

## William F. Punch III

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### **Education**

- The Ohio State University Columbus, OH. Ph.D. in Computer Science, major: Artificial Intelligence, minors: Computer Graphics and Cognitive Science, March 1989.
- The Ohio State University Columbus, OH. M.S. in Computer Science, June 1984.
- The Ohio State University Columbus, OH B.S. in Biochemistry, June 1979.

### **Experience**

- 2006-present. Director, High Performance Computing Center, Michigan State University.
- 2002-2005. Associate Chairperson, Computer Science, MSU
- 1995-1999. Computing Facilities Director in Computer Science Dept. of MSU. In charge of 200+ machines, network and all services.
- 1995-present. Michigan State University E. Lansing. Associate Professor in the Computer Science Department.
- 1989-1995. Michigan State University E. Lansing, MI. Assistant Professor in the Computer Science Department.
- 1985-1989. Ohio State University Columbus, OH. Graduate Research Assistant (half time). Developed a number of expert systems, including a shell for abductive inference and was a team member on development of a large integrated diagnostic system for liver disease (PATHEX). Also did work on a number of Chemical Eng. and Nuclear Eng. expert systems
- 1984-1985. Health Development Inc Columbus, OH. Programmer for Health Development Inc.(half time). Mainly responsible for developing communication software for Apple to IBM PC file transfer.
- 1982-1984. Ohio State University Columbus, OH. Graduate Teaching Assistant (half time). Taught an introduction to Pascal to general (non-cs) students. Responsible for all aspects of the course (test writing, grading, labs etc.).
- 1979-1982. Childrens Hospital Research Foundation Cincinnati, OH. Research Assistant. Worked on a large number of projects and equipment studying the etiology of complement malfunctions in kidney disease. Expert in techniques of chromatography and electrophoresis.

### **Teaching**

I am qualified to teach any introductory Computer Science course, as well as courses in Artificial Intelligence including: AI programming techniques, Expert Systems/Problem Solving Systems, Genetic Algorithms and any introductory level AI course. I have also taught introductory Data Structures and intermediate Computer Graphics, as well as Introduction to Operating Systems. I

have background in C/C++, Lisp, Smalltalk and Java.

## **Research**

My research interests are threefold:

- **Evolutionary Computation.** I am especially interested in Genetic Algorithms and Genetic Programming. I am the co-Director of the Genetic Algorithms Research and Application Group (GARAGE) since 1992 (<http://garage.cse.msu.edu>).
- **Computational biology.** I have done work in both the application of Evolutionary Computation to biology and biochemistry, as well more traditional AI approaches to prediction of biodegradation.
- **Online Search of Text.** A newer area, we have been working on the use of limited semantics to augment search of online text.

I am especially interested in tackling real world problems through interdisciplinary cooperation. To date I have worked in number of domains including: Composite Materials, Biochemistry, Psychology, Biodegradation, Medicine, Chemical Engineering, Nuclear Engineering, Wastewater Management, and the Internet. I feel that such real-world application is an essential part of advancing research, that real-world problems provide the impetus for exploring and expanding new fundamental research as well as making such research directly applicable.

## **Personal**

Born 1/15/57. Married with three children. Hobbies include squash, swimming, and karate.

## **Awards**

- Withrow Teaching Excellence Award, College of Engineering, Michigan State University, April 1993.

## **Grants Received**

- “Preserving H-Net, a program for Specialized Electronic Mailing List Archives”, National Archives and Records Administration, , M. Kornbluh, P. Knupfer, W. Punch, D. Rehberger, W. Dyksen, \$299,872, accepted for 2 years starting Jan 07
- extension of “Coupled Optimization of Crashworthiness and Vibration Frequencies in Automotive Structures using GA”, General Motors, \$60,000, August 1999.
- R. Averill, E. Goodman and W. Punch, “Coupled Optimization of Crashworthiness and Vibration Frequencies in Automotive Structures using GA”, General Motors, \$59,875, June 1998.
- W.F. Punch (PI), Larry Forney, Phil Howard and Bob Larson, “Bess, a System for Predicting the Biodegradability of New Compounds”, matching funds from Procter & Gamble for EPA grant, \$156,000, Jan 98
- W.F. Punch (PI), Larry Forney, Phil Howard and Bob Larson, “Bess, a System for Predicting the Biodegradability of New Compounds”, EPA, \$285,000, Nov 97
- R. C. Averill and W.F. Punch, “Optimal Design of Laminated Structures Using Genetic Algorithms”, Michigan REF, \$26,000, Aug 96.

