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## EDUCATION

**Ph.D. in Applied Mathematics**, University of Florida, August 1986.

Dissertation: *Image Algebra Techniques for Parallel Computation of Discrete Fourier and General Linear Transforms*

**M.S. in Mathematics**, University of Florida, May 1983.

**B.S. in Mathematics**, University of Central Florida, August 1981, *magna cum laude*.

## POSITIONS HELD

- 08/15-Present **Visiting Researcher**, Computer Science  
University of California, Santa Barbara
- 2003-Present **Professor** of Computer and Information Science and Engineering  
University of Florida.
- 05/12 – 05/15 **Chair and Professor** of Computer and Information Science and Engineering  
University of Florida
- 2001-2003 **Associate Professor** of Computer and Information Science and Engineering  
University of Florida.
- 2001 **Professor** of Computer Engineering and Computer Science,  
University of Missouri – Columbia
- 1997-2001 **Associate Professor** of Computer Engineering and Computer Science,  
University of Missouri-Columbia.
- 1991-1997 **Assistant Professor** of Computer Engineering and Computer Science,  
(formerly Electrical and Computer Engineering), University of Missouri-Columbia.
- 1994 **Summer Research Fellow**, Image Processing Laboratory, Eglin AFB FL.
- 1991-1997 **Consultant**, Environmental Research Institute of Michigan (ERIM).
- 1989-1991 **Section Head and Research Engineer**, Image and Pattern Analysis Section, ERIM.
- 1988 **Summer Research Fellow**, Institute for Mathematics and Its Applications,  
Summer Program on Signal Processing, University of Minnesota.
- 1987-1988 **Assistant Professor** of Mathematics, University of Wisconsin-Oshkosh.
- 1986-1988 **Senior Research Scientist**, Machine Vision Technology Section,  
Honeywell Systems and Research Center, MN.
- 1986-1988 **Honorary Fellow**, Department of Mathematics, University of Wisconsin-Madison.

- 1986            **Visiting Assistant Professor** of Mathematics, University of Wisconsin-Oshkosh.
- 1984-1986    **Graduate Research Assistant**, Computer and Information Science Department,  
University of Florida.
- 1984            **Summer Research Fellow**, Image Processing Laboratory, Eglin AFB, FL.
- 1981-1984    **Graduate Teaching Assistant**, Department of Mathematics, University of Florida.

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## PUBLICATIONS

### REFEREED JOURNAL ARTICLES

(99 published/accepted)

- (J1) R. Heylen, P. Scheunders, **P. D. Gader**, and A. Rangarajan, "Nonlinear unmixing by using different metrics in a linear unmixing chain", *IEEE-JSTARS, Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol.8, no.6, pp.2655-2664, June 2015, doi: 10.1109/JSTARS.2014.2375342.
- (J2) S. Yuksel, J. Bolton, P. D. Gader, "Multiple Instance Hidden Markov Models with Applications to Landmine Detection", *IEEE Transactions Geoscience and Remote Sensing*, (accepted for publication)
- (J3) T. Glenn, A. Zare, **P. D. Gader**, "Bayesian Fuzzy Clustering," *IEEE Transactions on Fuzzy Systems*, vol. PP, no.99, pp.1,1 doi: 10.1109/TFUZZ.2014.2370676 (accepted for publication)
- (J4) R. Close; **P. D. Gader**; J. Wilson, "Hyperspectral unmixing using macroscopic and microscopic mixture models", *J. Appl. Remote Sens.* 8 (1), 083642 (April 29, 2014); doi: 10.1117/1.JRS.8.08364
- (J5) R. Heylen, M. Parente, **P.D. Gader**, "A Review of Nonlinear Hyperspectral Unmixing Methods," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol.7, no. 6, Article #2320576, June 2014.
- (J6) Wing-Kin Ma, J.M. Bioucas-Dias, J. Chanussot, **P.D. Gader**, "Signal and Image Processing in Hyperspectral Remote Sensing [From the Guest Editors]," *IEEE Signal Processing Magazine*, vol.31, no. 1, pp. 22-23, January 2014.
- (J7) Xuping Zhang, J.Bolton, **P. D. Gader**, "A New Learning Method for Continuous Hidden Markov Models for Subsurface Landmine Detection in Ground Penetrating Radar," , *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol.7, no.3, pp.813:819, March 2014
- (J8) Xiaoxiao Du, A. Zare, **P.D. Gader**, D. Dranishnikov, "Spatial and Spectral Unmixing Using the Beta Compositional Model," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 7, no. 6, June 2014
- (J9) Rob Heylen and **P. D. Gader**, "Nonlinear Spectral Unmixing With a Linear Mixture of Intimate Mixtures Model," , *IEEE Geoscience & Remote Sensing Letters*, vol. 7, no. 11, pp:1195-1199, July 2014.
- (J10) A. Zare, J. Bolton, J. Chanussot, **P.D. Gader**, "Foreword to the Special Issue on Hyperspectral Image and Signal Processing," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 7, no. 6, pp. 1841-1843, June 2014.
- (J11) Ma, W.-K.; Bioucas-Dias, J.M.; Tsung-Han Chan; Gillis, N.; **P. D. Gader**, P.; Plaza, A.J.; Ambikapathi, A.; Chong-Yung Chi, "A Signal Processing Perspective on Hyperspectral Unmixing: Insights from Remote Sensing," *IEEE Signal Processing Magazine*, vol.31, no.1, pp.67,81, Jan. 2014
- (J12) P.D. Gader, A. Zare, J. Bolton, J. Chanussot, "WHISPERS 2013: 5<sup>th</sup> Workshop on Hyperspectral Image and Signal Processing ? Evolution in Remote Sensing [Conference Reports]," *IEEE Geoscience & Remote Sensing Magazine*, vol. 1, no.4, pp. 50-53, December 2013.
- (J13) Alina Zare, **P. D. Gader**, O. Bchir, and H., "Piece-wise Convex Multiple Model Endmember Detection and Spectral Unmixing", *IEEE Trans. Geoscience and Remote Sensing*, vol.. 51, no. 5, pp. 2853 - 2862, July, 2013.

