

# Cris Koutsougeras

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## Education:

- Ph.D., August 1988, Computer Science, Case Western Reserve University, Cleveland, Ohio
- Dissertation on neural network learning algorithms and hardware implementation architectures
- M.S., December 1984, Computer Engineering, University of Cincinnati, Cincinnati, Ohio
- Thesis on Data Flow machine architectures
- B.S., June 1983, Electrical Engineering (5 year prog.), National Technical University of Athens – Greece
- Thesis on graphs isometrically embeddable in hypercubes

## Experience (and highlights of accomplishments) :

Professor of Computer Science & Engineering Technology, and Undergraduate Programs Coordinator, Computer Science and Industrial Technology Dpt., Southeastern LA University, since August 2011

Department Head, Computer Science and Industrial Technology Dpt., Southeastern LA University, August 2006 – August 2011.

- Established new program in Engineering Technology with concentrations in Computer ET, Energy ET, Mechanical ET, Industrial ET, Construction ET
- Accreditation reviews by ABET (Computer Science program; 2006, 2008; OSHE 2010) and NAIT (ATMAE) (Industrial Technology program; 2008)
- Established 2+2 articulation agreements with technical colleges (Baton Rouge Community College, Delgado Community College)
- Program assessment methods (Computer Science, Industrial Technology, Engineering Technology, Occupational-Safety-Health-Environment)
- External advisory board with subcommittees for all four programs of the department
- Initiated EARLY-START program (high school coordinated offerings of selected courses for dual credit at Southeastern's Computer Science and Industrial Technology programs).

Faculty, Electrical Engineering & Computer Science Department, Tulane University, 1997 – 2006

- Leader of Tulane's DARPA Grand Challenge team and development for Team Gray's KAT5 (4<sup>th</sup> robot out of the 5 that finished the 2005 Grand Challenge competition)
- NASA summer faculty, Stennis Space Center, 2005
- Graduate program coordinator, EECS department
- Founder of the Center for Automation and Autonomous Systems at the School of Engineering

Faculty, Computer Science Department, Tulane University, 1988 – 1997

- NSF Young Investigator award
- IEEE awards

Instructor of Electrical & Computer Engineering, Cleveland State University, 1988

## **Hands-on Experience:**

- Developed more than 50 commercial websites involving server-side and client-side programming, shopping carts, and content management.
- Participated in the development of the completely autonomous car robot KAT-5; an intelligent robot car that navigates without any human guidance on unknown/unrehearsed terrain (search DARPA Grand Challenge 2005)
- Supervised more than 50 graduate and undergraduate projects involving electro-mechanical apparatus, microcontrollers, sensors, and computer interfacing.

## **Expertise:**

Past work, research, publications, and projects span the following fields: Renewable Energy harvesting systems, Robotics, Artificial Intelligence Systems (particularly sub-symbolic; Neural Nets, Machine Learning, Pattern Recognition/Classification), Hardware and software design for computer interfacing, Internet programming, Information Technology Tools (Web).

## **Publications**

### ***Refereed Journals:***

C. Koutsougeras, Y. Liu, R. Zheng, "Event-driven Sensor Deployment Using Self Organizing Maps", Intl. Journal of Sensor Networks (IJSNet) - Special Issue on: "Coverage Problems in Sensor Networks", Vol. 3, No. 3, 2008

P. Trepagnier, J. Nagel, P. Kinney, C. Koutsougeras, M. Dooner, "KAT-5: Robust systems for autonomous vehicle navigation in challenging and unknown terrain", Intl Journal of Field Robotics, Vol 23, No 8, pp: 509-526, Wiley, 2006; also in "The 2005 DARPA Grand Challenge" Book Series: Springer Tracts in Advanced Robotics, DOI 10.1007/978-3-540-73429-1\_3, Pages 103-128, ISBN 978-3-540-73428-4 Publisher: Springer

J. F. Vassilopoulos, C. Koutsougeras, and A. Hernandez-Acquire, "On the problem of training the Coulomb Energy Network", Intl. Journal of Artificial Intelligence Tools, Vol 11, No 4, pp 475-498, Dec. 2002

Arturo Hernandez-Aguirre, C. Koutsougeras, and B. Buckles, "Sample complexity for function learning tasks through linear neural networks", Intl. Journal n Artificial Intelligence Tools, Vol 11, No 4, pp 499-512, Dec. 2002

N. G. Bourbakis, S. Mertoguno, and C. Koutsougeras, "A knowledge based expert system for automatic visual VLSI reverse engineering", IEEE Trans. Systems, Man, and Cybernetics, V32, No3, pp 428-436, May 2002

