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CURRICULUM VITAE

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EDUCATION

1978 Ph.D. Computing Science, University of Alberta
 1970 M.B.A. McMaster University
 1968 B. Tech. Mechanical Engineering, Indian Institute of Tech., Madras

EMPLOYMENT EXPERIENCE

1994- to date *Distinguished Professor in Computer Science, USL-
 Ctr. for Adv. Computer Studies*
 1988- 94 *Professor of Computer Science, USL- Ctr for Adv.
 Computer Studies*
 1986-88 *Assoc. Professor of Computer Science, USL- Ctr. for Adv.
 Computer Studies*
 1981-86 *Assoc. Professor of Computer Science, University of Regina*
 May 1984-Aug 1984 *Database Consultant, Computer Center, University of Malaya*
 Aug 1983-Apr 1984 *Visiting Professor, CIS Group, Technical University of Berlin*
 1977-81 *Asst. Professor of Computer Science, University of Regina*
 1970-73 *Lecturer of Business Administration, St. Mary's University*

AWARDS AND HONORS

1994 USL Foundation Professorship
 1987 ACM Recognition of Service Award
 1986 ACM Computing Reviews' *Reviewer Excellence* Recognition

RESEARCH AREAS

Information Retrieval & Filtering, Conceptual Categorization of text/images, Knowledge Discovery in Databases, Image Database Management, Heuristic and Randomized Search Algorithms.

RESEARCH GRANTS AND CONTRACTS

State of Louisiana Board of Regents (ITRS), Ranking and Similarity-based Retrieval in Heterogeneous, Distributed Databases, July 1, 1997 - June 30, 2000, \$120,000.

State of Louisiana Board of Regents, Systematic and Statewide Initiatives to Support DoD-EPSCoR FY97 Proposal, June 1, 1997 - June 1, 2000, \$750,000.

Board of Regents and NSF-EPSCoR, Joint Faculty Appointment Program on Harnessing Distributed, Heterogeneous Information Sources, December 1996 - August 1998, \$450,000, with Dr. Erol Hinds, of Southern Univ., and Drs. H. Chu and T. R. Rao, of the State of Louisiana Board of Regents.

State of Louisiana Board of Regents, LEQSF (1995-1998), Systemic and State-wide Initiative to Support Louisiana DoD-EPSCoR Proposal, 1996-99, \$1.5M, with Dr. Trudell of UNO.

Department of Defense, Louisiana's DoD-EPSCoR Planning Grant, September 1993- August 1994, \$75,000, with Dr. Terry Watkins, of UNO, and Mrs. Reba Poulson and Mr. Ed Goodell of the State of Louisiana Board of Regents.

National Science Foundation, NSF-9114210, Invitational Workshop on Future Directions in Text Analysis, Retrieval and Understanding, 1991, \$25,105, with Dr. J. S. Deogun.

State of Louisiana Board of Regents, LEQSF (1991-92)- ENH - 100, Laboratory for Applied Artificial Intelligence, 1991-92, \$60,000, with Drs. Bayoumi, Chu, Dasgupta, Lursinsap and Loganantharaj.

DARPA, MDA 903-89-c-0041, Message Understanding for Template Filling, \$45,000, with Dr. J. S. Deogun.

State of Louisiana Board of Regents, LEQSF(1989-90)-ENH-51, Laboratory for Computer Vision and Multisensor Fusion Research, 1989-90, \$130,000, with Drs. Bayoumi, Chu, Loganantharaj and Seetharaman.

United States Army Research Office, DAAL03-89-0118, Application of Machine Learning Techniques for Effective Retrieval in Image Databases, 1989-1991, \$122,000, with V.N. Gudivada.

State of Louisiana Board of Regents, NSF/LASER (1989) - JCP-13, USL-NLU Distinguished Lecture Series in Data and Knowledge Bases, 1989-1990, \$5,000.

National Science Foundation, a IRI-8805875, Cluster-based Adaptive Information Retrieval, 1988-90, \$143,000, with J.S. Deogun.

Natural Sciences and Engineering Research Council (NSERC) of Canada, Operating grants from April 1979 to July 1987, \$54,000 during last 3 years.

NSERC of Canada, Sabbatical Travel Grant, 1983, \$2,400.

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- R. Kosireddy, M. A. Bayoumi and V. V. Raghavan, "A VLSI Parallel Architecture for Pattern Classification," *ACM South Central Regional Conf.*, Nov. 1987, Lafayette, La., 189-199.
- V. V. Raghavan, "Deterministic Strategies for Query (Re)formulation in Information Retrieval," *First International Conf. on Bibliometrics and Theoretical Aspects of Information Retrieval*, Aug. 1987, Diepenbeek, Belgium, published in L. Egghe and R. Rousseau (Eds.) *Informetrics 87/88*, Elsevier Science Publishers B.V., Amsterdam, 1988, 219-229.
- V. V. Raghavan and B. Agarwal, "Optimal Determination of User-oriented clusters: An Application for the Reproductive Plan," *Proc. of the Second International Conf. on Genetic Algorithms*, July 1987, Cambridge, MA., 241-246.
- V. V. Raghavan and J. S. Deogun, "Optimal Determination of User-oriented Clusters," *Proc. of the Tenth ACM-SIGIR International Conf.*, June 3-5, 1987, New Orleans, La. 140-146.
- V. V. Raghavan and L. V. Saxton, "Conceptual Design for an Integrated Information Retrieval/Database Management System," *G.I. Conf. on Database Systems for Office Automation, Engineering and Scientific Applications*, March-April 87, Darmstadt, FRG., published in H. -J. Schek and G. Schlageter (Eds.) *Datenbanksysteme in Büro, Technik und Wissenschaft*, Springer-Verlag, Berlin, 1987, 443-447.
- V. V. Raghavan, L. V. Saxton, S. K. M. Wong and S. S. Ting, "A Unified Architecture for the Integration of Data Base Management and Information Retrieval Systems," *Proc. of the IFIP 10th World Computer Congress*, North-Holland, Sept. 1986, Dublin, Ireland, 1049-1054.
- J. S. Deogun and V. V. Raghavan, "User-oriented Document Clustering - A Framework for Learning in IR," *Proc. of Ninth International ACM-SIGIR Conf.*, Sept. 1986, Pisa, Italy, 157-163.
- S. K. M. Wong, W. Ziarko, V. V. Raghavan and P. C. N. Wong, "On Extending the Vector Space Model for Boolean Query Processing," *Proc. of Ninth Annual International ACM-SIGIR Conf.*, Sept. 1986, Pisa, Italy, 175-185.
- V. V. Raghavan, "Clustering Algorithms for Information Retrieval - An AI Perspective," *Proc. of the 19th Hawaii International Conf. on System Sciences*, Jan. 1986, Honolulu, Hawaii, 142-151.
- K. Vidyasankar and V. V. Raghavan, "Highly Flexible Integration of the Locking and the Optimistic Approaches of Concurrency Control," *Proc. of the IEEE 9th International Compsac Conf.*, Oct. 1985, Chicago, IL, 489-494.
- J. S. Deogun and V. V. Raghavan, "Integration of Information Retrieval and Data Base Management Systems," *Proc. of the RIAO-85 (Recherche d'Informations Assistee par Ordinateur) Conf.*, March 1985, Grenoble, France, 627-644.
- J. S. Deogun and V. V. Raghavan, "A Generalized Retrieval System: Formulation and its Implications for the Sciences," *Symposium on Automatic Information Retrieval in the Sciences (organizer: Dr. M. J. McGill, Symposium II, Ninth International CODATA Conf.*, June 1984, Jerusalem, Israel, published in *The Role of Data in Scientific Progress*, P. S. Glaser (ed.) Elsevier Science Publishers B. V. (North Holland), 1985, 513-516 (INVITED PAPER).
- S. K. M. Wong and V. V. Raghavan, "Vector Space Model of Information Retrieval - A

