

Vita

Jim Peterson

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RESUME James K. Peterson

PERSONAL DATA

Associate Professor
Department of Mathematical Sciences
Clemson University
Clemson, SC 29634-1907
864/656-2883
August 24, 1951

EDUCATION

Ph.D., Colorado State University, 1980, Mathematics
M.S., Colorado State University, 1977, Mathematics
B.S., Indiana University Northwest, 1975, Mathematics

PROFESSIONAL EXPERIENCE

Associate Professor

Department of Biological Sciences
Clemson University
2007 - Present

Associate Professor

Department of Mathematical Sciences
Clemson University
1994 - Present

Assistant Professor:

Department of Mathematical Sciences
Clemson University
1990 - 1994

Senior Engineer CAM Systems:

CDI Technologies, Inc.
5270 Northland Drive, Suite A
Grand Rapids, MI 49505
1989 - 1990

Senior Engineer:

Advanced Development Operations Division
Smiths Industries Aerospace and Defense Division
SLI Avionic System Corp.
4141 Eastern Ave.
Grand Rapids, MI 49508
1986 - 1989

Member of the Technical Staff:

Optimization Techniques Section
Performance Analysis Department
System and Computer Engineering Division
Aerospace Corporation
P. O. Box 92957
Los Angeles, Ca. 90009
1985 - 1986

Assistant Professor:

Department of Mathematical and Computer Sciences
Michigan Technological University
Houghton, Mi. 49931
1980 - 1985

Teaching Assistant:

Department of Mathematics
Colorado State University
Fort Collins, Co.
1976 - 1980

CONSULTING EXPERIENCE

NASA Johnson Space Center “Algorithm Design for Learning and Obstacle Avoidance”, Software Development Section June 1990

NASA Lewis Research Center “Neural Modeling Issues for Structural Analysis Problems”, Computational Services Directorate, March 1995.

BioEngineering Department “Mathematical Modeling of Biological Sensors” May 2001 - July 2002.

Rome Air Force Laboratory, Information Sciences Research Group “Cognitive Modeling Design for Mixed Decision Making”, September - December 2005.

FELLOWSHIPS

Honorary Associate Professor in the Faculty of Medicine, Medical School, University of Sydney, New South Wales 2006, Australia, March - April 2007.

“West Nile Virus Models”, Department of Pathology, University of Sydney, New South Wales, Australia, March 15 - April 4 2007.

With Nicholas J.C. King M.B. Ch.B., Ph.D. (Professor and Head, Department of Pathology, University of Sydney), and Alison M Kesson, M.B. B.S. Ph.D., FRACP FRCPA, (Professor of Paediatrics, University of Sydney and Medical Virologist, Microbiologist and Infectious Diseases Physician The Children’s Hospital at Westmead), New South Wales, Australia.

MEMBERSHIPS

IEEE 1978 - Present

SUBMITTED PAPERS

1. 2007. “*Enhanced antigen processing and immune evasion: WNV and the induction of class I MHC molecules*”, invited chapter in **West Nile Virus**, Springer - Verlag, coauthored with N. King, A. Kesson and others.

PUBLICATIONS

Refereed Journal Publications

1. 2006. “*Abstract Action Potential Models For Toxin Recognition*”, Journal of Theoretical Medicine, Vol. 6, No. 4, pp 199 - 234, with T. Khan.
2. 1995. “*The Use of Pontryagin Estimators for On-line Optimal Control Sequence Estimation: The Truck Backer-Upper Case Study*”, **INVITED Submission** to Special Issue Artificial Neural Networks for *Mathematical and Computer Modeling*, Vol. 21, No. 1/2, pp. 31 - 51.
3. 1994. “*Software Design for Neurocontrol Code*”, Special Issue on Artificial Neural Networks for *Journal of Intelligent Material Systems and Structures*, Vol. 5, No. 2, March, 172 - 185.
4. 1992, “*Controlling a Truck with an Adaptive Critic CMAC Design*”, Simulation, Special Issue on Neural Networks, May, 1992, Vol. 58, Number 5, 319 - 326.
5. 1992, “*Neural Network Approaches to Estimating Directional Cost Information and Path Planning in Analog Valued Obstacle Fields*”, HEURISTICS: The Journal of Knowledge Engineering, Special Issue on Artificial Neural Networks, Summer 1992, Vol. 5, No. 2, Summer, 50 - 61.
6. 1985, “*The Existence of Optimal Consumption Policies in Optimal Economic Growth Models with Nonconvex Technologies*”, The Journal of Economic Theory, (with R. E. Gaines). Vol. 37, No. 1, pp. 76 - 98.
7. 1983, “*Degree Theoretic Methods in Optimal Control*”, The Journal of Mathematical Analysis and Applications, (with R. E. Gaines). Vol. 94, No. 1, pp. 44 - 77.
8. 1981, “*Periodic Solutions to Differential Inclusions*”, The Journal of Nonlinear Analysis: Theory, Methods and Applications, (with R. E. Gaines). Vol 5, No. 10, pp. 1109 - 1131.

