

## Curriculum Vitae of Karl Lieberherr

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## Education

- 1977 Dr. sc. math. (PhD), ETH Zurich, Switzerland.
- 1973 Dipl. Math. ETH (M. S.), ETH Zurich, Switzerland.

## Permanent Employment

- 1985-present Professor of Computer Science, 1990-2006 Director of the Center for Software Sciences.
- 1983-1985 Senior member to principal member technical staff, GTE Laboratories, Waltham, MA.
- 1979-1983 Assistant Professor, Princeton University, Department of Electrical Engineering and Computer Science.
- 1973-1977 Research and Teaching Assistant, Institut für Informatik, ETH Zurich.

## Part-time and visiting appointments

- 1983-1984 Visiting scientist, Massachusetts Institute of Technology, Laboratory for Computer Science, Cambridge, MA.
- 1982-1983 Winter semester, Visiting Professor, Institut für Informatik, ETH Zurich.
- 1978-1979 Visiting Assistant Professor, Department of Computing and Information Science, University of New Mexico.
- 1977-1978 Visiting Assistant Professor, Department of Mathematics, Florida State University.

- Consultant to several organizations, including IBM, Siemens, Mettler, Swiss Air Force, Crypto, ASEA, GTE, Schweizerische Kreditanstalt, Citibank, Daimler-Benz, Ciba, Tata Consultancy Services, GoodYear.

### **Awards**

- Academy of Distinction for Innovation, Northeastern University, 2001.
- Keynote Speaker, International Conference on Software Engineering, 2004, Edinburgh, Scotland.
- Lieberherr Fund, funded by my students at Northeastern, initiated by Pamela and Ian Holland.

### **Research Interests**

Tools for Software Development. Organizing and Modeling Scientific Communities with the purpose to improve both learning and the state-of-the-art in formal sciences.

### **Research Awards**

- NSF-Grant MCS80-04490, 1980/82 (Combinatorial Optimization and Search Problems)
- NSF-Grant ENG76-16808, 1980/81 (with K. Steiglitz, Structural Pattern Recognition)
- NSF-Grant MCS82-01878, 1982/84 (Combinatorial Optimization and Search Problems)
- Swiss NSF-Grant 82.001.0.82, 1983 (Computer-aided design of VLSI Chips)
- Naval Underwater Systems Center, Contract N66604-87-M-9761, 1987 (with John Proakis, Migration of functionality from software to hardware)
- NSF CISE Institutional Infrastructure Program, 1991-1994 (as co-principal investigator), shared between the College of Computer Science and the Center for Digital Signal Processing.
- Graduate student support from SAIC for three students from Jan. 1, 1990 - June 30, 1990.
- Graduate student support from IBM Yorktown Heights from April 1, 1990 - June 30, 1993.
- Graduate student support from IBM Kingston from Sep. 1, 1990 - June 30, 1994.
- Graduate student support from Mettler-Toledo from July 1, 1990 - March 30, 1995.

- Graduate student support from Citibank from Nov. 1, 1991 - June 30, 92.
- NSF-Grant CCR-9102578, 1991/93 (Abstractions for Organizing Classes)
- NSF-Grant CCR-9402486, 1994/97 (Engineering Adaptive Software)
- Research support from Xerox PARC (Gregor Kiczales) from 1994-1997 for Cristina Lopes.
- DARPA-Rome Laboratory-Grant F30602-96-0239, 1996-1999 (Evolution of Software via Adaptive Programming within John Salasin's EDCS project)
- Defense Advanced Projects Agency under agreement F33615-00-C-1694, 2000 - 2004, PCES program, AIRES project, subcontract from BBN.
- Research support from SKYVA International for Johan Ovlinger and Pengcheng Wu, 2000-2001.
- Research support from ABB Research Center, Daettwil Switzerland, 2001 - 20002 for Therapon Skotiniotis.
- Eclipse Fellowship from OTI (a subsidiary of IBM) for integrating Demeter into Eclipse. 2002 - 2003.
- Gift from Hewlett-Packard Research 2004.
- Fellowship from Novartis 2006-2010.

