. A.O. Hero and J.A. Fessler, "Convergence in norm for EM-type algorithms," *Special Theme Section on the EM Algorithm, Statistica Sinica*, Vol 5, No. 1, pp. 41-54, Jan. 1995.
89. J.A. Fessler and A.O. Hero, "Space-alternating generalized expectation-maximization algorithm," *IEEE Trans. on Signal Processing*, Vol. SP-42, No. 10, pp. 2664-2677, Oct. 1994.
90. N. Petrick, A.O. Hero, N.H. Clinthorne, W.L. Rogers, "A fast least squares arrival time estimator for scintillation pulses," *IEEE Trans. on Nuclear Science*, Vol. NS-41, No. 4, pp. 758-761, Aug. 1994.
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260. P. Chiao, W. L. Rogers, A.O. Hero, N.H. Clinthorne, "Maximum likelihood estimators for static and dynamic studies using emission tomography with auxiliary boundary information," Society of Nuclear Medicine, 38th Annual Meeting, Cincinnati, OH, June 1991.
261. P. Chao, W.L. Rogers, A.O. Hero, J.A. Fessler, N.H. Clinthorne and G.D. Hutchins, "Effects of side information on myocardial block flow estimation and optimal SPECT collimator resolution," Society of Nuclear Medicine, 38th Annual Meeting, Cincinnati, OH, June 1991.
262. A.O. Hero, "Intrinsic performance gains using side information," Midwest Workshop on Iterative Image Reconstruction, the University of Chicago, May 1991 (**Invited**).

263. A.O. Hero, "Recovering photon intensity information for continuous photo-detector measurements," Proceedings of the 1991 Conference on Information Science and Systems, pp. 643-648, Baltimore, MD, March 1991 (**Invited**).
264. R. Kakarala and A.O. Hero, "A Cramer-Rao bound for edge localization," Proceedings of the IEEE 1991 International Conference on Acoustics, Speech, and Signal Processing, Vol. 4, pp. 2545-2548, Toronto, May 1991.
265. B. Baygün and A.O. Hero, "Tradeoffs between detection and estimation for multiple signals," Proceedings of the IEEE 1991 International Conference on Acoustics, Speech, and Signal Processing, Vol. 2, pp. 1317-1320, Toronto, May 1991.
266. J.D. Gorman and A.O. Hero, "On the application of Cramer-Rao type lower bounds for constrained estimation," Proceedings of the IEEE 1991 International Conference on Acoustics, Speech, and Signal Processing, Toronto, Vol. 2, pp. 1333-1336, May 1991.
267. L. Shao, A.O. Hero, N.H. Clinthorne, and W.L. Rogers, "Information theoretic performance approximations for maximum likelihood object classification using projections data," Society of Nuclear Medicine, 37th Annual Meeting, Washington, DC, June 1990. Abstract in J. Nuc. Medicine, 31(5):797, 1990.
268. A.O. Hero, "Optimal simultaneous estimation and detection of unknown spectral components," Special session on Nonparametric Spectrum Estimation, organized by D. Thomson, Meeting of the Union de Radio Science Internationale (URSI), sponsored by the Assembly of Mathematical and Physical Sciences, National Research Council, Boulder, CO, Jan. 1990 (**Invited**).
269. N.H. Clinthorne, A.O. Hero, N.A. Petrick and W.L. Rogers, "Lower bounds on scintillation detector timing performance," Proceedings of Symposium on Radiation Measurement, Ann Arbor, MI, June 1990.
270. N.A. Petrick, N.H. Clinthorne, W.L. Rogers and A.O. Hero, "First photo-electron timing error evaluation of a new scintillation detector model," Proceedings of the IEEE 1990 Nuclear Science Symposium.
271. A.O. Hero and J.K. Kim, "Simultaneous signal detection and classification under a false alarm constraint," Proceedings of the IEEE 1990 International Conference on Acoustics, Speech, and Signal Processing, pp. 2759-2762, Albuquerque, NM, April 1990.
272. B. Baygün and A.O. Hero, "An order selection criterion via optimal joint estimation/detection theory," Proceedings of the Fifth IEEE ASSP Workshop on Spectrum Estimation and Modeling, pp. 541-544, Rochester, NY, Oct. 1990 (**Invited**).
273. L. Shao and A.O. Hero, "Information optimization of projective tomographic imaging systems," Proceedings of the IEEE 1989 International Conference on Acoustics, Speech, and Signal Processing, pp. 1464-1467, Glasgow, UK, May 1989.
274. J.K. Kim and A.O. Hero, "Error intensity measures for multi-parameter tracking and passive bearing estimation," Proceedings of the IEEE 1989 International Conference on Acoustics, Speech, and Signal Processing, pp. 2641-2644, Glasgow, UK, May 1989.
275. A.O. Hero, "Optical detection," Bangor Communications Symposium, organized by J. O'Reilly, University of Wales, Bangor, UK, May 1989 (**Invited**).
276. A.O. Hero, "Information theoretic criteria for emission computed tomography," Special session on Inverse Problems, organized by L. Scharf, Meeting of the Union de Radio Science Internationale (URSI), sponsored by the Assembly of Mathematical and Physical Sciences, National Research Council, Boulder, CO, Jan. 1989 (**Invited**).
277. J. Gorman and A.O. Hero, "Lower bounds on parametric estimators with constraints," Proceedings of the Fourth ASSP Workshop on Spectrum Estimation and Modeling, pp. 223-228, Minneapolis, MN, Aug. 1988 (**Invited**).
278. A.O. Hero, "A rate distortion lower bound on phase errors for optical receivers," Proceedings of Twentieth Conference on Information and Systems Science, pp. 140-145, Princeton, NJ, March 1988.

