

Larry R. Medsker

9/12/24

University of Vermont
(802) 488-4708 lmedsker@uvm.edu

Professional Interests

Physics, computer science, artificial intelligence, AI ethics, technology policy: teaching and research in physics, artificial intelligence, neural computing and independent component analysis, data science, technology and ethics, physics education research, STEM education research, and physics of music. Current research has a focus on applied data science and artificial intelligence, neural networks, AI technologies and the workforce, investigation of the impact of artificial intelligence on what it means to be human individually and in society, AI and ethics, trustworthy AI, and technology policy.

Professional History

2023-present Research Professor, Department of Physics, University of Vermont
 Affiliate Faculty, George Mason University
 Chair, ACM US Technology Policy Committee

2020-present Co-Editor-in Chief, *AI and Ethics*, Springer Nature.

2015-2023 Research Professor
 Co-Director, Human-Technology Collaboration Ph.D. Program
 Director and PI, GW Noyce Scholarship Program
 Co-Director Director, GWTeach Program
 The George Washington University, Washington, DC

2015-2018 Founding Director, GW Data Science Master's Program
 The George Washington University, Washington, DC

2012-present Research Professor of Physics
 The George Washington University, Washington, DC

2010-2015 Professor, Computer Science and Physics, Siena College, Loudonville, NY
 Co-Director, Siena College Institute for Artificial Intelligence

2008-2010 Visiting Professor, University Honors Program and Department of Physics
 The George Washington University, Washington, DC

2005-2008 Dean of the School of Science
 (on leave Professor of Computer Science
 2008-10) Siena College, Loudonville, NY

2003-2005 Professor of Physics and Computer Science
 Director, Multimedia Design & Development Program
 Director, Professional Science Master's Program
 Department of Computer Science, Audio Technology, and Physics
 American University, Washington DC

2001-2003 Associate Dean for Academic Affairs, College of Arts & Sciences
 Director, Multimedia Design and Development Program
 American University

- 2000-2001 Professor and Chair, Department of Physics
American University
- 1999-2000 Professor, joint appointment in Physics and Computer Science,
American University
- 1999 Acting Chair, Department of Physics, American University (July and August)
- 1990-1999 Professor, Computer Science and Information Systems
- 1989-1992 Chair, Computer Science and Information Systems, American University,
Washington, DC
- 1988-1990 Associate Professor, Computer Science and Information Systems, American
University, Washington, DC
- 1985-1988 Associate Professor, Computer and Information Science, Purdue School
of Science, Indianapolis, IN; Visiting Associate Professor, Computer Science,
Butler University, Indianapolis, IN (Fall, 1985 - Fall, 1986)
- 1982-1986 Associate Professor, Computer and Information Science, New Jersey Institute of
Technology, Newark, NJ. Awarded tenure in 1985.
- 1980-1983 Member of Technical Staff, Operations Systems Planning, Bell Laboratories,
Holmdel, NJ
- 1981-1982 Associate Professor, Mathematics and Computer Science, Fordham University,
New York, NY
- 1975-1980 Assistant Professor, Physics, Florida State University
- 1973-1975 Research Associate, Physics, University of Pennsylvania
- 1971-1973 Nuclear Information Research Associate, Argonne National Laboratory

Education

- Ph.D. Physics, 1971 Indiana University
M.S. Physics, 1967 Indiana University
B.A. Chemistry, 1965 Indiana University

2009-present

Grants and Proposals

Giles (PI), Medsker, Seneviratne, Wijesinghe, Learning Map Framework to Align Instruction and Improve Student Learning in STEM Course Sequences.

Source of Support: NSF IUSE

Funded

Total Amount: \$398,375

Award Period: 10/15/2023 - 10/14/2025

Medsker (PI), Feldman, Grooms, Pyke, Sikorski, Ullman, McClary, Ullman (Co-PIs), Proposal for Noyce Teacher Scholarship Program at GW

Source of Support: National Science Foundation

Funded

Total Amount: \$1.43M

Award Period Proposed: 04/1/17 - 3/31/22

Feuer (PI and Co-Director), Feldman and Pyke (Co-Directors), Medsker (Associate Director), GWTeach Program

Source of Support: NMSI and HHMI

Funded

Total Award Amount: \$1.4M (NMSI/HHMI)

Award Period: 01/01/15 - 12/31/2019

Pyke, Sikorski, Doebel, Ullman (Medsker in mentor and advisor role), Building Capacity for Disciplinary Experts in Math and Science Teaching

Source of Support: NSF Noyce

Funded

Total Award Amount: \$299,799

Award Period: 9/1/14 - 8/31/15

Feldman and Medsker (with collaborators at Georgia State University and University of Central Florida) Collaborative Research: Investigating Institutional Success at Overcoming Challenges in Algebra-based Studio Physics

Source of Support: NSF WIDER

Funded

Total Award Amount: \$500,000

Award Period: 01/01/14 - 12/31/16

Rong (PI), Feldman, Medsker, Ullman, and Roudenko (Co-PI's), JUMP: Joint Undergraduate Mathematics and Physics Scholarships at GW

Source of Support: NSF DUE S-STEM

Funded

Total Award Amount: \$614,440

Award Period: 08/01/13 - 7/31/18

Feldman and Medsker, Early Engagement of New STEM Students in Undergraduate Research

Source of Support: GW High Impact Learning Grant

Funded

Total Award Amount: \$10,000

Award Period: 06/01/13 - 5/31/14

Bennhold (PI), Feldman, Teodorescu, and Medsker, Bridging the Expert-Novice Problem-Solving Gap with the GW-ACCESS Protocol

Source of Support: NSF CCLI

Funded

Total Award Amount: \$163,085

Award Period: 06/01/09 - 08/31/13

2006-2015

Grants at Siena College

Fryling (PI), Medsker *et al.* (Co-PI), SPARCS, IUSE grant, National Science Foundation, \$650,000, 2014 - 2018.