#### **PhD advisees (16 PhDs)**

At Princeton University, I have been advisor of the following three PhD students who have completed their thesis under my direction: James Finn (1982), John Scranton (1982), Douglas Long (1983).

At Northeastern University I have been the advisor of the following students who have completed their thesis under my direction: Ian Holland (1993), Paul Bergstein (1994), Ignacio Silva-Lepe (1994), Cun Xiao (1994), Walter Hürsch (1995), Linda Seiter (1996), Cristina Videira Lopes (1997), Johan Ovlinger (2004), Doug Orleans (2005), Pengcheng Wu (2010), Therapon Skotiniotis (2010), Bryan Chadwick (2010). Ahmed Abdelmegeed (2014).

I served on the thesis committee of Eduardo Casais at the University of Geneva, 1990-1991 and on the committee of Markku Sakkinen at the University of Jyväskylä, Finland, 1992. In 1997 I served on Mira Mezini's (University of Siegen) and Pat Lutsky's (Brandeis University) thesis committee. Recent PhD committees: in Belgium (Free University of Brussels): Bart Wydaeghe (2001), Wim Vanderperren (2004). University of Texas at Austin: Mark Grechanik (2006). University of British Columbia: Christopher Dutchyn (2006).

At Northeastern, I served on the thesis committees for the following students: Dino Oliva, Sarah Mocas, Georgios Evangelidis, Dave Gladstein, Michael Werner, Paul Graunke, John Clements, Philippe Meunier.

### **Patent**

U.S. patent No. 5,946,490, Karl Lieberherr and Jens Palsberg and Boaz Patt-Shamir, *AUTOMATA-THEORETIC APPROACH COMPILER FOR ADAPTIVE SOFTWARE*, Northeastern University, 1999.

### **Professional service**

- Keynote Presentations
  - ICSE 2004, Edinburgh. Major International Conference in Software Engineering.
  - Smalltalk and Java in Industry and Education Conference (STJA '97), Erfurt, Germany, September, 1997.
  - 5th International ICST Conference on Bio-Inspired Models of Network, Information, and Computing Systems, Bionetics 2010, Cambridge, Massachusetts.
- Founding Editor-in-Chief for the John Wiley journal “Theory and Practice of Object Systems” (TAPOS) with Roberto Zicari 1994-1999.
- Refereeing for journals, conferences and research supporting agencies.
- Program committee member of CASE 87, CASE 88, ISOTAS 96, ECOOP 96, 97, 98, 99, 00, 01, 06, 07 OOIS 97, Workshop on Generic Programming '97, '02, GPCE 2004, 2006 AOSD 02, 04, 05, 06, 2010, 2011. FOAL 2006, 2007.
- Advisory Council, CASE 89, 90, 91, 92.
- North American Coordinator for ECOOP '91.
- Program Chair for AOSD 2004.
- Organizing Chair for AOSD 2003.
- Steering Committee AOSD Conferences 2002-2007.

### **Technology transfer for Demeter**

The Demeter technology which we have developed since 1983 leads to a significant productivity improvement for software development. Since we use C++ as target language this technology is of immediate interest to industry and it is our responsibility to transfer this technology.

I have taught courses on Demeter to companies including Data General, IBM, Mettler-Toledo, Landis & Gyr, Ascom, Modicon, Goodyear etc. I have also taught courses for National Technical University: a two-day

course on object-oriented design (March 1990, 284 participants) and a one-day course on object-oriented design and C++ software development (May 1991, 247 participants) and a one-day course on the Demeter Method

Steering Committee AOSD Conferences 2002-2007.

### **Technology transfer for Demeter**

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I have taught tutorials on the Demeter Method at the following conferences: OOPSLA '91 (Phoenix, Arizona, 1 day) and '92 (Vancouver, Canada, 1/2 day), ECOOP '92 (Utrecht, Netherlands, 1 day), ELECTRO '92 (Boston, Ma., 1 day), ICSE '97 (Boston) and for the following organization: CHOOSE Swiss Summer School '91 (Zurich, 3 days). I have been involved in a tutorial on Aspectual Collaborations ICSE 2000 (Limerick, Ireland).