279. A.O. Hero, "Time delay estimation for Poisson derived processes," Proceedings of the IEEE 1988 International Conference on Acoustics, Speech, and Signal Processing, pp. 2614-2617, New York, April 1988.
280. A.O. Hero, "Applications of error intensity measures to bearing estimation," Proceedings of the IEEE 1987 International Conference on Acoustics, Speech, and Signal Processing, pp. 443-446, Dallas, TX, April 1987.
281. L.Shao, A.O. Hero, W.L. Rogers, and N.H. Clinthorne, "Mutual Information - A new criterion for aperture design in SPECT," Society of Nuclear Medicine, 35th Annual Meeting, San Francisco, June 1988.
282. N.H. Clinthorne, W.L. Rogers, A.O. Hero, G.D. Hutchins, and K.F. Koral, "Improved coincidence timing through the application of estimation theory," Society of Nuclear Medicine, 34th Annual Meeting, Toronto, June, 1987. Abstract appeared in J. Nuc. Medicine, 28(4):695, 1987.
283. A.O. Hero and S.C. Schwartz, "A level crossing approach to modeling large error in time delay estimation," Special Session on Underwater Acoustics, organized by C. Baker, IEEE International Symposium on Information Theory, Brighton, UK, June 1985 (**Invited**).
284. A.O. Hero and J.K. Kim, "Sequential detection and coarse acquisition of time delay in passive arrays," Proceedings of the Twentieth Conference on Information and Systems Science, pp. 361-367, Princeton, NJ, March, 1985.
285. A.O. Hero and S.C. Schwartz, "Sequential detection and coarse acquisition of time delay in passive arrays," 1985 Proceedings of the IASTED Conference on Applied Signal Processing, pp. 267-270, Paris, France, June 1985.
286. A.O. Hero and S.C. Schwartz, "Large error performance of cross-correlation type estimators of time delay," Proceedings of the Twenty-Second Annual Allerton Conference on Communication, Control and Computing, pp. 344-353, Monticello, IL, Oct. 1985.
287. A.O. Hero and S.C. Schwartz, "Alternatives to the generalized cross-correlator for time delay estimation," Proceedings of the IEEE 1984 International Conference on Acoustics, Speech and Signal Processing, pp. 15.4.1-15.4.4, San Diego, CA, April 1984.
288. A.O. Hero and S.C. Schwartz, "On the asymptotic form of level crossing probabilities," IEEE International Symposium on Information Theory, St. Jovite, Canada, Sept. 1983.
289. A.O. Hero and S.C. Schwartz, "A new generalized cross-correlator," Proceedings of the Seventeenth Annual Conference on Information Science and Systems, pp. 808-818, Baltimore, MD, March 1983.

Book Chapters:

1. R. Rangarajan, R. Raich, and A.O. Hero, "Sparsity penalized MDS for blind tracking in sensor networks," in Networked Sensing, Information and Control, Ed. V. Saligrama, Springer, 2007.
2. A. O. Hero, "Geometric entropy minimization (GEM) for anomaly detection and localization," to appear in Advances in Neural Information Processing Systems (NIPS) 2007.
3. D. Zhu, M. Rabbat, A. O. Hero, R. Nowak, M. Figueredo, "De Novo signaling pathway reconstruction from multiple data sources," in New research on signal transduction, Ed. F. Columbus, Nova Publishing, 2006.
4. N. Patwari, A. O. Hero and J. Costa, "Learning Sensor Location from Signal Strength and Connectivity," in "Secure Localization and Time Synchronization for Wireless Sensor and Ad Hoc Networks," Eds. Radha Poovendran, Cliff Wang, and Sumit Roy, Advances in Information Security series, Vol. 30, Springer, Dec. 2006, ISBN 978-0-387-32721-1. .
5. D. Blatt and A. O. Hero, "From weighted classification to policy search," Advances in Neural Information Processing Systems (NIPS), vol 18, pp. 139-146, 2006.
6. J. Costa and A. O. Hero, "Learning intrinsic dimension and entropy of shapes," in Statistics and analysis of shapes, Eds. H. Krim and T. Yezzi, Birkhauser, pp. 231-252, 2006.

