

Curriculum Vitae

Erik D. Goodman

Professor, Electrical and Computer Engineering
Professor, Mechanical Engineering
Co-Director, Genetic Algorithms Research and Applications Group (MSU GARAGE)

Dept. of Electrical and Computer Engineering
2120 Engineering Building
Michigan State University
East Lansing, Michigan 48824
Phone: (517)355-6453 Fax: (517)353-1980 goodman@egr.msu.edu

Chair, ACM SIG for Genetic and Evolutionary Computation (SIGEVO)
(Use university address above for correspondence)

Vice President, Technology, Red Cedar Technology, Inc. (formerly Applied Computational Design Associates, Inc.)

4572 S. Hagadorn Road, Suite 3-A
East Lansing, MI 48823
Phone: (517)664-1137 Fax: (517)664-1175 e.goodman@redcedartech.com

EDUCATION

Ph.D., Computer and Communication Sciences, University of Michigan, 1972; Dissertation Title: *Adaptive Behavior of Simulated Bacterial Cells Subjected to Nutritional Shifts*
M.S., Systems Science, Michigan State University, 1968
B.S., High Honors, Mathematics, Michigan State University, 1966

HONORS AND PROFESSIONAL ACTIVITIES

International Recognition

Senior Fellow, International Society for Genetic & Evolutionary Computation, elected 6/2004
Advisory Professor, Tongji University, Shanghai, PRC, appointed 12/2002
Advisory Professor, East China Normal University, Shanghai, PRC, appointed 1/2002
Member, Academy of Engineering Sciences of the Ukraine, elected Oct, 2000
Honorary Doctorate, Dneprodzerzhinsk State Technical University, 1996
Academician, International Academy of Informatics (Moscow), 1993

University Recognition

Withrow Exceptional Service Award, College of Engineering, Michigan State U., 2004
Outstanding Faculty/Staff Award, MSU Resource Center for Persons with Disabilities, 2005
Alumni Club of Mid-Michigan Quality in Undergraduate Teaching Award, 2007

Additional Honorary Societies Elected into Membership:

Phi Kappa Phi, Sigma Xi, Omicron Delta Kappa, Pi Mu Epsilon, Phi Eta Sigma

Scholarships and Fellowships Awarded

MSU Alumni Distinguished Scholar
NSF Trainee
NASA Trainee
IBM Fellowship

Professional Activities:

Chair, ACM SIG for Genetic and Evolutionary Computation (SIGEVO), 2005 – 2007
Chair of the Executive Board, International Society for Genetic and Evolutionary Computation, 2001 - 2004
General Chair, Genetic and Evolutionary Computation Conference (“GECCO-2001”), San Francisco, July 7-11, 2001
Editorial Board, *Evolutionary Computation*, elected for 2002-2007
Editorial Board, *Journal of Applied Soft Computing*
Editorial Board, *International Journal of Applied Intelligence*
Editorial Board, *Journal of Intelligent Control, Neurocomputing and Fuzzy Logic*
Vice Chair, Genetic and Evolutionary Computation Conference – 2000 (“GECCO-2000”), Las Vegas, July, 2000
Member of Core Faculty, Center for Russian and East European Studies, MSU, 1999 -
General Chair, Seventh International Conference on Genetic Algorithms, East Lansing, 1997
General Chair, First International Conference on Evolutionary Computation and its Applications, Presidium, Russian Academy of Sciences, Moscow, June, 1996
General Chairman, 1987 International Computer Graphics Conference, co-sponsored by SAE and Engineering Society of Detroit
Executive Council, International Society for Genetic Algorithms, 1997 – 2003
Executive Board, International Society for Genetic and Evolutionary Computation, 2000 - 2003
Guest Editor, Special Issue on Evolutionary Computation, *Obozrenie Prikladnoy i Promyshlennoy Matematiki*, (*Review of Applied and Industrial Mathematics*), 1997 (in Russian)
American Institute of Aeronautics and Astronautics CAD/CAM Technical Committee (Outstanding Contributions Award, 1990), Chair of Research & New Directions Subcommittee, 1987-88, Chair of Conferences & Workshops Subcommittee, 1988-89
Member, National Visiting Board for NSF grant from Advanced Technology Education program
International Scientific Advisory Board, COMPAUTO '87, Geneva, Switzerland
International Program Committee, Internat. Aerospace Congress (Moscow), 1997, 2000
Reviewer for following journals: *Evolutionary Computation*, *IEEE Transactions on Systems, Man, and Cybernetics*, *IEEE Transactions on Education*, *IEEE Transactions on Evolutionary Computation*, *ASME Journal of Manufacturing Science and Engineering*, *Numerical Heat Transfer*, *Complex Systems*, *Applied Intelligence*, *Information Sciences*, *Artificial Intelligence in Engineering Design and Manufacturing*, *Journal of Robotic Systems*
Member of Organizing Committee, CAD 93, CAD 94, CAD 95 (Yalta), ENIAC 50 Conference (Moscow, 1996)
Local News Editor, Southeast Michigan IEEE Chapter, *IEEE Wavelengths*, 1977-80
Reviewer, ASME Design Automation Conference, 1996
Reviewer for Electro-Information Technology Conference, IEEE, 2006.
Reviewer, Division of Environmental Biology, National Science Foundation
Reviewer, MSU All-University Research Initiation Grants, MSU Outreach Grants
Chair/organizer of various conference sessions for Society of Manufacturing Engineers (SME), American Institute of Aeronautics and Astronautics (AIAA), Society of Automotive Engineers (SAE)

Memberships (not all continuous):

Academician, International Academy of Information Networking (Moscow)

Member (elected), Academy of Engineering Sciences of Ukraine
International Society for Genetic Algorithms
International Society for Genetic and Evolutionary Computation (Executive Board, 2000-2004;
Chair of Executive Board, 2001-2004)
American Institute of Aeronautics and Astronautics
Society for Environmental Toxicology and Chemistry (Charter Member)
Association for Computing Machinery (in 1980s, member of Special Interest Group for
Graphics,
SIGGRAPH; in 2004, became chair of a new SIG, SIGEVO, the Special Interest Group for
Genetic and Evolutionary Computation, 2004-2007)
Institute of Electrical and Electronics Engineers
IEEE Computer Society
Society of Manufacturing Engineers (Senior Member)
Computer and Automated Systems Association, SME
Society of Automotive Engineers
Engineering Society of Detroit
Society for Computer Simulation
American Association for the Advancement of Science
Lansing Torch Club (Board of Directors)

Listings:

Who's Who in the World
Who's Who in America
Who's Who in Science and Engineering
Who's Who in the Midwest
Who's Who in American Education
Who's Who in Finance and Business
American Men and Women of Science

EMPLOYMENT HISTORY

2006 - Present Design Coordinator, Department of Electrical and Computer Engineering,
Michigan State University
1999 - Present Vice President, Technology, Red Cedar Technology, Inc. (formerly, Applied
Computational Design Associates, Inc.)
1993 - 2003 Director, Manufacturing and Materials Research Consortium, Michigan State
University
Responsible for formation and direction of an industrial consortium administered through
the Case Center. Membership has included major automobile manufacturers and supplier
companies, one governmental agency.
1993 - 1998 Director, Russian/American Joint Education/Research Consortium for Intelligent
CAD and Genetic Algorithms (ICAD/GA Consortium)
Responsible for formation of new consortium including four Russian universities, which
are engaging in collaborative research in theory of genetic algorithms and application of
genetic algorithms to problems in intelligent design and manufacturing.
1993 - Present Co-Director, Genetic Algorithms Research and Applications Group (GARAGe)

Responsible, with co-director, for research activities in genetic algorithms conducted by a group of regular faculty, visiting faculty, post-doctoral research associates, graduate research assistants, and other graduate and undergraduate students. Personally developing a Genetic Algorithms toolkit (GALOPPS) for joint use in Russia, China, and U.S. for collaborative research. Funded GA research in Russia (Russian GARAGe) through the International Science Foundation.

- 1993 - Present Director, Chinese/American Consortium for Genetic Algorithm Research
Responsible for formation of research collaborations with three universities in China and the Chinese Academy of Sciences. Developed and provided first releases of new Genetic Algorithms toolkit (GALOPPS) to faculty and students in China during sabbatical leave; introduced key concepts in seminar course. Adding additional Chinese universities to collaborators through lecture visits, introduction of software, conducting of joint research, and hosting of visiting scholars (pre-doctoral and visiting professors). Informal activity, not a formal organization. Responsible for planning of an ACM SIGEVO-sponsored conference on evolutionary computation planned for Shanghai, May, 2009.
- 1994 - 2001 Professor, Materials Science and Mechanics, MSU (dept. eliminated, 2001)
- 1992 - Present Professor, Mechanical Engineering, MSU
- 1984 - Present Professor, Electrical Engineering, MSU (later renamed Electrical and Computer Engineering)
- 1983 - 2002 Director, A. H. Case Center for Computer-Aided Engineering and Manufacturing, College of Engineering, MSU
Responsible for administration and development of a leading center for instruction and research in CAD/CAM and computer-aided engineering. Duties include staff recruitment and supervision, planning for expansion; industrial liaison activities to promote sponsorship of research of engineering faculty; seeking donations of cash and equipment to enable center operation and growth; direction of research involving computer graphics and geometric modeling applied to industrial CAD and CAM problems, frequent visits to industry for technical exchange, including no-cost limited-term consulting regarding CAD/CAM acquisition by companies; representing center in several technical groups and professional meetings; operation of an international technology incubator function to provide access to foreign technology for U.S. companies; establishment of international exchange agreements to promote research; liaison with numerous international visitors. (In 1995, the center's Division of Computing Services was made an independent unit, the Division of Engineering Computing Services, with a specialist director reporting to the College of Engineering. The Case Center continued as the research and industrial outreach unit. The center ceased operation in 2002.)
- 1983 - 1986 Director, Engineering Computer Facility, College of Engineering, MSU
Responsible for planning development of a significant network of computer resources within the college. Duties include administering current facilities and consulting operation; promoting development of courseware by faculty; seeking of industrial and vendor support for improved facilities; representing college on several committees overseeing university computer resources; participating in design and technical specification of broadband and baseband cable data networks. Facility was merged with Case Center, 1986.
- 1978-1984 Associate Professor, Electrical Engineering and Systems Science, MSU

1972-1978 Assistant Professor, Electrical Engineering and Systems Science, MSU

FUNDED RESEARCH

As Director of Consortial Activities:

Director of MSU Manufacturing Research Consortium, 1993 – 2003; administered over \$200,000/year budget to provide seed funding for new research areas of interest to the industrial members. Actively recruited additional members through research presentations at industrial and government sites. Significant spinoff funding resulted (\$1.2 million in academic year 1998-99, for example).

Co-Director, Genetic Algorithms Research and Applications Group (GARAGe) (with Wm. F. Punch). Research group includes co-directors, 4 affiliated MSU faculty, 3 visiting faculty members, 2 visiting scholars, and 8-10 graduate students. Conducts funded projects and research initiation on GA application and theory.

Co-Director, Russian GARAGe

Initiated as a funded subset of the Russian/American Joint Education/Research Consortium for Intelligent CAD/CAM/CAE and Genetic Algorithms, also founded by Goodman and Punch in collaboration with V. L. Uskov of Moscow State Technical University (Bauman). Four collaborative projects with Russian investigators received low-level funding for research initiation, from U.S. industry, administered through the International Science Foundation.

