

# Curriculum Vitae

## Name:

Khalid Sayood

## Address:

(Home) 4524 Eagle Ridge Road  
Lincoln, NE 68516  
(402)#420-1024

(Office) Dept. of Electrical and Computer Engr.  
Univ. of Nebraska-Lincoln  
Lincoln, NE 68588-0511  
(402)#472-6688  
email: ksayood@unl.edu

## Personal Data:

Country of Citizenship: United States

## Education:

B.S. Electrical Engineering, University of Rochester, September, 1977.  
M.S. Electrical Engineering, University of Rochester, May, 1979.  
Ph.D. Electrical Engineering, Texas A&M University, August, 1982.

## Experience:

Heins Professor of Engineering, 2010 - present.  
Henson Professor of Engineering, Communications, and Information Sciences, 1998 - 2010.  
Professor, University of Nebraska-Lincoln, 1992 - present.  
Visiting Professor, Boğaziçi University, Istanbul, Turkey, 1996 - 1997.  
Head, Vision and Sensors Group, Marmara Research Center, Turkish Scientific and Technical Research Council, 1995 - 1996.  
Associate Professor, University of Nebraska-Lincoln, August 1987 - 1992. (Tenure 1988)  
Assistant Professor, University of Nebraska-Lincoln, August 1982 - August 1987.

## **Awards:**

- Outstanding E.E. Faculty Member 1986–1987. Awarded by the IEEE Student Branch.
- 1988 College of Engineering and Technology Award for Distinguished Teaching.
- 1989 College of Engineering and Technology Research Award.
- 1990 Parents Association Appreciation Award.
- 1994 College of Engineering and Technology Teaching Award.
- Outstanding Faculty Award 1994–1995. Awarded by the IEEE student branch.
- 1995 College of Engineering and Technology Research Award.
- Outstanding Faculty Award 2001–2002. Awarded by the IEEE Student Branch.
- Outstanding Advisor Award, 2004. Awarded by the College of Engineering and Technology Student Advisory Board.
- Props to Profs Award, January 2006. Awarded by the College of Engineering Student Advisory Board.
- 2006 College Faculty Research and Creative Activity Award.
- Professor of the Year Award 2012. Awarded by the IEEE Student Branch.
- 2015 Parents Association and Teaching Council Appreciation Award.
- Professor of the Year Award 2015, Awarded by the IEEE Student Branch.

## **Courses Taught at Undergraduate Level:**

Programming and Numerical Techniques  
Circuits and Systems  
Communication Systems  
Signals and Systems  
Probability  
Problem Solving

## **Courses Taught at Graduate Level:**

Data Compression  
Digital Communication  
Statistical Communication

Random Processes  
Coding and Modulation  
Information Theory  
Digital Signal Processing  
Mathematical Techniques  
Bioinformatics  
Biological Signal and Image Processing

## **Professional Activities:**

Consultant for United Nations Development Program (UNDP)  
Consultant US West Advanced Technologies  
Consultant Transcript International  
Consultant Havelsan A.Ş  
Consultant Reuters International.  
Member, Technical Program Committee for 29th Midwest Symposium on Circuits and Systems  
Member, Technical Program Committee for the Visual Information Processing Symposium, Lincoln, NE, Feb. 1991.  
Member, Technical Program Committee for the International GeoScience and Remote Sensing Symposium (IGARSS), Lincoln, NE, May 1996.  
Member, Organizing Committee for Symposium on Signal Processing Applications (SIU 97), Kusadasi, Turkey  
Member, Technical Program Committee International Wireless Communication and Networking Conference (WCNC), New Orleans, LA, September 1999.  
Member, Technical Program Committee for the Data Compression Conference (DCC), Snowbird, Utah, 2002 - 2015.  
Member US Telemetry Standards Coordinating Committee 2002 - Present.  
Member at Large - IEEE Nebraska Section 2004-2005.

Reviewed papers for:  
IEEE Transactions on Signal Processing  
IEEE Transactions on Information Theory  
IEEE Transactions on Communications  
IEEE Transactions on Automatic Control  
IEEE Journal On Selected Areas of Communications  
IEEE Signal Processing Letters  
Bioinformatics  
BMC Bioinformatics  
BMC Genomics  
Nucleic Acid Research

## Service:

Elected member Biomedical Engineering Oversight Committee (2015-2018) Elected member ECE Executive Committee (2015-2017) Member Department Grievance Committee (2011-) Elected to Advisory Committee for a two year term (2010-2012) (2012-2014) Curriculum Committee 2010-2013  
Chair, College of Engineering Biomedical Engineering Program Committee, 2007-2015  
Chair, College of Engineering Promotion and Tenure Committee, 2008-2010  
Promotion and Tenure representative for Electrical Engineering (elected 2007)  
Chair, Department Promotion and Tenure Committee, 2006-10  
Chair Curriculum Committee, 2004-2005.  
Elected to the Advisory Committee for a two year term (2001-2003). Served as Chair (2001-2002).  
Elected to the Advisory Committee for a two year term (2003-2005). Served as Chair (2004-2005).  
Member, College International Fellowship Committee 2003-2005.  
Member, Chaired Professors Committee 2003-2006.  
Member, College Curriculum Committee (2004-2005)  
Member, College International Fellowship Committee (2003-2006)  
Member, Dean Search Committee (2001-2002)  
Chair, Search Committee (1997-1998 )  
Member, College of Engineering and Technology Faculty Research Advisory Committee (1992-1995)  
Chair, College of Engineering and Technology Faculty Research Advisory Committee (1993-1995)  
Member, Graduate Committee (1985-1994)  
Chair, Graduate Committee (1987-1994)  
Member, College of Engineering and Technology Graduate Board (1987-1994)  
Member, UNL Advisory Committee on International Student Affairs (1991-1994)  
Member, Electrical Engineering Search Committee (1988- 1990 )  
Member, Computer Science Chair Search Committee (1988-1990)  
Member, Graduate Program Publicity Committee (1982-1983)  
Member, Curriculum Committee (1982-1984)  
Member, College of Engineering and Technology CAD/CAM Committee (1983-1989)  
Member, Grievance Committee (1983-1985)  
Member, Nebraska GIS Steering Committee  
Member, IEEE Signal Processing and Communication Electronics Committee