Small (PI), Medsker (Co-PI), REU grant, Undergraduate Research on Artificial Intelligence and Text Analysis, National Science Foundation, \$360,000, 2014 - 2017.

Medsker (PI), S-STEM grant, Tech Valley Scholars II, National Science Foundation, \$640,000, 2013 – 2017.

Matthews (PI), Medsker *et al.* (Co-PI's), Noyce Scholarship grant, Co-PI, National Science Foundation, \$1.2M, 2011 – 2016.

Medsker (PI), S-STEM grant, Tech Valley Scholars I, National Science Foundation, \$600,000, 2008 – 2012.

Medsker (PI), Egan *et al.* (CoPI's), Clare Boothe Luce scholarships for women in science, Luce Foundation, \$270,000 over five years, 2006-11.

1988-2005

Grants at American University

Expert Systems Research with the Knowledge Engineer's Workbench (REU Site Program),

National Science Foundation, \$38,996, 1989, L. Medsker *et al.*

Undergraduate Research Laboratory Development, The American University, \$6,297, 1989, L. Medsker and A. La Salle.

Expert Systems Research with the Knowledge Engineer's Workbench (REU Site Program), National Science Foundation, \$125,970, L. Medsker, et al., 1990 (funded one year at \$40,370)

Intelligent Systems Laboratory, National Science Foundation, Instrumentation and Laboratory Improvement Program, \$44,100, L. Medsker et al. (funded at \$35,625)

Research Experiences for Undergraduates: Intelligent Systems, National Science Foundation, \$178,627, L. Medsker et. al. (funded for one year at \$64,863).

Web-Based Expert Systems, U.S. Department of Labor, \$95,473 for March-August, 1997.

Help Desk Technology, U.S. Department of Labor, \$57,936 for September, 1997 – May, 1998.

Methods of Data Mining for US Department of Labor Regulatory Data, U.S. Department of Labor, \$86,283, 1999.

Advanced Computational Methods for Nuclear Data, Veridian-PSR, \$45,697, 2000 – 2001.

Professional Science Master's Initiative, Sloan Foundation, \$8,500, 2002.

Professional Science Master's Program Development, Sloan Foundation via Council of Graduate Schools, \$105,000 for two years. 2003.

University-Community Partnerships for Computing Conferences for Minority Students, Lumina Foundation, \$74,800 for two years, 2003.

1988-1993

Contracts at American University

Graduate Certificate in Computer Science, Defense Intelligence Agency, \$169,960, 1992-93.

AT&T Weekend Information Systems Master's Degree, Office of Contract Programs, 1992-93.

Weekend Information Systems Master's Degree Program, Office of Continuing Studies, 1991-3.

IBM Joint Study – Research Using DB2, with University Computing Center, 1991-93 (In-Kind Support)

Advanced Technology, Inc. Degree Program, Office of Contract Programs, 1990-91, \$146,640.

Advanced Technology, Inc. Degree Program, Office of Contract Programs, 1989-90, \$123,100.

1971-1987

Grants Prior to American University

Nuclear Information Research Associate Fellowship, National Research Council, \$40,000, 1971-73, L. Medsker.

Nuclear Physics Research, National Science Foundation, \$700,000, 1973-5, R. Middleton (Principal Investigator) and L. Medsker (Research Associate) at Univ. of Pennsylvania.

Nuclear Physics Research, National Science Foundation, \$1,500,000, 1975-79, L. Medsker (Faculty Associate 1975-78, Co-principal Investigator 1979) at Florida State University.

Public Service Science Residency, National Science Foundation, \$20,400, 1982-3, L. Medsker at National Audubon Society.

Local Area Network Research Lab, N.J. Institute of Tech., \$27,672, 1984-5, L. Medsker and M. Baltrush.

UNIX Educational Networking Facility, AT&T, \$29,100, 1984, Medsker, Baltrush, La Salle.

Center for Expert Systems, (startup grant), Butler University, \$13,700, 1986, L. Medsker and J. Morrel.

Expert System for Groundwater Model Selection, Holcomb Research Institute, \$5,547, 1986, L. Medsker.

Macintosh-based Expert Systems (Fellowship Grant), Butler University, \$3,500, 1986, Medsker.

Research Experiences for Undergraduates, National Science Foundation, \$5,840, 1987, Medsker, de Korvin, Kleyle.

Editorial and Professional Service Organizing Experience

2020-present Co-Editor-In-Chief (with John MacIntyre), *AI and Ethics* Journal, Springer Nature.

2016-present Public Policy Officer, ACM SIGAI

1989-present Member of Editorial Board, *Journal of Neural Network Computing*.