- Reevaluation," in (ed.) *C. J. van Rijsbergen: Research and Development in Information Retrieval, Proc. of the 3rd Joint BCS and ACM Symposium*, July 1984, King's College, Cambridge, England, 167-186.
- V. V. Raghavan, K. Vidyasankar and Jing Xinhai, "Distributed Calendar System with High Availability," *Proc. of the 17th Hawaii International Conf. on System Sciences*, Jan. 1984, Honolulu, Hawaii, 639-645.
- K. W. Tsou, L. V. Saxton, V. V. Raghavan and J. S. Deogun, "Consecutive Retrieval with Redundancy Organization of Clustered Files," in R. E. A. Mason (ed.) *Information Processing 83*, North-Holland, Amsterdam. Proc. of the IFIP 9th World Computer Congress, Sept. 1983, Paris, France, 533-537.
- V. V. Raghavan, H. Shi and C. T. Yu, "Evaluation of the 2-Poisson Model as a Basis for Using Term Frequency Data in Searching," *Proc. of Sixth International ACM-SIGIR Conf.*, June 1983, Washington, DC, 88-100.
- V. V. Raghavan and M. Y. L. Ip, "Techniques for Measuring the Stability of Clustering: A Comparative Study," in G. Salton and H.-J. Schneider (ed.) *Research and Development in Information Retrieval Proc.*, Berlin, May 1982. Published as Lecture Notes in Computer Science Series, Springer-Verlag, Berlin 1983, 209-237.
- J. S. Deogun and V. V. Raghavan, "Query Directed Partitioning Scheme for Securing Statistical Databases," *Proc. of the Workshop on Statistical Database Management*, Dec. 1981, Menlo Park, CA, 285-293.
- M. Y. L. Ip, V. V. Raghavan and L. V. Saxton, "An Approximation Algorithm for the Index Selection Problem," *Proc. of the IEEE 5th International COMPSAC Conf.*, Nov. 1981, Chicago, IL, 43-49.
- V. V. Raghavan and J. S. Deogun, "Information Retrieval: Research Strategies and their Implications," *Proc. of the Canadian Information Processing Society Conf.*, June 1981, Waterloo, Ont., 9.4.1-9.4.9.
- V. V. Raghavan and K. Birchard, "A Clustering Strategy Based on a Formalism of the Reproductive Process in Natural Systems," *Proc. of the Second International ACM-SIGIR Conf.*, Sept. 1979, Dallas, Texas, 10-22.

SELECTED SCHOLARLY ACTIVITIES

Keynote and Invited Presentations

- "Advances in Content-based Image Retrieval and their Implications to GIS," *Workshop on Advances in Geographic Information Systems*, Nov. 1993, Washington, DC.
- "Perspectives on Text Analysis, Retrieval and Understanding," *'Reflections on the Future' Conf.* Sept. 1993, Edmonton, Alta., Canada.
- "A Machine Learning Approach to Automatic Pseudo-Thesaurus Construction," *Workshop of Japanese Computer Society's Special Interest Group on Fundamental Infology*, May 1992, Tokyo, Japan.
- "On the Integration of Information Retrieval and Database Management Systems," *Malaysian Computer Society's Banquet*, Sept. 1984.

Conference & Professional Positions

1996	Program Committee	ACM Conference on Information and Knowledge Management
1996	Reviewer	8th Int'l. Conference on Computing and Information
1996	Program Committee	3rd Int'l. Joint Conference on Information Sciences, RSSC-97
1995	Panel Member	ACM CSC '95, Content-based Image Retrieval Systems
1995	Session Chair	Mardi Gras 1995 conf. on HPCC Technologies
1995	Ex-officio Member	La. Stimulus for Excellence in Research (LaSER) Committee
1995	Organizing Committee	ACM-CSC Wkshp On Rough Sets & Database Mining
1994	Session Chair	IFIP World Congress 1994
1993-	ACM Lecturer	ACM Lecturership Series
1993-95	Co-chair	La. State Planning Committee (DOD- EPSCoR)
1993	Session Chair	Symp. on Document Analysis & Inform. Retr.
1992	NSF Review Panel	Database and Expert Systems Program
1991	Panel Member	NSF Wkshp on Text Analysis, Retrieval and Understanding
1991	Program Co-chair	ACM- SIGIR Conference
1991	Publicity Chair	ACM Multimedia and Information Systems Conf.
1985-90	Co-editor	SIGIR Forum Newsletter
1988	Session Chair	ACM- SIGIR Conference
1987	Program Chair	ACM South Central Region Conference
1987	Panel Chair	ASIS Annual Conference
1987	Session Chair	ACM- SIGIR Conference
1987	Publicity Chair	ACM- SIGIR Conference
1986	Panel Chair	ASIS Annual Conference
1986	Panel Chair	Canadian Assoc. for Inform. Sci. Conference
1985	Program Chair	ACM- SIGIR Conference
1985	Panel Member	ACM- SIGIR Conference
1985	General Chair	Wkshp on Found. Adaptive Inform. Process.