Conference Proceedings(Refereed)

1. 2006, September, “*Core Cognitive Modeling In Avatar Design*”, Conference Proceedings GAME-ON-NA, 2nd International North America Conference on Intelligent Games and Simulation, September 19 - 20, 2006, 18 - 20.
2. 2005, November, “*Neural Computational Elements That Subserve Decision Making*”, Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Computation, Swarm Intelligence: Volume 15, Proceedings of the Artificial Neural Networks in Engineering (ANNIE 2005) Conference November, 2005, ed. C. Dagli, A. Buczak, D. Enke, M. Embrechts, and O. Ersoy, ASME Press, 33 - 42.
3. 2004, September, “*Würfelspiel Based Training Data methods for ATR*”, in **Automatic Target Recognition XIV**, Firooz Sadjadi, Editor, Proceedings of the SPIE, Vol. 5426, SPIE, Bellingham, WA, 379 - 390.
4. 2004, August, “*Agent Identification and Differentiation Via Abstract Second Messenger Modeling*”, in **Chemical and Biological Sensing V**, Proceedings of the SPIE, Vol. 5416, SPIE, Bellingham, WA, 123- 134.
5. 2004, August, “*Information Fusion Via IsoCortex Based Area 37 Modeling*”, in **Signal Processing, Sensor Fusion and Target Recognition XIII**, Proceedings of the SPIE, Vol. 5429, SPIE, Bellingham, WA, 468 - 479.
6. 2004, August, “*Cognitive/ Emotional Models For Human Behavior Representation in 3D Avatar Simulations*”, in **Enabling Technologies For Simulation Science VIII**, Proceedings of the SPIE, Vol. 5423, SPIE, Bellingham, WA, 110 - 121.
7. 2004, July, “*Cognitive Models of Music and Painting*”, in **Bridges: Mathematical Connections in Art, Music, and Science**, Editors Sarhangi and Sequin, Conference Proceedings of the Seventh Annual International Conference of Bridges, 109 - 116, with Linda Dzuris.
8. 2004, April, “*Polymodal Information Processing Via Temporal Cortex Area 37 Modeling*”, in **Intelligent Computing: Theory and Applications II**, K. Priddy, Editor, Proceedings of the SPIE, Vol. 5421, SPIE, Bellingham, WA, 149 - 160.
9. 2004, April, “*Categorizing Decision Strategies Through Limbic System Models*”, in **Multisensor, Multisource Information Fusion: Architectures, Algorithms and Appli-**