As Principal Investigator (or Project Director):

Initiated/directed or co-directed the following funded research projects (total funding about \$3.6 million from sources including National Science Foundation, General Motors, Chrysler, Ford, General Dynamics, National Research Council, SDRC):

"Automated Design of Advanced Mechatronic Systems (ADAMS)," with Zhun Fan (Tech. Univ. of Denmark (DTU), PI), Ole Sigmund (DTU, PI), Torben Sorenson (DTU, co-PI), Ronald Rosenberg (MSU, co-PI), Ronald Averill (MSU, co-PI). Funded by Danish Research Council for Technology and Production Sciences, March 1, 2007 - Feb. 28, 2010; 1,600,000 kroner (US\$279,179). (A Ph.D. student will spend approx. 18 mos. at MSU as a visiting scholar under direction of E. Goodman under support of this grant.)

"Automated Design of Mechatronic Systems Using Bond Graphs and Genetic Programming," with R. Rosenberg, K. S. Seo, National Science Foundation, \$308,000, Sept. 1, 2000 – Aug. 31, 2004.

"Globally Distributed Engineering Design Teams: Cultural, Social, and Technological Factors Influencing Group Process and Performance," with C. Steinfield, K. David, J. Lloyd, T. Hinds, National Science Foundation, \$340,000, Sept. 1, 1998 – Aug. 31, 2001.

"Coupled Optimization of Crashworthiness and Vibration Frequencies in Automotive Structures Using Genetic Algorithms," with R. Averill, W. Punch, General Motors, \$59,875, March 1, 1998 - Feb. 28, 1999 (work representing an extension of this project was funded for an additional \$60,000 for May – August, 1999).

"Supporting Globally Distributed Engineering Design Teams with Comm. Techniques", with C. Steinfield (Telecomm.), T. Muth (Telecomm.), Electronic Data Systems, \$87,756, Nov. 1, 1996 - Aug. 15, 1997.

"Optimal Design of Laminated Structures Using Genetic Algorithms," with R. Averill, W. Punch, Research Excellence Fund (State of Michigan), \$23,672, July 1, 1996 - June 30, 1997.

"Team Gems: The Effect of Collaboration Technology on Engineering Design Teams", with C. Steinfield (Telecomm.), T. Muth (Telecomm.), Electronic Data Systems, \$45,838 Apr. 29 - Dec. 31, 1996.

"Improved Algorithms for Manufacturing Planning and Scheduling," MSU Manufacturing Research Consortium, \$30,000, August 16, 1996 - August 15, 1997.

"Geometry of Helical Gear and Tool Surfaces for Plunge Shaving of Involute Gears (Testing Agreement)", with S. Radzevitch, New Venture Gear, \$18,848, June 1, 1996 - May 31, 1997.

"Evaluation of Crown Gear Rotary Hobbing Process for Face Ring Gear (Testing Agreement)", with N. Smirnov, GM Gear Center, \$13,109, June 11 - Aug. 1, 1996.

"Optimal Design of Laminated Structures Using Genetic Algorithms," with R. Averill, W. Punch, Research Excellence Fund (State of Michigan), \$23,873, July 1, 1995 - June 30, 1996.

"Improved Algorithms for Manufacturing Planning and Scheduling," MSU Manufacturing Research Consortium, \$72,000, August 16, 1994 - August 15, 1996.

"Optimal Design of Laminated Structures Using Genetic Algorithms," with R. Averill, W. Punch, Research Excellence Fund (State of Michigan), \$20,000, July 1, 1994 - June 30, 1995.

"Collaborative Research on NC Toolpath Generation," National Research Council, CAST program, \$11,200, March 15 - November 30, 1993.

"Genetic Algorithms for Clustering of Microbial Populations," Center for Microbial Ecology, \$22,000, 5/1/92-4/30/93.

"Software License Agreement for N/C Toolpath Verification," licensing software developed at MSU to CIMLINC, Inc., February, 1992; initial license fee paid to university, \$68,000, with subsequent royalties dependent on product sales. Enhancement and porting of software continuing through 12/92.

"Algorithms for N/C Toolpath Verification," CIMLINC, \$27,687, 9/15/91-12/15/91.

"Diagnostic Expert Systems Training," Electronic Data Systems, \$10,000, 1/9/91-12/31/91.

"Enhancements to Algorithms for Robotic Spray Verification," General Dynamics Corporation, \$16,508, 4/1/89-9/30/89.

"Off-Line Verification of Robotic Spray Application Programs," General Dynamics, \$169,454; 7/1/87-6/30/88.

"Algorithms for Display of Trimmed Surfaces," Structural Dynamics Research Corporation, \$55,000, 7/1/87-9/30/88.

"Expert System for Control of Lost Foam Pattern Molding," General Motors, Central Foundry Division, \$22,205, 7/28/86 - 7/31/87.

“Techniques for Conversion of Chrysler In-House Surfaces to Allow Communication of Design Data,” Chrysler Corporation, \$41,209, 1/1/86-9/30/86.

“CAD/CAM for Creating Experimental Parts,” Chrysler Corp., \$75,138, 9/1/85-11/30/86.

“Research and Development in Surface Reflectance Algorithms,” General Dynamics Corporation, \$50,000, 4/1/85-3/30/86.

“Research in CAD Applications and Athletic Biomechanics,” Wolverine World Wide Corporation, Brooks Division, \$351,000 (Case Center portion), 1984 - 1992.

“Research and Development Study Project in Color Graphics Application,” General Dynamics Corporation, \$50,000, 10/1/83-9/30/84.

“CAD/CAM Graphics,” General Dynamics Corporation, \$25,000, 9/1/82-8/31/83.

“Enhancement of MSU Colorscope for Trimming, Z-Clipping, and Multiple Hue Shading of Bicubic Patches,” General Dynamics Corporation, \$25,000, 10/1/82-9/30/83.

“Pseudocoloring of CAD Surfaces According to Curvature Measures,” Ford Motor Company, \$15,465, 1983.

“Integration of Interactive Graphics into Engineering and Science Instruction,” National Science Foundation, \$247,067, 5/15/79-10/31/82.

“Research and Development of Study Project in Color Graphics Applications,” General Dynamics Corporation, \$50,000, 9/16/80-8/31/82.

“Ecosystem Responses to Alternative Pesticides in the Terrestrial Environment: A Systems Approach” Environmental Protection Agency, \$675,000, 7/75-9/81.

“A Theoretical and Experimental Approach to Prediction and Control of Eutrophication of a Lake Ecosystem,” National Science Foundation, \$248,584, a portion of NSF GI-20 RANN Grant, 4/15/74-4/14/76.

As a Co-investigator (additional \$2.2 million):

“Rapid Product Development in International Production,” (with J. Lloyd, co-PI; P. Kwon, co-PI; M. Chung, Senior Faculty; F. Pourboghrat, Senior Faculty; and E. Goodman, Senior Faculty), National Science Foundation, subcontract to University of Texas Pan American, MSU portion: \$289,000, 1/1/00 – 12/31/02.

“New Web-Based CAD Framework for Design of Complex Technical Systems,” foreign collaborator, Proj. #1636, Internat. Science and Technology Center of Ukraine, July, 2000 – June, 2003, A. P. Petrenko, principal investigator, National Technical University of Ukraine (Kiev Polytechnic Institute), \$180,000 (most funds to be spent in Ukraine).

“Geometry of Helical Gear and Tool Surfaces for Plunge Shaving of Involute Gears,” with S. Radzevitch, V. Palaguta, New Venture Gear, \$18,472, July 15 – Sept. 30, 1998, and Phase II, \$23,000, Jan. 1, 1999 – August 31, 1999.

“Integrating Environmental Issues into Product Design, Planning, and Manufacturing,” National Science Foundation, \$400,000, Sept. 1995 - 1998. (with S. Melnyk, L. Tummala, K. Helferich, R. Handfield).

"Introduction to ALLTED All-Technology Design System," Roberts Sinto Corp., \$10,000, July-August, 1994 (with V. Tchkalov).

"Optimization of Cutting Conditions for Hobbing," Chrysler, \$24,000, June - August, 1994 (with N. Smirnov, S. Radzevitch).

"Optimization of Cutting Condition", Chrysler, \$7,000, July - August, 1993 (with N. Smirnov, S. Radzevitch).

"New Hob Designs for Improved Tool Life", General Motors Corporation, \$10,000, 5/31/92-8/20/92 (with N. Smirnov).

"Interactive Computer Graphics Applied to Agriculture," W.K. Kellogg Foundation, \$478,200, 1984-1988.

"Evaluating Acoustic Warning Signals in Automobile Interiors," Ford Motor Company, \$58,000, 2/82-1/83.

"Shading of Rational B-Spline Surfaces," General Dynamics Corporation, \$25,000, 9/1/82-8/31/83.

"Modal Testing of Clock PC Boards," Ford Motor Company, \$4,597, 9/81-12/81.

"Design and Direct Implementation of Dynamic Stream Flow and Toxicant Transport Model for Use in On-Line Control Algorithm," Monticello Stream Project, Environmental Protection Agency, \$850,000, 10/1/78-9/1/81.

ADDITIONAL RESEARCH

- a) Development of heuristics for optimal bin packing, minimum makespan scheduling (patent applied for, with B. Zulawinski, W. Punch, G. Ragatz, E. Torng, not issued).
- b) Invention of a new hybrid representation for genetic algorithm optimization of problems involving both permutation of tasks and determination of optimal values of (possibly inter-dependent) variables.
- c) Development of new, apparently superior algorithms for ranking of permutations and combinations (mapping bidirectionally between an index value and the field ordering or subset selected to which the index corresponds).
- d) Development of "Genetic ALgorithm Optimized for Portability and Parallelism" System ("GALOPPS"), a tool for coarse-grain parallel genetic algorithm research.
- e) Development of mathematical bounds on verification error for NC verification software
- f) Machine learning via genetic algorithms, applied to artificial systems exhibiting temporal and two-dimensional spatial complexity.
- g) Enhancement of two-and three-dimensional imaging capabilities for MR scanning data.
- h) VLSI implementation of graphics algorithms for display of geometric models.
- i) During Ph.D. thesis research, development of a genetic algorithm using a floating-point representation, one-point crossover, and a Gaussian mutation operator, applied to solving for rate constants governing a model of bacterial growth. One run of program used nearly one year of CPU time on an IBM 1800 computer.

TEACHING EXPERIENCE

Taught ECE 480, Senior Capstone Design, fall and spring semesters, 2002 – present. Five-credit course, required of all EE and CPE majors, requires individual lab projects by students, a major team-based design project, several written and oral presentations, about 35 lectures on engineering topics (including ethics, presented by another faculty member). Course development includes finding industry sponsors for nearly all teams, more oral and written presentations, project management training, entrepreneurship and lifecycle design lectures, awarding of prizes to best teams, and more public and media exposure of teams and projects in ECE Design Day.

Co-taught CSE 848/ECE 802 – Evolutionary Computation, with William F. Punch, fall semester, 2000, 2002, 2004, 2006.

Taught CSE 410, Operating Systems Principles, 4 credits, 35 students, in Dept. of Computer Science and Engineering, spring semester, 2000, spring semester, 2001, spring semester, 2002.

Team taught EGR 475, Global Engineering Design Teams, a cross-disciplinary course teaming MSU students with engineering students at universities in other countries, working on team projects, and including training of participants on many aspects of computer-supported collaborative work and trans-cultural cooperation, annually, 1999 – 2002.

Taught ECE 381, Communications, Ethics, and Professionalism, typically 25 students, 1 credit, in Dept. of Electrical and Computer Engineering, multiple semesters in 1997-1999.

Taught a 20-hour graduate seminar on Genetic Algorithms, at Beijing University of Aeronautics and Astronautics, Beijing, China, September - December, 1993, for students from BUAA, Tsinghua University, and Academia Sinica (Chinese Academy of Sciences). Served as foundation for a research consortium of investigators at three Chinese universities with MSU's Genetic Algorithms Research and Applications Group.