I have taught in the MIT Summer School in 1992, 1993, 1994 on adaptive software.

I have given the following invited presentations at conferences or summer schools:

- SOOLS (Symposium on Object-Oriented Languages and Systems) at Twente University in the Netherlands (Sept. 1990).
- Finish Computer Science Summer School, Aug. 1991, with America, Beeri, Wegner.

### **Talks**

Given in universities, research institutions, companies and/or meetings in Danemark, France, Germany, Israel, Italy, Netherlands, Switzerland (Aargau, Basel, Bern, Genf, Zurich, St. Gallen, Zug, Solothurn), Singapore and USA (Arizona, California, Florida, Hawaii, Illinois, Indiana, Louisiana, Massachusetts, Minnesota, New Jersey, New Mexico, New York, Ohio, Puerto Rico, Rhode Island).

## Languages

English, German, French

## Personal

Born: Aug. 27, 1948. Married: two children, born in 1978, 1980. U.S. citizen.

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## Publications 2005-2019

- Journal Publications

1. “A Functional Approach to Generic Programming using Adaptive Traversals”, with Bryan Chadwick. Higher-Order and Symbolic Computation, Festschrift for Mitch Wand, 2010
2. “Complexity of Partial Satisfaction II”, with Ernst Specker, Elemente der Mathematik, 2012, pages 134-150, volume 67, number 3, doi = 10.4171/EM/202.

- Reviewed Conference Publications

1. “Shadow Programming: Reasoning about Programs using Lexical Join Point Information”, with Pengcheng Wu, Proceedings of the 4th International Conference on Generative Programming and Component Engineering, 2005, pages 141-156, Springer Verlag.
2. “Demeter Interfaces: Adaptive Programming without Surprises”, with Therapon Skotiniotis and Jeffrey Palm, European Conference on Object-Oriented Programming, 2006, Nantes, France, pages 477-500, Springer Verlag.
3. “Weaving Generic Programming and Traversal Performance”, with Bryan Chadwick, Proceedings of the 9th International Conference on Aspect-Oriented Software Development, AOSD '2010, Rennes and Saint-Malo, France, pages 61–72, url = <http://doi.acm.org/10.1145/1739230.1739238>, ACM Digital Library.
4. “The Specker Challenge Game for Education and Innovation in Constructive Domains”, with Ahmed Abdelmeged and Bryan Chadwick, Keynote paper at Bionetics 2010 Cambridge, December 2010.

5. “A functional approach to generic programming using adaptive traversals”, Chadwick, Bryan and Lieberherr, Karl, *Higher-Order and Symbolic Computation*, Springer Verlag, Netherlands, pages 1-31, url = <http://dx.doi.org/10.1007/s10990-011-9064-1>.
  6. Learning Self-Game-Play Agents for Combinatorial Optimization Problems (Extended Abstract), with Ruiyang Xu, AAMAS 2019, Montreal, Canada, ACM Digital Library.
- Reviewed Workshop Publications
    1. “Expressiveness and Complexity of Crosscut Languages”, with Jeffrey Palm and Ravi Sundaram, Proceedings of the 4th workshop on Foundations of Aspect-Oriented Languages (FOAL 2005), March 2005.
    2. “A Type System for Functional Traversal-Based Aspects” with Bryan Chadwick, AOSD, FOAL Workshop, 2009, Charlottesville, Virginia, USA, pages = 1–6, url = <http://doi.acm.org/10.1145/1509837.1509839>, ACM Digital Library.
    3. “Controlled Evolution of Adaptive Programs”, with Ahmed Abdelmegeed and Therapon Skotiniotis, IWPSE-Evol ’2009 Proceedings of the joint international and annual ERCIM workshops on Principles of software evolution (IWPSE) and software evolution (Evol) workshops, pages 89–98, Amsterdam, Netherlands with ESEC/FSE, url = <http://doi.acm.org/10.1145/1595808.1595826>, ACM Digital Library.
    4. Algorithms for Traversal-Based Generic Programming, with Bryan Chadwick. ICFP, Workshop on Generic Programming, 2010 Proceedings of the 6th ACM SIGPLAN workshop on Generic programming, WGP ’2010, Baltimore, Maryland, USA, pages 61–72, url = <http://doi.acm.org/10.1145/1863495.1863504>, ACM.
    5. Design and Secure Evaluation of Side-Choosing Games, with Ahmed Abdelmegeed, Ruiyang Xu, AAAI 2016 Workshop on Incentives and Trust (WIT EC 2016), 4 pages.
    6. Learning Self-Game-Play Agents for Combinatorial Optimization Problems, with Ruiyang Xu, AAAI 2019 workshop on “Reinforcement Learning in Games” organized by three DeepMind researchers.