Conference Program Committee Membership

- 1995 RST-95 Workshop on Rough Set Theory
- 1995 ACM- Conf. on Inform. & Knowledge Mgmt.
- 1995 ACM-CSC Wkshp on Rough Sets & Database Mining
- 1994 IEEE Conf. on Tools with AI: Knowledge-based Systems, Intelligent Databases
- 1994 Wkshp on Rough Sets and Soft Computing
- 1994 ACM- SIGIR Conference
- 1993 Wkshp on Advances in Geographic Information Systems
- 1992 ACM- SIGIR Conference
- 1991 NSF Wkshp on Text Analysis, Retrieval and Understanding
- 1990 ACM- SIGIR Conference
- 1989 ACM- SIGIR Conference
- 1988 ACM- SIGIR Conference

GRADUATE STUDENT TRAINING

Thesis Supervision

Ph.D. Level

1. J.N. Bhuyan (1990), "Cluster-based Adaptive Information Retrieval"
2. G.S. Jung (1991), "Connectionist Domain Knowledge Acquisition and its Evaluation in Information Retrieval"
3. J.R. Alsabbagh (1992), "Characterization and Exploitation of Sharing Opportunities in Multiple Query Optimization"
4. V.N. Gudivada (1993), "A Unified Framework for Retrieval in Image Databases"
5. S.K. Mishra (1994), "Randomized Branch and Bound Algorithms-A Framework for Combinatorial Optimization"
6. H. Sever (1995), "Knowledge Structuring for Database Mining, and Text Retrieval Using Past Optimal Queries"
7. K. Vanapipat (1995), "A Framework for Object Integration in the Context of a Multidatabase Environment"; Co-advisor: Dr. N. Pissinou
8. S. Choubey (expected 1997)
9. T. Johnsten (expected 1998)

M.S. Level

1. T.K.W. Tsou (1982), "Consecutive Retrieval Organization of Clustered Files"
2. S.S. Ting (1985), "A Flexible Approach for the Integration of a DBMS and an IRS"
3. R. Sharma (1986), "Classification-based Adaptive Information Retrieval: A Framework and an Experimental Prototype"
4. K. Uildriks (1996)

Thesis Committee MembershipPh.D. Level

T. Huang (1988), P. Michaud (1990), D. Chung (1990), P. Rhee (1990), C. Leger (1990), S. K. Bhatia (1991), B. A. Babin (1992), P.-J. Chung (1992), M. Beheshti (1992), D. Schwartz (1993), C. R. Chow (1994), V. B. Krishnamoorthy (1995), G. Lin (1994), G. Washburn (1995), G.-Y. Song (1995), J. Gravely, A. Sarkar

M.S. Level

Z. Xing (1994), S.P. Obili (1994), A. Narasimhan (1992), M. Kottapalli(1991), Y.Y. Yao (1988), P.C.N. Wong (1986), M.Y.L. IP (1981).

Harold H. Szu
Lamson Professor and Director of CACS

Center for Advanced Computer Studies
 University of Southwestern Louisiana
 2 Rex St., Conf. Ctr. Rm. 459
 Lafayette, Louisiana 70504-4330

Office: (318) 482-6147
 Fax: (318) 482-5791
 Email: hszu@cacs.usl.edu

EDUCATION

- 1971, Ph.D. Physics, The Rockefeller University, NY; Graduate Advisor: George Uhlenbeck
- 1966, M.S. Physics, University of Detroit
- 1963, B.S. Physics, National CK University, Taiwan

RESEARCH INTERESTS

Neural networks, adaptive wavelet transforms, statistical and mathematical physics.

EXPERIENCE

- Lamson Professor of Computer Science and Director of CACS, USL, Lafayette, LA.
- Information Science Group Leader, Naval Surface Warfare Center, Code B44, Silver Spring, MD 20903; directly managed a team of 5 scientists with a total budget \$750K/year, and indirectly managed the Computation & Information Systems Branch consisting of 35 scientists with an annual budget of 5.3 million.
- Science Advisor to NSWC Director \$250 million/year.
- NSWC task leader of "Eng. of Complex Systems," \$2 million/year, ONR/ONT.
- Fifteen years as Research Physicist at Naval Research Lab, Plasma, Optics, Elec. Warfare Divisions.
- Graduated in 1971 from Rockefeller University, NY; Ph.D. in Physics (Prof. G. E. Uhlenbeck).
- Visiting Member, Institute for Advanced Studies, Princeton, 1976-1978.

HONORS, AWARDS AND SCHOLARSHIPS

- SPIE Fellow; OSA Fellow; IEEE Fellow, INTERNATIONAL NEURAL NETWORK SOCIETY (INNS) Founding Governor & President
- NAVSEA Scientist of the Year Award (nominated) 1996

SYNOPSIS OF RESEARCH CONTRIBUTIONS

- Multiple Targets Multiple Looks affine transform for passive range surveillance.
- Collective Chaos: Neural Network Models for efficient information processing.
- Adaptive Wavelet Transform: Pre-processing for wide-band transient signal analyses.
- Parallel Computing: Benchmark performances of MIMD machines.
- Automation & Optimizations: In resource management, e.g., Parallel TSP Algorithms.
- Sixth Gen. Computer: Dynamic Reconfigurable neural nets by Hairy neuron model.
- Cauchy Machines: Inventor of fast simulated annealing for global optimization.
- OCR: Optical Character Recognition by orthogonal feature self-generation.
- Neurocontrol: Convergence proofs of neurocontrol theorems. Over 300 publications and 7 patents; 11 Ph.D. students; edited 3 books.