1997-present North American Editor, *Neurocomputing & Applications*, Springer-Verlag.

2007 Member of the Organizing Committee and Publications Chair, 2007 International Joint Conference on Neural Networks.

2007-08 Editor for special issue on Temporal Data Analysis for *Neurocomputing & Applications*, Springer-Verlag.

1993-2002 Chair and Founder, Special Interest Group on Hybrid Intelligence of the International Neural Network Society

2000 L.R. Medsker and L.C. Jain, editors, *Recurrent Neural Networks: Design and Applications*, CRC Press.

1989 Guest Editor, Special Issue of *Expert Systems with Applications* journal

1990-91 Program Chair for 1991 IEEE/ACM International Conference on Developing and Managing Expert System Programs.

1991 Guest Editor, Special Issue on "The Synergism of Expert Systems and Neural Network Technologies," *Expert Systems with Applications*.

1992-93 Conference Chair for 1993 IEEE/ACM International Conference on Developing and Managing Intelligent System Projects

1993-94 Conference Co-Chair for 1994 IEEE/ACM International Conference on Developing and Managing Intelligent System Projects

1993-96 Associate Editor of *Heuristics, The Journal of Knowledge Engineering & Technology*

1995-97 Member of the Advisory Board, *International Journal of Computational Intelligence and Organizations*.

1996 Guest Editor, Special Issue on "Neural Networks for Financial Applications," *Heuristics*, Spring, 1996.

1997 Selected to organize the *Frontiers in Soft Computing and Decision Systems*, the American Association for Artificial Intelligence Fall Symposium at MIT, November 8-10, 1997.

Editor, Working Notes for the *Frontiers in Soft Computing and Decision Systems*.

1998-99 Member of the Organizing Committee, 1999 International Joint Conference on Neural Networks.

{Reviewer for numerous technical journals, books, conferences, and proposals for funding.}

Memberships in Professional and Civic Organizations

American Physical Society

IEEE Computer Society

Association for Computing Machinery (ACM)

International Neural Network Society

American Association for Artificial Intelligence

ACM Special Interest Group on Artificial Intelligence

Double bass player: NIH Philharmonia, Trinity Chamber Orchestra, and Vermont Philharmonic
DC Federation of Musicians Local 161-710

Siena College Activities

(2005-2015)

Dean, School of Science (2005-2008)

Professor, Computer Science and Physics (2008-2015)

Member, Deans' and Academic Vice President's Committee

Member, Status Committee (Promotion and Tenure)

Member, Board of Instruction (College curriculum Committee)

Member, Vice President's New Revenue Sources Committee

American University Activities

(1988-2005)

Developer of intelligent systems research group at American University; Project director for NSF-funded REU Site.

Chair of the Department of Computer Science and Information Systems at American University for three years: I led the department from a teaching unit to mix of teaching and research appropriate for the American University environment. Under my leadership we developed three computer labs, installed a local area network for CSIS faculty and students, and introduced the only UNIX lab on campus. I also started the first weekend cohort M.S. program in Information Systems, a successful program that educated over ten cohort groups. Our highest numbers of faculty and students were during my term as Chair.

Co-Director, with Dr. Jesse Bemley, of the Annual DC Computer Science Conference for high school students. In April, 2005, we held our Fourteenth Annual District of Columbia Computer Science Conference. This conference was designed for DC high school students to provide a forum for presenting and publishing the results of their work on computing-related projects. In addition to making presentations in a conference environment, their articles are published by the CSIS department in a proceedings of the conference. We believe we are providing a unique and valuable experience for high school students. We also attracted groups from outside DC.

Developer and director of the American University studio classroom, a new approach to interactive and high technology teaching and learning. The room accommodates up to 63

students, nine students at each of seven tables, who can work in groups of up to three using laptop computers with wireless connections to the Internet. Designed for physics courses, we explored use of the studio classroom for various subjects in science and outside fields of science.

Coordinator for the B.S. in Multimedia Design & Development program. I managed this program since its start in 1999, as the program grew to a size of about 50 majors. I was responsible for course scheduling, instructor recruiting and assignment, student advisement, and other administrative details. The program was a unique joint venture between the graphic design, computer science, and (School of Communication) film and video programs.

Director, Professional Science Master's Program (www.american.edu/psm). I received a grant from the Sloan Foundation, via the Council of Graduate Schools, to develop and start a new Master's program that has a solid core of science courses plus professional skills training. The concentration options are applied computing, biotechnology, and environmental science.

Other Academic and Professional Leadership

Founder and director of a nuclear physics research group at Florida State University;
Co-principal Investigator for NSF-funded Nuclear Physics Laboratory.

Founder and director of the Butler University Center for Expert Systems.

Publications

I have written four books, eight book chapters, and over 100 refereed articles in physics computer science, and information systems.

Books

1. L. Medsker and J. Liebowitz, *Design and Development of Expert Systems and Neural Networks*, Macmillan, 1994.
2. L. Medsker, *Hybrid Neural Network and Expert Systems*, Kluwer Academic Publishers, 1994.
3. L. Medsker, *Hybrid Intelligent Systems*, Kluwer Academic Publishers, 1995.
4. L.R. Medsker and L.C. Jain, eds., *Recurrent Neural Networks: Design and Applications*, CRC Press, 2000.