- cations, B. Dasarathy, Editor, Proceedings of the SPIE, Vol. 5434, SPIE, Bellingham, WA, 77 - 90.
10. 2001. “*Function-Based Biosensors for Use in Hazardous Waste Toxin Detection*”, Proceedings of the 19th Symposium On Energy Engineering Sciences, May 21 - 22, 2001, Argonne National Laboratory, with James Hickman.
 11. 1997. “*Post Synaptic Density Neural Objects and Dynamic Programming*, in **Smart Engineering Systems: Neural Networks, Fuzzy Logic, Data Mining and Evolutionary Programming**, Intelligent Engineering Systems Through Artificial Neural Networks: Volume 7, Proceedings of the Artificial Neural Networks in Engineering (ANNIE '97) Conference November, 1997, ed. C. Dagli, M. Akay, O. Ersoy, B. Fernandez and A. Smith, ASME Press, 43 - 48.
 12. 1997. “*Extensions to Connectionist Architectures: Introducing Space and Time Locality into Synaptic Links*, in **Smart Engineering Systems: Neural Networks, Fuzzy Logic, Data Mining and Evolutionary Programming**, Intelligent Engineering Systems Through Artificial Neural Networks: Volume 7, Proceedings of the Artificial Neural Networks in Engineering (ANNIE '97) Conference November, 1997, ed. C. Dagli, M. Akay, O. Ersoy, B. Fernandez and A. Smith, ASME Press, 49 - 54.
 13. 1997 (with Doug Bolling). “*Locally Scoped, Multiple Resolution (LOMR) CMAC Objects: A Design Study*, in **Smart Engineering Systems: Neural Networks, Fuzzy Logic, Data Mining and Evolutionary Programming**, Intelligent Engineering Systems Through Artificial Neural Networks: Volume 7, Proceedings of the Artificial Neural Networks in Engineering (ANNIE '97) Conference November, 1997, ed. C. Dagli, M. Akay, O. Ersoy, B. Fernandez and A. Smith, ASME Press, 165 - 170.
 14. 1997. “*Post Synaptic Density (PSD) Computational Objects: Abstractions of Plasticity Mechanisms from Neurobiological Substrates*”, in **Computational Neuroscience: Trends in Neuroscience 1997**, Proceedings of the Computational Neuroscience Conference (CNS96) July 1996, ed. J. Bower, Plenum Press, 765-769.
 15. 1994. “*Clusters of Chained Neural Architectures*”, in **Intelligent Engineering Systems Through Artificial Neural Networks**, Proceedings of the Artificial Neural Networks in Engineering (ANNIE '94) Conference November, 1994, ed. C. Dagli, B. Fernandez, J. Ghosh and R. T. Soundar Kumara, ASME Press, 5 - 10.
 16. 1993, “*On-line Estimation of Optimal Control Sequences: HJB Estimators*”, **Advances in Neural Information Processing Systems 5 (Proceedings of the Neural Information Processing Systems Conference 5 (NIPS 92), Denver and Vail, CO, December, 1992**, Editors J. Hanson, J. Cowan and C. Giles, 319 - 326.
 17. 1993, “*The Use of CMAC Neural Architectures in Obstacle Avoidance*”, **Proceedings of the 3rd Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, WNN 92, Feb. 10 - 12, Auburn University, Auburn, AL and Nov. 4 - 6, 1992, South Shore Harbor, Houston, TX, Simulation Councils Incorporated, 187 - 194. (coauthor: Robert Shelton, Software Technology Division, NASA, Johnson Space Center, Houston, TX).
 18. 1993, “*Controlling a Truck with an Adaptive Critic Temporal Difference CMAC Design*”, **Proceedings of the 3rd Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, WNN 92, Feb. 10 - 12, Auburn University, Auburn, AL and Nov. 4 - 6, 1992, South Shore Harbor, Houston, TX, Simulation Councils Incorporated, 195 - 204. (coauthor: Robert Shelton, Software Technology Division, NASA, Johnson Space Center, Houston, TX).
 19. 1992, “*Adaptive Obstacle Avoidance Using Residual HJB Corrections*”, **Proceedings of the International Conference on systems, Man and Cybernetics: Emergent Innovations in Information Transfer Processing and Decision Making**, Chicago, IL, October, 1992, 1023 - 1028.
 20. 1992, “*On-line Estimation of Optimal Control Sequences: Pontryagin Estimators*”, in **Intelligent Engineering Systems Through Artificial Neural Networks**, Proceedings of the Artificial Neural Networks in Engineering (ANNIE '92) Conference November, 1992, ed. C. Dagli, L. Burke and Y. Shin, ASME Press, 579 - 584.
 21. 1992, “*CMAC Tutorial*”, **Proceedings of the 3rd Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, WNN 92, Feb. 10 - 12, Auburn University,

- Auburn, AL and Nov. 4 - 6, 1992, South Shore Harbor, Houston, TX, Simulation Councils Incorporated, 630 - 649.
22. 1991. “*Path Planning in Analog Valued Obstacle Arrays Using Hierarchical Dynamic Programming and Neural Networks*”, in **Intelligent Engineering Systems Through Artificial Neural Networks**, Proceedings of the Artificial Neural Networks in Engineering (ANNIE '91) Conference November, 1991, ed. C. Dagli, S. Kumara and Y. Shin, ASME Press, 789 - 794.
 23. 1991, “*Nonlinear Iterative Methods for Approximating the Solution to the Learning Problem in Arbitrary Feed Forward Networks*”, **The Proceedings of the 2nd Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, 143 - 151.
 24. 1991, “*Obstacle Avoidance Using Neural Networks and Hierarchical Dynamical Programming*”, **The Proceedings of the 2nd Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, 553 - 560.
 25. 1991, “*Obstacle Avoidance Using Hierarchical Dynamical Programming*”, **The Proceedings of the 23rd Southeastern Symposium on System Theory**, 192-196.

Research Reports

1. 1996 - Present, “**The Gneural Gnome: Jim Peterson’s Home Page**”, www.ces.clemson.edu/~petersj This is where I put almost all of my experimental work as well as completed versions of papers and reports for archival purposes. My current experiments include:
2. 2008, April. “*Calculus For Biologists: A Beginning*”, www.ces.clemson.edu/~petersj/MyBooks/CalcBio.pdf. This is the set of lecture notes I am working out for an experimental course on calculus for biology majors.
3. 2008, April, “*A Primer On BioPhysics: Cognitive Modeling Volume One*”, www.ces.clemson.edu/~petersj/MyBooks/volume1.pdf
4. 2008, April, “*A Primer On Information Processing In The Brain: Cognitive Modeling Volume Two*”, www.ces.clemson.edu/~petersj/MyBooks/volume2.pdf
5. 2008, April, “*A Primer On Information Processing In The Brain: Cognitive Modeling Volume Three*”, www.ces.clemson.edu/~petersj/MyBooks/volume3.pdf
6. 2008, April, “*A Primer On Building Cognitive Models: Cognitive Modeling Volume Four*”, www.ces.clemson.edu/~petersj/MyBooks/volume4.pdf
7. 2007, December, “*West Nile Virus Survival Curve Models*”, www.ces.clemson.edu/~petersj/CurrentPapers/SurvivalPaper.pdf. This is the technical report which will turn into a submitted publication if the right journal can be found. It will be coauthored with N. King and A. Kesson.
8. 2007, December, “*West Nile Virus Survival Constraints*”, www.ces.clemson.edu/~petersj/CurrentPapers/SurvivalConstraints.pdf. This is the technical report which will turn into a submitted publication if the right journal can be found. It will be coauthored with N. King and A. Kesson.
9. 2007, December, “*A Primer On West Nile Virus Infection Simulations*”, www.ces.clemson.edu/~petersj/CurrentPapers/AgentSimulator.pdf. This is the technical report on the software used in the West Nile Virus simulations. It is part theory, part software development and part user guide. It is updated frequently.
10. 2006, December, “*Measure and Integration: First Steps*”, www.ces.clemson.edu/~petersj/MyBooks/M822.pdf. This is a set of notes for our graduate course in measure theory.
11. 2006, December, “*Experiments In Object Oriented Design*”, www.ces.clemson.edu/~petersj/MyBooks/basicOOD.pdf
12. 2006, December, “*A Primer On Hodgkin - Huxley Models*”, www.ces.clemson.edu/~petersj/MyBooks/HodgkinHuxley.pdf .