C. Koutsougeras, N. G. Bourbakis, and V. Gallardo, "Reverse engineering of real PCB level design using VERILOG HDL", Intl. Journal of Engineering Intelligent Systems, V10, No 2, pp 63-68, June 2002

N. G. Bourbakis, C. Koutsougeras, and A. Jameel, "Handwritten character recognition using low resolutions", Engineering Applications of Artificial Intelligence, vol.10, no.10, 1998

Srikanth, R., C. Koutsougeras, and R. George, "Hybrid Charge Clustering Network: a heterogeneous neural network model", Neural, Parallel & Scientific Computations Journal, vol. 2, pp. 235-244, 1994.

Israel P., and C. Koutsougeras, "A Hybrid Electro-Optical Architecture for Classification Trees and Associative Memory Mechanisms", International Journal of Tools for Artificial Intelligence, Vol. 2, No. 3, 1993.

Gumahad, A.T., N.G. Bourbakis, and C. Koutsougeras, "Recognition of typed characters using a 2-D FT for a letter driven text reading system", International Journal on Engineering Applications of AI, Vol. 6, No. 5, April 1993.

Koutsougeras, C., and P. Israel, "A Method for Parallel Search Under Higher Order Constraints", International Journal of Pattern Recognition, Vol. 7, No. 3, Sept. 1993.

Georgiou, G., and C. Koutsougeras, "Complex Domain Backpropagation", in IEEE Trans. on Circuits and Systems Part II: Analog and Digital Signal Processing, Vol. 39, no. 5:330-334, May 1992.

Koutsougeras, C., and G. Papadourakis, "Coupling Supervised and Unsupervised Techniques in Training Feed-Forward Nets", International Journal of Artificial Intelligence Tools, Vol. 1, no. 1, March 1992.

Koutsougeras, C., G. Georgiou and C. Papachristou, "A Feed Forward Classifier Model: Multiple Classes, Confidence Output Values, and Implementation", International Journal of Pattern Recognition and AI (IJPRAI), Vol.6, No. 4, 1992.

Israel, P., and C. Koutsougeras, "Associative Recall Based on Abstract Object Descriptions Learned from Observation: The CBM Neural Net Model", International Journal of Pattern Recognition and AI, Vol. 4, No. 2, June 1990.

### ***Other Archives:***

Koutsougeras, C., "Unsupervised Composite Networks", in the Handbook of Neural Computation, published jointly by Institute of Physics Publishing and Oxford University Press, p.p. C2.3:1-C2.3:12, Oct. 1996.

Koutsougeras, C., and N. Bourbakis, "Artificial Neural and Neuromorphic Models", chapter 17 in *Tools for AI*, World Scientific, Singapore/New Jersey/London/Hong Kong, 1992.

### ***Conference papers (peer reviews):***

P. McDowell, and C. Koutsougeras, "Graph Memory Development In A Robot Control Architecture", Proceedings CCSC:SC 2009

J. Nagel, P. Trepagnier, C. Koutsougeras, P. Kinney, M. Dooner, "The Culebra Algorithm for Path Planning and Obstacle Avoidance in Kat-5", ICTAI '06: Proceedings of the 18th IEEE International Conference on Tools with Artificial Intelligence, November 2006

Hernandez-Aguirre, Arturo and Cris Koutsougeras and Bill P. Buckles, "Sample Complexity for Function Learning Tasks through Linear Neural Networks", accepted for the Proceedings of Mexican International Conference on AI, MICAI-2002 Merida, Mexico. April 22-26, 2002

Hernandez-Aguirre Arturo, Koutsougeras Cris, and Buckles P. Bill, "On Model Selection in SLT and Linear Basis Functions", Proceedings of the International Joint Conference on Neural Networks (**ICNN-IJCNN**), Washington, D.C. 1999

R. Alba-Flores, C. Koutsougeras, B. Buckles, and S. Amer, "Metadata for a Content-Based Prototype", Third IEEE Meta-Data Conference, Bethesda, Maryland, April 1999.

J. Zhang, X. Yuan, Z. Zeng, B. Buckles, C. Koutsougeras, S. Amer, "Niching in an ES/EP Context", CEC'99, Washington, DC, July 6-9, 1999.

Bill P. Buckles, Cris Koutsougeras, Saud Amer, Jer-Yee Chuang, and Xiao Yuan, "Image Decomposition Using Evolutionary Strategies," Proc. JCIS'98, Vol. II, Second Intern. Workshop on Evolutionary Algorithms, Research Triangle Park, NC, 1998, pp. 395-398.