Developed three-course sequence in biological modeling for engineers and biologists (seniors and graduate students), taught two of the three courses from 1972 - 1982, to over 150 undergraduate students, 250 graduate students, and about 20 faculty members (visitors) in SYS 442, Systems Concepts for Biologists; supervised development of over 100 mathematical models of biological/ecological systems by teams each involving undergraduate engineering students, undergraduate and/or graduate biology students and a faculty member from biology (including faculty from the departments of Zoology, Entomology, Botany and Plant Pathology, Physiology, Crop and Soil Sciences, Horticulture, Resource Development, Forestry, Fisheries and Wildlife, and Agricultural Economics), in a project-oriented course entitled Ecosystem Analysis, Design, and Management, SYS 843. In addition to faculty members visiting the courses from MSU, faculty members from other universities also arranged sabbaticals here to participate in this course sequence.

Developed senior-level capstone computer engineering course, Computer Interfacing, with six associated laboratory projects, and taught this course three years, until appointed Director of Case Center.

Taught EE courses entitled Electric Circuits I, Electric Circuits II, Discrete-Time Systems, Continuous-Time Systems, and Analysis of Control Systems, at various times 1973 - 1989. My teaching of the Discrete-Time Systems class was selected for detailed study of teaching

techniques by a Ph.D. student in the College of Education, forming basis for the student's Doctoral Dissertation.

Taught an 8-hour short course on Local- and Wide-Area Computer Networking at the National University of Science and Technology, Rawalpindi, Pakistan, May, 1992.

Guest lectured in numerous classes, including EGR 160, IDC 201, ZOL 404, ME 464, *et al.*

Taught intensive 2- and 3-week courses on computing and simulation for telephone engineers, sponsored by U. S. Independent Telephone Association, annually, 1968-72.

Taught intensive short course for 22 EPA scientists, Duluth Research Laboratories, 1977.

Taught intensive short course on mathematical modeling for scientists of U.S. Soil Conservation Service, Lincoln, NE, 1974.

Developed software for using computer graphics to aid in teaching mathematical modeling concepts to biologists. Software was subsequently adopted by faculty at five other universities.

Invited Panelist, "The Lecture: Some Insights into What Makes a Good One," sponsored by Learning and Evaluation Services, MSU, February 19, 1980.

Invited Panelist, "Humor in the Classroom," sponsored by Learning and Evaluation Services, MSU, May 9, 1980.

GRADUATE STUDENT DIRECTION

Ph. D. Theses Directed (with Department Granting Degree):

Thomas M. Kopylay (co-directed), Systems Science, 1974

John A. Van Sickle, Systems Science, 1975

Mark N. Pickelmann, Mechanical Engineering, 1985

Cameron S. Kayvan, (co-directed), Electrical Engineering, 1985

James H. Oliver, Mechanical Engineering, 1986

Adrian V. Sannier, Systems Science, 1988

Jane L. Hawkins, Mechanical Engineering, 1989

Ki-Yin Chang, Mechanical Engineering, 1991

Shyh-Chang Lin, Electrical and Computer Engineering, 1997

Ming Bao, Electrical and Computer Engineering, 1997

Zhun Fan, Electrical and Computer Engineering, 2004

Bulent Buyukbozkirli, Mathematics, 2004

Jianjun Hu, Computer Science and Engineering, 2004

Hiram Firpi, Electrical and Computer Engineering, 2005

Biology Ph.D. Students Guided in Mathematical Modeling Work,

But Not As Advisor:

Glenn C. Kroh, Ph.D., Botany & Plant Pathology, 1975

Vaughn E. Wagner, Ph. D., Entomology, 1975

James D. Nichols, Ph.D., Fisheries & Wildlife, 1976

James E. Breck, Ph.D., Zoology, 1978

Rosemary Loria, Ph. D., Botany and Plant Pathology, 1980

James E. Galloway, Ph.D., Physiology, 1980

Jorge P. C. de Lima, Ph.D., Forestry, 1981

Jeffrey J. Jenkins, Ph.D., Entomology, 1981

Martha J. Flanders, Ph.D., Zoology, 1984

Other Ph. D. Committee Service:

David S. Wilson, Zoology, 1974
Brian Lalone, Physiology, 1975
Philip H. Crowley, Zoology, 1975
Alan S. Tipton, Entomology, 1976
William H. Caskey, Microbiology, 1978
Larry B. Crowder, Zoology, 1978
John W. H. Dacey, Zoology, 1979
Stephen A. Kuschel, Computer Science, 1979
James F. Gilliam, Zoology, 1982
M. John Dwyer, Zoology, 1982
Martin J. Vanderploeg, Mechanical Engineering, 1982
Yu-Ying Leung, Electrical Engineering, 1985
Charles E. Spiekermann, Mechanical Engineering, 1986
Chong-Wei Xu, Computer Science, 1986
Dennis G. Watson, Agricultural Engineering, 1987
Taieb Znati, Computer Science, 1988
Gongzhu Hu, Computer Science, 1988
Michael A. Driscoll, Electrical Engineering, 1988
Andrew J. Hull, Mechanical Engineering, 1990
Patrick Flynn, Computer Science, 1990
Joseph M. Miller, Computer Science, 1990
Chiu Chin-Chuan, Electrical Engineering, 1991
Carl Erickson, Computer Science, 1991
Bruce Koenig, Electrical Engineering, 1992
Timothy Newman, Computer Science, 1993
Gayle Ermer, Mechanical Engineering, 1995
Charles Birdsong, Mechanical Engineering, 1999
Michael Raymer, Computer Science & Engineering, 2000
David J. Eby, Materials Science and Mechanics, 2000
Jay Northern, Electrical and Computer Engineering, 2003
Heping Chen, Electrical and Computer Engineering, 2003
Wei Huang, Electrical and Computer Engineering, 2005
David Cherba, Computer Science and Engineering, 2005
Chen, Hui, Civil and Environmental Engineering
Clune, Jeffrey, Computer Science and Engineering
Goings, Sherri, Computer Science and Engineering
Goradia, Amit, Electrical and Computer Engineering
Shi, Quan, Electrical and Computer Engineering
Namilkonda, Sandeep, Electrical and Computer Engineering
Wu, Tao, Electrical and Computer Engineering
Quwaider, Muhannad, Electrical and Computer Engineering
Velez, Dalimar, Electrical and Computer Engineering
Ziad, Youssfi, Electrical and Computer Engineering
Chapco, Jeff, Electrical and Computer Engineering
Ghanim, Mohammed, Civil and Environmental Engineering
Rupp, Matthew, Computer Science and Engineering

Postdoctoral Research Associates Directed and Faculty Sabbaticals and Leaves Hosted:

Philip H. Crowley, Post-Doctoral Research Associate, 1975-76
Jeffrey J. Jenkins, Post-Doctoral Research Associate, 1981-82
Nikolay N. Smirnov, Dean of the Faculty, Volgograd Polytechnical Institute, Volgograd, USSR, sabbatical leave 1990-91.
Pei Min, Professor and Vice President, College of Automation, Beijing Union University, Beijing, PRC, 1991-92.
Nikolay N. Smirnov, Vice President, Volgograd Civil Engineering Institute/Academy, Russia, April - September, 1992; June-August, 1993; June-August, 1994; June - August, 1995; June - July, 1996; July, 1997.
Ding Ying, Instructor, Beijing Union University, Beijing, PRC, February 1, 1993 - January 31, 1994
Stepan Pavlovich Radzevitch, Professor, Dneprodzerzhinsk Industrial Institute, Dneprodzerzhinsk, Ukraine, (under support of National Research Council), March 15, 1993 - November 30, 1993; July - August, 1994; June-July, 1995; June - September, 1996; then as Professor, Kiev State Technical University (Kiev Polytechnic Institute), July - August, 1997; September, 1998.
Valery Tchkalov, Prof., Kiev Polytech. Inst., Kiev, Ukraine, July - Aug., 1994; Aug - Sept., 1995.
Volker Schneck, Post-Doctoral Research Associate (co-hosted with L. Kuhn, W. Punch), 1997 - 1999 .
Victor Palaguta, Post-Doctoral Research Associate, June - August, 1997; September, 1998.
Kisung Seo, Post-Doctoral Research Associate, Jan., 1999 – August, 2003
Zhenhua Li, Visiting Scholar, Assoc. Prof., China University of Geosciences, Wuhan, April, 2006 – April, 2007.
Lihong Xu, Visiting Scholar, Professor, Control Theory and Control Engineering, and Dean, School of Modern Agriculture Science and Engineering, Tongji University, Shanghai, PRC, May – November, 2006.

M.S. Theses Directed:

David A. McLaughry, ME, (co-directed), 1985
Chia-Yiu Maa, EE, (co-directed), 1987
David R. Chesney, ME, 1987
Daniel A. Wysocki, ME, 1987
Chiu Chin-Chuan, EE, (co-directed), 1989
Hari K. Kosaraju, ME, 1993
Kelvin Sumlin, CS, 1993
Brian Zulawinski, CSE, (co-directed), 1995
Ananda Debnath, ME, 1997
Eric Myers, ME, 2000
Huafeng Pei, ECE, 2001
Anand Uday, ME, 2001
Zhijian Huang, ECE, 2002
Zhiwen Zou, CSE, 2002

M.S. Projects (non-thesis) Directed:

Khurshid Qureshi, ME, 1993
Vladislav Tcheprasov, CSE, 1997
Lakshman Thiruvengkatachari, ECE, 2000
Ahmad Shahid, ECE, 2002

Diplomarbeit Projects Directed (students from Rheinische-Westphalische Technische Hochschule, Aachen, Germany):

Jan C. Otten, (co-directed), 1987
Martin Correns, 1989

Pre-Doctoral Visiting Scholars Hosted:

G. Pisarenko, Sept-Dec, 1994
V. Tcheprasov, Feb-October, 1995
Yi-Zheng Feng, July, 1995 - November, 1996
Gang Xu, Sept, 1997 – 1998
Huafeng Pei, May - August, 1998
Baoli Yang, Jan., 1999 – June, 2000

Other M.S. Thesis Committee Service:

J. Brian Hestbeck, 1976
Ralph F. Stonebraker, 1977
Robert A. Coviak, 1981
Man-Kuan Vai, 1985
Steven Leung, 1985

Undergraduate Students Mentored (as Research Assistants or Professorial Assistants):

Robert Leland (won Rhodes Scholarship)
Paul Haas
Benjamin Pfaff
Antony Paul
Matthew Skalny
Janelle Shane (won Goldwater Scholarship)
Keith Barber
Albert Anthony

ADMINISTRATIVE ACTIVITIES

Donations Obtained for University

Obtained industrial donations totalling over \$3.2 million in cash and \$4.8 million in equipment, targeted at fostering research in CAD/CAM/CAE and at improving computing facilities and services for the College of Engineering (averaged over \$700,000/year in donations received, 1983-1993). Funds raised includes Case Center Endowment, with \$1 million in donations, that has now doubled to about \$2 million, net of yield of \$50-\$100K/year in earnings disbursed to support programs in the College of Engineering.

Requested and obtained two grants from GE Foundation to support faculty development in the college -- total award, \$180,000. Project funded instructional/curriculum development by 15 faculty members.

Promotion of International Collaborative Projects

Initiated joint research program with East China Normal University and Nanjing University on improved methods for detecting cardiac irregularities using microwave devices and genetic algorithms, funded (in China) by National Natural Science Foundation of China; 2000 -- .

“Foreign Collaborator” on grant from International Science and Technology Center of Ukraine (ISTCU) to National Technical University of Ukraine (KPI), 2000 - 2003.

Academician (elected member), International Academy of Informatics, Moscow, Russia.

Foreign Member (elected), Academy of Engineering Sciences of Ukraine, 2000 -- .

Co-founded the Genetic Algorithms Research and Applications Group (GARAGE), including the Russian GARAGE, in which three universities participated, with funding arranged through the International Science Foundation, 1993 - 98.