7. H. Neemwuchwala and A. O. Hero, "Entropic Graphs for Registration," in *Multi-Sensor Image Fusion and its Applications*, Eds. R. S. Blum and Z. Liu, Marcel Dekker, Inc., pp. 185-235, 2005.
8. H. Park, P.H Bland, A.O. Hero III, and C.R. Meyer, "Least Biased Target Selection in Probabilistic Atlas Construction," *Lecture Notes in Computer Science*, Vol 3750 (MICCAI-05 Proceedings - Palm Springs), Springer-Verlag, pp. 419-496, 2005.
9. E. Oubel, C. Tabon-Gomez, A.O. Hero and A.F. Frangi, "Myocardial Motion Estimation in Tagged MR Sequences by Using alpha-MI-Based Non Rigid Registration," *Lecture Notes in Computer Science*, Vol 3750 (MICCAI-05 Proceedings - Palm Springs), Springer-Verlag, pp. 271-278, 2005.
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11. Yu J, Mears AJ, Yoshida S, Farjo R, Carter TA, Ghosh D, Hero A, Barlow C, Swaroop A. "From disease genes to cellular pathways: A progress report," In "Retinal dystrophies: functional genomics to gene therapy." Wiley, Chichester (Novartis Foundation Symposium 255) pp 147-160, 2004.
12. J. Costa, A. O. Hero and C. Vignat, "On solutions to multivariate maximum alpha-entropy Problems," in *Energy Minimization Methods in Computer Vision and Pattern Recognition (EMM-CVPR)*, Eds. M. Figueiredo, R. Rangagaran, J. Zerubia, Springer-Verlag, 2003.
13. D. Blatt and A. Hero, "Asymptotic distribution of log-likelihood maximization based algorithms and applications," in *Energy Minimization Methods in Computer Vision and Pattern Recognition (EMM-CVPR)*, Eds. M. Figueiredo, R. Rangagaran, J. Zerubia, Springer-Verlag, 2003
14. A.O. Hero, Donald L. Snyder "Parameter Estimation for Multi-dimensional Filtered Poisson Processes," *Festschrift – J. O'Sullivan* (Ed). Springer-Verlag, To appear 2005.
15. A.O. Hero, "Signal Detection and Classification," *The Digital Signal Processing Handbook*, Madisetti and Williams (Eds.), CRC Press, pp. 13.1-13.14, 1998. Revised edition with updated chapter in 2009.
16. A.O. Hero, "Telecommunications Media," *Encyclopedia Britannica*, pp. 493-500, 1997.
17. A.O. Hero and R.A. Delap, "Task specific criteria for adaptive beamforming with slow fading signals," *Advances in Spectrum Analysis and Array Processing*, vol. III, S. Haykin, Ed., pp. 352-401, 1995.
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19. A.O. Hero and S.C. Schwartz, "Level crossing representations, Poisson asymptotics and applications to passive arrays," *Stochastic Processes in Underwater Acoustics*, C. Baker, Ed., pp. 95-121, Springer-Verlag, New York, 1986.

Book Reviews:

1. "Radar Data Processing: Vol. 1 - A. Farina and F.A. Studer," *IEEE Trans. Acoustics, Speech and Signal Processing*, Vol. ASSP-34, pp. 1350-1352, Feb. 1987.

Technical Reports:

1. N. Dobigeon, A.O. Hero and J.-Y. Tourneret, 'Hierarchical Bayesian sparse image reconstruction with application to MRFM,' arXiv Sept. 2008.
2. A. Wiesel and A.O. Hero, 'Decomposable Principal Components Analysis,' arXiv, Aug, 2008.
3. John A. Sidles, Joseph L. Garbini, Lee E. Harrell, Alfred O. Hero, Jonathan P. Jacky, Joseph R. Malcomb, Anthony G. Norman, Austin M. Williamson, "Practical recipes for the model order reduction, dynamical simulation, and compressive sampling of large-scale open quantum systems," arXiv, May 2008

4. A. Wiesel, M.Kliger, A.O. Hero, "A greedy approach to sparse canonical correlation analysis," arXiv:0801.2748v1 [stat.CO], 17 Jan. 2008.
5. C. Hory and A. O. Hero, "Sequential Probability Ratio Test for the detection of a single electron spin in the OSCAR setup," arXiv manuscript quant-ph/0402181, Feb. 2004.
6. M. Ting, A. O. Hero, D. Rugar, C.-Y. Yip, and J. Fessler, "Electron spin detection in the frequency domain under the interrupted Oscillating Cantilever-driven Adiabatic Reversal (iOSCAR) protocol," a modified version appeared in IEEE Trans. on Signal Processing June 2006. Available as arXiv manuscript quant-ph/0307042, (arXiv), Dec. 2003.
7. A.O. Hero and T.L. Marzetta, "On computational cut-off rate for space-time coding," Bell Laboratories Technical Memo, Lucent Technologies, April 2000 (<http://mars.bell-labs.com/cm/ms/what/mars/index.html>).
8. S. Chretien and A. Hero, "Kullback Proximal Algorithms for Maximum Likelihood Estimation," RR-3756, INRIA Rhone-Alpes, Grenoble, France, Aug. 1999 (<http://www.inria.fr/RRRT/publications-fra.html>).
9. A.O. Hero, J. O'Neill and W.J. Williams, "Moments and moment matrices for invariant classification of noise contaminated spatial patterns," CSPL Technical Report 307, Mar. 1997.
10. A.O. Hero and C. Guillouet, "Maximal Invariant Theory Applied to Robust Detection of SAR/IR Targets," CSPL Technical Report 306, Jan. 1997
11. A. O. Hero, M. Usman, Anne Sauve, and J. A. Fessler, "Recursive algorithms for computing the Cramer-Rao bound," CSPL Technical Report 305, Nov.1996.
12. J.A. Fessler and A.O. Hero, "Space-alternating generalized EM algorithms for penalized maximum-likelihood image reconstruction," Tech. Report 286, Communications and Signal Processing Laboratory (CSPL), Dept. EECS, University of Michigan, Jan. 1994.
13. A.O. Hero and J.A. Fessler, "Asymptotic convergence properties of EM-type algorithms," Tech. Report 282, Communications and Signal Processing Laboratory (CSPL), Dept. EECS, University of Michigan, April 1993.
14. A.O. Hero, "A Cramer-Rao type lower bound for essentially unbiased parameter estimation," Technical Report 890, MIT Lincoln Laboratory, 1992.
15. A.O. Hero and J.K. Kim, "Simultaneous signal detection and classification under a false alarm constraint," Tech. Report 270, Communications and Signal Processing Laboratory (CSPL), Dept. EECS, University of Michigan, Oct. 1989.
16. J. Gorman and A.O. Hero, "Lower bounds on parametric estimation with constraints," Tech. Report 269, Communications and Signal Processing Laboratory (CSPL), Dept. of EECS, University of Michigan, Aug. 1989.
17. A.O. Hero, "Timing estimation for filtered Poisson processes in additive Gaussian noise," Tech. Report 255, Communications and Signal Processing Laboratory (CSPL), Dept. EECS, University of Michigan, March, 1988.
18. L. Shao and A.O. Hero, "Information theoretic criteria for SPECT image reconstruction and aperture optimization," Tech. Report 261, Communications and Signal Processing Laboratory (CSPL), Dept. EECS, University of Michigan, Oct. 1988.
19. A.O. Hero, "Topics in time delay estimation," Tech. Report 16, Information Sciences and Systems Laboratory, Princeton University, Feb. 1985.

