

Curriculum Vitae

Erik D. Goodman

Director, BEACON Center for the Study of Evolution in Action (an NSF Science and Technology Center) (<http://beacon-center.org>)

Professor, Electrical and Computer Engineering

Professor, Mechanical Engineering

Professor, Computer Science and Engineering

Co-Director, Genetic Algorithms Research and Applications Group (MSU GARAGE)

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East Lansing, MI 48823

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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

Michigan Distinguished Professor of the Year, 2009 (by Pres.'s Council, State Univs. of Mich.)

International Recognition

Senior Fellow, International Society for Genetic & Evolutionary Computation, elected 6/2004

Member, Academy of Engineering Sciences of Ukraine, elected Oct, 2000

Guest Professor, Wuhan University of Technology, Wuhan, PRC, appointed 10/2009

Honorary Maasai Elder, Losirwa Village, Monduli District, Arusha Region, Tanzania, 2008

Advisory Professor, Shanghai Business School, Shanghai, PRC, appointed 5/2007

Advisory Professor, Shanghai Maritime University, Shanghai, PRC, appointed 5/2007

Advisory Professor, Shanghai University, Shanghai, PRC, appointed 11/2007

Advisory Professor, Tongji University, Shanghai, PRC, appointed 12/2002

Advisory Professor, East China Normal University, Shanghai, PRC, appointed 1/2002

Honorary Doctorate, Dneprodzerzhinsk State Technical University, 1996

Academician, International Academy of Informatics (Moscow), 1993

University Recognition

Distinguished Faculty Award, Michigan State University, 2011

MSU Curricular Service-Learning and Civic Engagement Award, 2009

Alumni Club of Mid-Michigan Quality in Undergraduate Teaching Award, 2007 (MSU's highest award for teaching)

Outstanding Faculty/Staff Award, MSU Resource Center for Persons with Disabilities, 2005

Withrow Exceptional Service Award, College of Engineering, Michigan State U., 2004

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:

Charter Member, Advisory Council, Academy for Critical Incident Analysis, John Jay College, City University of New York, 2008-

Founding Chair, ACM Special Interest Group for Genetic & Evolutionary Computation, 2005-2007

Member, Executive Committee, ACM SIG for Genetic and Evolutionary Computation (SIGEVO), 2005-2009; re-elected for 2009-2015

Chair of the Executive Board, International Society for Genetic and Evolutionary Computation, 2001 – 2004

General Co-Chair, ACM/SIGEVO 2009 World Summit on Genetic and Evolutionary Computation, Shanghai, China, June 12-14, 2009

General Chair, Genetic and Evolutionary Computation Conference (“GECCO-2001”), San Francisco, July 7-11, 2001

Editorial Board, *Evolutionary Computation*, elected for 2002-2008, 2009-2015

Editorial Advisory Board, *Genetic Programming and Evolvable Machines*, 2008-

Editorial Board, *Journal of Applied Soft Computing*

Editorial Board, *International Journal of Applied Intelligence*, 2006-2008

Editorial Board, *Journal of Critical Incident Analysis*, 2010-

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 –

Member, Scientific Advisory Board, Kellogg Biological Station Long Term Ecological Research (LTER) site, 2008-

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 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 2005, became chair of a new SIG, SIGEVO, the Special Interest Group for Genetic and Evolutionary Computation, 2005-2007)

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

Torch Club of Greater Lansing (Board of Directors; President, 2010-11)

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

2010-2015 Director, BEACON Center for the Study of Evolution in Action (a new NSF Science and Technology Center)

2006 – 2010 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 Principal Investigator (or Project Director):

Initiated/directed or co-directed the following funded research projects (total funding about \$29 million from sources including National Science Foundation, General Motors, Chrysler, Ford, General Dynamics, National Research Council, SDRC):

CURRENT GRANTS:

BEACON: an NSF Center for the Study of Evolution in Action (an NSF Science and Technology Center). Principal Investigator on proposal, 2008-2010; center director, 2010 --. Funded at \$25 million, August, 2010 – July, 2015, renewable at \$5 million/year through July 2020. Partnering with MSU are NC A&T State University, University of Texas (Austin), University of Idaho and University of Washington. (<http://beacon-center.org>)

“Improving Governance of Next-Generation ICT Infrastructure,” National Science Foundation CDI-Type I, co-PI with Johannes Bauer and Kurt DeMaagd, \$698,030. 9/15/2009 – 9/14/2012.