# Publications:

## Journal Publications:

1. “Unsupervised Learning Approach to Adaptive Differential Pulse Code Modulation” (with N.C. Griswold), *IEEE Trans. on Pattern Analysis and Machine Intelligence*, Vol. PAMI-4, pp. 380–391, July 1982.
2. “An Algorithm for Uniform Vector Quantizer Design” (with J.D. Gibson and M.C. Rost), *IEEE Trans. Inform. Theory*, Vol. IT-30, No. 6, pp. 805–814, Nov. 1984. Also in *Vector Quantization*, ed. H-Abut, pp. 160–169, IEEE Press, 1990.
3. “An Information Theoretic Model for Allosteric Enzymes: Theory” (with S.G. Daggett and S.M. Schuster), *Applied Physics Comm.*, Vol. 4, pp. 187–206, Nov. 1984.
4. “Explicit Noise Models for Uniform and Nonuniform MMSE Quantization” (with J.D. Gibson), *Signal Processing*, Vol. 7, No. 4, pp. 407–414, Dec. 1984.
5. “A Postfiltered DPCM Scheme,” *IEEE Trans. Commun.*, Vol. COM-33, pp. 1019–1021, Sept. 1985.
6. “Lattice Quantization” (with J.D. Gibson), *Advances in Electronics and Electron Physics*, Academic Press Inc.
7. “The Root Lattices as Low Bit Rate Vector Quantizers” (with M.C. Rost), *IEEE Trans. on Information Theory*, Vol. IT-34, pp. 1053–1058, Sept. 1988.
8. “Use of ARMA Predictors in the Differential Encoding of Images” (with S.M. Schekall), *IEEE Trans. on Acoustic Speech, and Signal Processing*, Vol. ASSP-36, pp. 1791–1795, Nov. 1988.
9. “Use of Residual Redundancy in the Design of Joint Source/Channel Coders” (with J.C. Borkenhagen), *IEEE Trans. on Communications*, Vol. COM-39, pp. 838–846, June 1991.
10. “An Extended Least Hop Distributed Routing Algorithm” (with D.J. Nelson and C. Hao), *IEEE Trans. on Communications*, Vol. COM-38, pp. 520–528, April 1990.
11. “A Differential Lossless Image Compression Scheme” (with K.S. Anderson), *IEEE Trans. on Acoustic Speech and Signal Processing*, vol. 40, pp. 236–241, Jan. 1992.
12. “An Edge Preserving Differential Image Coding Scheme” (with M.C. Rost), *IEEE Trans. on Image Processing*, vol. 1, pp. 250–256, April 1992.
13. “A Robust Low Rate Coding Scheme for Packet Video” (with Y. C. Chen and D. J. Nelson), *IEEE Trans. on Communications*, vol. COM-40, pp.1491-1501, Sept. 1992.
14. “Recursively Indexed Quantization of Memoryless Sources” (with S. Na), *IEEE Trans. on Inform. Theory*, vol. IT-38, pp. 1602-1609, Nov. 1992.

15. "Data Compression in Remote Sensing Applications," *IEEE Geoscience and Remote Sensing Society Newsletter*, pp. 7-15, September 1992.
16. "A Simple Method for Enhancing the Performance of Lossy Plus Lossless Image Compression Schemes," (with N.D. Memon and S.S. Magliveras), *Electronic Imaging*, pp. 245-252, July 1993.
17. "Tree Codes in Lossless Image Compression," (with N.D. Memon and S.S. Magliveras), *Congressus Numerantium* v0l. 95, pp. 117-130, October 1993, Utilitas Mathematica.
18. "A Simple High Quality Lossy Image Coding Scheme" (with S. Bi), *Electronic Imaging*, January 1994.
19. "Lossless Compression of Multi-Spectral Image Data," (with N.D. Memon and S.S. Magliveras), *IEEE Trans. on Geoscience and Remote Sensing*, vol. 32, pp. 282-289, March 1994.
20. "Compression of Color-Mapped Images," (with A.C. Hadenfeldt), *IEEE Trans. on Geoscience and Remote Sensing*, vol. 32, pp. 534-541, May 1994.
21. "A Constrained Joint Source Channel Coder Design," (with F. Liu and J.D. Gibson), *IEEE Journal on Selected Areas of Communication*, December 1994.
22. "Lossless Image Compression with a Codebook of Block Scans," (with N.D. Memon and S.S. Magliveras), *IEEE Journal on Selected Areas of Communication*, January 1995.
23. "Lossless Compression of Color Images," (with N.D. Memon), *Optical Engineering*, June 1995.
24. "Scan Predictive Vector Quantization," (with N.D. Memon), *IEEE Transactions on Image Processing*, February 1996.
25. "Lossless Compression of Video Sequences," (with N.D. Memon), *IEEE Transactions on Communications*, October 1996.
26. "A New Algorithm in Locating Text in Complex Color Images," (with E. Ortaçdağ and B. Sankur), *International Journal on Document Analysis and Recognition*, 1998.
27. "A Joint Source/Channel Coder with Block Constraints," (with H. Otu), *IEEE Transactions on Communications*, November 1999.
28. "Joint Source/Channel Coding for Variable Length Codes," (with H. Otu and N. Demir) *IEEE Transactions on Communications*, May 2000.
29. "Joint Source/Channel Coding Using Arithmetic Codes," (with B.D. Pettijohn and M.W. Hoffman) *IEEE Transactions on Communications*, May 2001.
30. "Statistical Evaluation of Quality Measures," (with I. Avcibas and B. Sankur) *Journal of Electronic Imaging*, April 2002.

31. "A Progressive Lossless/Near-Lossless Image Compression Algorithm," (with I. Avcibas, B. Sankur, and N.D. Memon) *IEEE Signal Processing Letters*, October 2002.
32. "A Divide and Conquer Approach to Sequence Assembly," (with H.H. Otu), *Bioinformatics*, January 2003.
33. "A New Sequence Distance Measure for Phylogenetic Tree Construction," (with H.H. Otu), *Bioinformatics*, Nov. 2003.
34. "Utilization of the Relative Complexity Measure to Construct a Phylogenetic Tree for Fungi," (with D. Bastola, H.H. Otu, S.E. Doukas, P. Iwen, S. Hinrichs), *Mycological Research*, February 2004.
35. "A Successively Refinable Lossless Image Coding Algorithm," (with I. Avcibas, B. Sankur, and N.D. Memon), *IEEE Transactions on Communications*, Vol. 53, pp. 445-452, March 2005.
36. "An Analog-to-Digital Converter with Golomb-Rice Output Codes," (with W.D. Leon, S. Balkir, M.W. Hoffman) *IEEE Transactions on Circuits and Systems*, Vol. 53, pp. 278-282, April 2006.
37. "Lossless Video Sequence Compression Using Adaptive Prediction," (with Y. Li) *IEEE Transactions on Image Processing*, March 2007.
38. "A Low-Complexity Circuit for On-Sensor Concurrent A/D Conversion and Compression," (with W.D. Leon-Salas, S. Balkir, N. Schemm, and M.W. Hoffman), *IEEE Sensors Journal*, vol.7, pp. 1317-1325, September 2007.
39. "Lossless Hyperspectral Image Compression Using Context-based Conditional Average," (with H. Wang), *IEEE Transactions on Geoscience and Remote Sensing*, December 2007.
40. "A CMOS imager with focal plane compression using predictive coding," (with W.D. Leon-Salas, S. Balkir, N. Schemm, and M.W. Hoffman), *IEEE Journal of Solid-State Circuits*, November 2007.
41. "The Average Mutual Information Profile as Genomic Signature," (with M. Bauer and S.M. Schuster), *BMC Bioinformatics*, January 2008.
42. "Grammar-based Distance in Progressive Multiple Sequence Alignment," (with D.J. Russell and H.H. Otu), *BMC Bioinformatics*, [*Highly Accessed Paper*] July 2008
43. "Hyperthermophilic *Aquifex aeolicus* Initiates Primer Synthesis on a Limited Set of Trinucleotides Comprised of Cytosines and Guanines," (with M.A. Larson, R. Bressani, J.E. Corn, J.M. Berger, M.A. Griep, S.H. Hinrichs), *Nucleic Acids Research*, August 2008.
44. "Predictive Coding On-sensor Compression," (with W.D. Leon-Salas, S. Balkir, N. Schemm, and M.W. Hoffman), in press *IEEE Transactions on Circuits and Systems*.