TEN PUBLICATIONS RELATED TO THE PROPOSED RESEARCH

1. "Self-reference Spatio-Temporal Image-Restoration Technique," H. Szu and J. A. Blodgett, J. Opt. Soc. Am., Vol. 72, pp. 1666-1669, 1982.
2. "Inverse Problem of Image Processing," H. Szu, J. Math Phys. 25, pp. 2767-2772, 1984.

3. "An Image Processing Architecture for Real-Time Scale/Rotational Invariant Image Processing," R. Messner and H. Szu, *Computer Vision, Graphics and Image Processing*, Vol. 31, pp. 50-66, 1985.
4. "Application of an Algorithm for Invariant Feature Extraction in Machine Vision," R. Messner and H. Szu, *Proceeding SPIE*, Vol. 579, *Intelligent Robots and Computer Vision*, pp. 34-46, Cambridge, Sept. 1985.
5. "Infrared Power Spectral Density Diurnal Variations and Clutter Rejection Scaling Laws for Focal Plane Arrays," H. Szu, *SPIE*, 638, pp. 148-165, 1986.
6. "Simulated Annealing Feature Extraction from Occluded and Cluttered Objects," H. Szu and K. Scheff, *Int'l. Joint Conf. Neural Nets*, pp. II-76-II-79, Washington, DC, January 15-18, 1990.
7. "Image Wavelet Transforms Implemented by Discrete Wavelet Chips," H. Szu, C. Hsu, P. Thaker and M. Zaghoul, *Optical Engineering*, Vol. 33, pp. 2310-2325, 1994.
8. "Wavelet Processing and Optics," Y. Li, H. Szu, Y. Sheng and H. Caulfield, *Proceedings of the IEEE*, Vol. 84, pp. 720-732, 1996.
9. "Wavelet Transforms and Neural Networks for Compression and Recognition," H. Szu, B. Telfer and J. Garcia, *Neural Networks*, Vol. 9, pp. 695-708, 1996.
10. "Wavelet Index of Texture for ANN Classification of Landsat Images," H. Szu, J. Le Moigne, N. Netanyahu, M. Francis and C. Hsu, *Proceedings of AICV Conf., SPIE*, Washington, DC, Oct. 1996.

RESEARCH GRANTS

- Served as the Source & Evaluation Board of NIST/ATP Digital Video Information Infrastructure 1995.
- Helped obtain the \$1 Million/year, ONR/HBCU, 1993-1995 and served as a Governor of Neuroengineering Center, Tenn. State Univ.
- Member of Review Team of NSF Center of Excellence, 1990.
- Member of DARPA Neural Network Steering Committee, 1989.
- Helped create the NEUROENGINEERING RESEARCH CENTER through the Illinois State High Tech Challenge Fund invested at Southern Illinois University, 1990.
- Member of Intelligent Manufacturing Systems (of U.S. Dept. of Commerce).

PROFESSIONAL ACTIVITIES

- Founding Governing Board of INNS.
- INNS Secretary/Treasurer since its inception. Obtained IRS-501-C Status.
- President of INNS 1993 leading 22 Governors and 5 staffs with \$500K Asset.
- Developed 30 SIG/Chapters of INNS. Maintained interdisciplinary identity.
- Organized "Decade of the Brain" Symp., HJR 174, Washington, DC 5/28-29/91.
- Chair, Gordon Research Conf. on Holography and Information Proc., 1995-1997.
- Served as a member of KYOTO PRIZE nomination and review 1989-1990.
- International advisors of INTERNATIONAL INSTITUTE FOR NOVEL COMPUTING, headed by Prof. Hideo Aiso, Keio Univ., sponsored by JTTA, I. Idota (*Nature*, Vol. 347, p. 217, 1990).
- Org. Chair World Cong-NN-94, San Diego, 1994 June.
- Program Chair ICNN-92, Beijing 1992.
- Often-Sought-After Keynote Speakers internationally in many functions.
- Editor-in-Chief of INNS Press Publishing book series and Conf. Proceedings, 1993-1998.
- BOOK EDITOR: *Optical and Hybrid Computing*, SPIE, Leesburg, VA, 1987.
- Guest editor of *Opt. Eng. Special Issues on Wavelet Transforms*, Sept. 1992, July 1994.
- Editor-in-Chief, *Journal of Neural Network Computing*, Auerbach, from 1989-1991.

Chee-Hung Henry Chu

Education

- Ph.D., Electrical Engineering, Purdue University, West Lafayette, Indiana, August 1988. Major Professor: Edward J. Delp III.
- M.S.E., Computer, Information and Control Engineering, The University of Michigan, Ann Arbor, December 1982.
- B.S.E. (summa cum laude), Computer Engineering, The University of Michigan, Ann Arbor, August 1981.

Professional Experience

- Associate Professor (1994 to present), Center for Advanced Computer Studies, The University of Southwestern Louisiana, Lafayette.
- Assistant Professor (1988 to 1994), Center for Advanced Computer Studies, The University of Southwestern Louisiana, Lafayette.

Professional Registration

- Registered Professional Engineer in Electrical Engineering, State of Louisiana, Registration number 26314.