"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 spent one year at MSU as a visiting scholar under direction of E. Goodman under support of this grant.)

OTHER GRANTS (1991-2009)

Award Amount	Award Begin Date	Award End	PI 1 Name	PI 1 Credit	Grantor	Title
\$ 48,947	1/1/2008	12/31/2008	Demaagd; Kurt	50	LENOVO CO	INTERNET KIOSKS IN RURAL AFRICA
\$ 3,500	1/1/2008	8/31/2008	Goodman; Erik	100	CLARKSON AEROSPACE CORPORATION	DESIGN DAY SUPPORT - SENSORS TECHNICAL THRUST RESEARCH
\$ 105,650	8/1/2002	7/31/2004	Goodman; Erik	67	NATL SCIENCE FOUNDATION	AUTOMATED DESIGN OF MECHATRONIC SYSTEMS USING BOND GRAPHS AND GENETIC PROGRAMMING
\$ 102,938	8/1/2001	7/31/2002	Goodman; Erik	67	NATL SCIENCE FOUNDATION	AUTOMATED DESIGN OF MECHATRONIC SYSTEMS USING BOND GRAPHS AND GENETIC PROGRAMMING
\$ 100,000	1/1/2001	12/31/2001	Goodman; Erik	100	GENERAL MOTORS FOUNDATION	GENERAL RESEARCH MANUFACTURING MATERIALS CONSORTIUM SUPPORT
\$ 90,021	9/1/2000	8/31/2001	Steinfeld; Charles	23	NATL SCIENCE FOUNDATION	GLOBALLY DISTRIBUTED ENGINEERING DESIGN TEAMS: CULTURAL; SOCIAL; AND TECHNOLOGICAL FACTORS INFLUENCING GROUP PROCESS & P
\$ 10,000	8/3/2000	6/30/2002	Steinfeld; Charles	23	NATL SCIENCE FOUNDATION	GLOBALLY DISTRIBUTED ENGINEERING DESIGN TEAMS: CULTURAL; SOCIAL; AND TECHNOLOGICAL FACTORS INFLUENCING GROUP PROCESS & P
\$ 100,110	8/15/2000	7/31/2001	Goodman; Erik	67	NATL SCIENCE FOUNDATION	AUTOMATED DESIGN OF MECHATRONIC SYSTEMS USING BOND GRAPHS AND GENETIC PROGRAMMING
\$ 100,000	8/16/1999	8/15/2005	Goodman; Erik	100	GENERAL MOTORS CORPORATION	MSU MANUFACTURING RESEARCH CONSORTIUM
\$ 125,000	9/1/1999	8/31/2000	Steinfeld; Charles	23	NATL SCIENCE FOUNDATION	GLOBALLY DISTRIBUTED ENGINEERING DESIGN TEAMS: CULTURAL; SOCIAL; AND TECHNOLOGICAL FACTORS INFLUENCING GROUP PROCESS & P