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- (J15) Achmed Abdallah, H. Frigui, **P. D. Gader**, “Adaptive Local Fusion with Fuzzy Integrals”, *IEEE Trans. Fuzzy Systems*, vol. 20, no. 5, pp. 849-864, Oct. 2012.
- (J16) J.M. Bioucas, A. Plaza, N. Dobigeon, M. Parente, Qian Du, P. D. Gader, J. Chanussot, “Hyperspectral Unmixing Overview: Geometrical, Statistical, and Sparse Regression-Based Approaches,” *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 5, no. 2, pp. 354-379, April 2012.
- (J17) A. Zare, P. D. Gader, K. S. Gurumoorthy, “Directly Measuring Material Proportions Using Hyperspectral Compressive Sensing,” *IEEE Trans. Geoscience and Remote Sensing*, vol. 9, no. 3, pp. 323-327, May 2012.
- (J18) S. Yuksel, J. Wilson, and **P. D. Gader**, "Twenty Years of Mixture of Experts", *IEEE Transactions on Neural Networks and Learning Systems*, vol. 23, no. 8, p.1177-1193, May, 2012.
- (J19) Alina Zare, **P. D. Gader**, and K. S. Gurumoorthy, “Directly Measuring Material Proportions Using Hyperspectral Compressive Sensing”, *Geoscience and Remote Sensing Letters*, vol.9, no.3, pp.323-327, May 2012
- (J20) H. Frigui, L. Zhang, **P. D. Gader**, Joseph N. Wilson, K C Ho, and Andres Mendez-Vazquez “An Evaluation of Several Fusion Algorithms for Anti-tank Landmine Detection and Discrimination”, *Information Fusion* Vol. 13, Issue 2, April 2012, Pages 161–174.
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- (J23) J. Bolton, **P. D. Gader**, Hichem Frigui, Pete Torriane, “Random Set Framework for Multiple Instance Learning”, *Journal of Information Sciences*, Volume 181, Issue 11, 1 June 2011, Pages 2061-2070.
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- (J25) G. Heo, **P. D. Gader**, “Robust Kernel Discriminant Analysis using Fuzzy Memberships”, *Pattern Recognition*, Volume 44, Issue 3, March 2011, Pages 716-723.
- (J26) Alina Zare and **P. D. Gader**, “PCE: Piece-wise Convex Endmember Detection” *IEEE Trans. Geoscience and Remote Sensing*, Vol. 48, No. 6, June 2010, pp. 2620-2632.
- (J27) H. Frigui, L. Zhang, **P. D. Gader**, “Context Dependent Multi-Sensor Fusion and its Application to Land Mine Detection”, *IEEE Trans. Geoscience and Remote Sensing*, Vol. 48, No. 6, June 2010, pp. 2528 – 2543.
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- (J31) R. Mazhar, **P. D. Gader**, J. N. Wilson, “Matching Pursuits Dissimilarity Measure for Shape-Based Comparison and Classification of High-dimensional Data”, *IEEE Trans. Fuzzy Systems*, Vol. 17, No. 5, Oct. 2009, Page(s): 1175-1189.
- (J32) G. Heo, **P. D. Gader**, and H. Frigui, “RKF-PCA: Robust kernel fuzzy PCA”, *Neural Networks*, Vol. 22, No. 5-6, July 2009, Page(s): 642-650.
- (J33) H. Frigui and **P. D. Gader**, “Detection and discrimination of land mines in ground-penetrating radar based on edge histogram descriptors and a Possibilistic K-Nearest Neighbor Classifier”, *IEEE Trans. Fuzzy Systems*, Volume 17, Issue 9, March 2009, Page(s) 185-199.
- (J34) J. Bolton, **P. D. Gader**, J. N. Wilson, “Discrete Choquet Integral as a Distance Metric”, *IEEE Trans. Fuzzy Systems* Volume 16, Issue 4, Aug. 2008 Page(s):1107 - 1110.
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- (J40) Alina Zare and **P. D. Gader**, “Sparsity Promoting Iterated Endmember Detection in Hyperspectral Imagery”, *IEEE Geoscience and Remote Sensing Letters*, Vol.4, No. 3, pp. 446-451, July 2007.
- (J41) R. Joe Stanley, K.C. Ho, **P.D.Gader**, J. N. Wilson, James Devaney, “Land Mine and Clutter Object Discrimination Using Wavelet and Time Domain Spatially Distributed Features from Metal Detector and Their Fusion with GPR Features for Hand-Held Units”, *Circuits Systems and Signal Processing*, Vol. 26, No. 2, pp. 165-191, April 2007.
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- (J44) M. Popescu, **P. D. Gader**, and J. M. Keller, "Fuzzy Spatial Pattern Processing Using Linguistic Hidden Markov Models", *IEEE Trans. Fuzzy Systems*, Vol. 14, No. 1, pp. 81-92, Feb. 2006.
- (J45) H. Frigui, K.C. Ho and **P. D. Gader**, "Real-time Land Mine Detection with Ground Penetrating Radar using Discriminative and Adaptive Hidden Markov Models" *EURASIP Journal on Applied Signal Processing*, Vol. 2005, No. 12, pp. 1867-1885, July 2005.
- (J46) **P. D. Gader**, W-H Lee, J. N. Wilson, "Detecting Landmines with Ground Penetrating Radar using Feature-Based Rules Order Statistics, and Adaptive Whitening", *IEEE Trans. Geoscience and Remote Sensing*, vol. 42, No. 11, pp. 2522-2534, Nov. 2004.
- (J47) T. Wang, J. M. Keller, **P. D. Gader**, A. K. Hocaoglu, "Phase Signatures in Acoustic-Seismic Landmine Detection", *Radio Science*, vol. 39, pp. RS4S02/1-13, July 2004.
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- (J51) Jinhui Liu and **P. D. Gader**, "Neural Networks with Enhanced Outlier Rejection Ability for Off-Line Handwritten Word Recognition", *Pattern Recognition* Vol. 35, No. 10, pp. 2061-2071, October, 2002.
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- (J68) M. Khabou and **P. D. Gader**, "Automatic Target Detection using Entropy-Optimized Shared Weight Neural Networks," *IEEE Trans. Neural Networks*, Vol. 11, No. 1, pp. 186-194, January 2000.
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(C207) **P. D. Gader** and S. Takriti, "Decomposition Techniques for Gray-Scale Morphological Templates," Proceedings of the SPIE Conference on Image Algebra and Morphological Image Processing, San Diego, CA, July 1990, Vol. 1350.