Founded (with V. L. Uskov, W. F. Punch, T. A. Bickart) the Russian/American Joint Education/ Research Consortium for Intelligent CAD/CAM/CAE and Genetic Algorithms ("ICAD/GA"), an organization with four Russian university members, working with MSU's Genetic Algorithm Research and Applications Group, 1993-98.

Initiated collaborative research with Beijing University of Aeronautics and Astronautics, Tsinghua University, and Zhejiang University, during six-month sabbatical leave in China. Collaboration continues, with joint use of my software in several projects at each university. Investigators at Chinese Academy of Sciences have now joined in this joint research effort. Additional GA lectures given at East China Normal University, Shanghai Jiaotong University, and Nanjing University, 2000.

Initiated the development of an international technology transfer "incubator" in the center, in 1992, for introduction of Russian and Ukrainian technology and software into the U.S. market, with seed money provided by the Vice Provost for Computing and Technology. Incubator provides facilities and support for "Americanizing" technology, helps to identify U.S. companies to co- develop and market technology, does negotiation of contracts, etc. Future royalties will seed further research in the center and college. Eight foreign visitors have been hosted by the ITI to date.

Initiated Case Center Agreements for Cooperation with Moscow State Technical University (Bauman), Volgograd Polytechnic Institute, Volgograd Civil Engineering Institute, Dneprodzherzhinsk State Technical University, Beijing University of Aeronautics and Astronautics, Tsinghua University, and Zhejiang University, 1991-.

Advised and assisted Pakistan's National University of Science and Technology regarding purchase of computing and networking facilities for the new multi-campus university, 1991-95.

Other Unit Development

During tenure as director, and before spinoff of new Division of Engineering Computing Services, Case Center expanded from one computer, 4 rooms, and 20 terminals to 28 rooms and a total of over 200 personal and workstation computers. Staffing increased from 8 half-time graduate assistants to 11 full-time professional staff, two secretaries, 12 half-time graduate assistants, and 200 hours/week of undergraduate student consultant time. Faculty conducting research using center resources exceeded 75. General fund (internal) budget increased from \$100,000/year to over \$750,000/year. Excluding sponsored research, but including cash donations, center budget exceeded \$1 million/year. Division of Engineering Computing Services was spun off as freestanding service (non-research) entity in 1995, under a new director.

Committee Leadership and Service:

Internal Research Grants Program, MSU – Member of Science and Engineering Review Panel, 2003, 2004, 2005, 2006

ECE Departmental Advisory Committee, 2006-2007

Computer Engineering Working Group, 2002-07

ECE Undergraduate Studies Committee, 2003-05, chair 2005-07

College of Engineering Undergraduate Studies Committee, 2005-07

Department of ECE Faculty Search Committee, 2002-04

College of Engineering Research Rating Committee (promotion and tenure process), chair, 2000 and 2001

Travel Advisory Task Force (recommending reengineering of MSU travel policies), 1996-7

Travel Request-For-Proposals Task Force, 1997-8

Communication and Computer Systems Advisory Committee, member, 1986-1996; chair, 1988-89

(advises Vice Provost regarding Computing and Technology matters at university level)

Service/Outreach Technology Committee, initial organizer and chair, 1990 - 1993; member, 1994-2003

(was asked to initiate this new committee by Vice Provost for Computing and Technology; advises Vice Provost regarding university technology needs for its service and outreach missions; assisted in obtaining a major Kellogg Foundation grant for an outreach activity)

International Studies and Programs Advisory Committee, member, 1993-1997; co-chair, 1996-7

(advises Dean of International Studies and Programs regarding policy decisions, establishment of relationships with foreign institutions, etc. Chair, Communications Subcommittee, 1994-96)

Engineering International Studies Committee, member, 1993-1998

(advises Office of the Dean of Engineering regarding international programs and policies of the College of Engineering)

Advisory Committee, Institute for Global Engineering Education, member, 1998-2001

(advises Director and Dean of Engineering regarding international programs and policies of the College of Engineering)

University Computer Advisory Committee

(predecessor of CCSAC, advised Computer Laboratory regarding computer acquisitions, etc.)

User's Subcommittee, UCAC, member and chair for several years

(advised Computer Laboratory regarding research and instructional needs of users, prior to formation of separate committees)

Engineering Computer Advisory Committee, chair

Computer Systems Policy and Planning Committee, member

(formulated proposal for all-university computer activity, 1978-79)

Electrical Engineering and Systems Science Department Advisory Committee, member

EESS Graduate Studies Committee, member

Systems Science Curriculum Committee, member

Electrical Engineering Curriculum Committee, member, secretary

Engineering Sciences Committee, member, chair

Department of Botany and Plant Pathology Search Committee

Research Computing Committee, member, chair

(advises university's central Computer Laboratory regarding needs of research community)

Computer Laboratory Search Committee for Associate Director, member

Computer Science Department Chair Search Committee, member, 1994-95

Network Computing Committee, member

(Advises Computer Laboratory regarding networking needs of university)

Computer Communications Committee, member

(Charged with developing a computer network for the university; preceded Network Computing Committee)

Steering Committee, Case Center for Computer-Aided Design, member

(Policy-making group for Case Center; member until became director in 1983)

Reviewer, All-University Research Initiation Grant Program

Reviewer, All-University Outreach Grant Program (reviewed over 60 proposals, 1991-)

Center for European and Russian Studies, Search Committee for Director, member, 1993

CONSULTING (Non-University Professional Positions)

Vice President, Technology, Red Cedar Technology (formerly, Applied Computational Design Associates, Inc.), 1999 –

Lear Corporation, 2005

President, NEWTeams Training, Inc. (a not-for-profit entity), 1999 – 2000

Review Panel Member, 21st Century Fund (State of Indiana), 2001-2004

Site Visitor, NSF grant to Univ. of Cincinnati, 2000-2002

Review Panel Member, North Dakota EPSCoR Grant Program (NSF, NASA, EPA), 2001-2004

Senior Scientific Advisor, Utah Russia Institute

President, Technology Gateway, Inc.

Consulted for automotive industry suppliers, Environmental Protection Agency, National Academy of Sciences, American Association for the Advancement of Science, U. S. Soil Conservation Service, U. S. Independent Telephone Association, professional societies, and CAM-I (an industrial consortium). Technical advisor to Chinese Computer Communications, Inc. Reviewer for ASME, AIAA, NSF, IEEE, SME.

OTHER CREDENTIALS

President and Director, Mid-Michigan Flight, Inc., 1990-1998.

Commercial Pilot License with Instrument Rating

Member, Aircraft Owners and Pilots Association

Certified Manufacturing Assessment Methodology Field Agent, Industrial Technology Institute

Holder of U.S. Patent #4300135, with C. MacCluer, L. Korn, 1981.

Holder of U.S. Patent #5924105 with W. Punch, M. Wulfekuhler, 1999.

Graduate, Chinese Language Short Course, Fudan University, Shanghai, China, 1988

Studied 3 years of Chinese at MSU, 1987-90; used daily during sabbatical in China, 1993-4

Language Proficiencies:

Chinese: conversation -- moderate; reading -- formerly, limited; currently, almost nil

Russian: conversation -- good; technical reading -- good; winner, MSU Russian Poetry

Recitation Contests, 1964, 1965

German: conversation -- limited; reading -- moderate

French: reading -- moderate

PUBLICATIONS

Books and Monographs

L. Spector, E. Goodman, *et al.*, eds., *Proceedings of the Genetic and Evolutionary Computation Conference, 2001*, July 7-11, Morgan Kaufmann Publishers, San Francisco, 1463pp.

Late Breaking Papers, GECCO-2001, ed., ISGEC Press, PO Box 19656, Palo Alto, CA, 504pp.

Tutorials, GECCO-2001, ed., ISGEC Press, PO Box 19656, Palo Alto, CA, 493pp.

(with Radzevich, S., Palaguta, V.) *Gear Technology: Handbook* (in Russian), IPTTM Scientific Publishers, Kiev, ISBN 5-7763-2870-9, 299pp., 1999.

Dolblenie Zubchatykh Koliios (Gear Shaping), with S. P. Radzevitch, V. A. Palaguta, monograph, DSTU Press, Dneprodzerzhinsk, Ukraine, 1998, 99pp.

Obozrenie Prikladnoy i Promyshlennoy Matematiki (Review of Applied and Industrial Mathematics), guest editor (with A. Kovalenko) of special issue on evolutionary computation, vol.3, no.5, Scientific Publisher TVP, Moscow, Dec., 1996, 173pp.

(with V. Uskov, W. Punch) *Proceedings of the First International Conference on Evolutionary Computation and its Applications*, (editors), Institute for High-Performance Computer Systems, Russian Academy of Sciences, Moscow, 1996, 406pp.

(with R. Rosenberg) *SYSKIT: Software Toolkit for Linear Systems*, McGraw-Hill, New York, 1986.

(with L. Anderson, G. Bird, W. French, R. Rice, G. White, and E. Zehr) *Pest Management in Peach and Nectarine Production*, Intersociety Consortium for Plant Protection, St. Paul, MN, 1983.

Chapters in Books

Xiangdong Peng, Erik D. Goodman and Ronald C. Rosenberg. "Comparison of Robustness of Three Filter Design Strategies Using Genetic Programming and Bond Graphs," chapter in Riolo, R., Soule, T. and Worzel, B., *Genetic Programming Theory and Practice IV*, Springer, March, 2007.

J. Hu, S. Li and E. Goodman. Evolutionary Robust Design of Analog Filters using Genetic Programming. Chapter in *Evolutionary Computation in Dynamic and Uncertain Environments*, Springer Series on Studies in Computational Intelligence. Springer, Berlin, 2006.

Zhun Fan, Mogens Andreasen, Jiachuan Wang, Erik Goodman, Lars Hein. Towards an Evolvable Engineering Design Framework for Interactive Computer Design Support of Mechatronic Systems." Chapter in *Integrated Intelligent Systems for Engineering Design*, edited by Xuan F Zha and R. J. Howlett, IOS Press, pp. 182-198, 2006.

Zhun Fan, Mogens Andreasen, Jiachuan Wang, Erik Goodman, Lars Hein, "Towards an Evolvable Engineering Design Framework for Interactive Computer Design Support of Mechatronic Systems," chapter in *Integrated Intelligent Systems for Engineering Design*, Xuan F Zha and R. J. Howlett (eds.), IOS Press, pp. 182-198, 2006.

Fan, Z., Wang, J., Seo, K., Hu, J., Rosenberg, R., Terpenney, J., and Goodman, E. Automating the Hierarchical Synthesis of MEMS using Evolutionary Approaches. Chapter in *Evolvable*

Machines: Theory and Practice, Nedjah, N. and Mourelle, L., eds., Springer, Berlin, 2005, pp. 129-149.

Jianjun Hu, R. C. Rosenberg and Erik D. Goodman, "Domain Specificity of Genetic Programming Based Automated Synthesis: A Case Study with Synthesis of Mechanical Vibration Absorbers," chapter in T. Yu, R. Riolo, and B. Worzel (eds.), *Genetic Programming Theory and Practice III*, Springer, New York, November, 2005, pp. 275-290.

J. Hu and E. Goodman. "Evolving robust dynamic systems with genetic programming," *Genetic Programming Theory and Practice II*, R. Riolo and W. Worzel (eds.), Kluwer Academic Publishers, Boston, January, 2005, pp. 143-158.

Jianjun Hu, Erik Goodman, Kisung Seo, and Ronald Rosenberg, "Toward Efficient Topological Synthesis of Dynamic Systems Using Bond Graphs and Genetic Programming," chapter in Nedjah, Nadia (ed.), *Evolutionary Machine Design: Methodology and Application*, a book in Series on Intelligent Systems Engineering, Nova Science Publishers, 2004.