45. "Large Direct Repeats Flank Genomic Rearrangements between a New Clinical Isolate of *Francisella tularensis* subsp. *tularensis* A1 and Schu S4," (with O.U. Nalbantoglu, M.P. Dempsey, P.C. Iwen, S.C. Francesconi, R.D. Barabote, G. Xie, T. S. Brettin, S.H. Hinrichs, P.D. Fey), *PLoS ONE* 5(2), 2010
46. "Inactivation of phospholipase D diminishes *Acinetobacter baumannii* pathogenesis. *Infectious Immunology*, (with Jacobs AC, Hood I, Boyd KL, Olson PD, Morrison J, Carson S, Iwen PC, Skaar EP, Dunman PM.) March 2010.
47. Data Compression Concepts and Algorithms and Their Applications to Bioinformatics. (with O.U. Nalbantoglu and D.R. Russell), *Entropy*. 12(1):34-52, 2010.
48. "*Acinetobacter baumannii* Increases Tolerance to Antibiotics in Response to Monovalent Cations," (with M.I. Hood, A.C. Jacobs, P.M. Dunman, and E.P. Skaar), *Antimicrobial Agents and Chemotherapy*, p. 1029-1041, Vol. 54, No. 3, March 2010.
49. "Small molecule inhibitors of *Staphylococcus aureus* RnpA mediated RNA degradation exhibit antimicrobial activity and attenuate pathogenesis" (with P.D. Olson, L.J. Kuechenmeister, K.L. Anderson, M.L. Reniere, T.L. Lewis, W.J. Weiss, M. Pulse, P. Nguyen, J. Simecka, J.M. Morrison, O.A. Osojo, M.S. Smeltzer, E.P. Skaar, and P.M. Dunman), *PLoS Pathogen*, February 2011.
50. "A grammar-based distance metric enables fast and accurate clustering of large sets of 16S sequences," (with D.J. Russell, S.F. Way, and A.K. Benson) *BMC Bioinformatics* 2010, 11:601 (17 December 2010)
51. "RAIphy: Phylogenetic classification of metagenomics samples using iterative refinement of relative abundance index profiles," (with O.U. Nalbantoglu, S. Way, and S.H. Hinrichs), *BMC Bioinformatics*, February 2011.
52. "Identification of two small regulatory RNAs linked to virulence in *Brucella abortus* 2308," (with C.C. Caswell, J.M. Gaines, P. Ciborowski, D. Smith, C.H. Borchers, C.M. Roux, P.M. Dunman, R.M. Roop II), *Molecular Microbiology*, 85:2, July 2012.
53. "Characterization of the *Acinetobacter baumannii* growth phase dependent and serum responsive transcriptomes," (with A.C. Jacobs, S.B. Olmsted, C.E. Blanchard, S.H. Hinrichs, D. Russell, and P.M. Dunman), *FEMS Immunology & Medical Microbiology*, 64:3, April 2012.
54. "Metagenomic analysis of the microbial community in kefir grains," (with U. Nalbantoglu, A. Cakar, H. Dogan, N. Abaci, D. Ustek, and H. Can), *Food Microbiology* 41: 42-51, January 2014.
55. "*Francisella tularensis* Subtype A. II Genomic Plasticity in Comparison with Subtype AI," (with M. A. Larson, U. Nalbantoglu, E. B. Zentz, A. M. Bartling, S. C. Francesconi, P. D. Fey, M. P. Dempsey, S. H. Hinrichs), *PLoS ONE*, 10:4, April 2015
56. "Reclassification of *Wolbachia persica* ATCC VR-331T Suitor and Weiss 1961 as *Francisella persica* gen. nov.," (with M. A. Larson, U. Nalbantoglu, E. B. Zentz, R. Z. Cer,



P. C. Iwen, S. C. Francesconi, K. Bishop-Lilly, V. Mokashi, A. Sjostedt, S. H. Hinrichs), *International Journal of Systematic and Evolutionary Microbiology*, January 2016

57. "MIMOSA: Algorithms for profiling of microbiomes," (with U. Nalbantoglu) Submitted to *BMC Standards In Genomic Science*, 2015.

### Conference Publications:

1. "On the 'Desired Behavior' of Adaptive Signal Processing Algorithms," (with D.C. Farden and J.C. Goding), *Proc. of the 1979 International Conference on Acoustics, Speech, and Signal Processing*, Washington, D.C., pp. 941–944.
2. "Tracking Properties of Adaptive Signal Processing Algorithms" (with D.C. Farden), *Proc. of the 1980 International Conference on Acoustics, Speech, and Signal Processing*, Denver, CO., pp. 466–469.
3. "An Algorithm for Designing Vector Quantizers" (with J.D. Gibson), *Proc. 20th Annual Allerton Conference on Communication Control and Computing*, Allerton, IL, Oct.1982, pp. 301–310.
4. "Theoretical Aspects of Allosterism as Related to Beef Heart Mitochondrial ATPase" (with S. Daggett and S.M. Schuster), Meeting AM. Soc. of Biol. Chem. 1983, San Francisco, CA, *Fed. Proc.* 1983.
5. "Investigation of Lattice Vector Quantization" (with M.C. Rost), *Proc. 27th Midwest Symposium on Circuits and Systems*, Morgantown, W.VA., June 1984, pp. 149–152.
6. "A Postfiltered DPCM Scheme," *Proc. 27th Midwest Symposium on Circuits and Systems, Morgantown, W.VA., June 1984*, pp. 261–264.
7. "Sliding Scale Quantization" (with J.C. Borkenhagen), *Proc. of Eighteenth Annual Asilomar Conference on Circuits, Systems, and Computers*, Nov. 4–7, 1984, pp. 243–246.
8. "Analysis of Differential PCM," *Proc. Nineteenth Annual Asilomar Conference on Circuits, Systems, and Computers*, 1985, Nov. 6–8, pp. 218–222.
9. "Utilization of Correlation in Low Rate DPCM Systems for Channel Error Protection" (with J.C. Borkenhagen), *Proc. International Conference on Communications 1986*, Toronto, Canada, June 1986, pp. 1888–1892.
10. "Adaptive Prediction Algorithms in Differential Coding of Images" (with S. Schekall), *Proc. 29th Midwest Symposium on Circuits and Systems*, Lincoln, NE, Aug. 1986.
11. "A Bound on Predictor Misadjustment in ADPCM" (with D.C. Farden), *Proc. of IEEE 1987 International Conference on Acoustics, Speech and Signal Processing*, Dallas, TX, Apr. 1987, pp. 1336–1339.

12. "Noise Reduction in DPCM Using Residual Correlation" (with D. Zak), *Proc. of International Conference on Communication*, Seattle, WA, June 1987, pp. 1138–1141.
13. "Maximum A posteriori Joint Source/Channel Coding" (with J.D. Gibson), *Proc. of the 22nd Annual Conference on Information Sciences and Systems*, Princeton, NJ, Mar. 1988. pp. 380–385.
14. "A Fast Quantization Algorithm for Designing Lattice Vector Quantizers" (with S.J. Blankenau), *Proc. IEEE 1988 Conference on Acoustics, Speech, and Signal Processing*, New York, NY, Apr. 1988.
15. "An Edge Preserving DPCM Scheme for Image Coding" (with S.M. Schekall), *Proc. 31st Midwest Symposium on Circuits and Systems*, St. Louis, MO, Aug. 1988. pp. 904–907.
16. "A Progressive Data Compression Scheme Based on Adaptive Transform Coding" (with M.C. Rost), *Proc. 31st Midwest Symposium on Circuits and Systems*, St. Louis, MO, Aug. 1988. pp. 912–915.
17. "Implementation Issues in MAP Joint Source/Channel Coding" (with J.D. Gibson and F. Liu), *Proc. 22nd Annual Asilomar Conference on Circuits, Systems, and Computers*, Oct. 31–Nov. 3, 1988, pp. 102–106.
18. "Comparison of Circuit Switched and Packet Switched Networks using Network Simulators," (with D.J. Nelson, H. Vakilzadian, and H. Chang) *Proc. Summer Computer Simulation Conference*, Austin, TX, July 1989.
19. "A Differential Lossless Coding Scheme" (with K.S. Anderson), *Proc. 32nd Midwest Symposium on Circuits, and Systems*, Champagne, IL, Aug. 1989, pp. 329–332.
20. "An Edge Preserving Differential Image Coding Scheme" (with M.C. Rost) *Proc. International Phoenix Conference on Computers and Communications*, Phoenix, AZ, March 1990, pp. 280–287.
21. "A Robust Low Rate Coding Scheme for Packet Video" (with Y.C. Chen and D.J. Nelson), *Proc. 1990 Bilkent International Conference on New Trends in Communication, Control, and Signal Processing*, pp. 1490–1497.
22. "A Hybrid LBG/Lattice Vector Quantizer for High Quality Image Coding," (with V. Ramamoorthy), *Proc. 1990 Bilkent International Conference on New Trends in Communication, Control and Signal Processing*, pp. 1498–1505.
23. "Recursive Quantization" (with S. Na), *Proc. 24th Annual Asilomar Conference on Circuits Systems and Computers*, Nov. 1990, pp. 649–653.
24. "Low Rate Video Coding" (with C.S. Aik), *Visual Information Processing Symposium*, Lincoln, NE, Feb. 1991.
25. "DPCM Coding of Images" (with A.M. Summers), *Visual Information Processing Symposium*, Lincoln, NE, Feb. 1991.