J.F. Vassilopoulos, and Cris Koutsougeras "Refinement training schemes for the Coulomb energy network", Internat. conf. on Tools with AI, Toulouse, France, November 1996.

D. Roberts, C. Koutsougeras, R. Nudo, C. Cusick, "Modeling Sensory Representations in Brain: New Methods for Studying Functional Architecture Reveal Unique Spatial Patterns", Proc. 1<sup>st</sup> Intl. Symposium on Intelligence in Neural and Biological Systems, Washington, DC, May 1995.

N. G. Bourbakis, C. Koutsougeras and A. Jameel, "Handwriting recognition using a reduced character method and neural nets", SPIE Intl. Electronic Imaging Science & Technology Symposium, vol. VI, pp.592-601, San Jose, CA., February 5-10, 1995.

C. Koutsougeras, "Principal Components and Neural Nets", in proceedings World Congress on Neural Networks, Vol. 3, pp. 307-311, June 1994.

A. Jameel and C. Koutsougeras, "Experiments with Kohonen's Learning Vector Quantization in Handwritten Character Recognition Systems", Proceedings of the 37th Midwestern Symposium on Circuits and Systems, V1. pp 573-576 August 1994.

C. Koutsougeras and A. Jameel, Experiments with various Neural Architectures for Handwritten Character Recognition, Proceedings of the 37th Midwestern Symposium on Circuits and Systems, V1. pp 573-576 August 1994.

Koutsougeras C., and R. Srikanth, "Data transformation for learning in feed-forward neural nets", Proc. Internat. conf. on Tools with AI, pp 22-29, Boston, MA. November 1993.

Jameel, A. and C. Koutsougeras, "On features used for handwritten character recognition in a neural network environment", Proc. Internat. conf. on Tools for AI, pp 280-284 Boston, MA. November 1993.

Srikanth, R., C. Koutsougeras, and R. George, "Hybrid Kohonen Network", Proceedings 2nd International Conference on Fuzzy Theory and Technology, pp. 121-123, October 1993, Durham, NC.

Srikanth, R., F. E. Petry, and C. Koutsougeras, "Fuzzy Elastic Clustering", Proceedings International IEEE Conference on Fuzzy Systems, FUZZ-IEEE'93, March 1993, pp. 1179-1182, San Francisco, CA.

Georgiou, G., and C. Koutsougeras, "Embedding Discriminant Directions in Backpropagation", in Proceedings of the IEEE Southeastcon '92, Birmingham AL, April 1992, vol. 2, pp. 816-818.

Georgiou, G., and C. Koutsougeras, "Embedding Domain Information in Backpropagation", in Proceedings of SPIE (International Society for Optical Engineering) Conference on Adaptive and Learning Systems, Orlando, Florida, 1992.

Srikanth, R., and C. Koutsougeras, "Pattern Classification Using the Hybrid Coulomb Energy Network", Proceedings of the Fifth Annual Conference on Neural Nets and parallel distributed processing, pp 159-166, April 1992, Fort Wayne, Indiana.

Koutsougeras, C., and G. Papadourakis, "A Method for Training a Feed-Forward Neural Net Model While Targeting Reduced Nonlinearity", Proceedings ICTAI '91 international conference, San Jose, CA, Nov. 1991.

Israel, P., and C. Koutsougeras, "Associative Memory with Increased Storage Capacity and Retrieval Capability", 2nd Government Neural Network Applications Workshop, September 1991.

Koutsougeras, C., G. Georgiou and C. Papachristou, "Extending Athena : Multiple Classes and Confidence Output Values", Proc. Tools for Artificial Intelligence, International Conference, Washington D.C. Nov. 1990.

Israel, P., and C. Koutsougeras, "An Annealing Approach to Associative Recall in the CBM Model", International Joint Conference on Neural Networks (IJCNN-90), San Diego, Ca, June 1990.

Koutsougeras, C., H. Barad and A. Martinez, "Neural Networks in Scene Analysis", Invited paper, International Society for Optical Engineering (SPIE) Conference, Orlando FL. April 1990.

Srikanth, R., C. Koutsougeras, F. Dandashi and M. Bringman, "Test Cases : Emergent Generalizations in the Athena and the Rumelhart's Neural Net Models", Proc. of IEEE-Southeastcon, New Orleans LA, April 1990.

Abrahamson, A., C. Koutsougeras and C. Papachristou, "Handwritten Character Recognition with the Athena Model", Proc. of IEEE-Southeastcon, New Orleans LA, April 1990.