Book Chapters

1. A.J. La Salle, L.R. Medsker, and D. Hillmer, "Planning and Implementing Expert Systems in Organizations: Tools for Managers," in *Managing Expert Systems*, Efraim Turban and Jay Liebowitz, Eds., Idea Group Press, August, 1991.
2. Larry Medsker and Efraim Turban, "Neural Computing and Artificial Intelligence," in *Expert Systems and Applied Artificial Intelligence*, Macmillan, 1992.
3. L.R. Medsker and D.L. Bailey, "Models and Guidelines for Integrating Expert Systems and Neural Networks," in *Intelligent Hybrid Systems*, A. Kandel and G. Langholz, Eds., CRC Press, 1992.
4. L. Medsker, E. Turban, and R. Trippi, "Neural Network Fundamentals for Financial

- Analysts," in *Neural Networks in Finance and Investing*, R. Trippi and E. Turban, eds., Probus Publishing Co., 1993.
5. L. Medsker, "Hybrid Neural Network and Expert Systems: Research and Design Issues," *Professional Knowledge Engineering*, Peter Smith, ed., 1996.
 6. L. Medsker, "Neuroexpert Architecture and Applications in Diagnostic/Classification Domains," *Hybrid Intelligent Engineering Systems*, World Scientific Publishing Co., South Korea, 1997.
 7. L.C. Jain, L.R. Medsker, and C.L. Karr, "Knowledge-based Intelligent Systems: An Introduction," *Soft Computing Techniques in Knowledge-based Intelligent Engineering Systems*, L.C. Jain, ed., Physica-Verlag, Heidelberg, 1997.
 8. L.R. Medsker, S. Unadkat, and M. Ciocoiu, "Introduction," *Recurrent Neural Networks: Design and Applications*, L.R. Medsker and L.C. Jain, eds., CRC Press, 2000.

Invited Tutorials

1. L. Medsker, "Neural Network Technology and Expert Systems," ORSA/TIMS Joint National Meeting, Philadelphia, Oct. 30, 1990.
2. L. Medsker, "Artificial Neural Network Technology and Expert Systems," AFCEA Military/Government Computing Conference, Washington, DC, February 6, 1991.
3. D.L. Bailey and L.R. Medsker, "Integrating Expert Systems and Neural Networks," Ninth Nat'l Conf. on Artificial Intelligence, Anaheim, CA, July 15, 1991.
4. L.R. Medsker and D.L. Bailey, "Integrating Expert Systems and Neural Networks," IEEE/ACM Int'l. Conf. on Developing and Managing Expert Systems Programs, Washington, DC, September, 30, 1991.
5. L.R. Medsker and H. Szu, "Hybrid Neural and Expert Systems," World Congress on Expert Systems, Orlando, FL, December 16, 1991.
6. L.R. Medsker, "Integrating Neural Networks and Expert Systems," IAKE Third Annual Symposium of the International Association of Knowledge Engineers, Washington, DC, November 16, 1992.
7. L.R. Medsker, "Integrating Expert Systems and Neural Networks: Models and Guidelines," I International Symposium on Artificial Intelligence, Cancun, December 7, 1992.
8. L.R. Medsker, "Hybrid Neural Networks and Expert Systems," Workshop for the U.K. Chapter of the International Association of Knowledge Engineers (IAKE), London, July 27, 1993.
5. L.R. Medsker, "Hybrid Intelligent Systems," International Joint Conference on Artificial Intelligence, Montreal, Canada, August 21, 1995.
6. L. Medsker, Full-day tutorial on "Hybrid Intelligent Systems," presented at the International Conference on Knowledge Based Computer Systems (KBCS), Bombay, India, December 18, 1996.
7. T. Beckman and L. Medsker, "Soft Computing and Knowledge Management," International Joint Conference on Neural Networks, Washington DC, 1999.

Refereed Articles (1983-present) [1971-1982: 60 additional refereed publications in physics]

1. L. R. Medsker, "A Course in Computers and Music, *Collegiate Microcomputer* 1, May, 1983, 133-140.
2. L. V. Theisen, L. R. Medsker, and S. L. Tabor, "Compound Nuclear Evaporation Model Calculations in the Mass 50 and 80 Regions," *Phys. Rev. C* 27, 1983, 2679-2687.