Honorary and Professional Societies

- Tau Beta Pi, Eta Kappa Nu, Institute of Electrical and Electronics Engineers, Association for Computing Machinery, SPIE—The Optical Engineering Society

Selected Publications

- W. Watunyuta and C. H. Chu, "Voronoi tessellation-based spatial domain analysis of digital halftoning methods," to appear in *Optics Communications*, 1997.
- C. R. Chow and C. H. Chu, "A concurrent training algorithm for supervised learning in artificial neural networks," to appear in *Journal of Information Science and Engineering*, 1997.
- W. Watunyuta and C. H. Chu, "A dither pattern ensemble method for digital halftoning," *Optics Communications*, vol. 129, pp. 331–336, 1996.
- R. D. Sidman, C. H. Chu, and K. Efe, "Source localization and bioelectric imaging as it relates to continuous waveform analysis," *Electroencephalography and Clinical Neurophysiology*, 1996.
- W. Watunyuta and C. H. Chu, "On inverse halftoning by Markov random field model-based surface reconstruction," in *Recent Progress in Digital Halftoning*, ed. R. Eschbach, The Society for Imaging Science and Technology, Springfield, Va., 1995, pp. 21–24.
- D. H. Razi and C. H. Chu, "On the realization of an alpha-trimmed mean filter on the threshold decomposition architecture," *Optical Engineering*, vol. 34, no. 9, pp. 2767–2771, 1995.
- C. H. Chu, "Data compression by multiresolution tree search," *Optical Engineering*, vol. 33, no. 7, pp. 2136–2142, July 1994.

- R. D. Sidman, C. H. Chu, J. S. Semel, and T. D. Lagerlund, "Computing environment and tools for network-based interactive neuroscience data visualization," presented at the *American Clinical Neurophysiology Society Annual Meeting*, Boston, Mass., Sep. 1996.
- M. A. Pratt, C. H. Chu, and S. T. Wong, "Volume compuression of MRI data using zerotree wavelets," in *Proc. Wavelet Applications in Signal and Image Processing IV*, Denver, Colo., Aug. 1996, pp. 752-763.
- R. D. Sidman and C. H. Chu, "The use of the wavelet transform to compress electrophysiological data," presented at the *American Electroencephalographic Society Annual Meeting*, Chicago, Ill., Sep. 1994.

Graduate Student Training

Ph.D. Dissertation Supervision

W. Watunyuta (1994), C. R. Chow (1994), M. K. Ghanta (1994), B. Patwiwat (1995), J. K. Chen (1996), S.-K. Aditya (1996),

Current: N. A. Breaux, D. H. Razi, H. Duan, M. A. Pratt.

Ph.D. Dissertation Committee Membership

Current: A. L. Broadwater, S. K. Choubey, J. S. Semel (Mathematics), P. Watanapongse.
1996: P. Uthayopas.

1995: M. Altuwayri, M. S. Kolluru, J. Li, H. Sever, G. Song, C. L. Su

1994: D. J. Bouvier, A. Fernandez, C. Khunasaraphan, S. K. Mishra

1993: B. W. Ham, B. W. Jeon, D. D. Wei

1992: I. Remedios, W. Suengtaworn, T. Tanprasert, C. Thayer

1991: G. S. Jung

1990: J. Bhuyan, G. M. A. Schaar, W. E. Simmons, V. Techangam

Conference Organization Activities

Program Committee Member, IEEE International Conference on Image Processing, Sep. 1997, Santa Barbara, Calif.

Program Committee Member, SPIE Electronic Imaging and Multimedia Systems Conference, Nov. 1996, Beijing, China.

Program Committee Member, 1996 IEEE International Conference on Tools with Artificial Intelligence, Nov. 1996, Toulouse, France.

Program Committee Member and Session Chair, SPIE Wavelet Applications Conference, Apr. 1996, Orlando, Fla.

Finance and Registration Chair, 1995 IEEE Defect and Fault Tolerance in VLSI Systems Workshop, Oct. 1995, Lafayette, La.

Session Chair, SPIE Wavelet Applications Conference, Apr. 1995, Orlando, Fla.

Program Committee, IEEE International Conference on Tools with Artificial Intelligence, Nov. 1994, New Orleans, La.

Session Chair, 37th Midwest Symposium on Circuits and Systems, Aug. 1994, Lafayette, La.

KEMAL EFE

EDUCATION

INSTITUTION	DEGREE	DATE	MAJOR
University of Leeds (England)	Ph.D.	1985	Computer Science
University of California (UCLA)	M.Sc.	1980	Computer Science
Istanbul Technical University	B.S.	1977	Electrical Engineering

PROFESSIONAL EXPERIENCE

EMPLOYER	POSITION	PERIOD
University of Southwestern Louisiana, Lafayette, LA	Associate Professor of Computer Science	8/88 - present
University of Missouri Columbia, MO	Assistant Professor of Computer Science	8/85 - 8/88
University of Leeds	Lecturer Research Fellow	8/83 - 8/85 5/80 - 5/83
University of California (UCLA)	Research Assistant	8/78 - 3/80

RESEARCH INTERESTS

- Parallel Algorithms-Architectures.
 - Distributed Computing Systems and Networks.
-

INVITED TALKS (OVER 20)

1. Invited speaker and panelist at the ICPP Workshop on Challenges of Parallel Computation, August 14, 1995. (Invited by D. P. Agrawal)
2. Invited presentation at the NASA Kennedy Space Center, July 18, 1995. (Invited By R. Pecaut)
3. NSF-DIMACS workshop on Graph Embedding and Parallel Architectures, Rutgers University, January 13-15, 1992. (Invited by F. T. Leighton)

PUBLICATIONS (22 journals (plus 5 pending), over 40 Conferences)

FIVE PUBLICATIONS RELEVANT TO THE PROPOSAL:

1. K. Efe and V. Krishnamoorthy, "Optimal Scheduling of Compute-Intensive Tasks on a Network of Workstations," *IEEE Transactions on Parallel and Distributed Systems* vol. 6, no. 6, June 1995, pp. 668-673.
2. V. Krishnamoorthy, and K. Efe, "Task Scheduling With and Without Communication Delays: A Unified Approach," *European Journal of Operational Research*, vol. 89, (1996) pp. 366-379.
3. K. Efe, P. Uthayopas, V. Krishnamoorthy, and T. Deschakulthorn, "Parallel Algorithms for Workstation Clusters," *Proc. ICPP 1995 Workshop on Challenges for Parallel Processing*, pp. 140-147.
4. M. Schaar and K. Efe, "Effective Queueing Strategies for Co-Scheduling in a Pool of Processors," *Computer Communications* vol. 19, no. 9-10, August 1996, pp. 743-753.
5. R.D. Sidman, C.H. Chu, and K. Efe, "Source Localization and Bioelectric Imaging as it Relates to Continuous Waveform Analysis," *Electroencephalography and Clinical Neurophysiology*, special issue on *Continuous Wave-Form Analysis*, (EEG Suppl. 45), 1996, pp. 9-21.