\$ 124,907	9/1/1998	8/31/1999	Steinfeld; Charles	23	NATL SCIENCE FOUNDATION	GLOBALY DISTRIBUTED ENGINEERING DESIGN TEAMS: CULTURAL; SOCIAL; AND TECHNOLOGICAL FACTORS INFLUENCING GROUP PROCESS & P
\$ 100,000	8/16/1998	8/15/1999	Goodman; Erik	100	GENERAL MOTORS CORPORATION	MANUFACTURING RESEARCH CONSORTIUM
\$ 500,000	8/16/1998	8/15/2003	Goodman; Erik	100	FORD MOTOR COMPANY	MANUFACTURING RESEARCH CONSORTIUM
\$ 59,875	3/1/1998	12/31/1999	Averill; Ronald	50	GENERAL MOTORS CORPORATION	COUPLED OPTIMIZATION OF CRASHWORTHINESS AND VIBRATION FREQUENCIES IN AUTOMOTIVE STRUCTURES USING GENETIC ALGORITHMS
\$ 97,150	10/15/1997	10/14/1998	Goodman; Erik	0	FORD MOTOR COMPANY	A DRY PROCESS FOR ADHESION OPTIMIZATION IN FABRICATION AND ROLL LAMINATION OF FLEXIBLE CIRCUITS USING A COMBINATION OF U
\$ 200,000	8/16/1996	8/15/1998	Goodman; Erik	100	GENERAL MOTORS CORPORATION	MSU MANUFACTURING RESEARCH CONSORTIUM
\$ 90,184	10/24/1996	10/23/1997	Steinfeld; Charles	50	ELECTRONIC DATA SYSTEMS (EDS)	SUPPORTING GLOBALLY DISTRIBUTED ENGINEERING DESIGN TEAMS WITH COMM TECHNIQUES
\$ 3,750	9/5/1996	9/4/1997	Goodman; Erik	100	ADVANCED COMPOSITE SYSTEMS INC.	GENERAL RESEARCH
\$ 125,000	8/16/1996	8/15/2001	Goodman; Erik	100	SIMPLEX PRODUCTS	MSU MANUFACTURING RESEARCH CONSORTIUM
\$ 45,838	4/29/1996	12/31/1996	Steinfeld; Charles	50	ELECTRONIC DATA SYSTEMS (EDS)	Team Gems: The Effect of Collaborative Technology on Engineering Design Teams
\$ 15,642	4/29/1996	12/31/1996	Steinfeld; Charles	50	ELECTRONIC DATA SYSTEMS (EDS)	Team Gems: The Effect of Collaborative Technology on Engineering Design Teams
\$ 100,000	8/16/1994	8/15/1995	Goodman; Erik	100	GENERAL MOTORS CORPORATION	MSU MANUFACTURING RESEARCH CONSORTIUM
\$ 100,000	5/30/1995	5/29/1996	Goodman; Erik	100	DEFENSE REUTILIZATION & MARKETING SERVICE	MSU Manufacturing Research Consortium Membership
\$ 400,000	1/1/1996	12/31/2000	TUMMALA;R	45	NATL SCIENCE FOUNDATION	Environmentally Conscious Mfg: Integrating Environmental Issues Into Product Design Planning; and Manufacturing

\$ 100,000	8/16/1995	8/15/1996	Goodman; Erik	100	GENERAL MOTORS CORPORATION	MSU Manufacturing Research Consortium
\$ 450,000	8/16/1993	8/15/1998	Goodman; Erik	100	FORD MOTOR COMPANY	MICHIGAN STATE UNIVERSITY MANUFACTURING RESEARCH CONSORTIUM
\$ 11,100	2/15/1993	11/14/1993	Goodman; Erik	100	NATL RESEARCH COUNCIL I	COLLABORATIVE RESEARCH ON NC TOOLPATH GENERATION
\$ 27,687	9/16/1991	12/15/1991	Goodman; Erik	100	CIMLINC	PORTABILITY OF SOFTWARE FOR VERIFICATION OF NC TOOLPATHS
\$ 10,000	1/9/1991	12/31/1991	Goodman; Erik	100	ELECTRONIC DATA SYSTEMS (EDS)	EDS/MSU JOINT PROGRAM IN COMPUTER-AIDED ENGINEERING

Earlier Grants as PI/Co-PI (tabular data no longer available)

“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 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). (Many of the grants to the consortium are listed in the table above.)

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 a Co-investigator:

“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.

“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 (UNSPONSORED)

- a) Development of heuristics for optimal bin packing, minimum makespan scheduling (patent applied for, with B. Zulawinski, W. Punch, G. Ragatz, E. Tornig, 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 390, Ethics and Professionalism, 2007-2009.

Taught ECE 480, Senior Capstone Design, fall and spring semesters, 2002 – 2010. Four-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. In fall, 2007, reduced to 4 credits with moving of the material on ethics and professionalism to a new junior-level course, ECE 390.