- G. Ragatz, W.F. Punch and E.D. Goodman, “Improved Algorithms for Manufacturing, Planning and Scheduling”, MSU Manufacturing Research Consortium (with Ford Motor Co.), refunded at \$29,500, June 96
- G. Ragatz, W.F. Punch and E.D. Goodman, “Improved Algorithms for Manufacturing, Planning and Scheduling”, MSU Manufacturing Research Consortium (with Ford Motor Co.), refunded at \$23,000, Aug95
- R. C. Averill and W.F. Punch, “Optimal Design of Laminated Structures Using Genetic Algorithms”, Michigan REF, \$23,000, Aug 95.
- G. Ragatz, W.F. Punch and E.D. Goodman, “Improved Algorithms for Manufacturing, Planning and Scheduling”, MSU Manufacturing Research Consortium (with Ford Motor Co.), funded at \$42,034 for 1 year, April 95.
- W.F. Punch and E. D. Goodman, “Using Color Visualization in Genetic Algorithms Research and Applications”, Sun Microsystems, \$5,000 (equipment grant) Aug 94.
- G. Ragatz, W.F. Punch and E.D. Goodman, “Improved Algorithms for Manufacturing, Planning and Scheduling”, MSU Manufacturing Research Consortium (with Ford Motor Co.), \$30,936 for 1 year, Aug. 94.
- J. Sticklen and W. F. Punch III, “Using PDA’s to teach the Senior Capstone Course”, Apple Computer, \$20,000 (\$10,000 match from MSU). Oct 93.
- W. F. Punch III and Larry Forney, “Phase 2 Proposal: A Software System for Biodegradability Assessment”, Procter & Gamble. \$333,978 for 3 years. Jan 93.
- W. F. Punch III and K. Jayaraman, “Control of Liquid Composite Molding Using an Anytime Algorithm”. REF, Advanced Control Methods. \$14,590 for 9 months. Jan 93.
- W. F. Punch III and Jon Sticklen, “Research on Biodegradation”, Procter & Gamble. \$50,000 for 1 year. Sept 91.
- W. F. Punch III and C. Criddle. Start-up Grant from the Center for Microbial Ecology. “Knowledge-Based System for Design of Water Wastewater Treatment Facilities”. \$23,000. Sept 91.
- W. F. Punch III and S. K. Smith. Dow Chemical Grant for summer support of 1 graduate student, “A Knowledge-Based Approach to Countertrade”. \$2,000. Jun 90.
- W. F. Punch III. All University Research Initiation Grant, “Research on Abductive Assembly as a Tool for Automated Composition”. \$6000. Mar 90.
- W. F. Punch III. Ameritech Fellowship, “Research on Integrated Reasoning”. \$30,000 over two years. Sept 89.

### **Patents**

- Patent 5924105, W.F. Punch, M. Wulfekuhler and E.D. Goodman, “Method and Product for determining salient features in text”, 7/13/99
- Patent pending, B. Zulawinski, W.F. Punch and E.D. Goodman. “The Simple Bin Packing (SBP) Procedure”. June 96.

### **Journal Publications**

- P. Juhas, D.M. Cherba, P.M Duxbury, W.F. Punch, S.J.L Billinge, “Ab initio solid state nano-structure determination”, *Nature*, Vol 440, No 7084, pp 655-658, March 2006.
- Juhas, P. and Cherba, D. M. and Duxbury, P. M. and Punch, W. and Billinge, S. J. L., “Structure solution of single-element molecules from pair distribution function”, *Acta*

*Crystallographica Section A*”, Vol. 61, Num. A1, pp C64, Aug 2005

- Topchy, A.K. Jain, W. Punch, “Clustering Ensembles: Models of Consensus and Weak Partitions”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol 27, No 12, pp 1886-1881, Dec 2005
- Topchy, K. Scribner, W. Punch, Accuracy-driven loci selection and assignment of individuals, 2004, *Molecular Ecology Notes*, Vol 4, Issue 4, pp 798-800, Dec 2004
- Guinand, B., K.T. Scribner, A. Topchy, K.S. page, W. Punch, and M.K. Burnham-Curtis. 2004. Sampling issues affecting accuracy of likelihood-based classification using genetic data. *Environmental Biology of Fishes*, 69:245-259
- Raymer, M.L., T.e. Doom, L.A. Kuhn and W.F. Punch, “Knowledge Discovery in Medical and Biological Datasets Using a Hybrid Bayes Classifier/Evolutionary Algorithm”, 2003 *IEEE Trans. Systems, Man and Cybernetics*, Vol 33, Number 5, pages 802-813
- Guinand, B., A. Topchy, K.S. Page, M.K. Burnham-Curtis, W.F. Punch. and K.T. Scribner. 2002. “Comparisons of likelihood and machine learning methods of individual classification”. *Journal of Heredity*, Vol 93: 260-269.
- Guinand, B., K.T. Scribner, A. Topchy, K.S. page, W. Punch, and M.K. Burnham-Curtis. 2003. “Sampling issues affecting accuracy of likelihood-based classification using genetic data”. *Environmental Biology of Fishes*. In Press.
- M.L. Raymer, W.F. Punch, E.D. Goodman, L.A. Kuhn and A.K. Jain, “Dimensionality Reduction Using Genetic Algorithms”, *IEEE Trans. EC*, Vol. 4, No. 2, pg 164-171, July 2000
- D. Eby, R. Averill, W. Punch and E. Goodman, “Optimal design of flywheels using an Injection Island Genetic Algorithm”, *Artificial Intelligence in Engineering, Design and Manufacturing (AIEDAM)*, Vol 13, 1999, 389-402.
- M.R. Wulfekuhler and W.F. Punch, “Finding Salient features for Personal Web page Categories”, *Computer Networks and ISDN Systems*, Vol 29, 1147-1156, 1997.
- M. L. Raymer, W. F. Punch III, S. Venkataraman, P.C. Sanschagrín, E. D. Goodman, and L. A. Kuhn “Predicting Conserved Water-Mediated and Polar Ligand Interactions in Proteins Using a K-nearest-neighbor Genetic Algorithm”, *J. Mol. Biol.*, Vol 265(4), pg 445-464, Jan 1997.
- W.F. Punch, R.C. Averill, E.D. Goodman, S-C Lin and Y. Ding, “Design Using Genetic Algorithms--Some Results for Composite Material Structures”, *IEEE Expert*, vol 10 (1), pg 42-49, February 1995.
- W.F. Punch, A.K. Goel and D.C. Brown, “A Knowledge-Based Selection Mechanism for Control with Application in Design, Assembly and Planning”, *International Journal of Artificial Intelligence Tools*, Vol. 4, No. 3, pg 323-348, 1995.
- R.C. Averill, W.F. Punch, E.D. Goodman, S.-C. Lin, and Y. Ding, “Optimal Design of Laminated Composite Structures Using Coarse-Grain Parallel Genetic Algorithms,” *Computing Systems in Engineering*, Vol 5 (4), pg 415-123, 1994. Also presented at the Third National Symposium on Large-Scale Structural Analysis for High-Performance Computers and Workstations, Norfolk, Virginia, Nov. 8-11, 1994.
- R. Ethington and W. F. Punch, “SeaWave: A System for Musical Timbre Description”, *Computer Music Journal*, Vol 18, No 1, pg 30-39, 1994.
- W. F. Punch III, “Interactions of Compiled and Causal Reasoning in Diagnosis”, *IEEE Expert*, Volume 7, No. 1, pages 28-35, February 1992.