26. "Prediction Trees and Lossless Image Compression" (with N.D. Memon and S.S. Magliveras), *Data Compression Conference*, Snowbird, Utah, April 1991, pp. 83–92.
27. "Recursive Indexing and its application" (with S. Na), IEEE International Conference on Information Theory, Budapest, Hungary, June 1991.
28. "Data Compression for Full Motion Video Transmission" (with W.A. Whyte Jr.), AIAA/NASA/OAI Conference on Advanced SEI Technologies, Cleveland, OH, Sept. 1991.
29. "A Joint Source Channel Coder Design" (with F. Liu and J.D. Gibson), *Proc. 25th Annual Asilomar Conference on Signals, Systems and Computers*, Nov. 1991, pp. 1190–1194.
30. "Lossless Image Compression Using a Composite Source Model," (with F. Liu) *IEEE International Workshop on Intelligent Signal Processing and Communication Systems*, Taipei, Taiwan, Mar. 1992.
31. "Efficient Scan Patterns for Image Decorrelation," (with N.D. Memon and S.S. Magliveras), 26th Annual Conference on Information Sciences and Systems, Princeton, NJ, March 1992.
32. "Lossless Image Compression Using a Codebook of Prediction Trees," (with N.D. Memon and S.S. Magliveras), 1992 *Data Compression Conference*, Snowbird, Utah, March 1992.
33. "Tree-Codes for Lossless Image Compression," (with S.S. Magliveras and N.D. Memon) *24th Southeastern International Conference on Combinatorics, Graph Theory and Computing*, Boca Raton, Florida, February 1993.
34. "Coding of Color-Mapped Images," (with A.C. Hadenfeldt) *Proceedings International Conference on Communication*, Geneva, Switzerland, May 1993, pp. 537-541.
35. "A Joint Source/Channel Coder Design," (with F. Liu and J.D. Gibson) *Proceedings International Conference on Communication*, Geneva, Switzerland, May 1993, pp. 727-731.
36. "New Techniques for Reversible Compression of Multispectral Data," (with N.D. Memon and S.S. Magliveras) *AAIA - Computing in Aerospace 9* San Diego, California, October 1993, pp. 148-156.
37. "The Proposed HDTV Schemes and the NASA Network," (with Y.C. Chen), Submitted to *AAIA - Computing in Aerospace 9* San Diego, California, October 1993, pp. 1405-1413.
38. "Decompression of Portions of Losslessly Compressed Images," (with M. Remus), *PECORA 12 - Land Information from Space Based Systems*, Sioux Falls, South Dakota, August 1993.

39. "Vector Quantization of Non-stationary Sources," (with A.G. Al-Araj), *International Telecommunication Conference*, Dubai, Abu Dhabi, January 1994.
40. "A Simple High Quality Lossy Image Coding Scheme," (with S. Bi), *SPIE Symposium on Electronic Imaging Science & Technology*, San Jose, CA, February 1994.
41. "A Taxonomy of Lossless Image Compression," (with N.D. Memon) *1994 Data Compression Compression*, Snowbird, Utah, March 1994.
42. "Online Compression of Video sequences using Adaptive VQ," (with X. Wang and S.M. Shende) *1994 Data Compression Compression*, Snowbird, Utah, March 1994.
43. "Set Quantizer," (with S. Bi) *1994 Data Compression Compression, Snowbird*, Utah, March 1994.
44. "Scan Predictive Vector Quantization of Multispectral Images," (with N.D. Memon) *1994 International Geoscience and Remote Sensing Symposium*, Pasadena, California, August 1994.
45. "Accessing Portions of Losslessly Compressed Multiband data," (with M.R. Remus) *1994 International Geoscience and Remote Sensing Symposium*, Pasadena, California, August 1994.
46. "Lossless compression of color images," (with N. D. Memon) *Applications of Digital Image Processing XVII – SPIE Proceedings Vol. 2298*, July 1994.
47. "Differential Lossless Encoding of Images Using Non-linear Predictive Techniques," (with N.D. Memon and S. Ray), *IEEE Conference on Image Processing*, November 1994.
48. "Reversible Compression of a Video Sequence," (with N.D. Memon) *Visual Communications and Image Processing '94*, September 1994.
49. "A low complexity audio coding scheme for wideband audio," (with R. Peddibhotla, and R.C. Maher), *Proc. 28th Annual Asilomar Conference on Signals, Systems and Computers*, Nov. 1994.
50. "Lossless Compression of Continuous-Tone Still Images: A Comparative Study," (with N.D. Memon) *Still-Image Compression – SPIE Proceedings 2418*, February 1995.
51. "Asymmetric Lossless Image Compression," (with N.D. Memon) *1995 Data Compression Compression*, Snowbird, Utah, March 1995.
52. "Video Coding using 3 Dimensional DCT and Dynamic Code Selection," (with M. Bauer) *1995 Data Compression Compression*, Snowbird, Utah, March 1995.
53. "Recursively Indexed Vector Quantization of Non-Stationary Sources," (with A.G. Araj) *1995 Data Compression Compression*, Snowbird, Utah, March 1995.
54. "Quantization of Wavelet Coefficients for Image Compression," (with A. Mohammed) *1995 Data Compression Compression*, Snowbird, Utah, March 1995.