Jianjun Hu, Erik Goodman, and Kisung Seo, "Continuous Hierarchical Fair Competition Model for Sustainable Innovation in Genetic Programming," chapter in *Genetic Programming Theory and Practice*, R. Riolo and W. Worzel, (eds.), Kluwer Academic Publishers, 2003, pp. 81-98. December, 2003.

(with D. Eby, R. Averill, and W. Punch) "The Optimization of Flywheels Using an Injection Island Genetic Algorithm," in Bentley, P. (ed.), *Evolutionary Design by Computers*, Morgan Kaufmann, San Francisco, 1999, pp.167-190.

(with S. Radzevitch, V. Palaguta) "Efficiency of Multi-Axis NC Machining of Sculptured Part Surfaces," *Machining Impossible Shapes*, G. Olling, B. Choi, R. Jerard, eds., Kluwer Academic Publishers, Norwell, Mass., 1999, pp.42-58.

(with R. Averill, W. Punch, D. Eby) "Parallel Genetic Algorithms in the Optimization of Composite Structures," *Soft Computing in Engineering Design and Manufacture*, P. K. Chawdry, R. Roy, and R. K. Pant, eds., Springer Verlag, 1998, pp. 199-208.

(with I. Norenkov) "Solving Scheduling Problems via Evolutionary Methods for Rule Sequence Optimization," *Soft Computing in Engineering Design and Manufacture*, P. K. Chawdry, R. Roy, and R. K. Pant, eds., Springer Verlag, 1998, pp. 350-355.

(with D. Eby, R. Averill, W. Punch), "Evaluation of Injection Island GA Performance on Flywheel Design Optimization," *Adaptive Computing in Design and Manufacture*, I. C. Parmee, ed., Springer, Berlin, 1998, pp. 121-136.

(with W. Punch, D. Zongker) "The Royal Tree Problem, a Benchmark for Single and Multi-population Genetic Programming", in *Advances in Genetic Programming 2*, MIT Press, Cambridge, Mass.,1996, pp. 299-316.

(with S. Radzevitch), "About the Orthogonal Parameterization of Sculptured Part Surfaces and Initial Tool Surfaces," *Jubilee Collection of Scientific-Technical Works*, Dneprodzerzhinsk GTU, Ukrainian Ministry of Education, 1995, pp. 185-203.

(with K. Chang, N. Smirnov), "Method for Interference Detection of a Moving Tool," *Jubilee Collection of Scientific-Technical Works*, Dneprodzerzhinsk GTU, Ukrainian Ministry of Education, 1995, pp. 203-213.

(with G. Wang), "A New Representation to Assist in Solving Complex Manufacturing Scheduling Problems Via Genetic Algorithms," *Jubilee Collection of Scientific-Technical Works*, Dneprodzerzhinsk GTU, Ukrainian Ministry of Education, 1995, pp. 213-223.

Papers

H. Firpi, E. Goodman, J. Echauz, "On Prediction of Epileptic Seizures by Means of Genetic Programming Artificial Features," *Annals of Biomedical Engineering*, 34(3), 2006, pp. 515-529.

J. Hu, E. Goodman, K. Seo, Z. Fan, and R. Rosenberg, "The Hierarchical Fair Competition (HFC) Framework for Sustainable Evolutionary Algorithms," *Evolutionary Computation*, 13(2), 2005, pp. 241-277.

J. Wang, Z. Fan, J. Terpenney, and E. Goodman, "Knowledge Interaction with Genetic Programming in Mechatronic Systems Design Using Bond Graphs," *IEEE Transactions on Systems, Man and Cybernetics, Part C: Applications and Reviews, Special Issue on Knowledge Extraction and Incorporation in Evolutionary Computation*. 35(2), 2005, pp 172-182.

J. Hu, X. Zhong, E. Goodman, "Open-Ended Robust Design of Analog Filters Using Genetic Programming," *Proc. Genetic & Evolutionary Computation Conference-2005 (GECCO-2005), Volume 2*, ACM Press, June, 2005, Washington, DC, pp. 1619-1626 [nominated for Best Paper Award].

H. Firpi, E. Goodman and J. Echauz, "Epileptic Seizure Detection by Means of Genetically Programmed Artificial Features," *Proc. Genetic & Evolutionary Computation Conference-2005 (GECCO-2005), Volume 1*, ACM Press, June, 2005, Washington, DC, pp. 461-466.

Z. Fan, M. Andreasen, J. Wang, E. Goodman and Lars Hein," Towards an evolvable chromosome model for interactive computer design support," *Proc. Internat. Conf. on Engineering Design (ICED05)*, Melbourne, Australia, Aug. 15-18, 2005.

H. Firpi, E. Goodman, and J. Echauz, "On Prediction of Epileptic Seizures by Computing Multiple Genetic Programming Artificial Features," *Proc. 8th European Conference on Genetic Programming, Lecture Notes in Computer Science*, Springer, Lausanne, Switzerland, March, 2005, pp. 321-330.

Z. Fan, J. Wang, and E. Goodman, "An Evolutionary Approach For Robust Layout Synthesis of MEMS," *Proc. IEEE/ASME Int. Conf. on Advanced Intelligent Mechatronics*, Monterey, CA, July 24-28, 2005, pp. 1186-1191.

J. Clune, S. Goings, W. Punch and E. Goodman, "Investigations in Meta-GAs: Panaceas or Pipe Dreams?" in Workshop on Parameter Setting in Genetic and Evolutionary Algorithms, *Workshop Proceedings, Genetic & Evolutionary Computation Conference-2005 (GECCO-2005)*, sponsored by ACM SIGEVO, June, 2005, Washington, DC, pp. 235-241.

E. Goodman, "Strategies for Design Optimization: Lessons from Automotive Systems," invited paper in Proceedings, Evolutionary Computation in Practice Track, *Genetic & Evolutionary Computation Conference-2005 (GECCO-2005)*, sponsored by ACM SIGEVO, June, 2005, Washington, DC, 39pp.

K. Seo, E. Goodman, R. Rosenberg, "Design of Air Pump System Using Bond Graph and Genetic Programming Method," poster paper and published abstract in *Proc. Genetic & Evolutionary Computation Conference-2005 (GECCO-2005), Volume 2*, ACM Press, June, 2005, Washington, DC, pp. 2215-2216.

E. Goodman, "Introduction to Genetic Algorithms," in *Tutorial Proceedings, Genetic & Evolutionary Computation Conference-2005 (GECCO-2005)*, sponsored by ACM SIGEVO, June, 2005, Washington, DC, 19pp.

H. Firpi and E. Goodman, "Designing Templates for Cellular Neural Networks Using Particle Swarm Optimization," *33rd Applied Imagery Pattern Recognition Workshop 2004*, Washington DC, Oct. 13-15, 2004, pp. 119-123. (appeared in conference pre-print in 2004; post-conference proceedings appeared in 2005).

H. Firpi and E. Goodman, "Swarmed feature selection," *33rd Applied Imagery Pattern Recognition Workshop 2004*, Washington DC, Oct. 13-15, 2004, pp.112-118. (appeared in conference pre-print in 2004; post-conference proceedings appeared in 2005).

Z. Fan, J. Wang, and E. Goodman, "Exploring Open-Ended Design Space of Mechatronic Systems," *Internat. J. of Advanced Robotic Systems*, 1(4), pp. 295-302, Dec., 2004.

Z. Fan, K. Seo, J. Hu, E. Goodman, R. Rosenberg, "A Novel Evolutionary Engineering Design Approach for Mixed-Domain Systems," in *J. Engineering Optimization*, Volume 36, Number 2, 2004.

Bulent Buyukbozkirli and Erik Goodman, "A Statistical Model of GA Dynamics for the OneMax Problem," *Proc. 2004 Genetic and Evolutionary Computation Conference, Lecture Notes in Computer Science*, Springer, June, 2004, Seattle, WA, Part I, pp. 935-946.

Jianjun Hu, Erik Goodman, and Ronald Rosenberg, "Robust and Efficient Genetic Algorithms with Hierarchical Niching and a Sustainable Evolutionary Computation Model," *Proc. 2004 Genetic and Evolutionary Computation Conference, Lecture Notes in Computer Science*, Springer, June, 2004, Seattle WA, Part I, pp. 1220-1232.

Kisung Seo, Erik Goodman, Jianjun Hu, Zhun Fan, and Ronald Rosenberg, "Hierarchical Breeding Control for Efficient Topology/Parameter Evolution Using Modular Primitives in Bond Graph Model Design, poster and 2-p. abstract in *Proc. 2004 Genetic and Evolutionary Computation Conference*, June, 2004, Seattle, WA, Part II, pp. 722-723.

H. Chen, G. Abu-Lebdeh, & E. Goodman: "Optimizing Dynamic Roadway Traffic Control with Parallel Genetic Algorithms and Assessment of Computational Advantages," *Computational*

Intelligence: From Theory to Practice, Proceedings of the ASCE Civil Engineering Conference and Exposition, Baltimore, 2004, pp. 80-98.

H. Chen, G. Abu-Lebdeh & E. Goodman, "Improving Performance of Genetic Algorithms for Transportation Systems: The Case of Parallel Genetic Algorithms," *Proc. 83rd Transportation Research Board Meeting*, DC, January, 2004.

J. Hu, E. Goodman, R. Rosenberg, "Topological search in automated mechatronic system synthesis using bond graphs and genetic programming," *Proc. IEEE American Control Conference*, June 30 – July 2, 2004, Boston, Massachusetts.

Jianjun Hu and Erik Goodman, "Wireless Access Point Configuration by Genetic Programming," *Proc. IEEE Congress on Evolutionary Computation*, June, 2004, Portland, OR, pp. 1178-1184.

Zhun Fan, Erik Goodman, Jiachuan Wang, Ronald Rosenberg, Kisung Seo and Jianjun Hu, "Hierarchical Evolutionary Synthesis of MEMS," *Proc. IEEE Congress on Evolutionary Computation*, June, 2004, Portland, OR, pp. 2320-2327.

Erik D. Goodman, "Introduction to Genetic Algorithms," *Tutorial Program, 2004 Genetic and Evolutionary Computation Conference (GECCO-2004)*, R. Poli (ed.), Seattle, WA, June, 2004, pp. 383-401.

Kisung Seo, Zhun Fan, Jianjun Hu, Erik D. Goodman and Ronald C. Rosenberg, "Toward a Unified and Automated Design Methodology for Multi-Domain Dynamic Systems Using Bond Graphs and Genetic Programming," *Mechatronics*, 13(8-9), Oct, 2003, pp. 851-885.

Z. Fan, K. Seo, J. Hu, R. Rosenberg, and E. Goodman, "System-Level Synthesis of MEMS via Genetic Programming and Bond Graphs," *Proc. 2003 Genetic and Evolutionary Computing Conference*, Chicago, Springer, *Lecture Notes in Computer Science*, July, 2003, pp. 2058-2071 [nominated for Best Paper Award].

J. Hu, K. Seo, Z. Fan, R. Rosenberg, and E. Goodman, "HEMO: A Sustainable Multi-Objective Evolutionary Optimization Framework," *Proc. 2003 Genetic and Evolutionary Computing Conference*, Chicago, Springer, *Lecture Notes in Computer Science*, July, 2003, pp. 1029-1040.

K. Seo, Z. Fan, J. Hu, E. Goodman, and R. Rosenberg, "Dense and Switched Modular Primitives for Bond Graph Model Design," *Proc. 2003 Genetic and Evolutionary Computing Conference*, Chicago, Springer, *Lecture Notes in Computer Science*, July, 2003, pp. 1764-1775.

Z. Huang, M. Pei, E. Goodman, Y. Huang, G. Li, "Genetic Algorithm Optimized Feature Transformation – A Comparison with Different Classifiers," *Proc. 2003 Genetic and Evolutionary Computing Conference*, Chicago, Springer, *Lecture Notes in Computer Science*, July, 2003, pp. 2121-2133.