- W. F. Punch III, M. C. Tanner, J. R. Josephson and J. W. Smith, "Using the Tool Peirce to Represent the Goal Structure of Abductive Reasoning", *IEEE Expert*, Volume 5, No. 5, pages 34-44, October 1990.
- B. Chandrasekaran and W. F. Punch III, "Hierarchical Classification: Its Usefulness for Diagnosis and Sensor Validation", *IEEE Journal on Selected Areas in Communications*, Volume 6, No. 5, pg 884-891, June 1988.
- S. K. Shum, J. F. Davis, W. F. Punch III and B. Chandrasekaran. "An Expert System Approach to Malfunction Diagnosis in Chemical Plants", *Computers in Chemical Engineering*, Volume 12, No. 1, pg 27-36, 1988.
- Wang, G., Dexter, T. W., Punch, W. F., and E. Goodman, "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.
- Tcheprasov, V., Punch, W. F., Ragatz, G., Norenkov, I. P., and Goodman, E.D. "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.

### **Pending Articles**

#### **Software**

- lilgp, a C system for genetic programming. with Doug Zongker.

#### **Book Chapters**

- D. Eby, R. Averill, W. Punch, E. Goodman, "The Optimization of Flywheels using an Injection Island Genetic Algorithm" in Evolutionary Design by Computers, editor P. Bentley, Harcourt Brace 1999
- W.F. Punch, A. Patton, K. Wight, R.J. Larson, P.H. Masschelen, L. Forney, "A Biodegradability Evaluation and Simulation System (BESS) Based on Knowledge of Biodegradation Pathways", in Biodegradability Prediction, Peijnenburg and Damborsky Editors, NATO ASI Series, Number 2, Vol 23, pg 65-84, 1997
- W.F. Punch, D Zongker and E.D. Goodman, "The Royal Tree Problem, a Benchmark for Single and Multi-population Genetic Programming", appears in Advances in Genetic Programming 2, MIT Press, pg 299-316, 1996
- Abductive Inference: Computation, Philosophy, Technology, Cambridge University Press, 1994, edited by John R. and Susan G. Josephson. Contributing author, Chapters 3, 4, and 7.
- William Punch, Ashok Goel and Jon Sticklen. "Manufacturing Diagnosis and Control, A Task-Specific Approach. Appears in Intelligent Modeling, Diagnosis and Control of Manufacturing Process". Editors B-T B Chu and S-S Chu, World Scientific Press, Singapore. 1992.
- W. F. Punch and B. Chandrasekaran. "An Investigation of the Roles of Problem-Solving Methods in Diagnosis", in Second Generation Expert Systems. Springer-Verlag, 1992.