Co-taught CSE 848/ECE 802 – Evolutionary Computation, with William F. Punch, fall semester, 2000, 2002, 2004, 2006, 2008.

Taught CSE 410, Operating Systems Principles, 4 credits, ~35 students/class, 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

John Oliva, Mechanical Engineering, 2010

Prakarn Unachak, Computer Science and Engineering, 2010

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 Sloan 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 Schnecke, 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, 2006 – May, 2011 (back and forth, but > 50% at MSU)

Ping Wu, Visiting Scholar, Associate Professor, Computer Center, East China Normal University, Shanghai, China, visiting MSU October, 2008-September, 2009.

Meng Yao, Visiting Scholar, Professor, Electrical Engineering, East China Normal University, Shanghai, PRC, at intervals, February, 2009 – January, 2013.

Visiting Scholars (Pre-Doctoral) 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

Qingsong Hu, Visiting Scholar, Ph.D. student at Tongji University; visiting MSU September, 2007 – August, 2008

Jean-Francois Dupuis, Visiting Scholar, Ph.D. student at Technical University of Denmark, visiting MSU September, 2007 – August, 2008

Bingkun Zhu, Ph.D. student, Tongji University, Shanghai, China, visiting MSU November, 2008-October, 2009.

Dawei Lee, Ph.D. student, Tongji University, Shanghai, China, visiting MSU October, 2009 – October, 2010

M.S. Theses Directed:

David A. McClaughry, 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

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 and NSF Graduate Fellowship)
Keith Barber
Albert Anthony
Matthew Durak
Grayson Wright
Reed Fielstra

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 project with University of Dar es Salaam, Tanzania, to sponsor teams of MSU engineering seniors in ECE to work on technology for village schools in their capstone design course (under my direction), then to take that technology to Mto wa Mbu, Tanzania, and install it in primary and secondary schools, providing them power, computing, and Internet access. To date, have made trips there May, 2008, December, 2008, May, 2009, and December, 2009. Project has led to founding (with DeMaagd, Olson of TISM Dept.) of new undergraduate specialization in Information and Communications Technology for Development.

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, Dneprodz-erzhinsk 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:

Search Committee for Director of Interdisciplinary Undergraduate Education, chair, 2008

ECE Promotion and Tenure Committee, 2008-10

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

ECE Departmental Advisory Committee, 2006-2008

Computer Engineering Working Group, 2002-09

ECE Undergraduate Studies Committee, 2003-05, chair 2005-09

College of Engineering Undergraduate Studies Committee, 2005-09

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)

Academy for Critical Incident Analysis, John Jay College, CUNY, Member of Council (governing body), 2008 –

Vice President, Technology, Red Cedar Technology (formerly, Applied Computational Design Associates, Inc.), 1999 –; Board of Directors, 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), 2001-2006,
2008, 2009, 2010,
Senior Scientific Advisor, Utah Russia Institute.
President, Technology Gateway, Inc., 1992-2000.
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
SCUBA diving: PADI Advanced Open Water certification, 2007; enriched air (Nitrox) certification, 2007; Rescue Diver certification, 2009; Deep Diver, Underwater Navigator, Night Diver specialties, 2009; Equipment Specialist, 2010; Master Scuba Diver, 2010.
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 – formerly moderate, currently limited; reading – formerly, limited; currently, almost nil
Russian: conversation -- moderate; technical reading -- moderate; winner, MSU Russian Poetry Recitation Contests, 1964, 1965
German: limited
French: reading – limited
Swahili: reading – elementary only

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 Kolios (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) *YSKIT: 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

Xu, Lihong, Hu, Qingsong, Hu, Haigen and Goodman, Erik, "Conflicting Multi-Objective Control." Chapter 5 in *New Achievements in Evolutionary Computation*, P. Korosec, ed. INTECH Publishers, ISBN 978-953-307-053-7, February, 2010.