(C208) **P. D. Gader** and B. Forester, "Integrating Template and Model Matching for Unconstrained Handwritten Numeral Recognition," SPSE Annual Conference, Rochester, NY, May 1990.

(C209) Andres M. Gillies, **P. D. Gader**, M. P. Whalen, and B.T. Mitchell, "Application of Mathematical Morphology to Handwritten ZIP Code Recognition," Proceedings of the SPIE Conference on Visual Communications and Image Processing IV, Philadelphia, PA, Nov. 1989, Vol. 1199.

(C210) **P. D. Gader** and E. Dunn, "Image Algebra and Morphological Template Decomposition," Proceedings of the SPIE Conference on Aerospace Pattern Recognition, Orlando, FL, March 1989.

(C211) G. X. Ritter, **P. D. Gader**, and J. L. Davidson, "Bridge Detection FLIR Images," Proceedings of the Eighth International Conference on Pattern Recognition, Paris, France, October 1986.

(C212) G. X. Ritter and **P. D. Gader**, "Image Algebra Implementations on Cellular Array Computers," Proceedings of the IEEE Computer Society Workshop on Computer Architecture for Pattern Analysis and Image Database Management, Miami Beach, FL, November 1985.

## CONFERENCE PRESENTATIONS

D. K. C. Ho, **P. D. Gader**, Joseph N. Wilson, "Subspace Processing on the Energy Density Spectrum for Landmine Detection", Presented at UXO-Countermine Forum 2007, Orlando FL, August 2007.

J. N. Wilson, **P. D. Gader**, D. K. C. Ho, "Sensor Fusion for Autonomous Mine Detection", Presented at UXO-Countermine Forum 2007, Orlando FL, August 2007.

H. Frigui, Lijun Zhang, and **P. D. Gader**, "Comparison of Different Algorithm Fusion Methods for Landmine Detection with GPR", Presented at UXO-Countermine Forum 2007, Orlando FL, August 2007.

W. H. Lee, **P. D. Gader**, J. N. Wilson, "Optimizing functions of ROC curves for landmine detection", Presented at IEEE International Geoscience and Remote Sensing Symposium, Denver CO., August 2006.

J. N. Wilson, **P. D. Gader**, T. C. Glenn, K. C. Ho, "Sensor fusion for automated hand-held landmine discrimination", Presented at IEEE International Geoscience and Remote Sensing Symposium, Denver CO., August 2006.

**P. D. Gader** "HSI/SAR Fusion Using Choquet Integration for Airborne Mine Detection" Presented at SIAM 2005 National Meeting, Minisymposium on Mathematics in Landmine Detection, New Orleans, LA, July 2005 (invited talk)

**P. D. Gader**, "Displacement Ranks for Group Matrices," Presented at the SIAM 1988 National Meeting, Minneapolis, MN, July 1988.

**P. D. Gader**, "Numerical Factorization of Matrices into Products of Local Matrices," Presented at the SIAM Conference on Applied Linear Algebra, Madison, WI, May 1988.