Z. Fan, K. Seo, R. Rosenberg, J. Hu, and E. Goodman, "Computational Synthesis of Multi-Domain Systems," *Proc. 2003 AAAI Spring Symposium*, AAAI Press, San Francisco, pp. 59-66, 2003.

J. Hu, E. Goodman, K. Seo, Z. Fan, and R. Rosenberg, "HFC: A Continuing EA Framework for Scalable Evolutionary Synthesis," *Proc. 2003 AAAI Spring Symposium*, AAAI Press, San Francisco, pp. 106-113.

K. Seo, J. Hu, Z. Fan, E. D. Goodman, and R. C. Rosenberg, "Automated Design Approaches for Multi-Domain Dynamic Systems Using Bond Graphs and Genetic Programming," *International Journal of Computers, Systems and Signals*, vol.3, no.1, pp.55-70, 2002.

J. Hu, E. D. Goodman, K. Seo, M. Pei, "Adaptive Hierarchical Fair Competition (AHFC) Model for Parallel Evolutionary Algorithms," *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO-2002*, New York, July, 2002, pp. 772-779.

J. Hu, K. Seo, S. Li, Z. Fan, R. C. Rosenberg, E. D. Goodman, "Structure Fitness Sharing (SFS) for Evolutionary Design by Genetic Programming," *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO-2002*, New York, July, 2002, pp. 780-787.

Z. Fan, K. Seo, R. C. Rosenberg, J. Hu, E. D. Goodman, "Exploring Multiple Design Topologies using Genetic Programming and Bond Graphs", *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO-2002*, New York, July, 2002, pp. 1073-1080.

Radzevich, Stephen P. and Goodman, Erik D., "Computation of Optimal Workpiece Orientation for Multi-axis NC Machining of Sculptured Part Surfaces," *ASME Journal of Mechanical Design*, Vol. 124, pp. 201-212, June, 2002.

J. Hu and E. D. Goodman, "The Hierarchical Fair Competition Model for Parallel Evolutionary Algorithms," *Proc. 2002 IEEE World Congress on Computational Intelligence*, Congress on Evolutionary Computation, Honolulu, HI, pp. 49-54, May, 2002.

E. D. Goodman, K. Seo, R. C. Rosenberg, Z. Fan, J. Hu, and B. Zhang, "Automated Design Methodology for Mechatronic Systems Using Bond Graphs and Genetic Programming," *Proc. 2002 NSF Design, Service and Manufacturing Grantees and Research Conference*, January 7-10, 2002, San Juan, Puerto Rico, pp. 206-221.

D. Eby, R. C. Averill, E. D. Goodman, and R. S. Sidhu, "Shape Optimization of Crashworthy Structures," *Proc. 7th Internat. LS-DYNA Users Conference 2002*, Livermore Software Technology Corp., Livermore, CA, pp. 7-15 - 7-21, May, 2002.

(with R. Rosenberg, K. Seo) "Some Key Issues in Using Bond Graphs and Genetic Programming for Mechatronic System Design," *Proc. Internat. Mech. Engineering Conf. and Exhibition*, Oct., 2001.

(with Huafeng Pei), "A Comparison of Cohort Genetic Algorithms with Canonical Serial and Island-Model Distributed GA's," *Proc. Genetic and Evolutionary Computation Conference*, 2001, July 7-11, Morgan Kaufmann Publishers, San Francisco, pp.501-510.

(with K. Seo, R. Rosenberg), "First Steps toward Automated Design of Mechatronic Systems Using Bond Graphs and Genetic Programming," *Proc. Genetic and Evolutionary Computation Conference*, 2001, July 7-11, Morgan Kaufmann Publishers, San Francisco, p. 189 (1-page abstract) and poster.

(with A. Uday and A. Debnath) "Nesting of Irregular Shapes Using Feature Matching and Parallel Genetic Algorithms," *2001 Genetic and Evolutionary Computation Conference Late-Breaking Papers*, E. Goodman, ed., ISGEC Press, San Francisco, 2001, pp. 429-434.

(with Z. Fan, J. Hu, K. Seo, R. Rosenberg, and B. Zhang) "Bond Graph Representation and GP for Automated Analog Filter Design," *2001 Genetic and Evolutionary Computation Conference Late-Breaking Papers*, E. Goodman, ed., ISGEC Press, San Francisco, 2001, pp. 81-86.

(with C. Steinfield, M. Huysman, K. David, C. Jang, J. Poot, M. Veld, I. Mulder, J. Lloyd, T. Hinds, E. Andriessen, K. Jarvis, K. van der Werff, A. Cabrera) "New Methods for Studying Global Virtual Teams: Towards a Multi-Faceted Approach," Copyright 2001 IEEE, published in the Proceedings of the Hawaii International Conference On System Sciences, January 3-6, 2001, Maui, Hawaii; nominated for Best Paper.

(with R. Averill, D. Eby) "How Well Can It Take a Hit?" *Mechanical Engineering Design*, American Society of Mechanical Engineers, New York, March, 2001, pp. 26-28.

(with J. Lloyd, T. Hinds) "Organizing Student Engineering Design Team Collaboration with Russia," *Proc. Internat. Conf. on Engineering Education*, Oslo, Norway, Aug. 6-10, 2001.

(with C. Schlueter, J. Lloyd, T. Hinds) "Virtual Teams: Communicating in a Global Business," *Proceedings of 2001 ASME International Mechanical Engineering Conference and Exposition*, November 11-16, 2001, New York, NY, IMECE2001/T&S-23405.

(with M. Raymer, W. Punch, L. Kuhn and A. Jain), "Dimensionality Reduction Using Genetic Algorithms," *IEEE Trans. Evolutionary Computation*, vol. 4, no. 2, July, 2000, pp. 164-171.

(with D. Eby, R. C. Averill, W. Punch), "Optimal Design of Flywheels Using an Injection Island Genetic Algorithm," *Artificial Intelligence in Engineering Design, Analysis and Manufacturing*, 13, 1999, pp. 389-402.

(with R. Butler, R. Beckett, J. Lloyd, C. Steinfield, K. David, T. Hinds) "Facilitating Employment of Scientists/Engineers in Russia by U. S. Companies: NEWTeams," *Proc. Internat. Workshop: Technology Transfer & New Opportunities for International Cooperation*, Zhukovsky, Russia, MAKS'99, Central Aero-Hydrodynamics Research Institute, 1999, pp. 18-19.

(with D. Eby, R. Averill, W. Punch), "Genetic Algorithms for Design of Specialized Laminated Composite Structures," *Proceedings, Second International Aerospace Congress*, 1997, Moscow, Russia, (appeared 1999), pp. 68-73.

(with A. Ligun, A. Shumeiko, S. Radzevitch) "Asymptotically Optimum Recovery of Smooth Contours by Bezier Curve," *Computer-Aided Geometric Design*, 15, 1998, pp. 495-506.

(with S. Radzevich and V. Palaguta), "Gear Finishing Technology and Design of Gear Shaving Cutter," *Proc. 35th Ann. Tech. Mtg of Society of Engineering Science*, Sept. 27-30, 1998, Pullman, WA.

(with Radzevich, S. P.) "Efficiency of Multi-Axis NC Machining of Sculptured Part Surfaces," *Proc. Sculptured Surface Machining Conference SSM'98*, Auburn Hills, MI, Nov., 1998.

(with Patton, A. and Punch, W.) "Improving GA Performance on Real-Valued Function Optimization through Enhanced Cohort Driven Operators", *Proc. Seventh Ann. Conf. on Evolutionary Programming*, San Francisco, Springer Verlag, Berlin, March, 1998.

(with M. Pei, W. F. Punch) "Feature Extraction Using Genetic Algorithms," *Proc. 1st Internat. Symposium on Intelligent Data Engineering and Learning, IDEAL'98*, Springer, Hong Kong, Oct., 1998, pp. 371-384.

(with Radzevich, S. P. and Palaguta, V. A.) "Otdelka Modifitsirovannykh Zub'ev Tsilindricheskikh Kosozubykh Kolios Metodom Vreznovo Shevingovania (Making of Modified Teeth of Cylindrical Gears by the Method of Shaving Cutters)," *Proc. International Scientific-Technical Conference "Machinebuilding and the Foreign Technosphere of the 21st Century,"* vol. 3, Sevastopol, Russia, September, 1998, pp. 13-16.

(with G. Wang) "Toward the Optimization of a Class of Black Box Optimization Systems," *Ninth International IEEE Conf. on Tools with Artificial Intelligence*, Nov., 1997, pp. 348-356.

(with D. Eby, R. Averill, B. Gelfand, W. Punch, O. Mathews) "An Injection Island GA for Fly-wheel Design Optimization," invited paper, *Proc. 5th European Congr. on Intell. Techniques and Soft Computing (EUFIT'97)*, Aachen, Germany, Sept., 1997, pp. 687-691.

(with R. Averill, W. Punch, D. Eby) "Parallel Genetic Algorithms in the Optimization of Composite Structures," invited paper, Second On-Line World Conference on Soft Computing in Engineering Design and Manufacture, <http://www.zen.co.uk/cim.inst/wsc2/>, Cranfield, UK, June, 1997.

(with I. Norenkov) "Solving Scheduling Problems via Evolutionary Methods for Rule Sequence Optimization," Second On-Line World Conference on Soft Computing in Engineering Design and Manufacture, <http://www.zen.co.uk/cim.inst/wsc2/>, Cranfield, UK, June, 1997.

(with S. Radzevitch) "About the Orthogonal Parameterization of Sculptured Part Surfaces and Initial Tool Surfaces," *ASME Journal of Manufacturing Science and Engineering*, 119 (4(B)), November, 1997, pp. 823-828.

(with S.-C. Lin, W. Punch) "A Genetic Algorithm Approach to Dynamic Job Shop Scheduling Problems," *Proc. Seventh Internat. Conf. on Genetic Algorithms*, East Lansing, MI, Morgan Kaufmann Publishers, San Francisco, 1997, pp. 481-488.

(with M. Raymer, W. Punch, P. Sanschagrin, L. Kuhn), "Simultaneous Feature Scaling and Selection Using a Genetic Algorithm," *Proc. Seventh Internat. Conf. on Genetic Algorithms*, East Lansing, MI, Morgan Kaufmann Publishers, San Francisco, 1997, pp. 561-567.

(with A. Ligun, A. Shumeiko, S. Radzevitch) "Asymptotically Optimal Disposition of Tangent Points for Approximation of Smooth Convex Surfaces by Polygonal Functions," *Computer-Aided Geometric Design*, 14, 1997, pp. 533-546.

(with S.-C. Lin, W. Punch) "Investigating Parallel Genetic Algorithms on Job Shop Scheduling Problems," *Proc. 6th Annual Conf. on Evolutionary Programming (EP 97)*, Indianapolis, IN, Springer Verlag, Berlin, April, 1997, pp. 383-394.

(with D. I. Batishchev, I. P. Norenkov, M. Kh. Prilytskii, "Metod Dekompozitsii dlia Reshenia Kombinatornykh Zadach Yporyadochenia i Raspredelenia Resursov (A Decomposition Method for Solution of Combinatorial Problems of Ordering and Resource Allocation)" (in Russian), *Informatsionnie Tekhnologii (Information Technologies)*, vol.3, no.1, 1997, pp. 29-33.

(with D. I. Batishchev, I. P. Norenkov, M. Kh. Prilytskii, "Metod Kombinirovania Evristik dlia Reshenia Kombinatornykh Zadach Yporyadochenia i Raspredelenia Resursov (A Method for Combination of Heuristics for Solution of Combinatorial Problems of Ordering and Resource

Allocation)" (in Russian), *Informatsionnie Tekhnologii (Information Technologies)*, vol.3, no.2, 1997, pp. 29- 32.