3. L. R. Medsker, J. E. Beyea, and T. J. Lyon, "Computer Modeling for Energy Policy Analysis," *Proc. 15th Ann. Pittsburgh Conf. on Modeling and Simulation*, April, 1984, 1111-1116.
4. L. R. Medsker, "Structured Design Methodology for a Course on Computer Science in Engineering," *SIGCSE Bulletin*, 16, June, 1984, 7-9.
5. L. R. Medsker, "A Decision Support System for Energy Policy Analysis," *Communications of the Assoc. for Computing Machinery*, 27, November, 1984, 1122-1128.
6. L. R. Medsker and J. W. Brown, "A Framework for Health Information Systems," *Proc. HICSS-19, Hawaii Int'l Conf. on System Sciences* Vol. III, January, 1986, 138-147.
7. R. J. Beck and L. R. Medsker, "Relational Model for Data Analysis: Implications for Regional Economic Policy," *Proc. Southern Regional Science Assoc.*, March, 1986, 17 pp.
8. M. C. Yovits, A. de Korvin, R. Kleyle, L. Medsker, and M. Mascarenhas, "The Relationship between Information and Decision Making and the Effect on the Reliability and Failure of Information Systems," in *Information Systems: Failure Analysis*, J. A. Wise and A. Debons, eds., NATO ASI Series, F32, 1987, 37-46.
9. R. J. Beck and L. R. Medsker, "Entity-Relationship Approach to Regional Economic Data Analysis," *The Review of Regional Studies*, 17, 1, January, 1987, 13-20.
10. L. R. Medsker, J. H. Morrel, and K. L. Medsker, "Expert Systems: Meeting the Educational Challenge," *Collegiate Microcomputer*, V, 3, August, 1987, 223-229.
11. K. Medsker and L. Medsker, "Instructional Technology: A Key to Successful Information Systems," *Information & Management*, 12, 4, 1987, 195-208.
12. L. R. Medsker, H. T. Fortune, J. D. Zumbro, C. P. Browne, and J. F. Mateja, "112Cd from 110Cd(t,p)," *Phys. Rev. C* 36, 5, November, 1987, 1785-1791.
13. B. Humpert and L. Medsker, "On the Growing Impact of Artificial Intelligence," *Helvetica Physica Acta* 61, 1988, 30-35.
14. B. Humpert, B. Teel, E. S. Najar, L. R. Medsker, and M. Cader, "PEOPL: An Application of an Expert System for the Programmed Evaluation of Personnel," *Proc. 8th Int'l Workshop, Avignon '88: Expert Systems and Their Applications*, Avignon, France, May 30-June 3, 1988, 339.
15. L. R. Medsker, M. C. Yovits, and R. M. Kleyle, "Software Implementation and Applications of the Generalized Information System," *Proc. Sixth Symposium on Empirical Foundations of Information and Software Sciences (EFISS)*, Atlanta, GA, October 19-21, 1988, pp. 201-206.
16. M. C. Yovits, A. de Korvin, R. Kleyle, L. Medsker, and M. Mascarenhas, "A Generalized Systems Approach to Information Flow and Analysis Relating Information to Decision Making," *Proc. Third Int'l Conf. on Systems Research, Informatics, and Cybernetics*, West Germany, 1989, 18 pp.
17. B. Humpert, E. S. Najar, M. Cader, L. R. Medsker, and B. Teel, "PEOPL: A Knowledge-Based System for the Evaluation of Personnel," *Expert Systems*, April, 1989.
18. L. R. Medsker and J. H. Morrel, "Knowledge Engineering: An Example of University-Industry Cooperation," *IEEE Expert*, Summer, 1989, pp 25-30.
19. B. Teel, L. Teel-Comstock, E. Najar, J. E. Jackson, B. Humpert, and L. Medsker, "PSYCHO-SOMA: An ES Framework for Psychiatric Assessment and Treatment," *Proc. Ann. Conf. Int'l Assoc. of Knowledge Engineers*, U. of Maryland, 1989, pp 242-262.
20. D. Benachenhou, M. Cader, H., Szu, L. Medsker, C. Wittwer, and D. Garling, "AIDS Viral DNA Amplification by Polymerase Chain Reaction Employing Primers Selected by AI Expert System and an ART Neural Network," *Proc. 3rd IEEE Symposium on Computer-Based Medical Systems*, Chapel Hill, June 3-6, 1990, pp. 504-511.