**P. D. Gader**, "Elementary Number and Group Theory in Computer Science and Engineering," Presented at Wisconsin Section of Math Association of America Annual Meeting, La Crosse, WI, April 1988.

**P. D. Gader**, "An Algebraic Approach to the Development of Parallel Algorithms for Two-Dimensional Discrete Fourier Transforms," Presented at the SIAM 1986 National Meeting, Boston, MA, July 1986.

## WORKSHOPS AND SPECIAL PRESENTATIONS

“Hyperspectral Image Analysis”, Invited Talk, ECE Department, University of Massachusetts, Amherst, MA, USA, October 2012.

“Nonlinear spectral unmixing: An overview with applications”, Invited Talk at Universidad de Las Palmas, Gran Canaria, Canary Islands, September, 2012.

“Models and Algorithms for Linear & Nonlinear Hyperspectral Unmixing”, Presentation to Technical Staff of Commonwealth Scientific and Industrial Research Organisation (CSIRO), July 2012.

“Hyperspectral Image Analysis: How to See Inside a Pixel”, Keynote Talk at Alternative Sensing Modalities for Robotic Perception Workshop, part of the Robotic Science and Systems Conference, Sydney, Australia, July 2012.

“Nonlinear Unmixing of Hyperspectral Images”, Invited Talk, University of Pavia, Pavia, Italy, April, 2012.

“Ground Penetrating Radar and Hyperspectral/LIDAR Image Analysis for Buried and Occluded Object Detection” Invited Talk, Naval Surface Warfare Center, Panama City Beach, Florida, USA, October 2011.

“Soft Computing for Hard Pattern Recognition Problems”, Keynote Talk at the IEEE Conf. Fuzzy Systems, Taipei, Taiwan, July 2011.

“Piece-wise Convex Hyperspectral Endmember Distribution Detection”, Invited Talk, ECE Department, University of Puerto Rico – Mayaguez, Mayaguez, Puerto Rico, December 2010.

“Pattern Recognition for Humanitarian De-Mining”, Presentation as a Member of an Invited Panelist for Panel on Applications of Image and Signal Processing in the Preservation of the Environment, International Conference on Pattern Recognition (ICPR 2002), Quebec City, Quebec, Canada, August 2002.

“Hidden Markov Models for Landmine Detection with Ground Penetrating Radar”, Presented to the Research Staff of TNO Physics and Electronics Laboratory, The Hague, The Netherlands, September 2000.

“Soft Computing Techniques for GPR Detection and Fusion”, Presented at Joint U. S. / European Research on De-mining Technologies, Sponsored by the European Commission’s Joint Research Center, the U. S. Army Electronics Technology and Devices Lab, and the European Research Office, Ispra, Italy, July 2000.

“Introduction to Morphological Image Processing,” Short course co-taught with Edward Dougherty at the IS&T Symposium on Electronic Imaging Science and Technology, San Jose, CA, Feb. 10, 1997.

“Applications of Fuzzy Sets in Handwriting Recognition,” Presented to the Electronic Imaging Working Group Meeting at the IS&T/SPIE Symposium on Electronic Imaging, San Jose, CA, Jan. 30, 1996.

“A Comparison of Fuzzy Logic and Neural Network Methods for Street Number Location in Handwritten Addresses,” Presented to the Bay Area OCR Group at Apple Computer, San Jose, CA, Feb. 1, 1996.

## FUNDED RESEARCH

TOTAL ACADEMIC RESEARCH FUNDING (AUGUST 1991) **\$15,384,950**

### Research Funding at the University of Florida August 2001-June 2015

TOTAL UF FUNDING AWARDED AS A PRINCIPAL INVESTIGATOR = **\$10,176,663**

TOTAL UF FUNDING AWARDED AS A CO- INVESTIGATOR = **\$774,988**

TITLE	SPONSOR	AMOUNT	DATES
Analysis of Ground Penetrating Radar for Humanitarian Demining Principal Investigator	U. S. Army Humanitarian Demining Office through Science Applications International Corp.	\$381,416	11/16/01-09/10/02
Nonlinear Signal Processing of Ground Penetrating SAR Sensor Data for Land Mine Detection* Principal Investigator	Science and Technology Division of the Night Vision and Electronic Sensors Directorate (subcontract from the University of Missouri)	\$314,972	08/10/01-09/30/05
Nonlinear Signal Processing of Acoustic Sensor Data for Land Mine Detection* Principal Investigator	Science and Technology Division of the Night Vision and Electronic Sensors Directorate (subcontract from the University of Missouri)	\$517,311	08/10/01-09/30/05
Landmine Detection with a Hand-held Mine Detection System	U. S. Army Humanitarian Demining Office	\$146,469	9/26/02-12/31/04
Investigation of Quadrupole Resonance for Landmine Detection	Night Vision and Electronic Sensors Directorate	\$8546	9/25/2002-9/24/2003
Software Analysis/Algorithm Development for GSTAMIDS Mine Detection Systems (Del. Order 0001)	Night Vision and Electronic Sensors Directorate	\$233,940	9/26/01-12/31/02
Mine Detection Analysis	Night Vision and Electronic Sensors Directorate	\$36,000	9/30/02-12/31/02
Algorithms for Discriminating UXO from non-UXO based on Mathematical Morphology and Fuzzy Sets	Strategic Environmental Research and Development Program – Dept. of Defense	\$98,800	5/02-5/03
Land Mine Detection Based on Spectral Signatures Multi-University Research Initiative	Georgia Institute of Technology	\$487,711	9/02-5/08
Analysis of Ground Penetrating Radar for Vehicle Mounted Mine Detection	Night Vision and Electronic Sensors Directorate	\$36,000	9/30/02-12/31/04
Humanitarian Demining with the Wichmann Ground Penetrating Radar	Night Vision and Electronic Sensors Directorate	\$88,568	7/01/03-12/31/04
Ground Tracking for Vehicle Mounted Mine Detection	Night Vision and Electronic Sensors Directorate	\$25,000	10/1/04-9/30/05
Vehicle Mounted Mine Detection with Ground Penetrating Radar	Night Vision and Electronic Sensors Directorate	\$287,415	7/01/03-12/31/04