(with M. Raymer, P. Sanschagrín, W. Punch, S. Venkataraman, and L. Kuhn) "Predicting Conserved Water-Mediated and Polar Ligand Interactions in Proteins using a K-nearest-neighbor Genetic Algorithm," *Journal of Molecular Biology*, 265(4), Jan. 1997, pp. 445-464.

"Evolutsionnie Vychislenia i Genetichiskie Algoritmy: Kratkoe Vedenie (Evolutionary Computation and Genetic Algorithms: A Brief Introduction)," (in Russian), *Obozrenie Prikladnoy i Promyshlennoy Matematiki (Review of Applied and Industrial Mathematics)*, **3(5)**, Moscow, Dec., 1996, pp. 586-596.

(with Wang, G., Dexter, T. W., Punch, W. F., "Dvookhoorovnii Geneticheskii Algoritm dlia Zadachi ob Optimal'nom Razmeshchenii (A Two-Level Genetic Algorithm for Optimal Layout Problems)," (in Russian), *Obozrenie Prikladnoy u Promyshlennoy Matematiki (Review of Applied and Industrial Mathematics)*, **3(5)**, Dec., 1996, pp. 610-625.

(with Tcheprasov, V., Punch, W. F., Ragatz, G., Norenkov, I. P., "Genetichishii Algoritm Sozdayoushchii Preduprezhdayoushchii Planirovshchik dlia Sboriki Pechatnyikh Plat (A Genetic Algorithm to Generate a Predictive Planner for Assembly of Printed Circuit Boards)," (in Russian), *Obozrenie Prikladnoy u Promyshlennoy Matematiki (Review of Applied and Industrial Mathematics)*, **3(5)**, Dec., 1996, pp. 733-749.

(with M. Raymer, W. Punch, L. Kuhn) "Genetic Programming for Improved Data Mining -- Application to the Biochemistry of Protein Interactions," *Genetic Programming '96*, July, 1996, pp. 375-381.

(with G. Gang, T. Dexter, W. Punch) "Optimization of a GA and Within the GA for a 2-Dimensional Layout Problem," *Proc. First Internat. Conf. on Evol. Computation & its Applications*, Russian Academy of Sciences, Moscow, June, 1996, pp. 18-29.

(with V. Tcheprasov, W. Punch, G. Ragatz, I. Norenkov) "A Genetic Algorithm to Generate a Pro- Active Scheduler for Printed Circuit Board Assembly," *Proc. First Internat. Conf. on Evolutionary Computation & its Applications*, Russian Academy of Sciences, Moscow, June, 1996, pp. 232-244.

(with B. Malott, R. Averill, Y. Ding, W. Punch) "Use of Genetic Algorithms for Optimal Design of Laminated Composite Sandwich Panels with Bending-Twisting Coupling," *AIAA/ASME/ASCE/AHS/ASC 37th Structures, Structural Dynamics and Materials Conference*, Salt Lake City, Utah, April 15-17, 1996.

(with R. Averill, W. Punch, Y. Ding and B. Mallott) "Design of Special-Purpose Composite Material Plates via Genetic Algorithms," *Proc. Second Internat. Conf. on Adaptive Computing in Engineering Design and Control - 96*, Plymouth, UK, April, 1996, pp. 3-9.

(with W. Punch, R. Averill, C.-S. Lin, Y. Ding, and Y. Yip), "Optimal Design of Laminated Composite Structures Using Coarse-Grain Parallel Genetic Algorithms," *Computing Systems in Engineering*, Vol. 5 (4), 1995, pp. 415-423.

(with A. Patton, W. Punch), "A Genetic Algorithm for Calculating Protein Folding," *Proc. Sixth Internat. Conf. on Genetic Algorithms*, Morgan Kaufmann, Pittsburgh, July, 1995, pp. 574-581.

(with R. Averill, W. Punch, S.-C. Lin, Y. Ding, Y. Yip), "GA-Based Design of Energy-Absorbing Laminated Composite Beams," *Proceedings, ASME Design Automation Conference, Vol.1*, Boston, Sept., 1995, pp. 89-96.

(with W. Punch, R. Averill, S.-C. Lin, and Y. Ding), "Using Genetic Algorithms to Design Laminated Composite Structures," *IEEE Expert*, 10(1), February, 1995, pp. 42-49.

(with W. Punch), "New Techniques to Improve Coarse-Grain Parallel GA Performance," *Proceedings XXII International School and Conference on Computer-Aided Design (CAD-95)*, Yalta, Crimea, Ukraine, May 4-14, 1995, pp. 7-15.

(with W. Punch and D. Zongker), "LIL-GP, A Tool for Genetic Programming," *Proceedings XXII International School and Conference on Computer-Aided Design (CAD-95)*, Yalta, Crimea, Ukraine, May 4-14, 1995, pp. 26-32.

(with S. Radzevitch), "Some Elements of the Internal Geometry of Complex Part Surfaces Approximated by Polynomial Splines," *Mathematical Modeling*, 1, 1994, pp. 24-27 (in Russian).

(with W. Punch, C.-S. Lin, Y. Ding, R. Averill, and Y. Ding), "Optimal Design of Laminated Composite Structures Using Coarse-Grain Parallel Genetic Algorithms," *Proc. Third National Symposium on Large-Scale Structural Analysis for High-Performance Workstations*, Norfolk, VA, November 8-11, 1994.

(with S.-C. Lin, W. Punch), "Coarse-Grain Parallel Genetic Algorithms: Categorization and New Approach," *IEEE Conf. on Parallel and Distrib. Processing*, Nov., 1994.

(with G. Ermer, R. Hawkins, J. McDowell, R. Rosenberg, J. Sticklen), "Steps toward Integrating Function-based Models and Bond Graphs for Conceptual Design in Engineering," *Proc. ASME Winter Annual Meeting*, Dec., 1993, 16pp.

(with W. F. Punch, M. Pei, R. Enbody, C.-S. Lai, and P. Hovland) "Genetic Algorithms: New Implementations and New Applications," *Formal Design Methods for CAD Conf.*, Talinn, Estonia, June 16-19, 1993.

(with W. F. Punch, M. Pei, R. Enbody, C.-S. Lai, and P. Hovland), "Further Research on Feature Selection and Classification Using Genetic Algorithms," *Proceedings of the Fifth International Conference on Genetic Algorithms and their Applications*, Champaign-Urbana, IL, Morgan Kaufmann, July, 1993.

(with W. F. Punch, M. Pei, R. Enbody, C.-S. Lai, and P. Hovland), "Genetic Algorithms: New Implementations and New Applications," *Proceedings 1993 International CAD Conference*, Gurzuf (Yalta), Ukraine, May, 1993, 5pp.

(with D. Wysocki and J. H. Oliver) "Gouge Detection Algorithms for Sculptured Surface NC Generation," *ASME Journal of Engineering for Industry*, February, 1993.

(with K.-Y. Chang), "NC Toolpath Verification for a Multi-Axis Milling System," *Proceedings International Conference on Manufacturing Automation*, University of Hong Kong, August, 1992.

(with N. N. Smirnov) "New Problems of Russian Universities in Education of Foreign Students and in Contact with Foreign Universities," *Proceedings ASEE Annual Meeting*, Toledo, Ohio, June, 1992, pp. 133-135.

(with N. N. Smirnov) "Use of Computers for Foreign Language Instruction for Engineering Students," *Proceedings ASEE Annual Meeting*, Toledo, Ohio, June, 1992, pp. 205-208.

(with K. Y. Chang) "A Method of NC Toolpath Interference Detection for a Multi-Axis Machining System," *Control of Manufacturing Processes*, DSC-Vol.28, PED-Vol.52, ASME, pp. 23-30, December, 1991.

(with L. Hoppensteadt) "A Method for Accurate Simulation of Robotic Spray Application Using Empirical Parameterization," *Proceedings of the 1991 IEEE International Conference on Robotics and Automation*, Sacramento, CA, April, 1991.

(with J. H. Oliver) "Direct Dimensional N/C Verification," *Computer-Aided Design*, 22(1), pp. 3- 10, Jan/Feb, 1990.

(with D. Wysocki and J. Oliver) "Gouge Detection Algorithms for Sculptured Surface NC Generation," *ASME Computer-Aided Design and Manufacture of Cutting and Forming Tools*, PED-Vol 40, pp. 39-44, December, 1989

(with A. V. Sannier) "Midgard: A Genetic Approach to Adaptive Load Balancing for Distributed Systems," *Machine Learning*, 1988, pp.174-180.

(with C. Y. Maa, M. A. Shanblatt) "A VLSI Architecture for B-Spline Surface Evaluation," *Proc. 31st Midwest Symposium on Circuits and Systems*, 1988.

(with Y. Shamash) "U.S. Goes Back to School on Manufacturing," *Aerospace America*, 25(7), July, 1987.

(with A. Sannier) "Genetic Learning Procedures in Distributed Environments," *Proceedings Second International Conference on Genetic Algorithms and their Applications*, Laurence Erlbaum Associates, Inc., Cambridge, MA, 1987.

(with D. Chesney, M. Rieke) "'Almost' Real-Time Diagnosis and Correction of Manufacturing Scrap Using an Expert System," *Proceedings of the SAE/ESD International Computer Graphics Conference*, Detroit, Michigan, April 1987.

(with A. Hull) "CAE Applications at Michigan State University's A. H. Case Center for Computer- Aided Engineering and Manufacturing," *Proceedings of the ANSYS 1987 Conference & Exhibition*, Newport Beach, California, March, 1987.

(with J. Oliver) "Computational Verification of Numerical Control Programs for Sculptured Surface Parts," in *Computers in the Design, Construction, and Operation of Automobiles*, T.K.S. Murthy and C.A. Brebbia, Eds., Springer Verlag, New York, 1987, pp. 105-119.

(with R. Soutas-Little, V. Ulibarri, and A. Hull) "Biomechanical Analysis of the Athletic Shoe," *Soma*, 2(3), October 1987.

"How Michigan State University Integrated Computer-Aided Engineering, Design, and Manufacturing into its Engineering Curricula," *Proceedings Fourth National Conference on University Programs in Computer-Aided Engineering, Design, and Manufacturing*, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, August, 1986.

(with C. Kayvan, M. Shanblatt) "A Concurrent Error Detection and Correction Algorithm for Fault-Tolerant VLSI Arithmetic Array Processors," *IEEE Phoenix Conference on Computers and Communications*, Phoenix, Arizona, March, 1986.

(with J. Oliver) "Graphical Verification of N/C Milling Programs for Sculptured Surface Parts," *Integrated and Intelligent Manufacturing*, ASME, December 1986.

(with E. Potchen, C. Montgomery, P. Haas, A. Sannier) "High-field MR Images and Computer Graphics Reconstruction of the Corpus Striatum," *American Society for Neuroradiology National Meeting*, San Diego, California, January, 1986.

(with C. Spiekermann, C. Radcliffe) "Optimal Design and Simulation of Vibration Isolation Systems," *J. Mechanisms, Transmissions, and Automation in Design*, 1985.

(with J. Oliver) "Color Graphic Verification of N/C Milling Programs for Sculptured Surfaces," *Proceedings of the 10th ACM/ESD Automotive Computer Graphics Conference*, Detroit, MI, December, 1985.

(with A. Srivastava, R. Brook, L. Segerlind) "CAD Technology in Agricultural Engineering," *Proceedings ASAE Winter Annual Meeting*, New Orleans, Louisiana, December 1984.

(with C. Spiekermann, C. Radcliffe) "Evaluating Acoustic Warning Signals in Automobile Interiors," *Proceedings 1983 SAE International Congress and Exposition*, #830200, February, 1983.