Peng, Xiangdong, Erik D. Goodman and Ronald C. Rosenberg, "Robust Engineering Design of Electronic Circuits with Active Components Using Genetic Programming and Bond Graphs." Chapter in Riolo, R., Soule, T. and Worzel, W. (eds.), *Genetic Programming in Theory and Practice, V*, Studies in Computational Intelligence Series. Springer, Berlin, pp. 187-202, 2008.

Goodman, E., Averill, R., and Sidhu, R. "Multi-Level Decomposition for Tractability in Structural Design Optimization," chapter in Yu, T., Davis, L., Baydar, C., and Roy, R. (eds.), *Evolutionary Computation in Practice*, Springer, Studies in Computational Intelligence Series, v. 88, Berlin, pp. 41-62, 2008.

Hu, J., X. Li and E. Goodman. Evolutionary Robust Design of Analog Filters using Genetic Programming. Chapter in *Evolutionary Computation in Dynamic and Uncertain Environments*, Kacprzyk, J. (ed.), Springer Series on Studies in Computational Intelligence. Springer, Berlin, pp. 479-496, 2007.

Peng, Xiangdong, 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.

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.

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 (* indicates peer-reviewed publication)

(h-index, October, 2010, was 23)

*Seo, K., Hyun, S., and Goodman, E. "Genetic Programming-Based Automatic Gait Generation in Joint Space for a Quadruped Robot." *Advanced Robotics*, v. 24, no. 15, 2010, pp. 2199-2214.

*Unachak, P. and Goodman, E., "Solving Multiobjective Flexible Job-shop Scheduling Using an Adaptive Representation." *Proc. Genetic and Evolutionary Computation Conference, 2010*, Portland, OR, ACM, pp. 737-742.

*Li, D., Xu, L., and Goodman, E., "Online Background Learning for Illumination-robust Foreground Detection." *Proc. ICARCV-2010*, Singapore, Nanyang Technical University, December, 2010. (Finalist for Best Paper Award)

Xu, L., Hu, H., and Goodman, E., "A Control Algorithm for Greenhouse Climate Control Problems," *Companion Volume, 2010 Genetic & Evolutionary Computation Conference (GECCO-2010)*, ACM, pp. 2081-2082.

*Zhu, B., Xu, L., and Goodman, E., "A Compatible Energy-Saving Control Algorithm for a Class of Conflicted Multi-objective Control Problems," *Evolutionary Computation*, IN-TECH Publishers, March, 2009.

Oliva, J. and Goodman, E., "Simultaneous Type and Dimensional Synthesis of Planar 1DOF Mechanisms using Evolutionary Search and Convertible Agents," *Proc. ASME 2009 Internat. Design and Engineering Technical Conferences*, August, 2009.

*Oliva, J. and Goodman, E., "Evolutionary Search and Convertible Agents for the Simultaneous Type and Dimensional Synthesis of Planar Mechanisms," *Proc. 2009 GECCO Conference*, ACM, July, 2009, pp.1577-1584.

*Unachak, P. and Goodman, E., "Adaptive Representation for Flexible Job-Shop Scheduling and Rescheduling," *Proc. 2009 Internat. Summit on Genetic & Evolutionary Computation*, ACM, Shanghai, PRC, June, 2009, pp. 511-516.

*Xu, L., Zhu, B. and Goodman, E., "An Improved MOCC with Feedback Control Structure Based on Preference," *Proc. 2009 Internat. Summit on Genetic & Evolutionary Computation*, ACM, Shanghai, PRC, June, 2009, pp. 661-665.

*Dupuis, J.-F., Fan, Z. and Goodman, E., "Evolved Finite State Controller for Hybrid System," *Proc. 2009 Internat. Summit on Genetic & Evolutionary Computation*, ACM, Shanghai, PRC, June, 2009, pp. 105-111.

*Hu, Q., Xu, L. and Goodman, E., "Non-Even Spread NSGA-II and its Application to Conflicting Multi-Objective Compatible Control," *Proc. 2009 Internat. Summit on Genetic & Evolutionary Computation*, ACM, Shanghai, PRC, June, 2009, pp. 223-230.