13. 2006, May “A Primer On Excitable Nerve Cells”,
www.ces.clemson.edu/~petersj/MyBooks/BioPhysics.pdf
14. 2006, July, “*An Implementation Of The King - Kesson Flavivirus Decoy Model*”, with S. Crawford, A. Engau, J. Johnson, A. Tsolakis, Z. Voller and L. Wilkins Jr.
www.ces.clemson.edu/~petersj/CurrentPapers/immunemodel.pdf, This is an implementation of a simpler West Nile Virus model.
15. 2005, July, “*Abstract Second Messenger Objects and Excitable Cell Input Integration*”,
www.ces.clemson.edu/~petersj/CurrentPapers/SM-paper.pdf
16. 2005, July, “*Biological Feature Vector Modulation By First and Second Messenger Pathways*”,
www.ces.clemson.edu/~petersj/CurrentPapers/NeuronOutput.pdf
17. 2006, February, “*Extension Report: Cognitive Modeling Design for Mixed Decision Making*”,
www.ces.clemson.edu/~petersj/MyBooks/AbstractC++Implementation.pdf
18. 2003. “*Cognitive Models for Compositional Design in Genetic Algorithms: Data Abstraction*”,
with M. Kurz.
www.ces.clemson.edu/~petersj/CurrentPapers/GAPaper1.pdf.
19. 2003. “*Data Abstraction In Cognitive Models for Compositional Design in Music*”, with L. Dzuris.
www.ces.clemson.edu/~petersj/CurrentPapers/MusicPaper1.pdf.
20. 2003. “*Data Abstraction In Emotionally Tagged Models for Compositional Design in Music*”,
with L. Dzuris.
www.ces.clemson.edu/~petersj/CurrentPapers/MusicPaper2.pdf.
21. 2003. “*Data Abstraction In Cognitive Models for Compositional Design in Painting*”, with
L. Dzuris.
www.ces.clemson.edu/~petersj/CurrentPapers/PaintingPaper1.pdf.
22. 2003. “*Data Abstraction In Emotionally Tagged Models for Compositional Design in Painting*”,
with L. Dzuris.
www.ces.clemson.edu/~petersj/CurrentPapers/PaintingPaper2.pdf.
23. 2003. “*Neutral Cognitive Models of Compositional Design*”,
www.ces.clemson.edu/~petersj/CurrentPapers/TheoryPaper1.pdf.
24. 2003. “*Cognitive Models of Emotionally Labeled Compositional Design*”,
www.ces.clemson.edu/~petersj/CurrentPapers/TheoryPaper2.pdf.
25. 1996, “General Feedforward Architectures: Theory and Software Implementation”, Technical
Report 634, Department of Mathematical Sciences, Clemson University, Gneural Gnome
Press, 252 pp.
26. 1996, “CMAC Architectures: Theory and Software Implementation”, Technical Report 643,
Department of Mathematical Sciences, Clemson University, Gneural Gnome Press, 186 pp.
27. 1996, “A White Paper on Neural Object Design”, Technical Report 646, revised from 1995
to 2001, Department of Mathematical Sciences,
www.ces.clemson.edu/~petersj/NeuralCodes/NeuralObjects
28. 1988, December., “*A Neural Net Simulation for Back Propagation with Variable Neuron Offset
and Gain Parameters*”, Advanced Development Organization, Smiths Industries, SLI Avionics
Systems Corp.
29. 1988, December, “*Comments on Hopfield Networks and the paper 'A Traveling Salesman
Problem Objective Function That Really Works' by Van de Bout and Miller*”, Advanced De-
velopment Organization, Smiths Industries, SLI Avionics Systems Corp..
30. 1988, March 31, Technical appendices in “Strategic Flight Management System”, Smiths
Industries,SLI Avionic Systems Corp., Final Report, 59 pp. plus co-author of portions of the
main body, 190 pp.
31. 1988, “*Global Corridor Generation for In-Flight Strategic Mission Planning*”, report prepared
for the NAECON 88 (National Aerospace and Electronics Conference), May 23-27, 5 pp, with
K. Scholten and L. Reibling.
32. 1986, August 25, “*Bivariate Curve Fits For Given Missile Trajectories*”, IOC A86-5752.5-27,
Optimization Section, Performance Analysis Department, System and Computer Engineering
Division, The Aerospace Corporation,.