55. "An Asymmetric Image Compression Technique," (with N.D. Memon) Proceedings International Conference on Image Processing, 1995.
56. "Image Compression Using Variable Blocksize Transform Coding and Vector Quantization," (with M. Liu) *Sinyal Isleme Uygulamalar '96*, Kemer - Antalya, Turkey, March 1996.
57. "Adaptive Vector Quantization," *International Conference on Telecommunications*, Istanbul, Turkey, April 1996.
58. "Effect of Compression on Physical Parameters Derived from Polar Ice Radiances," (with K. St.Germain) *International Symposium on Geoscience and Remote Sensing*, Lincoln, Nebraska, May 1996.
59. "Nonbinary Convolutional Coding," (with A. Hocanin), *SIU '97, Applications of Signal Processing*, Kusadasi, Turkey, May 1997.
60. "A Compression Algorithm that Preserves NDVI and NDWI values," (with H. Otu), *Asilomar Conference on Circuits, Systems, and Computers*, Monterey, California, November 1997.
61. "A New Algorithm for Locating Text in Complex Color Images," (with E. Ortaçdağ and B. Sankur), EUSIPCO '98
62. "An Efficient Codebook Design," (with I. Avcıbaşı and B. Sankur), submitted to EUSIPCO '98.
63. "Joint Source/Channel Coding for Variable Length Codes," (with N. Demir), *1998 Data Compression Conference, DCC '98, Snowbird, Utah, March 1998*.
64. "A Joint Source Channel Coder with Block Constraints," (with H. Otu), ICASSP '98, Seattle, Washington, May 1998.
65. "New Distortion Measures for Color Image Vector Quantization," (with I. Avcıbaşı and B. Sankur), *Advances on Signal, Image Processing, Computer Vision and Graphics*, Orlando, Florida, July 1998.
66. "A Nearly Lossless Vector Quantization Algorithm for Compression of Remotely Sensed Images," *Asilomar Conference on Circuits, Systems, and Computers*, Monterey, California, November 1998.
67. "Use of Residual Redundancy for Error Correction with Nonbinary Convolutional Codes," (with A. Hocanin) 5th International Conference on Telecommunications, Zagreb, Croatia, June 1999.
68. "Joint Source/Channel Coding for Variable Length Codes," (with L. Perez), *Wireless Communication and Networking Conference*, New Orleans, Louisiana, September 1999.
69. "Component Ratio Preserving Compression for Remote Sensing Applications," (with I. Avcıbaşı, N. Memon, and B. Sankur), VCIP 2000, February 2000

70. "Joint Source/Channel Coding Using Arithmetic Codes," (with B.D. Pettijohn and M.W. Hoffman), Proceedings Data Compression Conference, DCC 2000, March 2000.
71. "Lossless Image Compression Based on Successive Refinement," (with I. Avcibas, N. Memon, and B. Sankur), VCIP 2001, February 2001
72. "Joint Source/Channel Coding Using Arithmetic Codes and Trellis Coded Modulation," (with C. Demiroglu and M.W. Hoffman), Data Compression Conference 2001, March 2001.
73. "A New Approach to Sequence Assembly Using Divide-and Conquer Algorithms," (with H.Otu), Georgia Tech - Emory International Conference on Bioinformatics, November 2001.
74. "An Evolvable Predictor for Lossless Image Compression," (with D. Leon, and S. Balkir), International Symposium on Circuits and Systems (ISCAS 2002), May 2002.
75. "Species Specific Informational Patterns in Genomic Sequences," (with M. Bauer, G. Erdos, S.M. Schuster). NSF-EPSCoR Conference on Diversity in Bioinformatics, March 2002.
76. "Utilization of the Relative Complexity Measure to Construct a Phylogenetic Tree for Fungi," (with D.R. Bastola, H.H. Otu, S.E. Doukas, S.H. Hinrichs, and P.C. Iwen), *103rd general meeting, American Society for Microbiology*, Washington DC, USA. 2003
77. "A Wideband Differential Coding Algorithm," (with E. Psota, J. Hartman, and M. Hoffman), *Asilomar Conference on Circuits, Systems, and Computers*, Monterey, California, November 2003.
78. "A CMOS imager with pixel prediction for image compression," (with W.D. Leon, S. Balkir, M.W. Hoffman) *Proceedings of the 2004 International Symposium on Circuits and Systems, 2003. ISCAS '03*, May 2003.
79. "Charge-based prediction circuits for focal plane image compression," (with W.D. Leon, S. Balkir, M.W. Hoffman) *Proceedings of the 2004 International Symposium on Circuits and Systems, 2004. ISCAS '04*, May 2004.
80. "Lossless Hyperspectral Image Compression Using Context-based Conditional Averages," (with H. Wang and S. Babacan), Data Compression Conference 2005, March 2005.
81. "The Use of Average Mutual Information Profile as a Species Signature," (with M. Bauer and S.M. Schuster), Data Compression Conference 2005, March 2005.
82. "Hard Decision and Iterative Joint Source Channel Coding Using Arithmetic Codes," (with L. Xu and M.W. Hoffman), Data Compression Conference 2005, March 2005.
83. "An Analog-to-Digital Converter with Golomb-Rice Output Codes," (with W.D. Leon, S. Balkir, M.W. Hoffman) *Proceedings of the 2005 International Symposium on Circuits and Systems, 2005. ISCAS '05*, May 2005.

84. "A Genome Signature Based on Markov Modelling," (with J. Li), Proc. 27th Annual International Conference of the IEEE Engineering and Medicine Society, pp. 2832-2835, Shanghai, 2005.
85. "A Compact Method for Identification of Exons," (with O. U. Nalbantoglu), RECOMB 2006.
86. "A CMOS Imager with Focal Plane Compression," (with W.D. Leon, S. Balkir, M.W. Hoffman) *Proceedings of the 2006 International Symposium on Circuits and Systems, 2006. ISCAS '06*, May 2006.
87. "State Machine Interpretation of Arithmetic Codes for Joint Source and Channel Coding," (with D. Bi and M.W. Hoffman), Data Compression Conference 2006, March 2006.
88. "Use of Average Mutual Information based Species Signature for Fungal and Mycobacterial Differentiation," (with D. Bastola, P. Iwen, and S. Hinrichs), 2007 International Conference on Bioinformatics and Computational Biology (BIOCOMP'07), June 2007.
89. "Growth-Phase Dependent Regulation of mRNA Stability in *S. aureus* (with K.L. Anderson, L.J. Kuechenmeister V.J. Torres, and P.M. Dunman), Wind River Conference on Prokaryotic Biology, June 2007.
90. "Characterization of *Staphylococcus aureus* Log and Stationary Phase Small Stable RNAs (SSRs)", (with E. Miller, L.J. Kuechenmeister, K.L. Anderson, S.H. Hinrichs, and P.D. Dunman), International Gram Positive Meeting, October 6-8, 2008.
91. "DNA Microarray Analysis of Bacterial Pathogens." (A.C. Jacobs, J. Morrison, S. Welander, A. Adibi, C. Lee, T.T. Luong, E. Skaar, G. Pishchany, P. Fey, and P. Dunman.) The 108th General Meeting of American Society of Microbiology. Boston, MA. June 3, 2008.
92. "Studies of an Emerging Pathogen," ( with A.C. Jacobs, B. Sharma, J.M. Morrison, P.D. Olson, P.M. Dunman) Mid-Atlantic Microbial Pathogenesis Meeting. Wintergreen, VA. February 8, 2009.
93. *Staphylococcus aureus* Small Stable RNAs (SSRs)," (with E. Miller, L.J. Kuechenmeister, K.L. Anderson, S.H. Hinrichs, and P.D. Dunman), Mid-Atlantic Microbial Pathogenesis Meeting, February 8-10, 2009
94. "Novel Antimicrobials Targeting the mRNA Turnover Apparatus In *Staphylococcus aureus*," (with P.D. Olson, L.J. Kuechenmeister, K.L. Anderson, T.L. Lewis, W.J. Weiss, M. Pulse, P. Nguyen, J.W. Simecka, J.M. Morrison, and P.M. Dunman), February 4-8, 2009. ASM Mid-Atlantic Meeting, Wintergreen, VA.
95. "MRSA vs MRSA," (with P.D. Olson, L.J. Kuechenmeister, K. Beenken, K.L. Anderson, T.L. Lewis, W.J. Weiss, M. Pulse, P. Nguyen, J.W. Simecka, J.M. Morrison, M. Smeltzer, and P.M. Dunman) March 3-5, 2009. Network on Antibiotic Resistant *Staphylococcus aureus*.