II. Patents and Disclosures:

1. A. Hero, K. Carter, R. Raich. and W. Finn, "A method and apparatus for clustering and visualization of multicolor flow cytometry data". Disclosed to Univ of Michigan Technology Management. Office Provisional patent 60/997,388 filed Oct 7, 2007.

2. A. Hero, H. Neemuchwala, P. Carson, "A method and apparatus for alignment of a sequence of high dimensional data," disclosed to Univ of Michigan Technology Management Office 12/04. Provisional patent 60/658,427 filed Mar 4, 2005.
3. N. Patwari, J. Costa, A. Hero. "Distributed method for mapping sensor data and location from high dimensional data and pairwise measurement," software disclosed to Univ of Michigan Technology Management Office 02/06.
4. N. Patwari, A. Hero, A. Pocholsky, P. Felsen. "Network data visualization tool," software disclosed to Univ of Michigan Technology Management Office 01/05.
5. A. Hero and G. Fleury, "Pareto Front Gene Filtering (PFGF) tool," software disclosed to Univ of Michigan Technology Management Office, 08/02.
6. W.J. Williams, E.J. Zalubas, J.C. O'Neill, R.M. Nickel, and A. Hero, "Method and system for extracting features in a pattern recognition system," United States Patent 6,178,261, Jan. 23, 2001.

III. Research Grants:

Current Research Grants

1. “Clinico-molecular predictors of presymptomatic infectious disease,” (06/01/09-05/31/11) DARPA phase II grant N66001-07-C-2024. Collaboration between Duke Univ, SRI and Univ of Michigan, DARPA Project PI: J. Ginsberg at Duke. UM co-PI A. Hero.
2. “Identification of effectors of hox protein mediated leukemogenesis,” (02/01/2009-01/31/2010) CCMB. A collaborative effort to support PhD studies of Y. Huang. co-PI’s J. Hess and A.O. Hero. (AFOSR). PI: A.O. Hero. co-PI: R. Raich (Oregon State Univ).
3. “Performance-Driven Multimodality Sensor Fusion,” (06/01/2009-11/30/2011) Air Force Office of Scientific Research. PI: A.O. Hero. co-PI: R. Raich (Oregon State Univ).
4. “Distributed active network sensing and estimation (DANSE),” (1/1/2008-12/31/2012), DIGITEO. PI: A. Hero.
5. “Automatic three dimensional (3D) registration for enhanced cancer management,” (04/09/2009-8/31/2014), National Institutes of Health, grant number. PI: C. Meyer.
6. “Learning and Adapting to Spatio-Temporal Anomalies,” (9/1/2008-8/31/2011), National Science Foundation. PI: C. Scott. co-PI: A.O Hero.
7. “Network Tomography for Structure Discovery,” (6/4/2008-6/5/2009), Office of Naval Research N00014-08-1-1065. PI: A. Hero.
8. “ATR Center,” Air Force Research Laboratory (9/01/07-8/31/12), subcontract to Signal Innovations Group (SIG) Inc. Project PI: L. Carin at SIG.UM PI: A. Hero.
9. “Integrated Fusion, Performance Prediction, and Sensor Management for Automatic Target Exploitation,” AFOSR MURI (06/01/06-05/31/10). Collaboration between Ohio State Univ, MIT, Boston Univ, Florida State Univ, and Univ of Michigan, Air Force Office of Scientific Research FA9550-06-1-0324. MURI PI: R. Moses at Ohio State University. UM coPI: A. Hero.
10. “Application of Magnetic Resonance Force Microscopy to Single Nuclear Spin Detection,” ARO-MURI (05/01/05-04/31/10). Collaboration with University of Washington (J. Sidles, J. Garbini), Cornell (J. Marohn), and IBM (D. Rugar). Army Research Office grant W911NF-05-1-0403. MURI P.I.: J. Sidles (Univ Washington). UM co-PI: A. Hero.
11. “Modular strategies for internetwork monitoring,” National Science Foundation CCR-0325571 (9/1/03-8/31/08). This grant is a collaborative ITR grant with UM(Hero, Teneketzis, Lafortune, Michailides), Univ. Wisconsin (R. Nowak, P. Barford) and Boston Univ. (E. Kolaczyk, M. Crovella). Project PI: A. O. Hero.