Israel, P., and C. Koutsougeras, "Associative Recall Based on Abstract Object Descriptions Learned from Observation: The CBM Neural Net Model", in Proceedings of the Tools for Artificial Intelligence International Conference, Washington D.C. Nov. 1989.

Koutsougeras, C. and C. Papachristou, "A Hybrid Architecture for the Implementation of the Athena Neural Network Model", NASA Conference on Space Telerobotics, Pasadena, Jan. 1989.

Israel, P., C. Koutsougeras and C.A. Papachristou, "The Development of an Associative Memory Model Based on a Classifier", in Proceedings of the International Joint Conference on Neural Networks, (IJCNN '89), June, 1989.

R. George, B. J. Geraci, R. Srikanth, and C. Koutsougeras, "A Methodical Study of the Rumelhart Model", Proc. of 5th IASTED International Conference, pp. 31-35, Honolulu, Hawaii, August 1989.

Koutsougeras, C. and C.A. Papachristou, "Training of A Neural Network Model for Pattern Classification Based on an Entropy Measure", in Proceedings of the IEEE International Conference on Neural Networks (ICNN '88), IEEE, July 1988.

Koutsougeras, C. and C.A. Papachristou, "A Neural Network Model for Propositional Logic Functions", Computational Intelligence International Conference, Elsevier-North Holland, October 1988.

Koutsougeras, C. and C.A. Papachristou, "Learning Discrete Mappings: Athena's Approach", in Proceedings of the IEEE International Conference on Languages for Automation (LFA '88), August 1988.

Koutsougeras, C., and C.A. Papachristou, "Data Flow Graph Partitioning to Reduce Communication Cost", 19th ACM/IEEE Microprogramming Conference (Micro-19), October 1986.

### ***Other Publications/Presentations:***

C. Koutsougeras and A. Jameel, Athena: An Adaptive Neural Network, Release 1.0 for the UNIX operating system. Anonymous ftp site ftp.cs.tulane.edu, a public domain computer software on the Internet, Feb. 1994.

Invited to deliver a seminar series on *Numerical and Adaptive Methods* at the *International Week of Pôle Universitaire Léonard De Vinci*, Paris, France, March 15-19, 2010

## **Funded Research**

- NSF Research Initiation Award : "Training Applications and Implementation of a new Neural Net Model". \$70,000 6/89-6/91
- NSF REU supplement: "Progress of the Neural Nets Approach and its impact on Machine learning", \$4,000 6/90-6/91
- LA Board of Regents : "Neural Network Architectures for Signal and Image Processing". \$125,000, 6/89-6/91
- Tulane Committee on Research : Two Awards: \$3,000 6/89 and \$4,000 6/91
- LASER-LA Board of Regents : "Tulane-LSU-UNO Joint Colloquium on Neural Nets" \$5,000 6/90-12/91
- LA Board of Regents : "Research and Instruction Enhancement Through Parallel Processing (Enhancement LEQSF) \$140,000, 6/91-6/92.
- NSF-EPSCOR Cluster (NSF/BOR) : "Fault-tolerant neural networks: Design theories and applications", \$78,000 for Tulane, 2/92-2/93. (Lead PI of Tulane's group in the joint USL-Tulane-LSU proposal selected in the final five proposals to represent Louisiana for the national competition for NSF funds)
- National Institute for Global Environmental Changes (NIGEC) : "Spectral Methods for Measurement and Analysis of Environmental Parameters" \$12,150, 7/92-12/92.
- NSF : "Neural networks applications Cluster" : \$381,809, 2/93-12/95.
- DoE: "Collaborative Research with the Institute of Radioecological Problems (Belarus Academy of Sciences, Minsk): Fate and Transport of Radionuclides in Belarus after the Nuclear Explosion at Chernobyl", 4/94-8/95, \$60,000, (with Michaelides, Ramer, and Sailor).
- NASA : "Content Based Search Prototype" \$100,000, (with B. Buckles) 4/97-6/98.
- DoD EPSCoR/BMDO : "Processing Optical Information Using Neural Nets and Evolutionary Computation", \$384,000, (with PI B. Buckles) 6/1998-5/2001.
- NASA Goddard Space Flight Center : "Advanced Methods for Storage and Retrieval in Image Databases" \$100,000, (with B. Buckles) 3/99-2/2000.
- NIGEC : "Remote Sensing of Forest Canopy Chemistry" (Feasibility Study), \$14,000, (with PI B. Buckles) July 1999-June 2000.
- LA Board of Regents-PKSFI : "Revised and New Curricula to Meet Post-Katrina Employment Development Needs of the Region", \$930,000 (with W. Duclos of Delgado-TC), 2007
- SELU Office of Technology: "Energy Technology: support for wind and solar projects", \$24,640, 2009
- SELU Technology Fund: "Development, construction, and testing of power generating airfoils", \$4,000, 2010