*Lu, J., Fan, Z. and Goodman, E., "SRDE: An Improved Differential Evolution Based on Stochastic Ranking," *Proc. 2009 Internat. Summit on Genetic & Evolutionary Computation*, ACM, Shanghai, PRC, June, 2009, pp. 345-352.

Wu, P. and Goodman, E., "A Hybrid GA-based Fuzzy Classifying Approach to Urinary Analysis Modeling," *Workshop Proceedings, 2009 GECCO Conference*, ACM, July, pp.2671-2674.

Liu, J., Fan, Z., and Goodman, E., "SRaDE: an adaptive differential evolution based on stochastic ranking," 2-page abstract and poster, 2009 GECCO Conference, ACM, July, pp. 1871-1872.

Hu, Q., Xu, L. and Goodman, E., "Dynamic multi-objective control of IPMC-propelled robot fish based on NSGA-II," 2-page abstract and poster, 2009 GECCO Conference, ACM, July, pp. 1927-1928.

*Hu, J., E. Goodman, S. Li and R. Rosenberg, "Automated Synthesis of Mechanical Vibration Absorbers using Genetic Programming," *Artificial Intelligence in Engineering Design and Manufacturing*, vol. 22, no. 3, August, 2008, pp. 207-217.

*Wang, J., Z. Fan, J. Terpenney and E. Goodman, "Cooperative Body-Brain Coevolutionary Synthesis of Mechatronic Systems," *Artificial Intelligence in Engineering Design and Manufacturing*, vol. 22, no. 3, August, 2008, pp. 219-234.

*Z. Fan; J. Wang; S. Achiche; E. Goodman, R. Rosenberg, "Structured Synthesis of MEMS Using Evolutionary Approaches," *Journal of Applied Soft Computing*, 8, pp. 579-589, January, 2008.

Tan, X., Kim, A., Goodman, E. and Shahinpoor, M. "A Hands-on Paradigm for EAP Education: Undergraduates, Pre-college Students, and Beyond", *Proc. SPIE 0277-786-Z Society of Photo-Optical Instrumentation Engineers*, Mar. 18-22, 2007, San Diego

Baker, D., E. Goodman, P. Kane and M. Shanblatt, "A Paradigm of Government/Industry/University Cooperation: A PSoC Controller for a NASA Robotic Arm." *Proc. 2007 Internat. Conf. on Microelectronic Systems Educ.*, June 2-4, 2007, San Diego, CA, pp. 129-130.

*Achiche, S., W. Wei, Z. Fan, A.Ozkil, J. Wang, T. Sørensen, E. Goodman, "Genetically Generated Double-Level Fuzzy Controller with a Fuzzy Adjustment Strategy." *Proc. Genetic & Evolutionary Computation Conference (GECCO-2007)*, D. Thierens et al., eds., July 7-11, 2007, London, ACM (New York), pp. 1880-1887.

*Li, Z. and E. Goodman, "Learning Building Block Structure from Crossover Failure" *Proc. Genetic & Evolutionary Computation Conference (GECCO-2007)*, D. Thierens et al., eds., July 7-11, London, ACM (New York), pp. 1280-1287.

*Xu, L., Hu, Q. and Goodman, E., "A Multi-Objective Compatible Control (MOCC) Algorithm for a Class of Energy-Saving Control Problems." *Proc. IEEE Conf. on Decision and Control*, New Orleans, Dec. 12-14, 2007.

*Xu, L., Hu, Q. and Goodman, E. "A Compatible Energy-saving Control Algorithm for a Class of Conflicted Multi-objective Control Problem," *Proc. 2007 IEEE Congress on Evolutionary Computation*, Sep. 25-28, 2007, Singapore.

*H. Firpi, E. Goodman, J. Echaz, "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.

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Goodman, Erik, Review of “Real-time Computation by n-Dimensional Iterative Arrays of Finite-State Machines,” *IEEE Trans. on Computers*, July, 1970, pp. 657-658.

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

PRESENTATIONS (other than of published work):

2010

Various public presentations about BEACON Center for the Study of Evolution in Action to lay groups; newspaper and television interviews, etc.

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

Married; wife, Cheryl Goodman; one child, David

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

REFERENCES:

Available on request