Past Research Grants:

1. “A Genomics-basec Integrative Approach to Discovery of Distant Transcriptional Enhancers,” (04/01/08-03/30/09), CCMB. UM (Student-faculty partnership award with PhD student Arvind Rao, Profs. David States and Doug Engel of UM Medical School). Co-PIs D. Engel, A. Hero, D. States
2. “Clinico-molecular predictors of presymptomatic infectious disease,” (06/01/07-05/31/08) DARPA Phase I grant N66001-07-C-2024. Collaboration between Duke Univ, SRI and Univ of Michigan, DARPA Project PI: J. Ginsberg at Duke. UM co-PI A. Hero.
3. ARO Workshop on Research Directions in Information Processing (05/01/07-04/31/08), Army Research Office. PI A. Hero.
4. “Utility-weighted sensor management for missile defense,” Missile Defense Agency (10/01/07-05/31/08), subcontract to TechFinity, Inc. UM PI: A. Hero

5. "Multi-modality Image Registration," National Institutes of Health, P01, 05/01-05/06. P.I.: C. Meyer (UM Radiology).
6. "Sequential adaptive multimodality target detection and classification using physics-based models," ARO-MURI (06/01/05-05/31/07). P.I.: L. Carin (Duke).
7. "Active Sensing Workshop," National Science Foundation CCR0524865 (04/01/05-04/31/06). P.I.: A.O. Hero.
8. "Adaptive detection and classification with entropic measures," DARPA Integrated Sensors Program (Phase II) F012399 (04/01/05-4/31/06). PI: H. Schmitt (Raytheon).
9. "Signal Detection for single-spin magnetic force microscopy," sub-contract to IBM, under DARPA MOSAIC project award, \$360,000, 06/02-12/04. P.I.: A.O. Hero.
10. "Radionuclides: radiation detection and quantification," National Institutes of Health RO1-CA32846. 6/1/02-5/31/05, \$1,000,000. P.I.: N. Clinthorne.
11. "Sequential adaptive multimodality target detection and classification using physics-based models," DARPA-MURI, 07/01-05/05. P.I.: A. Yagle (UM).
12. "Application and analysis of minimal graphs for information and divergence estimation," Collaborative Linkage Grant, NATO, 8/1/00-7/31/01, Project Coordinator from NATO: O. Michel, Project Coordinator from Israel: Y. Francos, Project Coordinator from US: A. Hero.
13. "Techniques for calculating tumor dosimetry," National Institutes of Health RO1-CA87955-01, 6/1/00-5/30/04. P.I. K. Koral.
14. "Challenges in Pattern Recognition," National Science Foundation CCR 0223741. 03/02-09/02. P.I.: A.O. Hero.
15. "Low-energy electronics design for mobile platforms," Army Research Office DAAH04-96-1-0337. 9/1/96-8/31/01, P.I. W. Stark.
16. "Radionuclides: radiation detection and quantification," National Institutes of Health RO1-CA32846. 3/1/94-2/28/02. P.I.: W.L. Rogers.
17. "Reduced Signature Automated Target Recognition," Air Force Office of Scientific Research F49620-96-0028. 11/1/95-7/30/01. P.I.: A.O. Hero.
18. "Detection and resource allocation problems in ATR systems," Air Force Office of Scientific Research AASERT F49620-98-0370. 4/1/98-3/31/01. P.I. A.O. Hero.
19. "Robust automatic multimodality registration," National Institutes of Health, 4/1/97-3/31/00. P.I. C. R. Meyer.
20. "Estimation strategies for nuclear medical imaging," National Institutes of Health RO1CA54362, 3/1/95-2/28/00. P.I.: W. L. Rogers.
21. "Space-Frequency Image Processing," National Security Agency MDA904-95-C-2157 , 6/1/95-11/31/96. P.I.: W.J. Williams.
22. "Cellular Network Modeling and Simulation for the Study of Cardiac Function," UM OVPR Research Partnership Award, 5/1/94-4/30/95. P.I.: A.O. Hero.
23. "Optimizing information transfer characteristics of tomographic imaging systems," National Science Foundation, BCS-9024370, 5/1/91 - 4/30/95. PI: A. O. Hero.
24. "Computation of content information and time frequency of biological signals," UM OVPR 1992. P.I.s: W. J. Williams and A. O. Hero.
25. "An integrated environment for image reconstruction and visualization," IBM/CAEN Distributed Computing Initiative, 5/20/91. P.I.s: A. O. Hero and D. J. Anderson.
26. "Improving coincidence timing for positron imaging," National Institutes of Health: R01 CA46622-01, 3/1/88 - 9/1/91. P.I.: N.H. Clinthorne.
27. "Engineering research equipment grant: array processing equipment for communications and signal processing research," National Science Foundation. P.I.: W.E. Stark.

28. "Large deviations in delay estimation: models and alternatives," The University of Michigan Rackham School of Graduate Studies, 1/85-9/86. P.I.: A.O. Hero.

Educational Activities:

I. University of Michigan Courses

1. EECS 203, Discrete Mathematics.
2. EECS 206, Signals and Systems I.
3. EECS 210, Introduction to Electrical Engineering I.
4. EECS 353, Intro to Communications.
5. EECS 453, Analog Communications
6. EECS 501, Probability and Random Processes
7. EECS 564, Estimation, Filtering and Detection
8. EECS 559, Advanced Signal Processing
9. EECS 659, Adaptive Signal Processing
10. EECS 750, Signal Processing: State of the Art and Unsolved Problems.

UM Thesis Committee Chairmanships:

1. "Dimensionality Reduction on Statistical Manifolds," Kevin Carter, PhD Thesis, Dept. EECS UM, Dec. 2008. Currently at MIT Lincoln Laboratory.
2. "Prospective identification of long-range transcriptional regulatory regions via integrative genomics," Arvind Rao, PhD Thesis, Dept. EECS UM, July 2008. Currently at Carnegie Mellon University.
3. "Efficient resource allocation schemes for search," Eran Bashan, PhD Thesis, Dept. EECS UM, May 2008. Currently post-doc at Univ. of Mich Dept. EECS.
4. "Advances in surface penetrating technologies for imaging, detection, and classification," Jay Marble, PhD Thesis, Dept. EECS UM, Aug. 2007. Currently at Army Night Vision Labs, Fort Belvoir, VA.
5. "Resource constrained adaptive sensing," Raghuram Rangarajan, Dept. EECS, UM, Aug 2007. Currently at CISCO, San Jose CA.
6. "Inference methods for message endpoint localization in networks," Derek Justice, PhD Thesis, Dept. EECS, UM, Aug. 2006. Currently at 3M Corporation, Minneapolis MN.
7. "Reconstructing Signaling Pathways from High Throughput Data," Dongxiao Zhu, PhD Thesis, Dept. Bioinformatics, UM, May 2006. Presently Research Assistant Professor at Stowards Institute.
8. "Performance Evaluation and Optimization for Inference Systems: Model Uncertainty, Distributed Implementation, and Active Sensing," Doron Blatt, PhD Thesis Dept. EECS, UM, May 2006. Presently financial analyst at DRW Holdings, Inc.
9. "Signal Processing for Magnetic Resonance Force Microscopy," Michael Ting, PhD Thesis Dept. EECS, UM, May 2006. Currently Post-doctoral researcher at Seagate Research Pittsburgh, PA.
10. "Location estimation in sensor networks," Neal Patwari, PhD Thesis, Dept. EECS, Sept. 2005. Presently Assistant Professor at University of Utah, Salt Lake City.
11. "Random graphs for structure discovery in high dimensional data," Jose Costa, PhD Thesis, Dept. EECS, Aug. 2005. Presently post-doctoral fellow at CalTech, Pasadena CA.
12. "An information-based approach to sensor resource allocation," Chris Kreucher, PhD Thesis, Dept. EECS, Feb. 2005. Presently Senior Research Staff member at General Dynamics, Ypsilanti MI.
13. "Unicast Internet Tomography," Clyde Shih, PhD Thesis, Dept. EECS, Jan. 2005. Presently at KLA-Tencor, San Jose, CA.

14. "Entropic graphs for image registration," Huzefa Neemuchwala, PhD Thesis, Dept. Biomedical Engineering, Jan. 2005. Presently at Fujifilm, San Jose CA.
15. "Tradeoffs and limitations in statistically based image reconstruction problems," Tom Kragh, PhD thesis, Dept. EECS, Univ. of Michigan, Sept. 2002. Presently Research Staff at MIT Lincoln Laboratory.
16. "Three dimensional shape modeling: segmentation, reconstruction and registration," Jia Li, PhD thesis, Dept. EECS, Univ. of Michigan, Jan. 2002. Presently Assistant Professor at Oakland University, Rochester, MI.
17. "Adaptive equalization and coding for space-time communications," Mahesh Godavarti, PhD thesis in Dept. EECS, Univ. of Michigan, July 2001. presently research staff at Altrawideband, Inc., CA.
18. "Quantization strategies for low power communications," Robby Gupta, PhD thesis in Dept. EECS, Univ. of Michigan, May 2001. Presently Research Staff at TRW, Inc., LA.
19. "Parametric and non-parametric approaches for multisensor data fusion," Bing Ma, PhD thesis in Dept. EECS, Univ. of Michigan, Jan. 2001. Presently Research Staff at M-Vision, Belleville, MI.
20. "Adaptive target detection in radar imaging," Hyung Soo Kim, PhD thesis in Dept. EECS, Univ. of Michigan, Jan. 2001. Presently Research Scientist in Dept. of Radiology, Univ of Michigan, Ann Arbor, MI.
21. "System modeling, sampling, interpolation and iterative reconstruction for the 3D Compton camera," Anne C. Sauve, PhD thesis in Dept. EECS, Univ. of Michigan, Jan. 2000. Presently Visiting Scholar in the Dept. of Statistics at UC Berkeley..
22. "Robust fusion of MRI and ECT data, and acceleration of EM Algorithm using proximal point approach," Robinson Piramuthu, PhD thesis in Dept. EECS, Univ. of Michigan, May 2000. Presently Research Staff at KLA-Tencor, Inc., CA.
23. "Recursive algorithms for digital communications using the discrete wavelet transform," Ilan Sharfer, PhD thesis in Dept. EECS, Univ. of Michigan, Oct. 1996. Presently Research Engineer at Orcit, Inc., Israel.
24. "Improved penalized likelihood image reconstruction of anatomically correlated emission computed tomography data," Steve Titus, (co-chair with Prof. J. A. Fessler) PhD thesis in Dept. EECS, Univ. of Michigan, Oct. 1996. Presently Research Engineer, Accelerant Networks, OR.
25. "Biased and unbiased Cramer-Rao bounds: computational issues and applications," Mohammed Usman, PhD thesis in Dept. EECS, Univ. of Michigan, Aug. 1994. Presently Dept Head, Phillips Research, CA.
26. "ADEPT: Task Specific Adaptive Beamforming," Ronald A. Delap, PhD thesis in Dept. of EECS, Univ. of Michigan, May 1994. Presently Associate Professor, Air Force Institute of Technology, Wright-Patterson AFB, OH.
27. "Optimal Strategies and Tradeoffs for Joint Detection and Estimation," Bülent Baygün, PhD thesis in Dept. of EECS, Univ. of Michigan, Oct. 1992. Presently Financial Analyst, Salomon Brothers, NY.
28. "Time Delay Estimation for Inhomogeneous Poisson Processes in the Presence of Gaussian Noise," Nick Antoniadis, PhD thesis in Dept. EECS, Univ. of Michigan, Oct. 1992. Presently Research Engineer at Hitec, Athens Greece.
29. "Optimal Arrival Time Estimators for Electromagnetic Radiation Detectors," Nick Petrick, PhD thesis in Dept. EECS, Univ. of Michigan, July 1992. Presently Research Scientist, Dept. of Nuclear Engineering, Univ. of Michigan, Ann Arbor, MI.
30. "Error Bounds in Constrained Estimation," John D. Gorman, PhD thesis in Dept. EECS, Univ. of Michigan, June 1991. Presently Vice President for Research, SET Associates, Maryland.
31. "Time Delay Estimation with Nuisance Parameters: Performance Approximation and Coarse Acquisition," Joong K. Kim, PhD thesis in Dept. EECS, Univ. of Michigan, Oct. 1989. Presently Professor, Sung Kyun Kwan University, South Korea.