Pattern Classification and Characterization	Harris Corp.	\$137,029	8/18/2004-12/31/2006
Feature-Based Analysis of Ground Penetrating Radar for Landmine Detection	Army Research Office	\$923,145	3/1/2005 - 2/28/2006
Feature-Based Methods for Landmine Detection with Ground Penetrating Radar II	Army Research Office	\$1,213,303	03/01/2005 - 08/31/2008
Development of Analysis Methods for Response Spectra Measurements	Sandia Nat'l Lab	\$110,800	06/20/2007 - 06/30/2008
Optimized Multi-algorithm Systems for Context Based Explosives Detection	National Science Foundation	\$370,000	09/01/2007 - 08/31/2010
Feature-Based Methods for Landmine Detection... Add-On	Army Research Office	\$1,287,785	06/15/2007 - 06/14/2010
Multi-Sensor Detection of Obscured and Buried Objects (Switched to J. Wilson PI when I became department chair)	Army Research Office	\$ 1,978,408	10/01/2008 - 09/30/2011
Multi-Object Detection and Discrimination Algorithms	Army Research Office	\$1,205,666	10/01/2009 - 09/30/2012
Random Set and Semiparametric Methods for Analyzing Human Terrain	University of Missouri	\$335,861	09/15/2010 - 12/31/2013
Probabilistic Hyperspectral and LiDAR Fusion	Department of Defense	\$648,906	08/25/2010 - 08/24/2013

### FUNDED RESEARCH

#### Co-Investigator at the University of Florida August 2001-May 2008 (Page 2)

TITLE	SPONSOR	AMOUNT	DATES
Humanitarian Demining Algorithm Improvement	U. S. Army Humanitarian Demining Office	\$25,000	12/14/2004-6/14/2005
Software Algorithm Improvements for Hand Held Standoff Mine Detection Systems	U. S. Army Humanitarian Demining Office	\$177,035	8/1/2005-6/30/2007
Software Algorithm Improvements for Landmine Detection	U. S. Army Humanitarian Demining Office	\$109,463	6/7/2007-5/8/2008
Classification of widgets based on response spectra measurements	Sandia National Lab	\$132,877	8/14/12008-8/14/2009
Analysis and Characterization of Response Spectra Measurements	Signalscape, Inc.	\$120,000	6/9/09-3/31/10
Spatial, Temporal, and Frequency Analysis of Wideband, Ground Penetrating Sensor Data (Switched to J. Wilson PI when I became department chair)	Army Research Office	\$210,613	01/01/13 - 12/31/15
Algorithm and Decision Support Systems	Army Research Office	\$198,399	9/18/2014-9/17/2017

**FUNDED RESEARCH**  
**University of Missouri**  
**Totals include all funds awarded Sept. 1 1991- Sept. 1, 2001.**

TOTAL FUNDING CREDITED TO PAUL GADER SINCE SEPT. 1991= **\$4,433,299**

A summary is provided in the following table on this page and the next page.

TITLE	SPONSOR	%	AMOUNT	DATES
Handwritten Word Recognition I Principal Investigator	ERIM	100	\$60,000	12/91 - 8/92
Handwritten Word Recognition II Principal Investigator	ERIM	100	\$51,783	9/92 - 3/93
Handwritten Word Recognition III Principal Investigator	ERIM	100	\$32,000	3/93 - 9/93
Pattern Recognition via Fuzzy Morphological Networks Principal Investigator	MU Research Board	100	\$48,044	6/93 - 5/94
Computer Vision Research in Automatic Target Detection and Recognition Co-Investigator	E&S Corporation	25	\$46,678	1/93 - 10/93
Computer Vision Research in Automatic Target Detection and Recognition Co-Investigator	E&S Corporation	25	\$29,995	1/94 - 9/94
Image Algebra Based Local Feature Extraction and Detection of Occluded Vehicles Principal Investigator	Eglin AFB	70	\$99,195	3/95 - 3/96
Tanker Recognition in Highway Images and Scene Recognition Investigations Co-Investigator	E&S Corporation	40	\$25,000	6/95 - 8/95
Parallel Algorithms for Chromosome Image Segmentation Co-Investigator	MU Research Board	50	\$43,360	1/96 - 12/96
Analysis of Bone Marrow Microscopic Images Co-Investigator	SEI (formerly E & S Corp)	35	\$42,000	7/96 - 9/96
Application of Fuzzy Logic to Automatic Target Recognition Co-Investigator	Office of Naval Research	33	\$483,135	1/96 - 12/98
Image Algebra Based Local Feature Extraction and Detection of Occluded Vehicles Principal Investigator	Eglin AFB	65	\$196,445	8/96 - 8/97
Mine Detection and Neutralization Co-Investigator	Army Research Office	21	\$524,802	1/97-11/99
Recognition Technology for Automatic Target Recognition Co-Investigator	Office of Naval Research	45	\$190,711	4/99-12/00
Automated Bone Marrow Cell Analysis Co-Investigator	SEI Corp	35	\$49,781	3/97-6/98