21. D. Benachenhou, M. Cader, H., Szu, L. Medsker, C. Wittwer, and D. Garling, "Neural Networks for Computing Invariant Clustering of a Large Open Set of DNA-PCR Primers Generated by a Feature-Knowledge Based System," *Proc. IJCNN-90*, San Diego, June 17-21, 1990, pp. ii83-89.
22. L. Medsker, A. La Salle, and D. Hillmer, "Knowledge Acquisition and the Expert System Life Cycle," *Proc. IEEE Managing Expert System Programs and Projects Conf.*, Sept. 10-12, 1990, pp. 216-222.
23. A.J. La Salle and L.R. Medsker, "The Expert System Life Cycle: What Have We Learned from Software Engineering?," *Proc. ACM-BDP Int'l Conf. on Trends and Directions in Expert Systems*, Orlando, FL, October, 1990, pp. 17-26.
24. M. Cader, D. Benachenhou, L. Medsker, and H. Szu, "External and Internal Knowledge Representations Appropriate for ART Neural Networks," *Proc. Int'l Conf. of ACM SIG Business Data Processing*, October, 1990, pp. 447-454.
25. D. Benachenhou, M. Cader, H. Szu, and L. Medsker, "Neural Network Applications in Biomedical Engineering," *Biological Engineering: Opening New Doors*, D. Mikulecky and A. Clarke, eds., 1990, pp. 251-260.
26. K.L. Medsker and L.R. Medsker, "Choosing Between Expert Systems and Training," *Proc. Int'l Conf. on Expert Systems Applications*, Los Angeles, Nov. 7-8, 1990, pp. 403-408.
27. A.J. La Salle and L.R. Medsker, "Distributed Knowledge Acquisition from Multiple Experts: Issues and Techniques," *Proc. Int'l Conf. on Expert Systems Applications*, Los Angeles, Nov. 7-8, 1990, pp. 237-242.
28. A.J. La Salle and L. R. Medsker, "An NSF Funded Research Experience for Undergraduates: Intelligent Systems," *ACM SIGCSE Bulletin*, 23, 2, 1991, pp. 39-44.
29. A.J. La Salle and L.R. Medsker, "Computerized Conferencing for Knowledge Acquisition from Multiple Experts," *Expert Systems with Applications*, 3,4,1991, pp.517-522.
30. D. Hillmer, A.J. La Salle, L. Medsker, and G. Welsh, "Identifying Risks in Expert System Projects," *Proc. IEEE/ACM Int'l Conf. on Developing and Managing Expert System Programs*, Washington, DC, September, 1991, pp. 45-52.
31. S.A. Becker and L.R. Medsker, "The Cleanroom Development of Expert Systems Using Petri-net Graphs," *Heuristics*, 4, 3, 1991, pp. 31-40.
32. D. Hillmer, A.J. La Salle, L. Medsker, and G. Welsh, "A Risk-Identification Tool for Managers Planning Expert System Applications," *Expert Systems with Applications*, 4,1992, pp 247-257.
33. S.A. Becker, E. McGuire, and L.R. Medsker, "The Effective Integration of an IS Curriculum Using the Cleanroom Methodology," *Computers & Education*, vol. 19, no. 3,1992, pp. 275-284.
34. S.A. Becker, E. McGuire, and L.R. Medsker, "An Information Systems Instructional Model for Supporting the DPMA 1990 Guidelines," *Journal of Information Systems Education*, vol. 4, no. 2, 1992, pp. 21-26.
35. L. Medsker, E. Turban, and R. Trippi, "Neural Network Fundamentals for Financial Analysts," *The Journal of Investing*, Spring, 1993, pp. 59-68.
36. F. Labate and L. Medsker, "Employee Skills Analysis Using a Hybrid Neural Network and Expert System," *Proc. IEEE Developing and Managing Intelligent System Projects Conf.*, March 29-31, 1993, pp. 205-211.
37. S.A. Becker, S.R. Finlow, and L.R. Medsker, "The Need for Expert Knowledge to Support Data Modeling in an ICASE Environment," *Heuristics*, vol. 6, no. 3, 1993, pp. 66-76.
38. W. Xu, S. Virmani, and L. R. Medsker, "Hybrid Intelligent Systems for Health Risk Analysis," Proceedings of the ISSM International Conference on Intelligent Information

- Management Systems, Washington, DC, June 1-3, 1994, pp. 5-8.
39. L. R. Medsker, "Neural Network Connections to Expert Systems," *Proceedings of the World Congress on Neural Networks*, San Diego, June 8, 1994, pp. 411-417.
 40. L. R. Medsker, "Design and Development of Hybrid Neural Network and Expert Systems," *Proceedings of the IEEE World Congress on Computational Intelligence*, Orlando, FL, July 29, 1994, pp. 1470-1474.
 41. L. Medsker and E. Turban, "Integrating Expert Systems and Neural Computing for Decision Support," *Expert Systems with Applications*, vol. 7, no. 4, 1994, pp. 553-562.
 42. T. Harris, J. MacIntyre, P. Smith, and L. Medsker, "Neural networks and expert systems: complementary technologies that can work together," *Proceedings of Expert Systems '94: 4th Annual Conference of the British Computer Society Specialist Group on Expert Systems*, Cambridge, U.K., December, 1994, pp. 224 - 259.
 43. L. Medsker, M. Tan, and E. Turban, "Knowledge Acquisition from Multiple Experts: Problems and Issues," *Expert Systems with Applications*, vol 9, no. 1, 1995, pp. 35-40.
 44. L. Medsker, "Models and Techniques for Developing Hybrid Neural Network and Expert Systems," *Journal of Computer & Software Engineering*, vol 3, no. 1, 1995, pp. 21-39.
 45. L. R. Medsker, "Microcomputer Applications of Hybrid Intelligent Systems," *Journal of Network and Computer Applications*, vol 19, 1996, pp. 213-234.
 46. L. R. Medsker, "Hybrid Intelligent Systems," *International Journal of Computational Intelligence and Organizations*, vol 1, 1996, pp. 10-20.
 47. L. R. Medsker, "Tutorial on Neural Networks," *Heuristics*, Vol. 9, No. 1, 1996, pp. 64-71.
 48. S. Guruswami, S. Chetty, D. Shah, and L. Medsker, "A Web-Based Hybrid Intelligent Data Analysis System," *Heuristics*, Vol. 10, No. 2, 1998, pp. 91-99.
 49. M. DiStasio, R. Droitsch, and L. Medsker, "Web-Based Expert Systems for elaws," *Failure & Lessons Learned in Information Technology Management*, vol. 3, 1999, pp 67-77.
 50. S. Unadkat and L. Medsker, "Independent Component Analysis and Data Mining," *Proceedings of the IASTED International Conference on Artificial Intelligence and Soft Computing*, Banff, Canada, July 24-26, 2000, pp. 294-298.
 51. R. Droitsch, D. Demers, and L. Medsker, "Knowledge Management at the U.S. Department of Labor," *Proceedings of the IASTED International Conference on Artificial Intelligence and Soft Computing*, Banff, Canada, July 24-26, 2000, pp. 319-323.
 52. M. Lynch, H. Patel, A. Abrahamse, A. Rajendran, and L. Medsker, "Neural Network Applications in Physics," *Proceedings of the International Joint Conference on Neural Networks*, Washington DC, July 15-19, 2001, pp. 2054-2058.
 53. S. Nayeri, S. Unadkat, H. Patel, T. Schulte, and L. Medsker, "Independent Component Analysis Applications in Physics," *Proceedings of the International Joint Conference on Neural Networks*, Washington DC, July 15-19, 2001, pp. 1926-1930.
 54. A. Abdelbar, G. Bahig, and L. Medsker, "A Recurrent Network Approach to MAP Explanation," *Proceedings of the International Joint Conference on Neural Networks*, Hawaii, May, 2002.
 55. Christy Fernandez, Soudabeh Nayeri, and Larry Medsker, "Independent Component Analysis Applications in Physics", *Proceedings of the International Joint Conference on Neural Networks*, Montreal, Canada, July 31-August 4, 2005, pp. 2213-2216.
 56. Larry Medsker, "Temporal Data Analysis," Editorial in a special issue of *Neural Computing & Applications*, January, 2009.
 57. G. Feldman, L. Medsker and N. Benmouna, "A Student-Centered Active Learning Environment for Introductory Physics", *Proceedings of the GIREP 2010 Conference (Groupe*