## Conference Articles

- David M Cherba, William Punch, “Crossover Gene Selection by Spatial Location”, *Proc. Genetic & Evolutionary Computation Conference-2006*, July 2006, pp 1111-1116
- David M. Cherba, William Punch, Phil Duxbury, Simon Billinge and Pavol Juhas, “Conformation of an Ideal Bucky Ball Molecule by Genetic Algorithm and Geometric Constraint from Pair Distance Data”, *Proc. Genetic & Evolutionary Computation Conference-2005*, June 2005, Vol. 2, pp 1565-1566
- Minaei-Bidgoli, B., Tan, P-N., Punch, W.F., “Mining Interesting Contrast Rules for a Web-based Educational System”, *International Conference on Machine Learning Applications (ICMLA 2004)*, Louisville, KY, Dec 2004.
- Minaei-Bidgoli, B., Kortemeyer G., Punch, W.F., “Association Analysis for an Online Education System”, *IEEE International Conference on Information Reuse and Integration (IRI-2004)*, Las Vegas, Nevada, Nov 2004.
- Hall, M., Parker, J., Minaei-Bidgoli, B., Albertelli, G., Kortemeyer, G., and Kashy, E., “Gathering and Timely Use of Feedback from Individualized On-line Work” (*IEEE/ASEE FIE 2004 Frontier In Education*, Savannah, Georgia, Oct. 2004.
- Topchy, A., Minaei-Bidgoli, B., Jain, A.K., Punch, W.F., “Adaptive Clustering Ensembles”, *International Conference on Pattern Recognition (ICPR 2004)*, pp 272-275, Cambridge, UK, Aug. 2004.
- Minaei-Bidgoli, B., Kortemeyer, G., Punch, W.F., “Optimizing Classification Ensembles via a Genetic Algorithm for a Web-based Educational System”, *IAPR International Workshop on Syntactical and Structural Pattern Recognition (SSPR 2004) and Statistical Pattern Recognition (SPR 2004)*, Lisbon, Portugal, Aug. 2004.
- Minaei-Bidgoli, B., Kortemeyer, G., Punch, W.F., “Enhancing Online Learning Performance: An Application of Data Mining Methods”, *The 7th IASTED International Conference on Computers and Advanced Technology in Education (CATE 2004)* Kauai, Hawaii, August 2004.
- Minaei-Bidgoli, B., Kortemeyer, G., Punch, W.F., “Mining Feature Importance: Applying Evolutionary Algorithms within a Web-Based Educational System”, *International Conference on Cybernetics and Information Technologies, Systems and Applications: CITSA 2004*, Orlando, Florida, July 2004.
- Minaei-Bidgoli, B., Topchy A., and Punch, W.F., “A Comparison of Resampling Methods for Clustering Ensemble”, *International conference on Machine Learning; Models, Technologies and Applications, (MLMTA04)*, Las Vegas, Nevada, June 2004.
- Minaei-Bidgoli, B., Topchy, A., and Punch, W.F., “Ensembles of Partitions via Data Resampling”, *International Conference on Information Technology, (ITCC/IEEE 2004)*, Las Vegas, Nevada, April 2004.
- M. Law, A. Topchy, A.K. Jain, “Clustering with Soft and Group Constraints”, *Structural, Syntactic, and Statistical Pattern Recognition*, Springer, LNCS, vol. 3138, Lisbon, 2004, pp. 662-670
- Topchy, A.K. Jain and W. Punch, A Mixture Model for Clustering Ensembles, in *Proc. SIAM Conf. on Data Mining*, pp. 379-390, 2004
- A. Topchy, A.K. Jain and W. Punch, Combining Multiple Weak Clusterings, in *Proceedings of the Third IEEE International Conference on Data Mining*, X. Wu et al. eds., pp.331-338,

2003.

- A. Topchy and W. Punch, Dimensionality Reduction via Genetic Value Clustering, Genetic Algorithms and Evolutionary Computation – GECCO 2003, Springer, LNCS 2724, pp. 1431-1443, 2003.
- Minaei-Bidgoli, B., Punch, W.F., (2003) "Using Genetic Algorithms for Data Mining Optimization in an Educational Web-based System", GECCO 2003 Genetic and Evolutionary Computation Conference, July 2003 Chicago, Springer-Verlag 2252-2263.
- Minaei-Bidgoli, B., Kashy, D.A., Kortemeyer G., Punch, W.F., (2003) "Predicting Student Performance: An Application of Data Mining Methods with an educational Web-based System", (IEEE/ASEE) FIE 2003 Frontier In Education, Nov. 2003 Boulder.
- Kortemeyer, G., Albertelli, G., Bauer, W., Berryman, F., Bowers, J., Hall, M., Kashy, E., Kashy, D., Keefe, H., Minaei-Bidgoli, B., Punch, W.F., Sakharuk, A., Speier, C. (2003): "The LearningOnline Network with Computer-Assisted Personalized Approach (LON-CAPA)". PGLDB 2003 Proceedings of the I PGL Database Research Conference, Rio de Janeiro, Brazil, April 2003.
- Guy Albertelli, Berhouz Minai-Bidgoli, William F. Punch, Gerd Kortmeyer and Edwin Kashy, "Concept Feedback in Computer-graded Assignments", FIE-13, 32nd ASEE/IEEE Frontiers in Education Conference, November 6 - 9, 2002, Boston MA
- M.L. Raymer, L.A. Kuhn and W.F. Punch, "Knowledge Discovery in Biological Databases Using a Hybrid Bayes Classifier/Evolutionary Algorithm", 2nd IEEE International Symposium on Bioinformatics and Bioengineering, Bethesda, Maryland, USA, November 4-5, 2001, pg 236-245
- V. Miagkikh and W. Punch, "An Approach to Solving combinatorial Optimization Problem Using a Population of Reinforcement Learning Agents", *GECCO99*, pg 1358-1365, Orlando FLA, 1999
- "Global Search in Combinatorial Optimization using Reinforcement Learning Algorithms", V.V. Miagkikh and W.F. Punch, CEC99, 189-196, Washington DC, 1999
- M. Pei, E.D. Goodman, W.F. Punch, "Feature Extraction Using Genetic Algorithms", *Proceeding of International Symposium on Intelligent Data Engineering and Learning 98* Hong Kong (IDEAL'98) Oct. 98.
- W. Punch, "How Effective are Multiple Populations in Genetic Programming", *Proceedings of the Third Annual Genetic Programming Conference*, pg 308-313, July 22-25, 1998, Morgan Kaufmann.
- D. Eby, R. Averill, W. Punch, E. Goodman, "Evaluation of Injection Island GA Performance on Flywheel Design Optimization", *Proceedings, Third Conference on Adaptive Computing in Design and Manufacturing*, Plymouth, England, April, 1998, Springer
- A. Patton, T. Dexter, E. Goodman, and W. Punch III, "On the Application of Cohort-Driver Operators to Continuous Optimization Problems using Evolutionary Computation", *Proceedings of Seventh Conference on Evolutionary Computation*, 1998, Springer Verlag, pp. 671-681.
- David Eby, R. C. Averill, William F. Punch III, Erik D. Goodman, "Evaluation of Injection Island GA Performance on Flywheel Design Optimization", *Proceedings, Third Conference on Adaptive Computing in Design and Manufacturing*, Plymouth, England, April, 1998, Springer Verlag.
- Michael Raymer, William Punch, Erik Goodman, Paul Sanschagrín and Leslie Kuhn, "Simultaneous Feature Extraction and Selection Using a Masking Genetic Algorithm", Proc.