## FUNDED RESEARCH at the University of Missouri (Page 2)

TITLE	SPONSOR	%	AMOUNT	DATES
Automatic Land Mine Detection Principal Investigator	Geo-Centers Inc.	70	\$138,075	12/97-4/99
Classification of Unexploded Ordnance Signatures Principal Investigator	Geo-Centers Inc.	90	\$30,011	8/98-12/98
Interactive Handwritten Database Query Research Principal Investigator	NSF	100	\$149,284	9/98-12/00
Interactive Handwritten Database Query Research Supplement Research Experience for Undergraduates Principal Investigator	NSF	100	\$6,250	8/99-12/00
Improved Land Mine Detection for HSTAMIDS Principal Investigator	Night Vision and Electronic Sensors Directorate	70	\$136,850	4/99-3/00
Automated Concrete Evaluation System Validation and Pathology Detection and Resolution -- Phase I Co-Investigator	Missouri Department of Transportation	10	\$31,739	7/99-6/00
Extension of Improved Land Mine Detection for HSTAMIDS Principal Investigator	Night Vision and Electronic Sensors Directorate	50	\$22,339	4/00-5/00
Support Services for the Mine Hunter/Killer ATD Co-Investigator	Night Vision and Electronic Sensors Directorate	25	\$24,669	3/00-8/00
Mine Detection and Neutralization Principal Investigator	Army Research Office	60	\$292,000	12/99-11/00
GSTAMIDS GPR Algorithm Analysis Principal Investigator	Night Vision and Electronic Sensors Directorate	100	\$24,876	5/18/00 – 8/18/00
Hidden Markov Models for Sensor Fusion of EMI and GPR Principal Investigator	Army Research Office	70	\$50,000	6/1/00 – 5/31/01
Improved Land Mine Detection for HSTAMIDS – Phase II Principal Investigator	Night Vision and Electronic Sensors Directorate	50	\$88,910	6/1/00 – 11/30/00
Mine Detection Analysis Support –Delivery Order 2 GSTAMIDS GPR Algorithm Analysis Principal Investigator	Night Vision and Electronic Sensors Directorate	100	\$74,999	8/19/00-12/31/00
*Nonlinear Signal Processing of Ground Penetrating SAR Sensor Data for Land Mine Detection Principal Investigator	Night Vision and Electronic Sensors Directorate	60	\$562,585	09/01/00-8/31/03
*Nonlinear Signal Processing of Acoustic Sensor Data for Land Mine Detection Principal Investigator	Night Vision and Electronic Sensors Directorate	75	\$877,783	09/01/00-08/31/03

\* Note that these projects were originally awarded at the University of Missouri and moved to Florida with Dr. Gader. Thus, they should not be counted twice when counting the total funding at both schools.

## TEACHING

### Ph.D. Dissertations Supervised (21)

- 2014 *Normalized Maximum Likelihood on Variable Length Sequence Datasets* by Joshua Horton
- 2014 *Bayesian Hyperspectral Unmixing and Endmember Detection with MultiVariate Beta Distributions* by Dmitri Dranishnikov
- 2013 *Context-Dependent Detection in Hyperspectral Imagery* by Taylor Glenn
- 2011 *Endmember And Proportion Estimation Using Physics-Based Macroscopic And Microscopic Mixture Models* by Ryan Close
- 2011 *Context-Based Classification Via Data-Dependent Mixtures Of Logistic And Hidden Markov Model Classifiers* by Seniha Esen Yuksel
- 2010 *Fast Physics-Based Methods for Wideband Electromagnetic Induction Data Analysis* by G. Ramachandran
- 2009 *Robust Kernel Methods in Context-dependent Fusion* by G. Heo
- 2009 *Automatic Feature Learning and Parameter Estimation for Hidden Markov Models Using MCE and Gibbs Sampling* by Xuping Zhang
- 2009 *Optimized Dictionary Design and Classification Using the Matching Pursuits Dissimilarity Measure* by Raazia Mazhar
- 2008 *Hyperspectral Endmember Detection and Band Selection Using Bayesian Methods* by Alina Zare
- 2008 *Random Set Framework for Context-Based Classification* by J. Bolton
- 2008 *Information Fusion and Sparsity Promotion using Choquet Integrals* by Andres Mendez-Vazquez.
- 2007 *Piecewise Linear Lattice Based Associative Memories* by J. McElroy.
- 2003 *New Sequence Processing Algorithms using Hidden Markov Models* by M. Popescu.
- 2000 *Choquet Integral Based Morphological Operators with Applications to Object Detection and Information Fusion* by A. K. Hocaoglu.
- 2000 *Word Level Training of Handwritten Word Recognition Systems* by W-T. Chen.
- 2000 *Morphological Granulometric Estimation with Random Primitives and Applications to Blood Cell Counting* by N. Theera-Umpon.