International de Recherche sure l'Enseignement de la Physique) Reims, France, August 2010.

58. R. Teodorescu, D. Pritchard, G. Feldman, L. Medsker, A. Barrantes, A. Pawl and S. Rayyan, "Fostering Diverse Thinking in Introductory Physics," Proceedings of the 21st International Workshop on New Trends in Physics Teaching, (XIX Taller Internacional, Nuevas Tendencias en la Enseñanza de la Física), Benemérita Universidad Autónoma de Puebla, Puebla, Mexico, May 2011.
59. R. Teodorescu, C. Bennhold, G. Feldman and L. Medsker, "A New Approach to Analyzing Physics Problems: A Taxonomy of Introductory Physics Problems," Physical Review Special Topics – Physics Education Research, 2013.
60. R. Teodorescu, C. Bennhold, G. Feldman and L. Medsker, "Curricular Reforms that Improve Students' Attitudes and Problem-Solving Abilities," American Journal of Physics (under review, resubmitted, 2013).
61. S. Small and L. Medsker, "Review of Information Extraction Technologies & Applications," Neural Computing & Applications, December, 2013.
62. A. Abrahamse, M. Johnson, N. Levinson, L. Medsker, J. Pearce, C. Quiroga, and R. Scipione. A Virtual Educational Exchange: A North–South Virtually Shared Class on Sustainable Development. Journal of Studies in International Education. Vol. 19(2) 140–159, 2015.

Other Research Activities

Faculty associate with the NSF-funded Software Engineering Research Center (operated by Purdue and U. of Florida) -- Worked with the planning team for SERC, and has been discussing research opportunities with Indianapolis industrial groups to identify cooperative software engineering projects.

Co-director and founder of the Butler University Center for Expert Systems -- Developed a resource and research center for cooperative AI projects involving students, faculty, and industry.

Systems Engineering at Bell Laboratories -- Conducted studies in telecommunications database planning, new computer technology assessment, and mathematical techniques for optimizing resource allocation in computer networks.

Involvement in Graduate Research

American University -- expert systems and artificial neural networks -- Advisor to M.S. students working on projects in expert systems, neural networks, and distributed intelligence in networks.

American University -- I have maintained a group of 4-10 computer science and physics students over the last several years in the area of hybrid intelligent systems and applications of neural networks. We meet regularly over the year and discuss research projects and progress individuals are making on independent projects or fellowship research. We have published four articles and students helped with the editing of a book on Recurrent Neural Networks.

Purdue School of Science at Indianapolis -- expert systems and decision making -- Advisor to

M.S. students working on applications of expert systems, computer implementation of models of decision making, and expert systems for database design.

New Jersey Institute of Technology (NJIT) -- database systems and data communications. -- Organized a research group that received two grants for work on databases in local area networks; guided and evaluated graduate students in the NJIT-Rutgers joint Ph.D. in Management program.

Florida State University -- Co-principal investigator on a \$1,500,000 NSF grant at the Tandem Accelerator Laboratory -- Originated research group and directed 3 Ph.D. and 2 M.S. students.

Supervision of Theses and Dissertations

Supervision of Master's Theses at American University (1990).
Member of numerous Master's Thesis and Ph.D. Dissertation Committees.
Dissertation advisor for three Ph.D. students in physics at Florida State University (1977-80).
Dissertation advisor for one Ph.D. student at The American University (1995-99).
Member of committees for Ph.D. students at The American University (1994-99).
Dissertation advisor for two Ph.D. students in physics at The American University (1999-04).

Guidance for Undergraduate Research

I have extensive experience working with undergraduate students in research environments. I developed an ability to work with students to find interesting, challenging, and productive ways for them to participate in serious research projects. I obtained funding from the National Science Foundation for three IUPUI students under the Research Experience for Undergraduates (REU) program and was funded by the NSF to establish an REU Site at American University.

The following are research projects in which I have been able to involve undergraduates:

American University (Summers, 1989 and 1990)

Director of the NSF-sponsored Research Experiences for Undergraduates Sites and director of the Hybrid Intelligent Systems group.