32. "Mutual Information Optimization and Evaluation of Single Photon Computed Tomography," Ling Shao, PhD thesis in Program in Bioengineering, Oct. 1989. Presently Dept. Head at ADAC, Inc, CA.

II. Major Short Courses:

1. "Complexity, Information, and Geometry," Ecole d'été GRETSI, Peyresque, France, July 2008.
2. "Signal Processing as Enabler for Wide Area Distributed Network Applications: Statistical Signal Processing for Network Inference," IEEE International Conference on Information, Communications and Signal Processing (ICICS'2007), Singapore, Dec. 2007.
3. "Signal processing for integrative bioinformatics," Tutorial, Workshop on Information Theory and Applications (ITA), Jan 2008.
4. "Statistical signal processing for networks," half day tutorial, Intl Conference on Information, Communications and Signal Processing (ICICS), Dec 2007.
5. "In vitro measurement of gene expression, Part II: Analysis," IEEE Intl Symposium on Biomedical Imaging (ISBI) Tutorial, A.O. Hero, Washington DC, April 15 2004.
6. "Signal detection theory and application," A.O. Hero, five day short course given at EG&G, Inc. , Las Vegas, NV, June 1998.
7. "Methodes d'évaluation de l'erreur minimale atteignable en estimation de paramètres," A. O. Hero, one day short course on Evaluation et Utilisation de Bornes d'Erreur en Estimation Paramétrique, University of Nice, France, Nov.29, 1991.
8. "Aspects of optimal estimation theory," A. O. Hero, short course given at Laboratoire des Signaux et Systèmes (LSS) Ecole Supérieure d'Electricité, Gif-sur-Yvette, France, Oct. 1991.

Service Activities:

Major Leadership Positions

1. Director, IEEE Division IX, 2010-2011.
2. President, IEEE Signal Processing Society, 2006-2007.
3. Chair, U.S. Commission C, International Union of Radio Sciences (URSI)
4. V.P. Finance, IEEE Signal Processing Society, 2000-2002.
5. Chair, IEEE Statistical Signal and Array Processing (SSAP) Technical Committee, IEEE Signal Processing Society, (1996-1998)
6. General Chairman, IEEE International Conference on Acoustics Speech and Signal Processing (ICASSP), 1995.

Editorial Boards

Editeur Associé, Traitement du Signal (2008-2010).

Associate Editor, IEEE/ACM Transactions on Computational Biology and Bioinformatics (2003-2008)

Guest co-Editor (Guest Editor, A. Singer), Special Issue on Signal Processing and Machine Learning, IEEE Transactions on Signal Processing, 2003-2004

Guest co-Editor (Guest Editor, R. Riedi), Special Issue on Signal Processing for Networking, IEEE Transactions on Signal Processing, Sept. 2003

Guest co-Editor (w/ H. Krim), Special Issue on Mathematical Imaging, IEEE Signal Processing Magazine, Oct. 2002

Guest Associate Editor (w/ D. Snyder, P. Moulin, J. O'Sullivan), Special Issue on Information Theoretic Imaging, IEEE Transactions on Information Theory, 1999-2001

Guest Editor, IEEE Signal Processing Magazine, Special Issue on Statistical Signal and Array Processing, 1996.

Associate Editor, IEEE Transactions on Information Theory, 1994-1998.

Service to IEEE

Chair, IEEE Board of Directors Ad Hoc Committee on Conference Quality, 2009.

Director, IEEE Division IX, 2010-2011 (Director-elect in 2009)

Member, IEEE Board of Directors, 2010-2011

Member, IEEE Signal Processing Society Lensing oversight Committee, 2008-2009.

Member, IEEE Society Review Committee (2008)

Member, IEEE International Committee on Earth Observation (2008)

Chair, Nominations and Appointments Committee, IEEE Signal Processing Society (2008-2009)

Member, IEEE TAB Periodicals Board (2006-2008)

President, IEEE Signal Processing Society (2006-2007)

IEEE International Conference on Acoustics, Speech and Signal Processing, 1995.

President-Elect, IEEE Signal Processing Society (2004-2006)

Chair, Technical Directions Committee, IEEE SP Society (2004-2006)

Chair, Long Range Planning and Implementation Committee, IEEE SP Society (2004-2006)

Chair, ad hoc Biological Imaging and Signal Processing (BISP) committee, IEEE SP Society (2004-2005)

Chair, ad hoc Information Forensic and Security (IFS) committee, IEEE SP Society (2005-2006)

Panelist, Panel on Women in Signal Processing, IEEE ICASSP-05, Philadelphia, Mar 2005.

Vice President – Finance, IEEE Signal Processing Society, 2000-2002

Member, Executive Committee, IEEE Signal Processing Society, 2000-2008

Member, Board of Governors, IEEE Signal Processing Society, 2000-2005

Member, Signal Processing Theory and Methods Technical Committee, IEEE Signal Processing Society, 1999-2004

Member Conference Board, IEEE Signal Processing Society, 1992-2002

Member Publications Board, IEEE Signal Processing Society, 2000-2002

Member, Technical Directions Committee, IEEE Signal Processing Society, 1996-1998

Treasurer, IEEE Signal Processing Society Conference Board, 1996-1999.