33. 1986, October 25, “*Bivariate Curve Fits For Minimum Energy Trajectories Part 1*”, IOC A86-5752.5-45, Optimization Section, Performance Analysis Department, System and Computer Engineering Division, The Aerospace Corporation.
34. 1986, October 25, “*Bivariate Curve Fits For Minimum Energy Trajectories Part 2*”, IOC A86-5752.5-46, Optimization Section, Performance Analysis Department, System and Computer Engineering Division, The Aerospace Corporation.
35. 1986, October 25, “*Bivariate Curve Fits For Minimum Energy Trajectories of a Three Stage Missile*”, IOC A86-5752.5-47, Optimization Section, Performance Analysis Department, System and Computer Engineering Division, The Aerospace Corporation.

PRESENTATIONS

1. September 19, 2006, “*Core Cognitive Modeling In Avatar Design*”, GAME-ON-NA, 2nd International North America Conference on Intelligent Games and Simulation.
2. November 25, 2005, “*Neural Computational Elements That Subserve Decision Making*”, Artificial Neural Networks in Engineering (ANNIE 2005) Conference.
3. March 26, 2005, “*Modeling Cognitive Function*”, Session: Biological Modeling, SIAM - SEAS Joint Conference, Charleston, SC.
4. March 25, 2005, “*Constraining Cognitive Models with Emotionally Labelled Musical Data*”, Session: Mathematics and Music, SIAM - SEAS Joint Conference, Charleston, SC.
5. July 30 - August 1, 2004, “*Cognitive Models of Music and Painting*”, Seventh Annual International Conference of Bridges, Mathematical Connections in Art, Music and Science, held at Winfield, Kansas, by Linda Dzuris.
6. April 12, 2004, “*Agent Identification and Differentiation Via Abstract Second Messenger Modeling*”, presented at the SPIE Defense and Security Symposium, Orlando, Florida, in the Session: Chemical and Biological Sensing V OR 48.
7. April 13, 2004, “*Polymodal Information Processing Via Temporal Cortex Area 37 Modeling*”, presented at the SPIE Defense and Security Symposium, Orlando, Florida, in the Session: Intelligent Computing: Theory and Applications II, OR 53.
8. April 13, 2004, “*Cognitive/ Emotional Models For Human Behavior Representation in 3D Avatar Simulations*”, presented at the SPIE Defense and Security Symposium, Orlando, Florida in the Session: Enabling Technologies For Simulation Science VIII, OR 31.
9. April 15, 2004, “*Würfelspiel Based Training Data methods for ATR*”, presented at the SPIE Defense and Security Symposium, Orlando, Florida, in the Session: Automatic Target Recognition XIV OR 37.
10. April 14, 2004, “*Information Fusion Via IsoCortex Based Area 37 Modeling*”, accepted to SPIE Defense and Security Symposium, presented at the SPIE Defense and Security Symposium, Orlando, Florida, in the Session: Signal Processing, Sensor Fusion and Target Recognition XIII, OR 40.
11. April 14, 2004, “*Categorizing Decision Strategies Through Limbic System Models*”, presented at the SPIE Defense and Security Symposium, Orlando, Florida, in the Session: Multisensor, Multisource Information Fusion: Architectures, Algorithms and Applications VIII, OR 44.
12. November 10, 2002, “*Experiments In Distributed Biological Modeling*”, , Genesis Users Meeting 2002, San Antonio, TX.
13. November 10, 1997, “*Post Synaptic Density Neural Objects and Dynamic Programming*, Artificial Neural Networks in Engineering (ANNIE '97) Conference
14. November 10, 1997, “*Extensions to Connectionist Architectures: Introducing Space and Time Locality into Synaptic Links*, Artificial Neural Networks in Engineering (ANNIE '97) Conference
15. November 10, 1997, “*Locally Scoped, Multiple Resolution (LOMR) CMAC Objects: A Design Study*, Artificial Neural Networks in Engineering (ANNIE '97) Conference
16. March 22, 1995, “*A White Paper on Neural Object Design*”, Computational Services Directorate, NASA Lewis Research Center, Cleveland, OH, .