## **Professional Service**

- Louisiana Region coordinator for the Future City competition for middle schools since 2011.
- Member of the faculty of the Neuroscience Program hosted by the Tulane Medical School (elected November 1994) until June 2000.
- Graduate Studies Director of the Electrical Engineering and Computer Science Department, 1997-July 1999.
- Director of the Computer Engineering Program of Tulane University since 1994.
- Founder of the Center for Automation and Autonomous Complex Systems (CA<sup>2</sup>CS) at Tulane University (approved by the University Committee on Research on 11/16/90).
- Represented Tulane University at the Planning committee of the Louisiana Board of Regents - Department of Defense EPSCOR planning committee, 1993-1997.
- Program Co-Chair for the IEEE Symposium on Information and Intelligent Agents (IIA), and Program Committee of the 1999 International Conference on Information, Intelligence, and Systems, Washington DC, November 1999
- Member of the Editorial Board of the International Journal on Artificial Intelligence Tools, published by World Scientific. Also, Guest Editor for the 1995 Special Issue.
- Program Co-Chairman for the STOC-91 (ACM - Theory of Computation) international conference on Theory of Computation)
- Program Chairman, organizer in charge for the IEEE International Conference on Tools for Artificial Intelligence (ICTAI), November 1994. Also, member of Organizing and Program Committee for the International Conference on Tools for Artificial Intelligence (ICTAI), 1989-93. Also, member of the Steering Committee for ICTAI'95.
- General Chairman, IEEE International Conference on Tools for Artificial Intelligence (ICTAI), Vancouver, Canada, November 2000.
- Organizing Committee member for the 1st IEEE Symposium of Artificial Intelligence in Biotechnology, Washington DC, May, 1995.
- IEEE certificate awards for service, 1992 & 1995; Awarded IEEE Golden Core Membership in 1996.
- Member of the Standards Committee of the IEEE Council for Neural Nets, 1989-1991.
- Served on NSF proposal selection panels.
- Reviewer for International Conferences; Reviewer for Intl. Journals; Reviewer for NSF proposals; Book reviews.
- Also see more recent activity under the section “experience” on page 1.

## Duties performed as administrator

While the following list is not exhaustive, it indicates the types of major tasks performed in current position.

- Supervise program assessment for all four programs of the department; Objectives and Outcomes; Assessment rubrics; Industrial advisory committee, Program accreditations (ABET, NAIT/ATMAE).
- Curriculum: Development; Compliance revisions; Articulations; Specification sheets and content control; Class assignments and scheduling.
- Member of Department Heads Council
- Faculty evaluation instrument, procedures, and faculty annual evaluations
- Coordination of labs in three buildings and management of lab fee programs
- Student recruitment events and student advising
- Departmental policies
- Developed student progression plans (early detection of low performers and effect appropriate advising)
- Senior student exit interviews
- Faculty recruitment (6)
- Management of departmental budgets; program reports; short and long term planning; course schedules; administrative personnel (non-faculty) reviews; graduation audit reviews; purchasing; coordinated regular student recruitment and advising sessions.
- Worked with architects firm to develop specifications and floor plans for a new ET building.

## Courses Taught

<ul style="list-style-type: none"> <li>• Web Servers and Internet Programming *</li> <li>• Web Design and Interfacing *</li> <li>• Artificial Intelligence *</li> <li>• Computer Architecture *</li> <li>• Theory of Computation *</li> <li>• Software Design *</li> <li>• Programming Languages *</li> <li>• Numerical Analysis *</li> <li>• Neural Nets *</li> <li>• Computer Science Principles (600 leveling course) *</li> <li>• Computer Engineering Capstone Projects at Tulane.</li> <li>• Engineering Technology Capstone Projects at Southeastern</li> </ul>	<ul style="list-style-type: none"> <li>• Intro. Control Systems #</li> <li>• Data Structures *</li> <li>• Digital Logic Design # *</li> <li>• Electronic Circuits \$</li> <li>• Microcomputer Interfacing * # \$</li> <li>• Photovoltaics #</li> <li>• Signal Analysis \$</li> <li>• Computer Engineering Lab * #</li> <li>• Electrical Engineering Lab * \$</li> <li>• Introduction to Engineering Technology #</li> </ul>
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\* Computer Science

# Engineering Technology

\$ Electrical Engineering