FIVE OTHER PUBLICATIONS

1. K. Efe, "Heuristic Models of Task Assignment Scheduling in Distributed Systems," *IEEE Computer*, June 1982, pp. 50-56.
2. W.W. Chu, L.J. Holloway, M.T. Lan and K. Efe, "Task Allocation in Distributed Data Processing," *IEEE Computer*, Nov. 1980, pp. 57-69.
3. K. Efe and A. Fernandez, "Products of Networks with Fixed Degree and Logarithmic Diameter," *IEEE Transactions on Parallel and Distributed Systems*, vol. 6, no. 9, September 1995, pp. 963-975.
4. K. Efe and A. Fernandez, "Mesh Connected Trees: A Bridge Between Grids and Meshes of Trees," *IEEE Transactions on Parallel and Distributed Systems*. December 1996.
5. K. Efe, "The Crossed Cube Architecture for Parallel Computation," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 3, No. 5, October 1992, pp. 513-524.

CURRENT RESEARCH GRANTS

K. Efe, "Models of Parallel Computations on Workstation Networks with Applications in Engineering," LEQSF R&D, \$ 77,000, June 1997-December 1997.

PhD STUDENTS GRADUATED (Last Five Years)

1. Putchong Uthayopas, May 1996, currently at Kasetsart University (Thailand).

2. Venkatesh Krishnamoorthy, May 1995, currently at SGI.
3. Antonio Fernandez, December 1994, currently at the Laboratory for Computer Science, MIT.
4. Ian Remedios, May 1992, currently at Schlumberger Research.
5. Kent White, May 1992, currently at Nicholis State University.

SERVICE TO THE PROFESSION

ORGANIZATION/EVENT	SERVED AS	DATE
-8th IEEE Symposium on Parallel and Distributed Processing, New Orleans, LA	Chair, publicity committee	Oct. 23-25, 1996
-5th International Conference on Computer Communications and Networks, Las Vegas	Chair, workshops committee	Sept. 1996

NSWC Key Personnel With GIS/Content Expertise

Lawrence R. Handley

Larry received a M.S. in Geography from the University of Arkansas in 1973. He was a Ph.D. candidate, also in Geography, at the University of California, Berkeley in 1987. His specialties include cartography, aerial photointerpretation, GIS, GPS, Geomorphology, and 4-color process printing. He is currently the supervisor of the mapping section at the National Wetlands Research Center. His work includes the acquisition of aerial photography, the photointerpretation of wetland and upland habitats for present and historical time periods, and the cartographic representation of the photointerpretation on base maps. His project management and coordination include extensive field work, the use of GPS (global positioning system) and laser-leveling techniques, and the use of GIS to analyze wetland and upland habitats over time. Larry's research projects focus on the determination of mapping and photointerpretation accuracy, the use of GPS in base map development, the comparison of PC-based GIS software packages, seagrass photointerpretation and mapping, the use of aerial video in mapping, and the introduction of wetlands mapping and GIS to secondary school educators. Larry has 11 years of college and university teaching experience and organizes and conducts several workshops for the Southern Science Center.

William R. Jones

William received a B.S. in Geography from the University of Southern Mississippi in 1991. William has been working for the National Wetlands Research Center for 5 years providing GIS support to Federal, State and local agencies. He provides technical assistance in support of the Coastal Wetland Planning, Protection and Restoration Act for educational outreach programs. He is responsible for the task of converting spatial digital databases to new hardware and software systems. William often performs GIS analysis in conjunction with studies such as wetland trend analysis and hurricane damage assessment. He also has the responsibility of purchasing equipment for the GIS lab including workstations, CD recorders, disk drives and back-up systems.

Calvin P. O'Neil

Pat received a B.S. in Forestry and Geography from Stephen F. Austin State University in 1967. In 1992, he earned a M.S. in Geography from the University of Southern Mississippi. Currently Pat is on assignment from the U.S. Geological Survey to the Biological Resource Division. His work and responsibilities at the National Wetlands Research Center include coordination, development and sometimes lead or co-instructor of spatial analysis and supportive natural resource workshops. Other primary duties are coordinating, participating and supporting in the National Wetlands Research Center's spatial analysis projects such as research of archival image or photographic data sets for project development, evaluation of potential project acquisition of image or photographic data sets, image and photographic analysis on a variety of projects utilizing aircraft and satellite systems, evaluation of map and image classification schemes, on site recognition of natural (primarily botanical) and anthropogenic features for image or map

collaboration, participation in project ground surveys (laser surveys and GPS) and development of mapping strategies for inventory of unmapped natural (botanical) resource systems.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: Vijay Raghavan	Other agencies (including NSF) to which this proposal has been/will be submitted
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Harnessing Distributed, Heterogeneous Information Sources	
Source of Support: NSF/EPSCoR via Louisiana Board of Regents Award Amount (or Annual Rate): \$ 450,000 Period Covered: 06/01/96 - 05/31/98 Location of Project: University of Southwestern Louisiana Person-Months Committed to the Project. Cal: Acad: 5% Summ: 5%	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Systematic and Statewide Initiatives to Support DoD-EPSCoR FY95 Proposal	
Source of Support: Louisiana Board of Regents Award Amount (or Annual Rate): \$ 1,500,000 Period Covered: 06/01/96 - 05/31/99 Location of Project: Louisiana Board of Regents Person-Months Committed to the Project. Cal: Acad: 5% Summ: 15%	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Systematic and Statewide Initiatives to Support DoD-EPSCoR FY97 Proposal	
Source of Support: Louisiana Board of Regents Award Amount (or Annual Rate): \$ 750,000 Period Covered: 06/01/97 - 06/01/00 Location of Project: Louisiana Board of Regents Person-Months Committed to the Project. Cal: Acad: 5% Summ: 15%	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Concept-Based Approach to Information Retrieval and Database Mining	
Source of Support: NSF Award Amount (or Annual Rate): \$ 220,000 Period Covered: 06/01/97 - 05/31/00 Location of Project: University of SW Louisiana / University of Nebraska-Lincoln Person-Months Committed to the Project. Cal: Acad: 15% Summ: 50%	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Ranking and Similarity-based Retrieval in Heterogeneous, Distributed Databases	
Source of Support: Louisiana Board of Regents (ITRS) Award Amount (or Annual Rate): \$ 120,000 Period Covered: 7/1/97 - 6/30/00 Location of Project: University of Southwestern Louisiana Person-Months Committed to the Project. Cal: Acad: 10% Summ: 25%	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