17. November 1, 1994, 16th Annual International Conference in Biomedical Engineering under the auspices of the IEEE, Baltimore, MD.: Workshop 4, Hybrid Systems : Neural, Fuzzy and Beyond: Invited Lecture entitled “*CMAC Architectures: Theory and Software Implementation*”. Talk about state of the art CMAC issues including my new convergence results. Software implementations were discussed.
18. November 12, 1994, “*Clusters of Chained Neural Architectures*” **Artificial Neural Networks in Engineering (ANNIE 94)**, St. Louis, MO.
19. November 17, 1994, “*Enhancing Senior Level Analysis Courses with Maple*” Seventh Annual International Conference on Technology in Collegiate Mathematics, Orlando, FL.
20. November 15, 1993, “*Convergence of the CMAC Learning Algorithm*”, **Artificial Neural Networks in Engineering (ANNIE 93)**, St. Louis, MO.
21. November 14, 1993, *Tutorial on CMAC Architectures*, **Artificial Neural Networks in Engineering (ANNIE 93)**, St. Louis, MO.
22. November 14, 1993, *Tutorial on Reinforcement Learning and Adaptive Critic Models Using CMAC Architectures* **Artificial Neural Networks in Engineering (ANNIE 93)**, St. Louis, MO.
23. July 2, 1993, “*Possible Mechanisms for Estimating Control Laws from On-Line Measurements*”, Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology.
24. Feb. 12, 1993, “*On-line Estimation of Optimal Control Sequences*”, Systems Seminar, **INVITED TALK**, Department of Electrical Engineering, Virginia Polytechnic and State University.
25. Feb. 12, 1993, “*CMAC Tutorial*”, INVITED LECTURE, Multivariable Control Course, Department of Electrical Engineering, Virginia Polytechnic and State University.
26. December 3, 1992, “*On-line Estimation of Optimal Control Sequences*”, Applied Mathematics Colloquium, Colorado State University, Fort Collins, CO..
27. December 1, 1992, “*On-line Estimation of Optimal Control Sequences: HJB Estimators*”, Poster Presentation, **Neural Information Processing Systems 5 (NIPS 92)**, Denver and Vail, CO.
28. November 30, 1992, “*On-line Estimation of Optimal Control Sequences*”, Martin Marietta Neural Network Colloquium, Martin Marietta Astronautics Group, Denver, CO.
29. November 16, 1992, “*On-line Estimation of Optimal Control Sequences: Pontryagin Estimators*”, **Artificial Neural Networks in Engineering (ANNIE '92) Conference** .
30. November 15, 1992, “*Tutorial on CMAC Neural Architectures and Neurocontrol*” **Artificial Neural Networks in Engineering (ANNIE 92)**, St. Louis, MO.
31. October 20, 1992, “*Adaptive Obstacle Avoidance Using Residual HJB Corrections*”, **International Conference on Systems, Man and Cybernetics: Emergent Innovations in Information Transfer Processing and Decision Making**, Chicago, IL. **INVITED TALK**.
32. June 17, 1992, “*Training Session: Neurocontrol*”, Seminars in Computing, NASA Lewis Research Center 5 one hour lectures, .
33. May 6, 1992, “*Neurocontrol Architectures for Real-Time Adaptive Control*”, Software Technology Branch, NASA Johnson Space Center.
34. February 1992, *Tutorial on CMAC Neural Architectures*, **Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, Auburn University.
35. February 10 - 12, 1992, “*The Use of CMAC Neural Architectures in Obstacle Avoidance*”, **Workshop on Neural Networks: Academic/ Industrial/ NASA/Defense**, (coauthor: Robert Shelton, Software Technology Division, NASA, Johnson Space Center, Houston, TX), Auburn University.
36. February 10 - 12, 1992, “*Controlling a Truck with an Adaptive Critic CMAC Design*”, **Workshop on Neural Networks: Academic/ Industrial/ NASA/ Defense**, (Given by coauthor: Robert Shelton, Software Technology Division, NASA, Johnson Space Center, Houston, TX), Auburn University.
37. December 4, 1991, “*Neurocontrol Architectures for Real-Time Adaptive Control*”, Martin Marietta Neural Network Colloquium, Martin Marietta Astronautics Group, Denver, CO.