#### Older Publications

1. “Complexity of superresolution,” *Notices of the AMS* 24, pp. A-433 (1977).

2. "Information Condensation of Models in the Propositional Calculus and the P=NP Problem," *Dissertation* Nr. 5941, ETH Zurich, Switzerland (1977).
3. "Optimal heuristics for combinatorial optimization problems," *ACM Computer Science Conference, Detroit* (1978).
4. "Interpretations of 2-satisfiable conjunctive normal forms," with E. Specker, *Not. Am. Math. Soc.* 25(2), pp. A-295 (1978).
5. "Optimal heuristics for the graph coloring problem," *Notices of the AMS* 26(1), pp. A-13 (1979).
6. "Complexity of partial satisfaction," with E. Specker, *Proceedings 20th Annual Symposium on Foundations of Computer Science*, pp. 132-139 (1979).
7. "P-optimal heuristics," *Theoretical Computer Science* (10), pp. 123-131 (1980).
8. "P-optimal heuristics and symmetrization," *Proceedings 14-th Annual Conference on Information Sciences and Systems*, pp. 550-556, Princeton University (1980).
9. "Probabilistic combinatorial optimization," *Lecture Notes in Computer Science, 10th International Symposium on Mathematical Foundation of Computer Science '81, Strbske Pleso, Czechoslovakia*, Springer, pp. 423-432 (1981).
10. "Uniform Complexity and Digital Signatures," *Theoretical Computer Science* 16, pp. 99-110 (1981).
11. "Complexity of partial satisfaction," with E. Specker, *Journal of the ACM* 28 (2), pp. 411-421 (1981), reprinted in *Ernst Specker Selecta*, 1990, 310-320, editors, Gerhard Jäger and Hans Läuchli and Bruno Scarpellini and Volker Strassen, Birkhäuser Verlag, Basel, Boston, Berlin.
12. "Uniform complexity and digital signatures," *Lecture Notes in Computer Science, 8-th International Colloquium on Automata, Languages and Programming*, Haifa, Israel, Springer, pp. 530-543 (1981).
13. "Algorithmic extremal problems in combinatorial optimization," *Journal of Algorithms* 3, September 1982, pp. 225-244.
14. "On P-Optimal Approximation Algorithms," with J. Scranton, *Proceedings 16-th Annual Conference on Information Sciences and Systems, Princeton University 1982*, pp. 257-258.
15. "Towards an approximation scheme for generalized satisfiability," with M.A. Huang, *Proceedings 16-th Annual Conference on Information Sciences and Systems, Princeton University 1982*, pp. 268-273.