*7th Internat. Conf. on Genetic Algorithms*, Morgan Kaufmann Publishers, San Francisco, pp. 561-567, July 97.

- Shyh-Chang Lin, Erik D. Goodman, William F. Punch, “A Genetic Algorithm Approach to Dynamic Job-Shop Scheduling Problems, *Proc. Seventh Internat. Conf. on Genetic Algorithms*, Morgan Kaufmann Publishers, San Francisco, pp. 481-488, July, 97.
- Marilyn Wulfekuhler and W.F Punch, “Finding Salient Features for Personal Web Page Categories”, *6th WWW Conference*, Santa Clara CA, Apr 97 (see Journal Equivalent above)
- David Eby, R. C. Averill, Boris Gelfand, William F. Punch, Owen Mathews, Erik D. Goodman “An Injection Island GA for Flywheel Design Optimization”, invited paper, *Proc. 5th European Congr. on Intell. Techniques and Soft Computing (EUFIT'97)*, Aachen, Germany, Sept., 1997, pp. 687-691.
- R. Averill, W. Punch, E.D. Goodman and 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.
- Shyh-Chang Lin, Erik D. Goodman and William F. Punch, III, “Investigating Parallel Genetic Algorithms on Job Shop Scheduling Problems”, *6th Annual Conference on Evolutionary Programming (EP 97)*, Indianapolis, IN, April 14-16, Springer Verlag, 1997.
- W.F. Punch, D.B. Decker, J. Sticklen and J.K. McDowell, “IPCA, an Architecture for Planning and real-time Plan Execution,” *AAAI Fall Symposium on Plan Execution*, pg 129-134, Nov 1996.
- D. Decker, W.F. Punch and J. Sticklen, “IPCA, an Architecture for Intelligent Control”, *11th IEEE Symposium on Intelligent Control*, Detroit, pg, 80-85, Sept. 1996
- M. L. Raymer, W. F. Punch, E. D. Goodman, and L. A. Kuhn, “Genetic Programming for Improved Data Mining -- Application to the Biochemistry of Protein Interactions”, *Genetic Programming 96*, pg 375-381, July 1996.
- W.F. Punch, A. Patton, K. Wight, R. Larson, P. Masscheleyn and L. Forney, “BESS, a System for Predicting the Biodegradability of New Compounds”, *QSAR 96*, Copenhagen, Denmark, June 96.
- William F. Punch, “The Problem-Dependent Nature of Parallel Processing in Genetic Programming”, *First International Conference on Evolutionary Computation and Its Applications*, pg 156-163, Moscow, June 96
- V. Tcheprasov, E. Goodman, W. Punch, G. Ragatz and I. Norenkov, “A Genetic Algorithm to Generate a Pro-Active Scheduler for a Printed Circuit Board Assembly”, *First International Conference on Evolutionary Computation and Its Applications*, pg 232-244, Moscow, June 96
- B. Malott, R.C. Averill, E.D. Goodman, Y. Ding, and W.F. 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.
- E.D. Goodman, R.C. Averill, W.F. Punch, Y. Ding and B. Malott “Design of Special-Purpose Composite Material Plates via Genetic Algorithms”, *Adaptive Computing in Engineering Design and Control 96*, pg 3-9, Plymouth, March 1996
- R.C. Averill, W.F. Punch, E.D. Goodman, S.C Ling, Y.C. Yip, Y. Ding “Genetic Algorithm Based Design of Energy Absorbing Laminated Composite Beams,” *21st ASME Design Automation Conference*, Boston, Massachusetts, September 17-20, 1995.