38. November 10, 1991, “*Path Planning in Analog Valued Obstacle Arrays Using Hierarchical Dynamic Programming and Neural Networks*”, Artificial Neural Networks in Engineering (ANNIE '91) Conference, .
39. “*Neurocontrol*”, Computer Science Connectionist Seminar, October 14, 1991.
40. June - July 1991, “*Tutorial: CMAC Neural Architectures and Control Issues*”, 10 one hour lectures, Software Technology Branch, NASA Johnson Space Center.
41. April 2, 1991, “*An Introduction to Feedforward Networks and Their Applications*”, Department of Mathematical Sciences, Wake Forest University, Winston-Salem, NC, **Invited Talk**.
42. March 10 - 12, 1991, “*Obstacle Avoidance Using Hierarchical Dynamical Programming*”, 23rd **Southeastern Symposium on System Theory**, University of South Carolina.
43. February 26, 1991, “*Tutorial: Artificial Neural Networks and Their Applications*”, Seminars in Computing, NASA Lewis Research Center, 5 one hour lectures.
44. February 11 - 13, 1991, “*Nonlinear Iterative Methods for Approximating the Solution to the Learning Problem in Arbitrary Feed Forward Networks*”, 2nd **Workshop on Neural Networks**, Auburn University, Auburn University.
45. February 11 - 13, 1991, “*Obstacle Avoidance Using Neural Networks and Hierarchical Dynamical Programming*”, 2nd **Workshop on Neural Networks**, Auburn University.
46. July 16 - 20, 1990, “*Direct Approximation Methods for Solving Feed Forward Networks: Linear and Nonlinear Techniques*”, Poster Session, SIAM Annual Meeting.
47. December 1, 1989, “*Direct Approximation Methods for Solving Feed Forward Networks: Linear and Nonlinear Techniques*”, Mathematics Colloquium, Colorado State University, Fort Collins, CO.
48. October 5, 1989, “*Estimating Costs in Obstacle Avoidance Problems*”, Western Michigan University, Kalamazoo, MI.
49. May 23-27, 1988, “*Global Corridor Generation for In-Flight Strategic Mission Planning*”, **invited talk** at NAECON 88 (National Aerospace and Electronics Conference).
50. May 20-23, 1985, “*Positive Solutions to a Class of Action Integrals*”, International Conference on Theory and Applications of Differential Equations, Pan American University, Edinburg, Texas, 78539.
51. June 7 - 16, 1983, “*The Existence of Optimal Consumption Policies in Optimal Economic Growth Models with Nonconvex Technologies*”, Lecture at the International Conference on Multifunctions and Normal Integrands, held in Catania, Sicily.
52. January, 1983, “*The Existence of Solutions to Nonconvex Optimal Control Problems: the $\alpha - \alpha^*$ Problem*”, Annual Meeting of the American Mathematical Society, Denver, CO.
53. June 2 - June 4, 1981, “*Degree Theoretic Methods in Optimal Control*”, Lecture at the Conference on Nonlinear Analysis, held at the Memorial University of Newfoundland, St. John's, Newfoundland, Canada.
54. October 31 – November 1, 1980, “*Mathematical Economics and Optimal Control*”, Lecture at the Lake Superior Conference of Colleges and Universities, Duluth, MN.

SPONSORED RESEARCH

1. \$1,000.00 Summer Faculty Research Grant from Michigan Technological University, Summer 1981.
2. \$6,000.00, Summer Faculty Research Grant from Argonne National Labs., “*Control Laws for Treat Upgrade Nuclear Reactor*”, Summer 1983.
3. \$2,000.00 Summer Faculty Research Grant (Creativity Grant) from Michigan Technological University, “*A Numerical Study of Periodic Solutions to Optimal Economic Growth Problems*”, Summer 1984.
4. \$10,000, NASA-ASEE Case-Lewis Summer Faculty Fellowship Program, Lewis Research Center, Cleveland, OH, “*Constructive Existence Proofs to Two Point Boundary Value Problems*”, Summer, 1985.

5. \$10,000, NASA-ASEE Johnson Space Center Summer Faculty Fellowship Program, NASA Johnson Space Center, Houston, TX, “*CMAC Neural architectures and NeuroControl*”, Summer, 1991.
6. \$15,000.00, “*Neural Architectures for Adaptive Control*”, NAG 9-559, NASA Johnson Space Center, Software Technology Group, September, 1991 - May, 1992.
7. \$34,878.00, “*Neurocontrol*”, NAG 3-1311, NASA Lewis Research Center, Scientific Services Group, May 15, 1992 - May 15, 1993.
8. \$20,852.68, Addendum for Computer Hardware for NASA LeRC Grant NAG 3-1311, NASA Lewis Research Center, Scientific Services Group, May 1992.
9. \$28,623.92 Extension to “*Neurocontrol*”, NAG 3-1311, NASA Lewis Research Center, Scientific Services Group, May 15, 1993 - November 22, 1993
10. \$68,047.70 Renewal to “*Neurocontrol*”, NAG 3-1311, NASA Lewis Research Center, Scientific Services Group, November 23, 1993 - November 22, 1994.
11. \$1,500.00 “*McDonnell-Pew Summer Institute on Cognitive Neuroscience*, paid room and board, July 1994.
12. \$222,834.70 “*Software and Neural Architectures for Real-Time Adaptive Learning and Control*”, The National Science Foundation, Directorate for Engineering, Division of Electrical and Communications Systems, Program: Neuroengineering, August 1, 1994 - July 31, 1997.
13. \$66,000.00 “*Dynamic Programming Based Learning Methods for Continuous Time Processes Using Neural Architectures*”, Graduate Student Research Fellowship Program, Minority Focus for Linda Lawson, The National Aeronautics and Space Administration, July 1, 1994 - July 1, 1997
14. \$100,000.00 “*Asynchronous Methods on Heterogeneous Computer Networks for Abstracting High Level Biological Meaning*”, DBI 0119171, Division of Biological Infrastructure, Biological Databases and Bioinformatics, July 1, 2001 - June 30, 2003
15. \$37,432.00 “*Function-Based Biosensors for Use in Hazardous Waste Toxin Detection*”, CoPI, DOE, April 01, 2002 - August 31, 2002, with James Hickman.
16. \$22,020.00, Air Force-ASEE, Summer Faculty Fellowship Program, Rome Air Force Laboratory, Information Sciences Research Group, Rome, N.Y. “*Cognitive Modeling Design for Mixed Decision Making*”, Air Force program 13.20.03.B5507, *Decision Sciences and Effects Based Operations* directed by T. E. Busch, Summer, 2005.
17. \$5,500.00, Fellowship to Department of Pathology, University of Sydney, New South Wales, Australia, March 15 - April 4 2007.