16. "Primality Testing and Factoring," with J. Finn, *Theoretical Computer Science* 23, 1983, pp. 211-215.
17. "Implications of forbidden structures for extremal algorithmic problems", with M.A. Huang, *Theoretical Computer Science* 40, 1985, pp. 195-210.
18. "Analysis of Polynomial Approximation Algorithms for Constraint Expressions", with S.A. Vavasis, 6. GI Fachtagung Theoretische Informatik, Universität Dortmund, *Lecture Notes in Computer Science* 145, Springer, Jan. 1983, pp. 187-198.
19. "Zeus, a hardware description language for VLSI," with S. E. Knudsen, *Proceedings of the ACM/IEEE 20th Design Automation Conference, June 27-29, Miami Beach 1983*, pp. 17-23.
20. "Multi-level simulation for VLSI," *Proceedings of the IEEE International Conference on Computer Design, October 31 - November 3, Portchester, N.Y. 1983*, pp. 441-444.
21. "Towards a standard hardware description language," *Proceedings of the ACM/IEEE 21st Design Automation Conference, June 1984, Albuquerque, N.M.*, pp. 265-272.
22. "Parameterized Random Testing," *Proceedings of the ACM/IEEE 21st Design Automation Conference, June 1984, Albuquerque, N.M.* pp. 510-516.
23. "Chip Design in Zeus and a proposal for a standard benchmark set for hardware description languages," *IEEE International Conference on Computer Design, Port Chester, N.Y., October 1984*, pp. 66-72.
24. "Zeus: A language for expressing algorithms in hardware," with S. M. German, *IEEE Computer, February 1985*, pp. 55-65.
25. "Towards a standard hardware description language," *IEEE Design & Test of Computers, Feb. 1985*, pp. 55-62.
26. "GEM: A generator of environments for metaprogramming," with A. V. Goldberg, *Proceedings of SOFTFAIR II, ACM/IEEE Conference on Software Development Tools, San Francisco, CA. Dec. 2-5, 1985*, pp. 86-95.
27. "Efficient Test Generation Algorithms," with A. V. Goldberg, *Proceedings of the International Test Conference, Philadelphia, Nov. 1985*, pp. 508-516.
28. "Approaches towards silicon compilation," with A. V. Goldberg and S. S. Hirschhorn, *IEEE Circuits and Devices, May 1985*, pp. 29-39.
29. "Grammar-based metaprogramming techniques and their applications," with A.V. Goldberg, *Proceedings of the IEEE International Conference on Computer Design, Oct. 1985*, pp. 541-544.

30. "Data types, direct implementation and knowledge representation," with C. F. Nourani, *19th International Hawaii conference on System Sciences, Honolulu, Jan. 1986*.
31. "A two-dimensional hardware design language for VLSI," *Microprocessing and Microprogramming 18 (1986)*, pp. 131-142.
32. "Object-oriented programming with class dictionaries," *Journal on Lisp and Symbolic Computation, 1(2)*, 1988.
33. "Demeter: A CASE study of software growth through parameterized classes," with A.J. Riel, *Journal on Object-Oriented Programming, 1(3)*, 1988. A preliminary version of this paper was published in *International Conference on Software Engineering, Singapore, 1988*, pp 254-264.
34. "Object-Oriented Programming: An Objective Sense Of Style," with Ian Holland and Arthur Riel, *Proceedings of Conference on Object-Oriented Programming Systems, Languages and Applications*, San Diego, CA, September 1988, pp 323-334, in Special Issue of SIGPLAN Notices, Vol. 23(11). A short version of this paper appeared in *IEEE Computer Open Channel*, June 1988, pp 79-80.
35. "The Demeter System: A Seed for the CASE Tool of Tomorrow," with Arthur Riel, *Proceedings CASE 88 Workshop*, Index Technology Corporation, Cambridge, MA, Elliot Chikofsky, ed., pp 27.18-27.22.
36. "Formulations and Benefits of the Law of Demeter," with Ian Holland, *SIGPLAN Notices 1989*, 24(3), pp 67-78.
37. "Tools for preventive software maintenance," with Ian Holland, *Conference on Software Maintenance*, IEEE, Miami Beach, Florida, 1989, pp 2-13.
38. "Contributions to teaching object-oriented design and programming", with Arthur Riel, *Proceedings of Conference on Object-Oriented Programming Systems, Languages and Applications*, New Orleans, LA, October 1989, pp 11-22.
39. "Assuring Good Style for Object-Oriented Programs", with Ian Holland, *IEEE Software*, September, 1989, 38-48.
40. "Objekt-Orientierte Programmierung", *Neue Zürcher Zeitung*, Sept. 26, 1989.
41. "Abstraction of Object-Oriented Data Models", with Paul Bergstein and Nacho Silva-Lepe, *Proceedings of International Conference on Entity-Relationship Approach*, Lausanne, Switzerland, 1990, 81-94, Elsevier.
42. "From objects to classes: algorithms for optimal object-oriented design", with Paul Bergstein and Nacho Silva-Lepe, *Software Engineering Journal*, July 1991, 205-228.