APPENDIX



United States Department of the Interior
U.S. GEOLOGICAL SURVEY
BIOLOGICAL RESOURCES DIVISION



National Wetlands Research Center
700 Cajundome Boulevard
Lafayette, Louisiana 70506
(318) 266-8500

October 11, 1996

Patrick Landry
Center for Advanced Computer Studies
University of Southwestern Louisiana
Lafayette, LA 70506

Dear Mr. Landry,

The National Wetlands Research Center is pleased to have an opportunity to collaborate with the University of Southwestern Louisiana's Center for Advanced Computer Studies on the project entitled "Infrastructure Enhancement to NASA/USL Regional Data Center." The Wetlands Center is part of the United States Geological Survey in the Department of the Interior. As the name of the center implies our mission concerns the wetlands of the United States, including wetland assessments and inventory, wetland structure and biological functions, values of the nations wetlands, their management and restoration. We frequently use spatial information related to wetland location, type and condition. The NASA/USL Regional Data Center will provide the ability for our scientists to utilize near-real-time data on the environmental landscape. This information is critical to our ability to provide scientific advice on the effects of proposed governmental policies or developmental activities.

The National Wetlands Research Center is prepared to commit the use of our facility, equipment, and scientists' time to the Regional Data Center. The Wetlands Center is prepared to share in the cost of the wireless communication project proposed to the Louisiana Education Quality Support Fund up to the amount of \$18,000. Technical questions concerning the communication project should be addressed to Jim Capezza (266-8694) of my staff.

Sincerely,

Robert E. Stewart, Jr.
Director



LOUISIANA UNIVERSITIES MARINE CENTER

8124 Highway 56, Chauvin, Louisiana 70344-2124

(504) 851-2800

Fax No. (504) 851-2874

LOUISIANA UNIVERSITIES
MARINE CONSORTIUM

October 1, 1996

Dr. Patrick Landry
Center for Advanced Computer Studies
PO Box 44330
Lafayette LA 70504-6032

Dear Dr. Landry:

This letter is written to show my strong support for the Regional Data Center being developed at USL. I anticipate that LUMCON will be both a user and a provider of RDC data.

As you know, LUMCON is a Marine Research and Education Laboratory. We anticipate using data from the USL RDC for both kinds of activities. Our research scientists focus primarily on the coastal environment here in the northern Gulf of Mexico. Remotely sensed data have become integral components of this research during the past decade. Our K-12 education programs benefit greatly by "pictures worth thousands of words"; our university programs benefit more widely.

We are currently developing a series of monitoring instruments for coastal waters that will initially relay data back to us here at the Marine Lab in real time. I would like to put the reduced data into the RDC for wider distribution, and eventually to have the data transmitted directly to the RDC as well as to the Lab. These data sets are of wide interest to coastal researchers within the region, country and also internationally.

Sincerely

Michael Dagg
Executive Director

Corporate Headquarters	New Orleans Office
135 Revenez Square	1100 Poydras, Suite 1550
Post Office Box 52106	Post Office Drawer 57089
Lafayette, Louisiana 70505	New Orleans, Louisiana 70157-7089
518.237.2200 phone	504.582.2201 phone
518.232.3200 fax	504.582.2210 fax

C. H. Fenstermaker & Associates, Inc.

Civil Engineers Environmental Consultants Land Services

October 9, 1996

Mr. Patrick Landry
USL, CACS
P.O. Box 44330
Lafayette, LA 70504

Dear Patrick,

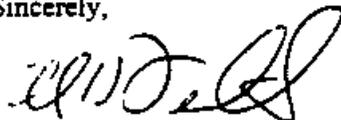
I am excited to see the NASA RDC project become a reality. The possibilities are endless to use these types of data to enhance our environment, predict the weather, make farming more cost effective, minimize our wetland losses, etc. My firm is willing to participate in whatever way possible to help you take full advantage of this opportunity.

Also, as a end user and distributor of the ER Mapper imaging software, the InFoCAD GIS software, a user of the Intergraph GIS and imaging software, and a project participant in GIS type projects for the oil & gas industry and the utility industry, our firm is willing to help USL receive *gratis* software and data from industry sources.

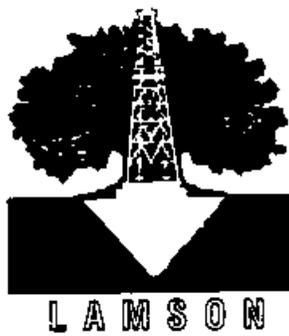
Please don't hesitate to call on me if we can be of assistance.

With kind regards, I am

Sincerely,



William H. Fenstermaker
President, CEO



September 27, 1996

Mr. Patrick Landry
USL, CACS
P. O. Box 44330
Lafayette, Louisiana 70504

Dear Mr. Landry:

Lamson Petroleum Corporation is an exploration-oriented company situated in Lafayette, Louisiana, owned by Alfred Lamson, Chairman of the Board, and Gary Lamson, President. Lamson Petroleum Corporation and its predecessors have been in the oil and gas exploration business since 1946, mainly in South Louisiana.

We were very pleased to hear of the selection of USL and CACS as the site for one of the NASA Regional Data Centers. We are particularly interested in the increased capabilities the RDC will bring to our region in the following areas:

1. Remote sensing
2. Weather modeling
3. 3-D modeling
4. Multisource data fusion
5. In-situ data retrieval

We believe that the Regional Data Center will provide a valuable resource for the oil and gas industry in Louisiana by more accurately predicting the weather. This will save a tremendous amount of money by not having to shut down offshore projects needlessly.