OTHER SPONSORED ACTIVITY

None.

GRADUATE STUDENT ADVISING

Doctoral Graduates

Linda Lawson “*Multigrid Dynamic Programming*”, 2000.

Masters Graduates

Joseph Pepper “*A Computational Model of the Squid Axon*”, May 1993.

Tina Hein “*Air Foil Models*”, May 1994.

Ethan Baldwin “*Neural Network Models*”, May 1994.

Steven Charlesworth “*Neural Network Cluster Models*”, May 1994.

Doug Bolling “*X Window Interfaces for CMAC Architectures*”, May 1995.

Christine Juergens “*Simple Space Station Models*”, August 1996.

Erin McNelis “*Dynamic Heart Models*”, May 1996.

Brian Kamery “*Image Processing for Sign Language*”, May 1997.

Tracy Stephens “*Morphological Image Processing*”, May 1998.

John Paul Roop “*Computational Models of Emotions*”, May 2001.
Matthew Faucett “*Generating Virtual Worlds*”, May 2002.
Saha Snehanshu “*Hodgkin - Huxley Excitable Cell Models*”, Dec. 2003.
Steven Crawford “*Topology and Distributions*”, Dec. 2003.
Leonard Wilkins “*Topological Structure of Manifolds*”, May 2005.

TEACHING

Courses Taught **MTH SC 106 “Calculus I”**. Various Times, most recently Fall 1998.

MTH SC 108/ 108 Honors “Caclulus II”. Various Times

MTH SC 108 - Biologists “Calculus for Biologists”. Since Spring 2006

MTH SC 207 “Calculus For Business. Summer Session II, 2003.

MTH SC 206/ 206 Honors “Caclulus III”. Various Times

MTH SC 450 “Mathematical Modeling”. Fall 2000, Fall 2001, Fall 2002 – introduced biological modeling into curriculum.

MTH SC 453/453 Honors/ 653 “Advanced Calculus I”. Many Times, most recently Fall 2003.

MTH SC 454/454 Honors/ 654 “Advanced Calculus II”. Many Times, most recently Spring 2004.

MTH SC 863 “Programming For Mathematicians” Fall 1993, Fall 1994, Fall 1995

MTH SC 865 “Data Structures For Mathematicians”. Fall 1995, Fall 1996

MTH SC 821 “Linear Analysis”. Many Times, most recently Spring 2006.

MTH SC 822 “Measure Theory”. Many Times, most recently Fall 2006.

MTH SC 823 “Complex Analysis”. Most recently Fall 2005

MTH SC 825 “Ordinary Differential Equations”. Fall 1992

MTH SC 827 “Dynamical Systems”. Summer 2006.

MTH SC 927 “Functiona Analysis”. Most recently Spring 2006.

MTH SC 974 1. “**Topology and Modern Analysis**”. Fall 2004,
 2. “**Introduction to Modern Analysis**”. Fall 2007.

MTH SC 982 “Special topics in neural networks”, neural control and software engineering.

New Course Development

MTH SC 108-Biologists Developing second semester mathematics requirement for biologists that is based on ordinary differential equation modeling.

MTH SC 450 Introduced biological modeling.

MTH SC 827 Introduced bioinformation processing.

MTH SC 863 Introduced two computer languages policy and software engineering elements.

MTH SC 865 Introduced C++ and Object Oriented Design into Data Structures Course.

MTH SC 974 Introduction To Modern Analysis is a course designed to bring students up to the level of abstract reasoning needed for the linear analysis course, MTH SC 821.

UNIVERSITY AND PUBLIC SERVICE

Continuing Education None

Committees

Analysis Subfaculty

Graduate Affairs

Mathematics Science Council

Other Service

Preliminary Examinations Analysis Twice a year.
Preliminary Examinations Computational Three Times
Refereeing Papers Many of these.

MISCELLANEOUS

Lectures on Python For Faculty Spring 2004.
Lectures on Calculus on Manifolds for Faculty Spring 2004