43. "Incremental Class Dictionary Learning and Optimization", with Paul Bergstein, *Proceedings of the European Conference on Object-Oriented Programming*, Geneva, Switzerland, 1991, 377-396.
44. "Formal foundations for object-oriented data modeling", with Cun Xiao, *IEEE Transactions on Knowledge and Data Engineering*, 1993, Vol. 5, No. 3, pages 462-478, June 1993.
45. "The Hardware Description Language Zeus", *IEEE Design & Test of Computers*, pp 60-62, September 1992.
46. "Component Enhancement: An Adaptive Reusability Mechanism for Groups of Collaborating Classes", *Information Processing '92, 12th World Computer Congress*, pp 179-185, September 1992, Madrid, Spain, Elsevier.
47. "Experience with a Graph-Based Propagation Pattern Programming Tool", with Walter Hürsch, Ignacio Silva-Lepe and Cun Xiao, *International Workshop on CASE*, pp 114-119, July 1992, Montréal, Canada, IEEE Computer Society.
48. "Evolution of object-oriented software", with Cun Xiao, *IEEE Transactions on Software Engineering*, Vol. 19, No. 4, pages 313-343, April 1993.
49. "Object-Oriented Schema Extension and Abstraction", with Walter Hürsch and Sougata Mukherjea, *ACM Computer Science Conference, Symposium on Applied Computing*, pp 54-62, Feb. 1993, Indianapolis, Indiana, ACM Press.
50. "Object-Extending Class Transformations", with Walter Hürsch and Cun Xiao, *Formal Aspects of Computing*, 1994, No. 6, pages 391-416, Springer Verlag.
51. "Minimizing Dependency on Class Structures with Adaptive Programs", with Cun Xiao, *International Symposium on Object Technologies for Advanced Software*, pp 424-441, Kanazawa, Japan, Springer Verlag, 1993.
52. "Adaptive Object-Oriented Programming using Graph-Based Customization", with Ignacio Silva-Lepe and Cun Xiao, *Communications of the ACM*, May 1994, pages 94-101.
53. "Polymorphic Reuse Mechanisms for Object-Oriented Database Specifications", with Ling Liu and Roberto Zicari and Walter Hürsch, *International Conference on Data Engineering*, pp 180-189, Houston, Texas, IEEE, 1994.
54. "Customizing Adaptive Software to Object-Oriented Software Using Grammars", with Cun Xiao, *International Journal of Foundations of Computer Science*, 1994, Vol. 5, No. 2, pp 179-208, World Scientific Publishing Company.