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read "Gary Lamson".

Gary Lamson

LAMSON PETROLEUM CORPORATION

1106 COOLIDGE BLVD. / BUILDING 200, OIL CENTER • BOX 54000 • LAFAYETTE, LOUISIANA 70505 • PH. 318/233-8020 • FAX 318/237-2154



LOUISIANA APPLIED OIL SPILL RESEARCH AND DEVELOPMENT PROGRAM

Louisiana State University • Center for Coastal, Energy, & Environmental Resources



26 September 1996

Mr. Patrick Landry
University of Southwestern Louisiana, CACS
P.O. Box 44330
Lafayette, Louisiana 70504

Dear Mr. Landry:

The Louisiana Applied and Educational Oil Spill Research and Development Program (OSRADP) is a relatively new state research initiative. In its simplest terms, the program's goal is to promote oil spill-related research among the state's 19 eligible public colleges and universities. We have statutorily-dedicated funds to meet this goal. Cooperative efforts among the state universities is encouraged in order to combine resources and talent to develop projects that will meet the program's mandate and promote broad-based research initiatives. In this regard, we were pleased to hear of the selection of the University of Southwestern Louisiana and CACS as the site for a NASA-sponsored Regional Data Center. The capabilities of the Regional Data Center will be a welcome addition to our ability to effectively respond and manage an oil spill.

The impact of an oil spill and the success of any cleanup efforts depend on characteristics of the water and land nearby and weather conditions. In some cases, luck—good and bad—plays the prominent role in determining the severity of a spill. The shallower the water, the greater the damage likely to occur to life on the bottom. High winds and ocean currents can spread oil faster and impede cleanup efforts. Tidal mud flats and shallow grass beds are especially difficult to clean. The key, therefore, to an effective response plan is the level of pre-existing environmental and ecological information available. Ideally, this material should be extensive, current, and easily extracted from a comprehensive database. We are particularly interested in the increased capabilities the Regional Data Center will bring to our region in the area of remote sensing, weather modeling, 3-D modeling, and *in-situ* data retrieval. All of these elements will help us get a better "picture" of the state's land, water, and weather conditions.

Oil and/or natural gas are produced in every Louisiana parish and the economic impacts are well documented. The offshore industry alone spends more than \$2 billion annually doing business with Louisiana vendors. The industry has evolved as technology evolved. Recent oil and gas discoveries in deep water of the Gulf of Mexico - defined by depths greater than 1500 feet - have estimated reserves larger than Alaska's Prudhoe Bay field. Further, using three-dimensional seismic geology and advanced horizontal drilling technology that allows a drill bit to penetrate geological formations in one or more directions, increases the chances of finding oil and/or natural gas. This coupled with new state incentives, has renewed interest in Louisiana prospects. As a result, oil companies are investing millions in leasing and exploration programs. The state is currently undergoing a mini oil boom.

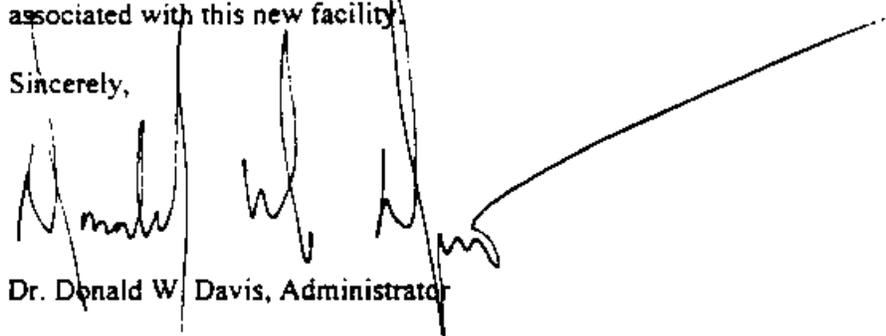
With all of this activity one always runs the risk of a spill; it is part of the business. In order to help fulfill the state's commitment to be prepared in the event of an oil spill, the Oil Spill Coordinator commissioned creation of the Louisiana Oil Spill Contingency Plan Map. This map is designed to provide a document for oil spill planning and response and was developed using Landsat Thematic Mapper (TM) satellite imagery of the entire state. It provides an up-to-date view of environmental and land-cover conditions throughout Louisiana.

Since Louisiana has experienced significant land change in the past 40 years, making most available maps obsolete, especially those of coastal areas where maximum land loss has been measured at more than 25 square miles per year, the map is particularly timely and useful. The final map is a multi-color lithograph produced at a scale of 1:500,000 and is digitally maintained in a GIS at the resolution of the source data. Shortly, the entire digital data set will be available on a CD-ROM. The CD version will allow the user to display and manipulate a great deal of information. A partial list of some of the tasks that can be accomplished using the CD include:

- Identify geographic coordinates of feature or location;
- Measure length, radius and/or areas of features;
- Identify and locate features such as highway numbers;
- Select features within polygon, box or proximity radius;
- Capture information for plotting or to export to graphic program;
- Display information from data base for feature such as population or number of dwellings within a particular town;
- Use satellite image backdrop for context of spatial features; and
- Determine parish or quadrangle name of any specific site.

As good as this CD will be, it can only improve by marrying data and expertise from the Regional Data Center with remote sensing and weather modeling individuals familiar with the response needs of the Oil Spill Coordinator's Office. A strong link between the Data Center and the digital data team working for the Coordinator's office will make Louisiana, not only the nation's principal source of marketable hydrocarbons, but also a world leader in using satellite-derived data in preparing and managing an oil spill event. In this case, everyone benefits because the state will be well prepared. The better the data, the better our ability to respond. The Regional Data Center can become an important component in helping Louisiana manage its resources effectively and we want to foster a strong working relationship with the Data Center and the research teams associated with this new facility.

Sincerely,

A handwritten signature in black ink, appearing to read 'Donald W. Davis', with a long horizontal line extending to the right.

Dr. Donald W. Davis, Administrator

cc: Roland J. Guidry
Louisiana Oil Spill Coordinator