Purdue School of Science, 1985 and 1987-88

Directed students under an NSF grant in the Research Experiences for Undergraduates (REU) program. Two students developed software systems for simulations and experiments to study models of decision making.

Directed 19 students in different Independent Study (CSCI 490) projects. Their research topics were in the area of expert systems.

Butler University, 1985-86

Established and developed a Center for Expert Systems that enabled undergraduates, faculty, and local businesses to work on expert systems research projects. A number of presentations were given by undergraduates at the St. Louis ACM meeting.

New Jersey Institute of Technology, 1983-85

Directed 3 students in the design and development of interactive systems for displaying information about New Jersey state government.

Included and directed students in a large research project with the National Audubon Society on a decision support system for energy policy analysis.

Florida State University, 1975-79; University of Pennsylvania, 1973-75

As a nuclear physicist, Dr. Medsker routinely involved undergraduates along with graduate students in research. Some of the undergraduates worked at high enough levels to publish their results in journals.

Consultant Activities

- 1984 Bell Laboratories (New Jersey) -- Database creation and management for surveys of technical training needs within Bell Laboratories.
- 1984 National Audubon Society (New York) -- Planning studies for office automation system and computer training for Audubon staff in the New York office.
- 1984-85 Center for Information Age Technology -- (based at the New Jersey Institute of Technology) Member of the team that started CIAT, which was set up by the State of New Jersey to help businesses and governmental units integrate computing technologies into their operations; conducted numerous workshops on database systems and computer literacy for executives; served as project leader of several consulting efforts with business and governmental groups.
- 1985 Indianapolis Center for Advanced Research (Indiana) -- Literature searches and engineering reports on computer technology topics.
- 1986-87 Holcomb Research Institute (Indiana) -- Technical assistance in the development of expert systems in groundwater modeling work.
- 1992-93 NEC, Inc. - Technical assistance with proposals on Neural Networks and Expert Systems
- 1992-97 Instructor for the Institute of Professional Education: Building Expert Systems Seminars and Neural Network Seminars
- 1997-99 Consultant to the U.S. Department of Labor, Office of the Assistant Secretary for Policy: pioneered the use of web-based expert systems to advise the public on rights and obligations under selected Department of Labor regulations.
- 1997-99 Consultant to the Federal Highway Administration to develop guidelines for the verification and validation of artificial neural networks in engineering applications.
- 1997-present Chief Scientist and Co-Owner, Human Performance Systems, Inc., Design and development of knowledge-based systems.
- 2008-10 Consultant to SRI Consulting, work on eAdvisors at the Administrative Offices of the U.S. Courts, Washington, DC.

Course and Other Instructional Activities

Courses Developed and/or Taught

<u>Course Title</u>	<u>Number</u>	<u>University</u>
College Physics (pre-med)		Florida State University
Physics and Music		"
Intro. to Computers (with BASIC)	CP 16110	Fordham University
Computer Problem Solving (FORTRAN)	CP 26210	"
Computer Structure & Organization	CP 26310	"
Computers and Music	CP 49899	"
Data Structures	CIS 335	N.J.I.T.
Computer Organization	CIS 351	"
Comp. Sci. for Engineers	CIS 407	"

Senior Project Supervision	CIS 491	"
Operating Systems	CIS 630	"
Data Management Systems	CIS 631	"
Data Communications	CIS 651	"
Master's Project Supervision	CIS 700	"
Intro. to Computer Science(Pascal)	CS 215	Butler University
Database Systems	CS 410	"
Expert Systems	CS 471	"
Personal Computing	CS 471	"
Operating Systems	CS 472	"
Systems Programming	CSCI 403	Purdue-Indianapolis
Programming Languages	CSCI 461	"
Indep. Study - Expert Systems	CSCI 490	"
Operating Systems	CSCI 503	"
Knowledge Base Systems	CSCI 590	"
Concepts in Systems and Information	55.511	American University
Human Factors in	55.515	"
Software Engineering	55.532	"
Systems Analysis	55.560	"
Quantitative Analysis for IS	55.606	"
Expert Systems	40.630	"
Intelligent Information Systems	55.663	"
Creativity and Computers	CSIS-200	"
Artificial Intelligence	CSIS-568	"
Neural Networks	CSIS-580	"
Modern Physics	PHYS-370	"
Multimedia III (Flash and Director)	MMDD-450	"
University Physics (Honors Section)	PHYS-110H	"
Physics of Music	PHYS-010	Siena College
Research in Science	SCDV-001	"
General Physics IA	PHYS-110	"
Multimedia Development	MUMD-190	"
General Physics I	PHYS-011	George Washington U.
Honors: Scientific Reasoning and Discovery	HONR-033	"

Off-Campus Teaching

Taught 55.515, 55.532, and 55.560 for AU at Advanced Technology, Inc., a high-technology firm in Reston, VA; taught 55.663 at AT&T; 40.630 at the Defense Intelligence Agency.

Course and Curriculum Development at American University

- Designed and taught an Honors Colloquium course: "Machines Who Think and Feel".
- Designed and taught a course "Physics of Music" at American University and Siena College.
- 55.200 Creativity and Computers (co-developer Gene McGuire) -- very popular course.