55. "Efficient Implementation of Adaptive Software", with Jens Palsberg and Cun Xiao, *ACM Transactions on Programming Languages and Systems (TOPLAS)*, 1995, Vol. 17, No. 2, pp 264-292, March, ACM Press.
56. "Adaptive Object-Oriented Software: The Demeter Method with Propagation Patterns", *PWS Publishing Company*, 1996, 650 pages, ISBN 0-534-94602-X.
57. "Object-Oriented Design", with Ian Holland, *ACM Computing Surveys*, Vol. 28, No. 1, pages 273 - 275, March 1996.
58. "AP/S++: case-study of a MOP for purposes of software evolution", with Cristina Videira Lopes, *Reflection '96*, 18 pages, S. Francisco, CA, 1996.
59. "A New Approach to Compiling Adaptive Programs", with Jens Palsberg and Boaz Patt-Shamir, *European Symposium on Programming*, pages 280-295, Linkoping, Sweden, 1996.
60. "A New Approach to Compiling Adaptive Programs", with Jens Palsberg and Boaz Patt-Shamir, *Science of Computer Programming*, pages 303-326, Vol. 29, No. 3, 1997.
61. "Evolution of Object Behavior Using Context Relations", with Linda Seiter and Jens Palsberg, *ACM SIGSOFT '96, 4th Symposium on the Foundations of Software Engineering*, pages 46-57, San Francisco, CA, 1996.
62. "The role of polymorphic reuse mechanisms in schema evolution in an object-oriented database", with Ling Liu and Roberto Zicari and Walter Hürsch, *IEEE Transactions on Knowledge and Data Engineering*, Vol. 9, No. 1, pages 50-67, 1997.
63. "Integrating Adaptive Programming into Existing Object-Oriented Analysis and Design Methods: Do It Yourself Adaptiveness", with Martin Spit, Sjaak Brinkkemper, *OOIS'96: 1996 International Conference on Object Oriented Information Systems*, 1996, pages 57-75, Springer Verlag.
64. "Strategic Research Directions in Object-Oriented Programming", with Rachid Guerraoui and his working group, *ACM Computing Surveys*, 1996, December, Vol. 28, No. 4.
65. "From Transience to Persistence in Object-Oriented Programming: Patterns and Architectures (Position paper on Adaptive Programming)", *ACM Computing Surveys*, 1996, December, Vol. 28, No. 4, <http://www.ccs.neu.edu/research/demeter/papers/ACMsurveys1996>.
66. "Preventive Program Maintenance in Demeter/Java (Research Demonstration)", with Doug Orleans, *International Conference on Software Engineering*, 1997, "Boston, MA", pages 604-605.

67. "Evolution of Software Via Adaptive Programming", *Software Engineering Notes*, 1997, September 1997, Vol. 22, no. 5, pages 56-57.
68. "Traversals of Object Structures: Specification and Efficient Implementation", with Boaz Patt-Shamir, Technical Report NU-CCS-97-15, 1997.
69. "Evolution of Object Behavior Using Context Relations", with Linda Seiter and Jens Palsberg, *IEEE Transactions on Software Engineering*, Vol. 24, no. 1, pages 79-92, 1998.
70. "From CSCW Applications to Multicast Routing: An Integrated QoS Architecture" with I. Matta and M. Eltoweissy. *1998 Proc. IEEE International Conference on Communications-ICC*, Atlanta, Georgia.
71. "Adaptive Plug-and-Play Components for Evolutionary Software Development" with Mira Mezini, *1998 Proc. Object-Oriented Programming Systems, Languages and Applications Conference (OOPSLA), Special Issue of SIGPLAN Notices*, Vol. 33, no. 10, pages 97-116, ACM Press.
72. "Modeling Behavior with Personalities" with Luis Blando and Mira Mezini, *1999 International Conference on Software and Knowledge Engineering*, Kaiserslautern, Germany, 7 pages.
73. "Dynamic Component Gluing", with Linda Seiter and Mira Mezini, *First International Symposium on Generative and Component-Based Software Engineering*, 1999, Erfurt, Germany, Ulrich Eisenecker and Krzysztof Czarnecki, editors, Springer.
74. "The Refinement Relation of Graph-Based Generic Programs", with Boaz Patt-Shamir, *1998 Schloss Dagstuhl Workshop on Generic Programming*, 2000, David Musser et al., editors, Springer Verlag.
75. "Interaction Schemata: Compiling Interactions to Code", with Neeraj Sangal and Edward Farrell and David Lorenz, *TOOLS USA, Technology of Object-Oriented Languages and Systems*, 1999, August, Santa Barbara, CA, IEEE Computer Society.
76. "Component Integration with Pluggable Composite Adapters" with Mira Mezini and Linda Seiter, *2000 Symposium on Software Architectures and Component Technology: The State of the Art in Research and Practice*, Enschede, Netherlands, Kluwer Academic Publishers, Mehmet Aksit, editor, 30 pages.
77. "DJ: Dynamic Adaptive Programming in Java" with Doug Orleans, *Reflection 2001: Meta-level Architectures and Separation of Cross-cutting Concerns*, Kyoto, Japan, Springer Verlag, Akinori Yonezawa, editor, 8 pages.