- D.L. Swets, W.F. Punch and J. Weng, “Genetic Algorithms for Object Recognition in a Complex Scene”, *International Conference on Image Processing*, Vol II, pg 595-598, October 95.
- A.L. Patton, W.F. Punch and E.D. Goodman, “A Standard GA Approach to Native Protein Conformation Prediction”, *International Conference on Genetic Algorithms 95*, pg 574-581, Pittsburgh, July 95.
- M. Pei, Y. Ding, W.F. Punch and E.D. Goodman, “Genetic Algorithms for Classification and Feature Extraction”, presented at *Classification Society Conference*, June 95
- W.F. Punch, D.A. Zongker and E.D. Goodman, “lil-gp, a Tool for Genetic Programming”, *Russian CAD Conference*, Yalta, Ukraine, May 1995.
- K.A. Oostendorp, W.F. Punch and R.W. Wiggins, “A Tool for Individualizing the Web”, *2nd World Wide Web Conference*, pg 49-59, Chicago 1994
- Shyh-Chang Lin, W.F. Punch III, and E.D. Goodman, “Coarse-Grain Parallel Genetic Algorithms: Categorization and New Approach,” *Sixth IEEE SPDP*, October 1994, pp. 28-37.
- J. McDowell, D. Decker, J. Sticklen, M. Hawley and W.F. Punch, “An Intelligent Control Architecture for Microwave Processing of Polymer Composites”, presented at *41st Sagamore Army Materials Research Conference*, Aug 94.
- R.C. Averill, W.F. Punch, E.D. Goodman, S.-C. Lin, and Y. Ding, “Optimal Design of Laminated Composite Structures Using Coarse-Grain Parallel Genetic Algorithms,” presented at the *Third National Symposium on Large-Scale Structural Analysis for High-Performance Computers and Workstations*, Norfolk, Virginia, November 8-11, 1994. (a more detailed version published in *Computers and Engineering*).
- W.F. Punch, E.D. Goodman, Min Pei, Lai Chia-Shun, P. Hovland and R. Enbody, “Further Research on Feature Selection and Classification Using Genetic Algorithms”, *5th International Conference on Genetic Algorithms, Urbana-Champaign*, July 1993, pg 557.
- Vladimir L. Uskov, William F. Punch III. “Expert CAD Systems of Dynamic Objects and Systems - A Conceptual Framework”. *Formal Design Methods for CAD*, Tallinn, ESTONIA, June 16-19, 1993.
- E. Goodman, W. F. Punch, Min Pei, R. Enbody, Chia-Shun Lai and P. Hovland. “Genetic Algorithms: New Implementations and New Applications.” *Formal Design Methods for CAD*, Tallinn, ESTONIA, June 16-19, 1993.
- V.L. Uskov, I. P. Norenkov, Y. I. Norenkov, N. V. Pivovarova, W. F. Punch and, J. Sticklen. “CTS Intelligent Computer-Aided Instruction System.” *World Conference on Artificial Intelligence on Artificial Intelligence in Education (AI-ED 93)*, Dingleberry, SCOTLAND, August 25-29, 1993.
- W. F. Punch and R. J. Enbody, “Teaching the Concept of Computation to Junior High-School Students,” *IEEE Frontiers in Education Conference*, 1992.
- W. F. Punch and M. Sullivan. “A Dynamic Hierarchical Assembly Tool (DHAT) for Musical Composition”. *International Computer Music Conference*, October 1991, page 45.
- G. Sepesi and W. F. Punch. “The Design of a C++ Class Library for MIDI Applications”, *International Computer Music Conference*, October 1991, page 459.
- W. F. Punch and B. Chandrasekaran, “An Investigation of the Roles of Problem-Solving Methods in Diagnosis”, in *Proceedings of Second Generation Expert System’s Conference*, pages 25-36, May 1990, Avignon, France.

- B. Chandrasekaran and W. F. Punch III, "Data Validation, A Step Beyond Traditional Sensor Validation", Proceedings of AAAI-87, *Sixth National Conference on Artificial Intelligence*, Pages 778-782, Seattle WA, July 1987.
- W. Punch, A. Patton, V. Miagkikh R. Larson and L. Forney, "A Biodegradability Evaluation and Simulation System (BESS), Applying and Discovering Knowledge of Biodegradation Pathways", 8th. International Workshop on QSAR's in Environmental Sciences, May 1998, Baltimore
- B. Gelfand, W. Wulfekuhler and W. Punch, "Text Categorization through concept extraction", AAAI98, Workshop on "Learning for Text Categorization", Fall 1998.
- B. Gelfand, W. Wulfekuhler and W. Punch, "Automated Concept Extraction from Plain Text, CONALD98, Workshop 6, Fall 1998
- L. A. Kuhn, M. L. Raymer, W. F. Punch, P. C. Sanschagrin, and E. D. Goodman (1996) "Predicting and Analyzing Determinants of Water-Mediated Ligand Recognition", presented to *International Union of Crystallography Congress and General Assembly*, Seattle, Washington, August 1996
- L. A. Kuhn, M. L. Raymer, P. C. Sanschagrin, E. D. Goodman, and W. F. Punch (1996) "Resolving Water-Mediated and Polar Ligand Recognition Using Genetic Algorithms", presented to *International Conference on Protein Folding and Design*, National Institutes of Health, Bethesda, Maryland, April 1996.
- W.F. Punch, A. Patton, K. Wight, R. Larson, P. Masscheleyn and L. Forney, "A Biodegradability Evaluation and Simulation System (BESS) Based on Knowledge of Biodegradation Pathways", *Symposium on QSARs for Biotransformation and Degradation*, Luhacovice, Czech Republic, Apr 96.
- W.F. Punch, D. Zongker and E. Goodman, "Royal Trees as a Benchmark Problem for Genetic Programming; A Parallel Processing Example," *GP Workshop*, ICGA95, Pittsburgh PA. (to appear in *Advances of GP II*)
- M.L. Raymer, S. Venkataraman, W.F. Punch, E.D. Goodman and L.A. Kuhn, "Predicting Conserved Water-Mediated Interaction in Protein Active Sites", presented to *American Crystallographic Association Annual Meeting*, Monteral, July 95.
- M.L. Raymer, W.F. Punch, E.D. Goodman, M. Pei and L.A. Kuhn, "Prediction of Conserved Water Sites Between Independently Solved Protein Structures Using a Genetic Algorithm and a K-Nearest Neighbor Classifier", *West Coast Crystallography Workshop*, Pacific Grove CA Mar 95.
- D. Decker, W.F. Punch, J. McDowell and J. Sticklen, "An Intelligent Control Architecture for the Microwave Fabrication of Composite Materials Based on the Generic Task Approach to Knowledge-Based Systems", *AAAI Fall Symposium on Intelligent Control*, New Orleans, Nov. 94.
- William Punch and Charles Barr. "Integrated Reasoning in Medical Diagnosis", *Stanford Spring Symposium 92 proceedings on Medical Informatics*. April 1992.
- W. F. Punch III, "TIPS (Task-Integrated Problem Solver), a Task-Specific Integration Architecture for Heterogeneous Agents" *workshop on Cooperation Among Heterogeneous Agents*, AAAI91. Page 1-10.
- W. F. Punch III, K. Keller and J. Sticklen, "Domain-Specific Software Architectures and Their Use in Developing Complex AI Systems", *IEEE workshop on AI Applications* held Miami, Fla Feb 1991.
- B. K. Hajek, D. W. Miller, R. Bhatnagar, J. E. Stasenko, W. F. Punch III and N. Yamada, "A

Generic Task Approach to a Real Time Nuclear Power Plant Fault Diagnosis and Advisory System”, *Proceedings of the International Workshop on Artificial Intelligence for Industrial Applications*, Hitachi City Japan, May 1988.