96. “*Staphylococcus aureus* growth phase inducible Small Stable RNA (SSR) regulatory molecules,” (with E. Miller, L.J. Kuechenmeister, K.L. Anderson, S.H. Hinrichs, and P.D. Dunman), Wind River Conference for Prokaryotic Biology, June 3-7, 2009.
97. “Characterizing *Acinetobacter baumannii* Factors Required for Adherence to Biological Surfaces,” ( with A.C. Jacobs, K. Wilcox, I. Hood, B. Sharma, J.M. Morrison, P.D. Olson, E. Skaar, and P.M. Dunman) 53rd Annual Wind River Conference on Prokaryotic Biology. Estes Park, Co. July 2009.
98. “Phospholipase D: A Putative *Acinetobacter baumannii* Virulence Factor,” (with A.C. Jacobs, I. Hood, B. Sharma, J.M. Morrison, P.D. Olson, E. Skaar, and P.M. Dunman) 53rd Annual Wind River Conference on Prokaryotic Biology. Estes Park, Co. July 2009.
99. “A Fast and Accurate Microbial Phylotyping Strategy for the Estimation of Microbial Diversity and the Abundance Profile of Microbiomes,” (with U. Nalbantoglu), Algorithms for Threat Detection, November 2012.
100. “Use of average mutual information for studying changes in HIV populations,” (with F. Hoffman and C. Wood), Proc IEEE Eng Med Biol Soc. 2009;2009:3861-4.
101. “Microbial Phylotyping Using a Communication System Model,” (with U. Nalbantoglu), Algorithms for Threat Detection, March 2014.
102. “Compression of Quality Factors in Next Generation Sequencing,” (with U. Nalbantoglu), Data Compression Conference, March 2014.
103. “Regulation of post-transcriptional gene expression by upstream open reading frames,” ( with G. Newcomb, E. Choi, A. L. Atkin), 28<sup>th</sup> Fungal Genetics Conference, March 2015.
104. “Compression of next generation sequencing data,” (with U. Nalbantoglu and A. Riffle), Data Compression Conference, March 2015

## Books:

1. *Introduction to Data Compression*, Morgan-Kaufman Publishers, December 1995 (second edition 2000, third edition 2005, fourth edition 2012). This book has been translated into Chinese and Polish and has been used at over 100 universities in over 20 countries

Some of the schools which have used *Introduction to Data Compression*

### *United States*

Texas A&M University, University of Rhode Island, Stanford University, University of Nebraska, University of Missouri - Rolla, New Mexico State University, George Washington University, Georgia Institute of Technology, Illinois Institute of Technology, University of California at Santa Cruz, Southern Methodist University, University



of Texas at Arlington, University of Arizona, Kansas State University, University of Southwestern Louisiana, Wayne State University, University of Toledo, Santa Clara University, College of William and Mary, University of California at Berkeley, University of California at Santa Barbara, California Institute of Technology, Ohio State University, City University of New York, Clemson University, Purdue University, University of Michigan, Rensselaer Polytechnic University, Penn State University, South Dakota University, Memphis State University, University of North Texas, University of Texas at El Paso, University of Washington, University of Southern California, University of Minnesota, University of Massachusetts - Lowell, University of California at Irvine, University of Colorado, Johns Hopkins University, Duke University, Tufts University, Lamar University, Oregon State University, University of Tennessee, Northwestern University, DigiPen Institute of Technology, Brandeis University, University of Kentucky, Washington University at St. Louis, Carnegie Mellon University, Virginia Tech University, Northwestern University

*Outside the United States*

University of Sydney, Sydney, Australia, University of Newcastle, Australia, University of Technology, Sydney, Australia, Swinburne University of Technology, Melbourne, Australia, University of British Columbia, Canada, University of Toronto, Canada, McGill University, Canada, Simon Fraser University, Canada, Queen's University, Canada, University of Ottawa, Canada, National Chiao Tung University, Taiwan, National Tsing Hua University, Taiwan, W. Schikard Institute, Tübingen, Germany, University of Stuttgart, Germany, RWTH Aachen University, Germany, University of Tübingen, Germany, University of Economic Science, Budapest, Hungary, Lucian Blaga University of Sibiu, Sibiu, Romania, University of Crete, Greece, University of Aveiro, Portugal, University of Ulsan, South Korea, Northern India Engineering College, Lucknow, India, St. Josephs College, Tiruchirappalli, India, Anna University, Chennai, India, Jawaharlal Nehru Technological University, India, University of Mumbai, India, Sharif University of Technology, Iran, Sophia University, Tokyo, Japan, Wrocław University of Technology, Wrocław, Poland, Warsaw University, Warsaw, Poland, Boğaziçi University, Istanbul, Turkey, Middle East Technical University, Ankara, Turkey, Eskisehir Osmangazi University, Turkey, German University in Cairo, Egypt, Electronics and Technology Research Institute, South Korea, Technical University of Denmark, Lyngby, Denmark, University of Aarhus, Aarhus, Denmark, Linköping University, Sweden, Chalmers University of Technology, Sweden, University of Leicester, United Kingdom, Kings College, London, United Kingdom, Beijing University, Beijing, China, Fudan University, Shanghai, China, Chaoyang University of Technology, Taiwan, National Sun Yat-Sen University, Taiwan.

2. *Handbook of Lossless Compression*, (editor) Academic Press, 2002.
3. *Understanding Circuits: Learning Problem Solving Using Circuit Analysis*, Morgan Claypool, 2005.
4. *Learning Programming Using MATLAB*, Morgan Claypool, 2006.
5. *Joint Source Channel Coding Using Arithmetic Codes*, (with D. Bi and M. W. Hoffman), Morgan Claypool, 2010.

6. *Computational Genomic Signatures*, (with O.U. Nalbantoglu), Morgan Claypool, 2011.
7. *Minds, Models, and Mentors*, (with D.W. Brooks and G. Trainin), In Press.

### **Book Chapters:**

1. “Lossless Compression,” (with N.D. Memon) in *The Communication Handbook (2nd ed)* , CRC Press, September 2002.
2. “Facsimile Compression,” (with N.D. Memon) in *The Communication Handbook (2nd ed)*, CRC Press, September 2002.
3. “Still Image Compression Standards,” (with M. Hoffman) *Multimedia Communications*, edited by J.D. Gibson, Academic Press, 2000.
4. “Data Compression,” in *Encyclopedia of Information Systems*, edited by H. Bidgoli, Academic Press, 2002.
5. “Facsimile Compression,” in *Lossless Compression Handbook*, edited by K. Sayood, Academic Press, 2002.
6. “Lossless Predictive Compression of Hyperspectral Images,” (with H. Wang) in *Hyperspectral Data Compression*, edited by G. Motta and J. Storer, Kluwer Academic Press, 2005.
7. “Data Compression,” (with D. Bi) *Encyclopedia of Measurement and Statistics*, edited by N.J. Salkind, Sage Publications, 2006
8. “Digital Image Formats,” *Digital Image Forensics* edited by H.T. Sencar and N.Memon, Springer 2013.
9. “Data Compression,” (with O.U. Nlbantoglu) *Computer Science Handbook*, edited by T. Gonsalez, CRC Press, 2014.

### **Invited Presentations**

1. “A Robust Compression Scheme for Low Bit Rate Telemetry - Test Results with Lunar Data,” (with M.C. Rost), *Proc. of the Scientific Data Compression Workshop*, NASA CP-3025, Snowbird, UT, May 1988, pp. 237–250.
2. “Data Compression for the Microgravity Experiments,” (with W.A. Whyte Jr., K.S. Anderson, M.J. Shalkhauser and A. Summers), *Proc. International Workshop on Visual Information Processing for Television and Tele-robotics*, NASA CP-3053, Williamsburg, VA, May 1989, pp. 93–107.
3. “Image Compression for High Resolution Video,” (with W.A. Whyte Jr.), *Proc. 1990 National Communications Forum*, Oct. 1990.