78. “Aspect-Oriented Programming with Adaptive Methods” with Doug Orleans and Johan Ovlinger, *Communications of the ACM*, October 2001, Special Issue on Aspect-Oriented Programming, Tzilla Elrad and Robert Filman, editors.
79. “Aspectual Collaborations – Combining Modules and Aspects”, with David Lorenz and Johan Ovlinger, *The Computer Journal*, September 2003, vol. 46, no. 5, pages 542-565, Oxford University Press.
80. “A Case for Statically Executable Advice: Checking the Law of Demeter With AspectJ”, with David H. Lorenz and Pengcheng Wu”, *Second International Conference on Aspect-Oriented Software Development*, March 2003, Boston MA, pages 40-49, Mehmet Aksit (ed.), ACM Press.
81. “XAspects: An Extensible System for Domain Specific Aspect Languages”, with Macneil Shonle and Ankit Shah, OOPSLA ’2003, Domain-Driven Development Track, Anaheim CA, October 2003, pages 28-37, ACM Press.
82. “Beyond AOP: Toward Naturalistic Programming”, with Cristina Videira Lopes and Paul Dourish and David H. Lorenz, OOPSLA 2003, Onward! Track, Anaheim CA, pages 198-207, ACM Press.
83. “Coupling Aspect-Oriented and Adaptive Programming”, with David Lorenz, a chapter in the book “Aspect-Oriented Software Development”, editors Robert Filman and Tzilla Elrad and Siobhán Clarke and Mehmet Aksit, 2004, Addison-Wesley, ISBN 0-32-121976-7.
84. “Traversals of object structures: Specification and Efficient Implementation”, with Boaz Patt-Shamir and Doug Orleans, *ACM Trans. Program. Lang. Syst.*, vol. 26 (2), 2004, pages 370–412, ACM Press.
85. “Controlling the Complexity of Software Designs”, *International Conference on Software Engineering*, 2004, Edinburgh, Scotland, pages 2-11, editors Jacky Estublier and David Rosenblum, ACM Press, invited presentation.
86. “Shadow Programming: Reasoning about Programs using Lexical Join Point Information”, with Pengcheng Wu, *Proceedings of the 4th International Conference on Generative Programming and Component Engineering*, 2005, pages 141-156, Springer Verlag.
87. “Demeter Interfaces: Adaptive Programming without Surprises”, with Therapon Skotiniotis and Jeffrey Palm, *European Conference on Object-Oriented Programming*, 2006, Nantes, France, pages 477-500, Springer Verlag.

Additional papers from my research group

1. "Specifying reusable components using contracts", by Ian M. Holland, *ECOOP '92*, 287-308, June/July 1992, Utrecht, Netherlands, Springer Verlag.
2. "Object-Preserving Class Transformations", by Paul Bergstein, *Proceedings of Conference on Object-Oriented Programming Systems, Languages and Applications*, Phoenix, Arizona, October 1991.
3. "In any CASE: Demeter", by Walter L. Hürsch and Linda M. Seiter and Cun Xiao, *The American Programmer*, September, 1991.
4. "Abstracting Graph-Based Specifications of Object-Oriented Programs", by Ignacio Silva-Lepe, ACM Computer Science Conference, Symposium on Applied Computing, 1994, Phoenix, Arizona.
5. "A Demeter/C++ Report", by Ignacio Silva-Lepe and Walter Hürsch and Greg Sullivan, *C++ Report*, February 1994.
6. "An Empirical Method for Identifying Objects and their Responsibilities in a Procedural Program", by Ignacio Silva-Lepe, TOOLS Europe, Technology of Object-Oriented Languages and Systems, Versailles, France, 1993, Prentice Hall.
7. "Specifying and Adapting Object Behavior During System Evolution", by Linda Keszenheimer, *Conference on Software Maintenance*, Montreal, Canada, September 1993, IEEE Press.
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