- 1999 *Improving Shared-Weight Neural Networks Generalization Using Regularization Theory and Entropy Maximization* by M. Khabou.
- 1995 *Handwritten Word Recognition using Generalized Hidden Markov Models* by M. Mohamed.
- 1995 *Nonlinear Correlation Filter and Morphology Neural Networks for Image Pattern and Automatic Target Recognition* by Y. Won.
- 1995 *Hybrid Fuzzy Neural Systems for Robust Handwritten Word Recognition* by J.-H. Chiang.

### **M.S. Theses Supervised (13)**

- 2007 *A Study of Joint Classifier and Feature Optimization – Theory and Analysis* by F. Mao
- 2003 *Integration of Ordered Weighted Averaging Operators with Feed-forward Neural Networks for Optimal Feature Subset Selection and Pattern Classification* by R. Grandhi
- 2001 *Radial Basis Function Networks and Outlier Inputs in Handwriting Recognition Systems* by D. Viragh
- 1999 *Applications of Hidden Markov Models to Landmine Detection* by M. Mystkowski
- 1997 *Analysis of Ground Penetrating Radar Data for Landmine Detection* by H. Liu.
- 1997 *An Automated Karyotyping System* by M. Popescu.
- 1996 *Separation of Touching Chromosomes Using Morphological Image Processing* by K. Hamacher.
- 1996 *Ordinary Morphology Neural Networks for Automatic Target Recognition* by H-R. Ryoo.
- 1995 *Fuzzy Integral Match Functions for Handwritten Word Recognition* by Q. Hsu.
- 1995 *Chromosome Karyotyping using a Neural Network Classifier and Transportation Algorithm* by H. Nair.
- 1993 *A Fuzzy Rule-Based System for Locating Street Numbers* by J. Cai.
- 1993 *Automated Feature Generation for Handwritten Digit Recognition by Neural Networks* by M. Khabou.
- 1992 *Segmentation of Handwritten ZIP Codes* by D.-H. Kim.

### **Current Ph.D. students at the University of Florida**

Leila Kalantari, Ron Fick, Yuan Zhang (~30%), Troy Kling

### **Post-Doctoral Associates Supervised**

- 1) Dr. H. Frigui (Dec 97 – Aug 98) (University of Missouri)
- 2) Dr Brijesh Verma (Jan 99 – Nov 99) (University of Missouri)
- 3) Dr. Jinhui Liu (Jan 99 – December 2000) (University of Missouri)
- 4) Dr. Miroslaw Mystkowsky (Dec 99 – Aug 01) (University of Missouri)
- 5) Dr. Nipon Theera-Umpon (May 00 – May 01) (University of Missouri)
- 6) Dr. Guoqing Liu (joint with Dr. Li of ECE) (Oct. 01 – Aug 02) (University of Florida)
- 7) Dr. Ali Koksai Hocaoglu (Fall 01 – August 04) (University of Missouri and University of Florida)
- 8) Dr. Wen-Hsiung Lee (Spring 02 – Aug 06) (University of Florida)
- 9) Dr. Alina Zare (January 2009 – August 2010) (University of Florida)
- 10) Dr. Jeremy Bolton (January 2009 – 2012) (University of Florida)
- 11) Dr. Rob Heylon (Oct. 2012 – April 2013) (University of Florida)
- 12) Dr. Hamdi Jenzri (August 2014 – December 2014) (University of Florida)

## **COURSES TAUGHT AT THE UNIVERSITY OF MISSOURI**

- CECS 476: Pattern Recognition (Graduate Course)
- ECE 471: Neural Network Based Computing Systems (Graduate Course)
- CS 425: Artificial Intelligence II (Graduate Course)
- ECE 474: Artificial Intelligence (Graduate Course)
- ECE 458: Introduction to Modeling and Management of Uncertainty (Graduate Course)
- ECE 401: Image Algebra and Morphological Image Processing (Graduate Course)
- ECE 365: Introduction to Digital Image Processing (Senior Lab Course)
- ECE 227: Algorithms and Software Design with the C Language (Junior Course)
- ENGR 20: Introduction to Computer Programming with the PASCAL Language (Freshman Course)

## **COURSES TAUGHT / DEVELOPED AT THE UNIVERSITY OF FLORIDA**

- CAP 6617 Advanced Machine Learning (Graduate Course) (I developed into regular course)
- CAP 6615 Neural Networks for Computing (Graduate Course)
- CAP 6610: Machine Learning (Graduate Course)
- CAP 4621: Artificial Intelligence (Senior Course)
- CAP 4410: Digital Image Processing (Senior Course)
- COT 3100: Applied Discrete Structures (Junior Course)
- CIS 6930: Fuzzy Sets and Fuzzy Logic (Graduate Special Topics)
- CIS 6930: Mathematics for Intelligent Systems (Grad Special Topics) (I developed into regular course)
- CIS 6930 Hidden Markov Models (Graduate Special Topics Course)
- CIS 6930 Subsurface Sensing Algorithms (Graduate Special Topics Course)
- CIS 6930 Elements of Statistical Learning (Graduate Special Topics Course)
- CIS 4930 Introduction to Computational Intelligence (Undergraduate Special Topics Course)
- CIS 6930/4930 Hyperspectral Image Analysis (Graduate / Undergraduate Special Topics Course)

## **National / International SERVICE**

### **Panels**

Pattern Recognition for Humanitarian Demining, ICPR Panel, (2002).