4. "Recent Progress in Image Compression," First Electrotechnology Conference, Ames, IA, March 1992.
5. "Recursively Indexed Differential Pulse Code Modulation," (with S. Na), *IEEE/DIMACS Workshop on Quantization and Coding, Princeton, NJ*, Nov. 1992.
6. "Correlation Patterns in Genomic Sequences," (with M. Bauer and H.H. Otu), *IEEE/DIMACS Workshop on Data Compression in Networks and Applications*," March 2002.
7. "Arithmetic Coding and Joint Source/Channel Coding," (with L. Xu and M.W. Hoffman) *IEEE Communication Theory Workshop*, AZ, April 2003.
8. "Structures in DNA Sequences," Keck Graduate Institute, Claremont, CA, January 2004.
9. "Data Compression and Bioinformatics: Searching for Structure in all kinds of places," Plenary Lecture, 2005 European Signal Processing Conference, EUSIPCO, Turkey, 2005.
10. "Image and Video Compression: Algorithms and Standards," Joint IEEE Section and Communication Society Meeting, April 2005.
11. "Uncovering Structure: Common Themes in Data Compression and Bioinformatics," Northwestern University, Evanston, IL, January 2006.
12. "Species Signatures and their Applications," University of California at Santa Barbara, March 2008.
13. "Information Theory, Data Compression and Bioinformatics," (Keynote Speech), The 6th Annual Biotechnology and Bioinformatics Symposium, October 2009.

## Patents

US Patent 6,892,343, "System and method for joint source-channel encoding, with symbol decoding and error correction," (with M.W. Hoffman and B. Pettijohn), May 2005, Reissued March 2012

US Patent 8,725,419, "System and Method for Sequence Distance Measure for Phylogenetic Tree Construction," (with H.H. Otu and S.H. Hinrichs) May 2014.

US Patent App. 20030224384, "Divide and conquer system and method of DNA sequence assembly," (with H.H. Otu), December 2003

US Patent App. 20060057592, "Methods for identifying primase trinucleotide initiation sites and identification of inhibitors of primase activity," (with M. Griep, S.H. Hinrichs, S. Koepsell, J.M. Takacs), March 2006.

US Patent App. 20140121985, "Classification of nucleotide sequences by Latent Semantic Analysis," (with S. Way, U. Nalbantoglu, and G. Garrity), July 2013

## Research Funding:

Principal Investigator (with S.H. Hinrichs), “Algorithms for the Analysis of Microbiomes,” NSF, \$246,367, August 2011-2014.

Principal Investigator, “Species Identification Using Genomic Sequences,” Names for Life, \$ 129,883, January 2011-2013.

Principal Investigator, “Compression of Composite Sources” \$ 54,921, July 2008-2009.

Principal Investigator, “Adaptive Video Coding Using Wavelets,” NASA Goddard Space Flight Center, \$ 64,717, August 2007-2008.

Principal Investigator, “Source Coding and Joint Source/Channel Coding,” NASA Goddard Space Flight Center, May 2006-2007.

Principal Investigator, “Identification of Biological Materials of Unknown Origin,” NIH, \$ 797,542, February 2006-2012

Principal Investigator, “An Intelligent Compression Design Strategy,” NASA Goddard Space Flight Center, May 2005, \$ 73,893.

Principal Investigator, “Lossless and Lossy Compression,” NASA Goddard Space Flight Center, August 2004, \$ 76,614.

Principal Investigator, “Compression of Hyperspectral Images,” NASA Goddard Space Flight Center, August 2003, \$ 90,000.

Principal Investigator, “Multi-Stage Compression,” NASA Goddard Space Flight Center, July 2002, \$ 77,642.

Co-Principal Investigator (with S. Balkır), “Focal Plane Video Compression,” Catalyst Foundation, November 2001, \$ 118,000.

Principal Investigator, “Context Based Compression Schemes,” NASA Goddard Space Flight Center, April 2001, \$ 74,697.

Principal Investigator, Robust Compression for Land Use Data,” NASA Goddard Space Flight Center, October 2000, \$ 60,546.

Co-Principal Investigator (with L.C. Perez and M.W. Hoffman), “Robust Mobile Multimedia Communications,” AFOSR, January 2000, (\$ 180,000)

Principal Investigator, “Compression for Land Use Data,” Goddard Space Flight Center, October 1999, (\$63,000)

Principal Investigator (with M.W. Hoffman, L.C. Perez, R.M. Narayanan, S.M. Magliveras, L.Nguyen, and H. Sharif), “Mobile Communications Research Project,” Nebraska Research Initiative, July 1998 (\$251,000), July 1999 (\$261,000).

Principal Investigator, “Compression for Remote Sensing Applications,” Goddard Space Flight Center, October 1998, (\$60,500)

Principal Investigator, "Lossless Compression of Multi-Spectral Data," Naval Research Laboratories, April 1998, (\$40,000)

Principal Investigator, "Compression for Remote Sensing Applications," Goddard Space Flight Center, October 1997, (\$60,000)

Principal Investigator, "Design of Joint Source/Channel Coders," Goddard Space Flight Center, June 1994, (\$47,492).

Principal Investigator, "Design of Joint Source/Channel Coders for Packet Video," Goddard Space Flight Center, June 1993, (\$66,055).

Principal Investigator, "Scientific Image Compression," NASA Lewis Research Center, May 1993, (\$58,685).

Principal Investigator, "HDTV and the NASA Network," Goddard Space Flight Center, June 1992, (\$79,716)

Principal Investigator, "Image Compression II," NASA Lewis Research Center, Nov. 1991, (\$142,816)

Principal Investigator, "Video Coding for Low Bandwidth Channels," Goddard Space Flight Center, June 1991, (\$78,799)

Co-Principal Investigator (with R.C. Maher and J.L. Varner), "Integration of Modern Digital Signal Processing Applications in Undergraduate Engineering Education," National Science Foundation, July 1991 (\$54,887).

Principal Investigator, "Image Compression," NASA Lewis Research Center, August 1990 (\$158,747).

Principal Investigator, "Simulation of Packet Video Networks," Goddard Space Flight Center, June 1990 (\$61,872).

Principal Investigator, "Compression Schemes for HHVT," NASA Lewis Research Center, August 1989, (\$90,100)

Principal Investigator, "Implementation Issues in Source Coding," NASA Goddard Space Flight Center, June 1989, (\$55,787)

Principal Investigator, "A Low Rate Robust Coding Scheme for Image Transmission over Noisy Channels," U.S. West Advanced Technologies, May 1988 (\$80,890), May 1989 (\$142,000)

Principal Investigator, "Compression Schemes for High Definition Television," NASA Lewis Research Center, August 1988, (\$81,006)

Principal Investigator, "Design of Low-Rate Noiseless and Perceptually Noiseless Image Coding Algorithms," NASA Goddard Space Flight Center, NAG 5-916 (\$72,517).

Principal Investigator, "Error Protection for Digital Image Transmission over Noisy Channels," NASA Lewis Research Center, NAG 3-806, July 1987 (\$36,000).

Principal Investigator, "Design of Source Coders and Joint Source Channel Coders," NASA

Goddard Space Flight Center, NAG 5–916, May 1987 (\$66,000).