- J. F. Davis, W. F. Punch III, T. M. Hess and B. Chandrasekaran, “An Expert System Approach to Diagnosis of Product Quality Deviations”, Presented to *AICHE 1987 Annual Meeting*, Houston TX, March 1987.
- B. K. Hajek, J. E. Stasenko, S. Hashemi, R. Bhatnagar, N. Yamada and W. F. Punch III, “The Structure of an Expert System to Diagnose and Supply a Corrective Procedure for Nuclear Power Plant Malfunctions”, *ANS Topical Meeting: Artificial Intelligence and Other Innovative Computer Applications in the Nuclear Industry*, Snowbird Utah, September 1987.
- W. F. Punch III, M. C. Tanner and J. J. Josephson, “Design Considerations for Peirce, a High Level Language for Hypothesis Assembly”, *Proceedings of the Expert Systems in Government Symposium*, Pages 279-281, McLean VA, October 1986.
- J. F. Davis, S. K. Shum, W. F. Punch III and B. Chandrasekaran. “An Expert System for Diagnosing Process Plant Malfunctions”, *Proceedings of IFAC Workshop*, Kyoto Japan, October 1986.
- J. F. Davis, W. F. Punch III, S. K. Shum and B. Chandrasekaran, “Application of Knowledge-Based Systems for Diagnosis of Operating Problems”, Presented to *AICHE 1985 Annual Meeting*, Chicago IL, November 1985.

### **Workshops, Symposiums, Presentations, Reviews**

- Mark Kornbluh, William F. Punch, Wayne Dyksen, “H-Net and Scholarly Discourse in the Digital Age: A New Approach to Data Mining Email Discussion Lists”, *Chicago Colloquium on Digital Humanities and Computer science*, University of Chicago, Nov 5-6, 2006.
- W. Punch, “Review of GP98”, *IEEE Trans EC*, accepted March 1999.
- W. Punch, Review of “Introduction to Artificial Life”, by Christoph Adami, *IEEE Intelligent Systems*, Vol 13, No. 3, May/June 1998
- G. Ragatz, W. Punch, E.D. Goodman, “Improved Algorithms for Manufacturing Scheduling and Planning,” Final Report, MSU Manufacturing Research Consortium, December, 1997, 60 pp.
- Terry Dexter, E.D. Goodman, W.F. Punch, “The Genetic Algorithm and Local Optimizer Hybrid Approach for the Advanced Layout Problem. GARAGE Technical Report, GARAGE97-02-03, Michigan State University, Feb 97.
- Arnold Patton, Terrence Dexter, W.F. Punch and E.D. Goodman, “A Comparison of the Effects of Dominance on Evolutionary Programming and Genetic Algorithms”, GARAGE Technical Report, GARAGE97-02-02, Michigan State University, Feb 97.
- Gang Wang, Erik Goodman, William Punch, “On the Optimization of a Class of Blackbox Optimization Algorithms”, GARAGE Technical Report, GARAGE97-02-01., Michigan State University, February, 1997, 9pp.
- D. Zongker and W. F. Punch, “lilgp 1.0 manual”, Jan 96.
- V. L. Uskov and W. F. Punch, “Review of Applications of Ai in Engineering VII”. *AIEDAM*, Jan 94, pp34-36
- W. Punch and L. Forney. “A Software System for Biodegradability Assessment”, Published in the Center for Microbial Ecology yearly report on research, Fall 92.

- W. Punch, E. Goodman, P. Min and L. Shun, “Further Research on Large-scale feature Classification Using Genetic Algorithms”, W. Punch, E. Goodman, P. Min and L. Shun. Published in Center for Microbial Ecology yearly report on research, Fall 92.
- Mark Adler, Edmund Durfee, Michael Huhns, William Punch, Evangelos Simoudis. “Report from the AAAI Workshop on Cooperation Among Heterogeneous Agents”, *IEEE Expert*.
- W. F. Punch III and T. Bylander. “CSRL, a Tool for Creating Diagnostic Systems”, Series of 3 AI Tutorials appearing in the Nov., Dec. and Jan. issues of *Applied Artificial Intelligence Reporter*, 1986-1987. Published by University of Miami.

### ***Invited Talks***

- Central Michigan University, “Genetic Algorithms for Physics Problems”, December 1998.
- University of Illinois, “Genetic Algorithms for Design”, November 1998
- Complex Systems, Intelligent Systems, & Interfaces, Nimes, France 98, “Artificial life and its applications”, July 1998
- Genetic Algorithm Research at Michigan State University, Professional Seminar Series, Wayne State University Department of Computer Science, December 8, 1993.
- Presentation to International Conference on Expert Systems in Agriculture, “Genetic Algorithms and Neural Nets, Approaches to Learning”. Feb 22, 1991. East Lansing MI.
- An Introduction to Generic Tasks, Minneapolis IEEE Chapter, Minneapolis MN, April 17, 1987.