(with J. Jenkins, M. Zabik, R. Kon) "A Model for Azinphosmethyl Attenuation and Movement in a Michigan Orchard Ecosystem: I. Development and Presentation of the Experimental Database," *Archives of Env. Contam. and Toxicol.*, 12 (1), pp. 99-110, 1983.

(with J. Jenkins and M. Zabik), "A Model for Azinphosmethyl Attenuation and Movement in a Michigan Orchard Ecosystem: II. Parameterization of a Field-based Model," *Archives of Env. Contam. and Toxicol.*, 12 (1), pp. 111-119, 1983.

(with D. Rabe and H. Prince) "The Effect of Weather on the Bioenergetics of Breeding Woodcock," *J. Wildlife Mgt.*, 47 (3), pp. 762-770, 1983.

"Modeling Effects of Pesticides on Populations of Soil/Litter Invertebrates in an Orchard Ecosystem," *Env. Toxicol. and Chem.* 1(1), pp. 45-60, 1982.

(with S. Eisensmith, A. Jones, J. Flore) "Predicting Leaf Expansion of 'Montmorency' Sour Cherry from Degree-Day Accumulations," *J. Am. Soc. Hort. Sci.*, 107(5), pp. 717-722, 1982.

(with C. Herrick *et al.*) "A Model for Mercury Contamination in a Woodland Stream," *Ecological Modelling*, 15, pp. 1-28, 1982.

"Color Graphics for Teaching Computer Simulation," *Proc. ASEE NCS Conference*, Dayton, Ohio, 1981.

"Using On-Line Color Graphics in Lectures," *Proc. 1981 Conference on Frontiers in Education*, Rapid City, SD, 1981.

(with E. Lampert *et al.*) "Maximizing Asparagus Yield: A Computer Simulation," *J. Am. Soc. Hort. Sci.*, 105(1), pp. 37-42, 1980.

(with M. Zabik, J. Jenkins, R. Kon, L. Geisel) "Mill Creek Pilot Watershed Study on Pesticide Fate in an Orchard Ecosystem: Development and Presentation of the Experimental Database," *Proceedings, Seminar on Water Quality Management Tradeoffs*, Chicago, IL, pp. 207-223, 1980.

"Role of Computer Simulations in Plant Protection Teaching Programs," *Proc. IX International Congress of Plant Protection*, Washington, DC, 1979.

(with V. Wagner, G. Tully, and H. Newson) A Computer Simulation Model for Population Studies of Woodland Pool *Aedes* Mosquitos," *Envir. Entom.*, 4(6), pp. 905-919, 1975.

(with R. Boling, J. Zimmer, K. Cummings, S. Reice, R. Peterson, and J. Van Sickle) "Toward a Model for Detritus Processing in a Woodland Stream," *Ecology*, 56(1), pp. 141-151, 1975.

"Ecosystem Dynamics: A Case Study of an Educational Program," in *Case Studies in Environmental Education*, National Association for Environmental Education, Washington, DC, 1974.

(with P. Werner) "New Academic Training for Ecologists and Engineers," *A.I.B.S. Education Review*, 3(4), pp.1-5, 1974.

(with R. Weinberg and R. Laing) "A Cell Space Embedding of Simulated Living Cells," *Biomedical Computing*, 2, pp. 121-136, 1971.

Technical Reports, Manuals, Promotional Materials, Software, Artistic Works:

"Introduction to Genetic Algorithms," annually, in *Tutorial Proceedings, Genetic & Evolutionary Computation Conference-2004-2006 (GECCO-204-2006)*, sponsored by ACM SIGEVO, June/July, 2004-2006, 19pp.

An Introduction to GALOPPS, the "Genetic Algorithm Optimized for Portability and Parallelism," Release 3.2, (software and User's Guide), Technical Report #960801, MSU Genetic Algorithm Research and Applications Group and Case Center for Computer-Aided Engineering and Manufacturing, Michigan State University, 80pp., August, 1996.

An Introduction to GALOPPS, the "Genetic Algorithm Optimized for Portability and Parallelism," Release 3.0, (software and User's Guide), Technical Report #950501, MSU Genetic Algorithm Research and Applications Group and Case Center for Computer-Aided Engineering and Manufacturing, Michigan State University, 75pp., May, 1995.

An Introduction to GALOPPS, the "Genetic Algorithm Optimized for Portability and Parallelism," Release 2.20, (software and User's Guide), Technical Report #940801, MSU Genetic Algorithm Research and Applications Group and Case Center for Computer-Aided Engineering and Manufacturing, Michigan State University, 73pp., August, 1994.

An Introduction to GALOPPS, the "Genetic Algorithm Optimized for Portability and Parallelism," Release 2.05, (software and User's Guide), Technical Report #940401, MSU Genetic Algorithm Research and Applications Group and Case Center for Computer-Aided Engineering and Manufacturing, Michigan State University, 66pp., May, 1994.

The Extended Simple Genetic Algorithm / Island Parallel Genetic Algorithm System, (software, Releases 1.9, 2.0, and 2.01), and User's Guides, 60pp., November 1993 - February, 1994.

(with W. F. Punch, M. Pei, C.-S. Lai) "Further Research on Large-Scale Feature Classification Using Genetic Algorithms," in *Center for Microbial Ecology Research Findings Fall 1992*, Technical Report, CME, Michigan State University, East Lansing, 1992.

(with Case Center staff) *Case Center User's Guide*, Case Center for Computer-Aided Engineering and Manufacturing, Michigan State University, East Lansing, 1984; 254 pp., revised annually through 1992.

(with L. Hoppensteadt) *SPRAYTOOL User's Manual*, Case Center for Computer-Aided Engineering and Manufacturing, Michigan State University, East Lansing, 240 pp., 1990.

Off-Line Verification of Robotic Spray Application Programs, Technical Report, Case Center, Michigan State University, East Lansing, April, 240 pp., 1989.

Case Center for Computer-Aided Engineering and Manufacturing: Progress Report, Michigan State University, East Lansing, 36pp., 1988.

A. H. Case Center for Computer-Aided Design: Progress Report, Michigan State University, East Lansing, 1985.

(with M. Pickelmann, J. Oliver) *SURFPAK User's Manual*, Case Center for Computer-Aided Design, Michigan State University, 21pp., 1984.

(with J. Bernard, M. Vanderploeg, and P. Haas) *MSU COLORSCOPE User's Manual*, Case Center, Michigan State University, East Lansing, February, 1982.

(with J. Jenkins, R. Snider, R. Kon, and M. Zabik) *Ecosystem Responses to Alternative Pesticides in the Terrestrial Environment: A Systems Approach*, Final Report, EPA R805624, U. S. Environmental Protection Agency, Corvallis, OR, 278pp., 1982.

POEM: The Pesticide/Orchard Ecosystem Model -- User's Manual, Michigan State University, East Lansing, 56pp., 1982.

INTEGRATE: Software for Graphically Teaching Numerical Integration, Case Center for CAD, Michigan State University, East Lansing, 1982.

CURFIT: Software for Teaching Fitting of Curves to Biological Data, Case Center for CAD, Michigan State University, 1982.

The Bluegrass Extension Service: First Time Out, Great Lakes Records, East Lansing, 1978.

(with project staff) *Ecosystem Responses to Alternative Pesticides in the Environment: A Systems Approach*, Final Report, EPA R803859, U. S. Environmental Protection Agency, Corvallis, OR, 302 pp., 1977.

(with P. Arneson, T. Oren, R. Loria, J. Jenkins, and W. Cooper) *APPLESCAB: A Pest Management Training Game: Instructor's Manual, User's Manual, Programmer's Manual*, Michigan State University, East Lansing, 1977.

(with P. Crowley, eds.) *Interdisciplinary Studies in Biological Systems at Michigan State University*, College of Engineering, Michigan State University, East Lansing, 134pp., 1976.

(with D. Hall, P. Crowley, C. Gauronskas, J. Dacey, S. Threlkeld, and J. Breck) *Predicting Eutrophication in Lake Ecosystems*, Vol. 5 in a series of reports on NSF GI-20, Michigan State University, East Lansing, 1974.

Adaptive Behavior of Simulated Bacterial Cells Subjected to Nutritional Shifts, Technical Report 012520-6-T, University of Michigan, Ann Arbor, 1972.

(plus many technical progress reports, final reports, etc. from smaller research projects)

PRESENTATIONS (other than of published work):

2006

Goodman, Erik, “Evolutionary Design of Mechatronic and Structural Systems,” presented at HPCC Symposium, Michigan State University, Oct. 7, 2006.

Goodman, Erik, “Stupid Computers Evolve Clever Designs,” presented to Lansing Torch Club, Kellogg Center, April 19, 2006.

Goodman, Erik, panelist in session “Evolutionary Computation in Industry,” at 2006 Genetic and Evolutionary Computation Conference (GECCO-2006), July 12, 2006.

Goodman, Erik, “Self-Configuring Search Methods for Robust and Efficient Optimization,” presented at International Symposium on Applications of Optimization Techniques to Product and Process Design, at People’s Education Society Institute of Technology, Bangalore, India, April 10-11, 2006.

Goodman, Erik, “Collaborative Independent Agents to Speed Discovery,” presented at International Symposium on Applications of Optimization Techniques to Product and Process Design, at People’s Education Society Institute of Technology, Bangalore, India, April 10-11, 2006.

2005

“A Hybrid, Adaptive Method for Optimization,” International Symposium on Product and Process Optimization in Industry, PES Institute of Technology, Bangalore, India, April 10, 2006.

“Cooperative Independent Agents for Optimization,” International Symposium on Product and Process Optimization in Industry, PES Institute of Technology, Bangalore, India, April 11, 2006.

2003

“Shape Optimization of Vehicle Structures,” invited presentation in Evolutionary Computation in Industry: Innovative Applications session, Genetic and Evolutionary Computation Conference (GECCO-2003), Chicago, IL, July 15, 2003.

2001

Workshop on Future Directions in Manufacturing Research, organized meeting and chaired panel discussion, March 19-20, 2001.

“Research Opportunities in MSU’s College of Engineering,” invited presentation to eight CEO’s of small companies in mid-Michigan area, Memorial Healthcare Center, Owosso, MI, June 8, 2001.

2000

“Evolutionary Computation for Data Mining,” Nanjing University, Nanjing, China, June 14, 2000.

“Genetic Algorithms – Introduction and Application to Microwave Detection of Heart Anomalies,” East China Normal University, Shanghai, China, June 12, 2000.

“Genetic Algorithms and Global Team Collaboration,” Shanghai Jiaotong University, Shanghai, China, June 12, 2000.

Presentation to management at Lawrence Livermore National Labs, re NEWTeams project, Aug. 3, 2000

Presentation to Ford management, Dearborn, re NEWTeams support, May, 2000

Presentation to GM management group re current research in genetic algorithms applied to structural optimization, Feb. 11, 2000

1999

(with R. Butler) “Facilitating Employment of Scientists/Engineers in Russia by U. S. Companies: NEWTeams,” Internat. Workshop: Technology Transfer & New Opportunities for International Cooperation, Zhukovsky, Russia, Central Aero-Hydrodynamics Research Institute, August 19, 1999.

Previous

Presented over 120 talks and seminars for a variety of professional, university, industrial, and lay audiences. Hosted ten day-long meetings of Industrial Advisory Board of the Case Center for Computer-Aided Engineering and Manufacturing, and about 20 day-long meetings of the MSU Manufacturing Research Consortium.

PERSONAL DATA

Born February 14, 1944, Palo Alto, California, USA

Married; wife, Cheryl B. Goodman; one child, David Richard

Hobbies: tennis, model railroading, formerly musical performance (24 years in a local band)

Home Address: 330 Clarendon Road, East Lansing, MI 48823

Phone: (517)337-0178

REFERENCES:

Available on request