Co-Principal Investigator (with D.J. Nelson), “Development of a Switched Circuit/Packet Overlay Network Simulator,” Jet Propulsion Laboratory NAS 7–918(RE-182/502), July 1987 (\$65,000).

Co-Principal Investigator (with D.J. Nelson), “Development of a Switched Circuit/Packet Overlay Network Simulator,” Jet Propulsion Laboratory, NAS 7–918 (RE-182/205), May 1987 (\$20,000).

Co-Principal Investigator (with D.J. Nelson), “Advanced Protocol Development for a Simulation Program,” Department of the Army, Communication-Electronics Command, DAAB07–85-K-K535, May 1985 (\$160,000).

University Research Council Grant for Development of Speech IO Hardware, Jan. 1985, \$1,500.

Investigator, “A Systems Study of Packet Networks under Stress,” Department of the Army, Communications-Electronics Command, DAAB07- 83-K-K530, May 1984.

Investigator, “Study of the Future of Adaptive Spread Spectrum Research,” U.S. Army Research Office, DAAB-81-D-0100, May 1983.

## Graduate Students Supervised

- O. Ufuk Nalbantoglu, Ph.D, 2011, “Computational genomic signatures and metagenomics.”
- Samuel F. Way, MS 2012, “Classification of genomic sequences by latent semantic analysis.”
- David Russell, Ph.D., 2010, “Modeling Biological Structures via Abstract Grammars to Solve Common Problems in Computational Biology.”
- Alan Flagg, MS 2009, “Detection of Binding Sites Using Bayesian Networks.”
- Hongqiang Wang, Ph.D. 2009, “Robust and Adaptive Rate Allocation for Video Coding.”
- Baran Barut, MS 2008, “Bacterial Genome Phylogeny Construction and Fragment Identification using Compositional Features.”
- Ying Li, MS 2006, “Lossless Compression of Video Sequences.”
- Dongsheng Bi, PhD 2006, (co-advisor M.W. Hoffman), “State Machine Interpretation of Arithmetic Codes for Joint Source Channel Coding.”
- Jian Li, MS 2005, “Markov Models and Bacterial Genomes.”
- Jayanth Kadambi, MS 2005, “Wideband Speech Coding: A Tree Code Approach.”

- Manjush Pattapurati, MS 2005, “Near-Lossless Compression of Hyperspectral Images Using Spectral Signatures.”
- Lifeng Xu, MS 2004, (co-advisor M.W. Hoffman), “Iterative Joint Source Channel Coding Using Arithmetic Codes”
- Hasan H. Otu, PhD 2002, “Characterization and Use of Structure and Complexity of DNA Sequences.”
- Mark Bauer, PhD 2001, “A distance Measure for DNA Sequences.”
- Ei Mon Phyu, MS, August 2001, (co-advisor M.W. Hoffman), “High Quality Speech Coding.”
- Cenk Demiroglu, MS, December 2000 (co-advisor M.W. Hoffman), “A New Technique for Joint Source/Channel Coding Using Arithmetic Codes.”
- Gulay Ozkan, MS, December 2000, (co-advisor M.W. Hoffman), “Robust Joint Source/Channel Coding of Images Using Variable-Length Codes.”
- Ramazan Kerek, MS, May 2000, “ Implementation and Evaluation of Recursively Indexed Vector Quantizer on Multiple-Use Environmental Datasets”
- Billy D. Pettijohn, MS, May 2000, “Joint Source/Channel Coding Using Arithmetic Codes.”
- Hasan H .Otu MS (Boğaziçi University), August 1997, “Constrained Joint Source Channel Coding.”
- R. Cem Çevikbaş, MS (Boğaziçi University), May 1997, “Obtaining high-fidelity images using distance constrained hierarchical vector coding.”
- Nejat Demir, MS, December 1995, Thesis Title: “An Approach to Joint Source Channel Coding”
- Rajiv Bagora, MS, December 1995, Thesis Title: “Effect of Codebook Size on Variable Rate RIVQ.”
- Ali G. Al-Araj, PhD, December 1994, Dissertation Title: “Vector Quantization of Non-Stationary Sources”
- Aziz Mohammed, MS, August 1995, Thesis Title: “Use of Wavelets in Image Compression”
- Sekhar Nori, MS, December 1994, Thesis Title: “Reconstruction of Packet Video after Packet Loss”
- Rodney Bowen-Wright, MS, December 1994, Thesis Title: “Lossless Compression of Images Using Variable Coefficients and Simulated Annealing”
- Euigyoo Kim, MS, May 1994, Thesis Title: “Modified Decoding for Concatenated Coding System”

- Shaolin Bi, PhD, December 1993, Dissertation Title: “Set Quantizer”
- Yun-Chung Chen, PhD, December 1993, Dissertation Title: “Video Transmission on ATM Networks”
- James Nau, MS, December 1993, Thesis Title: “Lossless Compression of Video Sequences”
- Robert J. Morrill, MS, December 1993, Thesis Title: “Lossless Compression of Multi-spectral Images”
- Todd Clatanoff, MS May 1993, Thesis Title: “Composite Source Modeling Applied to Lossless Compression of Images”
- Nasir D. Memon, Ph.D. Aug. 1992, (co-chair S.S. Magliveras), Dissertation Title: “Image Compression Using Efficient Scan Patterns”
- Fuling Liu, Ph.D. May 1992, Dissertation Title: “Application of Composite Source Models to Lossless Image Compression”
- Andrew E. Hadenfeldt, MS May 1992, Thesis Title: “Progressive Transmission of Pseudo-Color Images”
- Saravana Soundararajan, MS Aug. 1992, Thesis Title: “Hardware Implementation of Differential Lossless Image Compression Scheme”
- Chong Y. Lai, MS Dec. 1991, Thesis Title: “Adaptive Transform Coding Using Energy Classification”
- Bhargavi Gorjala, MS Aug. 1991, Thesis Title: “Compression of Digital Images Over Local Area Networks”
- Minru Liu, MS May 1991, Thesis Title: “Image Compression Using Variable Blocksize Coding”
- Xiaojie Lin, MS May 1991, Thesis Title: “Dynamic Huffman Coding for Image Compression”
- Chua S. Aik MS May 1991, Thesis Title: “Low Rate Video Coding with Frequency Switching Transmission Scheme”
- Patrick Chiu, MS Aug. 1991, Thesis Title: “Transform Coding with Recursive Quantization,” June 1991
- Ali Araj, MS December 1989, Thesis Title: “Use of Bit Estimation and Linear Feedback Shift Register for Data Compression”
- Yung-Chun Chen, MS August 1989, Thesis Title: “Mixture Block Coding with Progressive Transmission in Packet Video”
- Min He, MS June 1989, Thesis Title: “Lattice Vector Quantization for Image Compression”



- Martin C. Rost, Ph.D. October 1988, Dissertation Title: “Data Compression Using Adaptive Transform Coding”
- Steve Blankenau, MS August 1987, Thesis Title: “Lattice Vector Quantization for Image Coding”
- S. M. Schekall, MS May 1987 Thesis Title: “Improved Data Compression of Digital Images Using Differential Pulse Code Modulation”
- Jay C. Borkenhagen, MS August 1986, Thesis Title: “An Application of Maximum-Likelihood Estimation for Error Protection in Data Compression Systems”
- Terry A. Bacon, MS May 1986, Thesis Title: “A Short Term Autocorrelation Function Based System for Speaker Independent Word Recognition”
- Martin C. Rost, MS August 1984, Thesis Title: “Lattice Quantization”
- Don D. Zak, MS May 1984, Thesis Title: “A System for Noise Reduction in Differential Pulse Code Modulation”