### ***Ph.D. Degrees Supervised***

- David Cherba, “Molecular Conformation of Clusters by Genetic Algorithm Using Spatial Operators and Unlabeled Distance Data”, Fall 2005
- Behroz Minaei-Bidgolgi, “Datamining techniques for Student Data”, Fall 2004
- Alexander Topchy, “Datamining Techniques”, Spring 2004
- Arnold Patton, “Examination of EC operations in Genetic Algorithms”, expected Spring 2004.
- Michael Raymer, Ph.D., “Datamining in Biology using Evolutionary Computation”, Spring 2002
- Marilyn Wulfekuhler, Ph.D., “Personalized Information Recovery from Unstructured Text”, Fall 98.
- Dave Decker, Ph.D., “IPCA: An Intelligent Control Architecture Based on the Generic Task Approach to Knowledge-Based Systems”, Fall 95

### ***M.S. Degrees Supervised***

- Sameer Arora, , “Optimizing Side-Chain Interactions in Protein-Ligand Interfaces”, Summer 2005
- Andrew Shi-wa Chen, “Directed Genetic Programming”, Spring 1999.
- David Guyette, “GUI Tools for the lilgp Genetic Programming Tool”, Summer 1998.
- Ryan Shoemaker, “GUI Tools for the lilgp Genetic Programming Tool”, Spring 1997.
- Brian Zulawinski, MS Thesis, “The Swapping Heuristic”, Fall 95.
- Michael Boers, “Genetic Algorithms in Spatial Layout Problems”, Spring 1995
- Karen Oostendorp, “A Tool for Individualizing the Web, Spring 1994
- Daniel Redder, MS Project, “Using Genetic Algorithms to Find Low Energy Configurations

for Large Molecules”, Spring 1994.

- Matt Hoepfinger and Steve Schalkhauser, “Tools Supporting Granular Synthesis Composition”, Spring 1993
- Renee Palmer, “Expert System for Stamping Process”, Spring 1992

### ***Ph.D. Committees***

- Shyh-Chang Lin, Ph.D., Spring 1997
- Ananda Debnath, M.S., Spring 1997
- Steve Perkins, Ph.D., Spring 1997
- Kathy Wight, M.S., Fall 1996
- Sally Howden, Ph.D., Fall 1996
- Chitra Dorai, Ph.D., Spring 1996
- Julie David Smith, Ph.D., Spring 1995
- Reid Baldwin, Ph.D., Fall 1994
- Cheryl Dunn, Ph.D., Spring 1994
- Anastasia Analyti, Ph.D., Fall 1992

### ***Professional Activities and Associations***

- Editorial Board, “Genetic Programming and Evolvable Machines”, Kluwer Academic Publishers, 1999-2002
- E. Cantu-Paz and W. Punch, GECCO 99 Workshop, “Evolutionary Computation and Parallel Processing”, July 99.
- Program Committee, AAAI-99 & GECCO-99 Workshop on Data Mining with Evolutionary Algorithms, July 99
- Publicity Chair, Conference on Evolutionary Computation, July 1999
- Local Arrangements Chair (Conference Committee), International Conference on Genetic Algorithms, 1997, E. Lansing MI
- Program Committee, Genetic Programming, since 1995
- Co-Director, with E.D. Goodman, of MSU Genetic Algorithm Research and Application Group (GARAGE), since 1992.
- Coach, ACM Programming Team, since 1994.
- Computing Facilities Director for Computer Science Department, 1995-1999
- Local Arrangements Chair, 7th International Conference of Genetic Algorithms, East Lansing, July 97.
- Program Committee, Evolutionary Computing 1996 (EvCA96), Moscow, June 96.
- Co-founder, with E.D. Goodman and T.A. Bickart, of Joint Educational/ Research Consortium for Intelligent CAD/CAM/CAE and Genetic Algorithms. Russian co-founders, I.P. Norenkov and V.L. Uskov (Moscow State Bauman Technological University).
- Conference Chair of Genetic Algorithms Applications, Pattern Recognition in Practice IV, Vlieland, The Netherlands, June 1994.
- Program Committee, Tools for AI (93-94).
- Assistant Editor, Software, IEEE Expert(90-94).
- Member, Center for Microbial Ecology
- Member, American Association for Artificial Intelligence.

- Member, Association for Computing Machinery.
- Member, ACM Special Interest Group on Artificial Intelligence.
- Member, Sigma Xi

### ***Courses Taught***

- MST at MSU program. Taught a 2 week course to 60 junior high students as an introduction to computer science (done twice in summer).
- Faculty Mentor, Capstone projects for CSE students:
  - design of a chemical structure editor (sponsored by Procter & Gamble).
  - design of web crawler (sponsored by IBM).
- CSE 848, Seminar on Genetic Algorithms.
- CPS 890, Seminar on Automated Learning, Genetic Algorithms and Neural Nets.
- CPS 890, Seminar on Integrated Reasoning Architectures.
- CPS 846, Seminar on Design Problem Solving,
- CSE 841, Introduction to Artificial Intelligence
- CPS 449, Software Engineering Project in Artificial Intelligence.
- CSE 472, Introduction to Computer Graphics
- CSE 440, Undergrad Introduction to Artificial Intelligence.
- CSE 410, Introduction to Operating Systems.
- CPS 330, Data Structures and Algorithms.
- CPS 316, Assembler/System Programming
- CSE 231, Introduction to Computer Programming I.