Invited serve White House Science panel on Evaluation of New Technologies for Humanitarian Demining, (2002).

Member of United States Army Hand-held Standoff Mine Detection System Red Team, (1998-1999).

NSF Panel, Interactive Systems Division, (Gary Strong, Program Director), (1996).

### **Memberships**

Fellow International Institute of Electrical and Electronics Engineers (IEEE)

Member Society of Photo-Optical and Instrumentation Engineers (SPIE)

### **International Committees**

IEEE Society/Technical Council Fellow Evaluation Committee, 2011

### **Honors**

University of Florida Research Foundation Professor

Outstanding Junior Faculty Research Award, University of Missouri, College of Engineering, March 1996.

Technical Director of Army Research Office Multi-University Research Initiative on Humanitarian De-Mining.  
(University of Missouri, University of Kansas, and Carnegie Mellon University), (1999-2002).

Best Paper Award, IEEE Transactions Fuzzy Systems, 2000.

### **Associate Editor**

IEEE Geoscience and Remote Sensing Letters (2009 – 2013)

IEEE Transactions Fuzzy Systems (2004-2007)

Journal of Mathematical Imaging and Vision

Journal of Electronic Imaging (1996-1999)

### **Journal Guest Editor**

IEEE Signal Processing Magazine, Hyperspectral Signal and Image Processing, 2012-13

IEEE Transactions on Fuzzy Systems, Special Issue on Recognition Technology, February 2001.

Journal of Mathematical Imaging and Vision, September 1992.

### **Conference Chair**

SPIE Conference on Image Algebra and Morphological Image Processing (1990-1994)

IEEE Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (2013).

### **Area/Theme Chair**

Landmine and Unexploded Ordnance Detection, IEEE Int'l Conference Geo-science and Remote Sensing (2010)

Landmine and Unexploded Ordnance Detection, IEEE Int'l Conference Geo-science and Remote Sensing (2008)

Pattern Recognition and Image Processing, IEEE Int'l Conference Neural Networks, (1997).

Pattern Recognition and Clustering Area, IEEE Int'l Conference Fuzzy Systems, (1998).

### **Keynote Speaker**

IEEE International Conference on Fuzzy Systems, Taipei, Taiwan (2011)  
Robotics Science and Systems, Sydney, Australia, (2012)

### **Session Chair**

IEEE World Congress on Computational Intelligence, Special Session on AGOPs in Practice, (2008)  
IEEE Int'l Conference Geo-science and Remote Sensing, Special Session Subsurface Sensing, (2008)  
International Workshop on Frontiers of Handwriting Recognition, (September 2000)  
Detection & Remediation Technologies for Mines and Minelike Targets (2000-2009)  
IEEE International Conference on Fuzzy Systems (1998, 2003)  
Fuzzy Sets in Handwriting Recognition, NAFIPS '96 (June 1996)  
IEEE Conference on Systems, Man, and Cybernetics (October 1995)

### **Program Committee**

IEEE Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing, (2011-2012)  
IEEE International Conference on Fuzzy Systems (1998, 2001, 2003, 2005, 2008)  
IEEE International Conference on Geo-science and Remote Sensing (2004, 2008, 2010, 2013)  
International Workshop on Frontiers of Handwriting Recognition, (2000, 2006)  
IEEE Workshop Computer Vision Beyond the Visible Spectrum (1999-2001)  
International Conference on Pattern Recognition (ICPR) (1998, 2006)  
SPIE Conference on Nonlinear Imaging (1996-1998)  
NAFIPS (1996, 2001, 2002)

### **Organizing Committee**

IEEE World Congress on Computational Intelligence (2010)

### **Paper Reviewer**

IEEE Computer  
IEEE Geoscience and Remote Sensing Letters  
IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)  
IEEE Sensors  
IEEE Transactions on Pattern Analysis and Machine Intelligence  
IEEE Transactions on Fuzzy Systems  
IEEE Transactions on Image Processing  
IEEE Transactions on Knowledge and Data Engineering  
IEEE Transactions on Signal Processing  
IEEE Transactions on Antennas and Propagation  
IEEE Transactions on Geoscience and Remote Sensing  
IEEE Transactions on Systems, Man, and Cybernetics  
IEEE World Congress on Computational Intelligence (WCCI)  
IEEE Workshop Hyperspectral Image & Signal Analysis... (WHISPERS)  
Fuzzy Sets and Systems  
Journal of Information Fusion  
Journal of Information Science  
International Conference on Pattern Recognition (ICPR)  
International Conference Neural Networks (ICNN)  
International Conference on Frontiers of Handwriting Recognition (ICFHR)  
International Workshop on Frontiers of Handwriting Recognition (IWFHR)  
ISPRS Journal of Photogrammetry and Remote Sensing

Journal of Real-Time Imaging  
Journal of Mathematical Imaging and Vision  
Journal of Electronic Imaging  
Pattern Recognition Letters  
Pattern Recognition  
Signal Processing