Chairman, Statistical Signal and Array Processing Technical Committee, IEEE Signal Processing Society, 1996-1998

Chairman, Ad Hoc Task Force for Restructuring IEEE Signal Processing Society, 1998

Conference Organization

General Chairman, 1995 IEEE International Conference on Acoustics, Speech, and Signal Processing, Detroit, 1995.

Co-Chair, 1999 IEEE Workshop on Higher Order Statistics, Caesaria ISRAEL, June 1999.

Co-Chair, 1999 IEEE Workshop on Information Theory, Santa Fe, Feb. 1999.

Program committee member, IEEE Nuclear Science Symposium and Medical Imaging Conference, San Francisco, 1994 -

Chairman for Publicity, 1986 IEEE International Symposium on Information Theory.

Member Education Committee, IEEE Signal Processing Society, 1993-1995

Co-chair, (w/ P. Barford, C. Partridge, W. Willinger) 2nd Workshop on Internet Signal Processing (WISP) Madison WI, 2004

US Liason, European Signal Processing Conference, Toulouse, France, Sept. 2002.

Program committee member, SPIE Int. Symposium on Optical Science, Engineering, and Instrumentation, San Diego, 1998.

Service to Government Agencies

National Science Foundation:

Member, UIUC CISE site visit team (2008)

Organizer and Chair, NSF Workshop on active sensing, 2005.

Member, NSF ITR review panels, 2003-2004.

Co-Chair, NSF/DARPA Workshop on Genomic Signal Processing and Statistics (GENSIPS), Oct. 2002.

Chair, NSF Workshop on Challenges in Pattern Recognition, Mar. 2002.

Member, NSF CAREER Panel, Nov. 2001.

Member, NSF Advisory Panel for Interfaces between Signal Processing and Statistics, 1995.

Panelist NSF (1994, 1998, 2001)

National Research Council (NRC):

Panelist, IED Workshop, National Academy of Sciences, 2008

Chair, Cross Cutting Robotics Panel (reviews research at Army Research Laboratory (ARL), National Research Council (NRC), 2004.

Member, Sensors and Electronic Devices (SED) Panel (reviews research at ARL), National Research Council (NRC), 2002-2005.

Department of Defense Research Agencies

Panelist, NSF/IARPA/NSA Science of Security Workshop (2008)

Member, ARO Computer Information Sciences Division Strategy Workshop (2008)

Organizer, ARO Workshop on Signal and information processing (2007).

Member, IARPA Panel on Science of Security (2008)

Member, DARPA Panel on ISAT-AIR (2006)

Member, AFOSR Panel on ATR (2004)

Member, DARPA Panel on GUMBY (2004)

Member, DARPA Panel on Multistage Scheduling (2004)

Member, DARPA Multi-User Detection Study Group, April-July 2000.

Member, Army Research Lab Technical Activities Board (ARLTAB), coordinates yearly review of ARL's research activities, (2004-2006).

National Institute of Health (NIH):

Special Study Section member NIH (1992, 1993, 1996, 1997, 1998, 2002, 2004)

University of Michigan Leadership and Major Committees:

Member, ECE Executive Committee Committee 2008-2009

Member, ECE Faculty Search Committee 2007-

Interim Director, Systems Laboratory, Dept. of EECS 2007-2008

Area Coordinator, Signal Processing, Dept. of EECS 2005-.

Member, College of Engineering EECS Internal Review Committee, 2003-2005

Member, EECS Atrium Renovation committee, 2003-2004.

Faculty Advisor, Michigan Gamma Chapter of Tau Beta Pi, 2002-2005

Graduate Counselor, Signal Processing Program, Dept. EECS, 2001-

Member, ECE Faculty Search Committee, Dept EECS, 2002-2005

Member, College of Engineering EECS Chair Search Committee, 2001-2003

Member, EECS Awards Committee, 2000-2001

Member, EECS Executive Committee, 2000-2002

Member, EECS-EES Graduate Committee, 2000-2002

Member, Faculty Search Committee for Communications and Signal Processing, 2000-2001

Member, Departmental Computing Organization (DCO), 1999-2000

Member, Rules Committee of the Faculty Senate, 1997-2003.

Co-Chair of Admissions, Systems Division Graduate Program, 1997-.

Director, Communications and Signal Processing Laboratory (CSPL) 1996-2000.

Chair, College Rules Committee, College of Engineering 1996-1997.

Chair, Signal Processing Processing Area, 1991-1996

Chair, Faculty Search Committee for Signal Processing, 1994-1996, 1999-2000.

Member, College of Engineering Faculty Discipline Committee, 1993-1998.

Member, EECS Executive Committee, 1990-1992.

Member, Blue Ribbon Committee for EECS Undergraduate Curriculum, 1991-1992.

Member, EES Graduate Committee, Sept. 1985-1990, 2000-.

Member, Systems Division Executive Committee, 1988-1989.

Graduate Advisor for Signal Processing Program, Systems Division, 1985-1990.

Member, EES Graduate Financial Aid Committee, 1987-1990.

Member, Systems Division Seminar Committee, 1987, 1988, 1990, and 1991.

Membership in Professional Societies

The Institute of Electrical and Electronic Engineers (IEEE), Fellow (1998)

American Association for the Advancement of Science (AAAS), member

The American Statistical Association (ASA), Member

The Society for Industrial and Applied Mathematics (SIAM), Member

The International Union of Radio Science (URSI), Commission C, Member

Tau Beta Pi, Member