

## Curriculum Vitae

### Betty H.C. Cheng

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### Brief Biographical Sketch

Betty H.C. Cheng received her BS in computer science from Northwestern University in 1985 and her MS and PhD degrees in computer science from the University of Illinois-Urbana Champaign, in 1987 and 1990, respectively. She is a professor in the Department of Computer Science and Engineering at Michigan State University. Her research interests include dynamically adaptive systems, requirements engineering, model-driven engineering, automated software engineering, and harnessing evolutionary computation to address software engineering problems. These research areas are used to support the development of high-assurance adaptive systems that must continuously deliver acceptable behavior, even in the face of environmental and system uncertainty. Example applications include intelligent transportation and vehicle systems. She collaborates extensively with industrial partners in her research projects in order to ensure real-world relevance of her research and to facilitate technology exchange between academia and industry. Previously, she was awarded a NASA/JPL Faculty Fellowship to investigate the use of new software engineering techniques for a portion of the shuttle software. She spent one sabbatical working with the Motorola Software Labs investigating automated analysis techniques of specifications of telecommunication systems. During her next sabbatical, she was awarded an international faculty scholarship to explore research techniques for specifying and managing uncertainty in high-assurance systems. She is currently on sabbatical, where she is starting new projects in the area of model-driven approaches to sustainability, cyber security for automotive systems, and feature interaction detection and mitigation for autonomic systems, all in the context of operating under uncertainty while maintaining assurance objectives. She has also taught courses in programming languages, software engineering for embedded systems, and formal methods for security and adaptive systems. In recognition of her teaching efforts, she has received the Withrow Teaching award.

She has been a PI or Co-PI on externally funded projects totaling more than \$35 M, with funding from NSF, DARPA, ARO, AFRL, NASA, EPA, USDA, and numerous industrial collaborators, including Eaton Corporation, Ford Motor Company, General Motors, Motorola, and Siemens. Her research interests include high assurance systems, integrating informal and formal software engineering techniques, automated software engineering, model-driven engineering, embedded systems, dynamically adaptive software systems, and harnessing digital evolution for developing high-assurance systems.

Dr. Cheng has been active in service to the professional community, where she is currently an associate editor for three journals: *Requirements Engineering Journal* and *Journal for Software*

and *Systems Modeling*; she was recently appointed to a second term as associate editor for *IEEE Transactions on Software Engineering*. She has been active on the organizing committees for *IEEE International Conference on Software Engineering (ICSE)*, and *IEEE Requirements Engineering Conference (RE)*, *IEEE/ACM International Conference on Model-driven Engineering, Languages, and Systems* for the past several years. She was the Technical Program Co-Chair for IEEE International Conference on Software Engineering (ICSE-2013), the premier and flagship conference for software engineering. She was also the Program Co-Chair for RE2000. In addition, each year she serves on several program committees for workshops and conferences. She regularly serves on review panels for NSF and other funding agencies.

In 2007, she was selected to receive a Michigan State University *Distinguished Faculty Award* for outstanding scholarship and service to the University. In 2008, she was awarded the MSU College of Engineering *John D. and Dortha J. Withrow Endowed Scholar Award* for her achievements in the design of high-assurance software systems.

## Education

1990 Ph.D. in Computer Science. University of Illinois at Urbana-Champaign, Urbana, Illinois.

1987 M.S. in Computer Science. University of Illinois at Urbana-Champaign, Urbana, Illinois.

1985 B.S. in Computer Science. Northwestern University, Evanston, Illinois.

## Professional Experience

7/02–present *Professor of Computer Science, Michigan State University.*

Teach undergraduate courses in software engineering and programming languages, , graduate courses in advanced software engineering and formal methods in software development. Conduct research with M.S. and Ph.D. students in the areas of automated software engineering, adaptive middleware and security, requirements engineering, component-based reuse, object-oriented development techniques, and embedded systems development.

8/08-10/08 *Visiting Professor* in Laboratoire Informatique de L'Université de Pau et des Pays de L'Adouritem Pau, France.

7/96–6/02 *Associate Professor of Computer Science, Michigan State University.*

Teach undergraduate courses in Software Engineering and Senior Design Capstone, graduate courses in Advanced Software Engineering and Formal Methods in Software Development. Conduct research with M.S. and Ph.D. students in the areas of formal methods in software engineering and applications to distributed computing with specific emphasis on requirements engineering, component-based reuse, and reverse engineering, object-oriented development techniques, and embedded systems development.

8/98-12/98 *Visiting Faculty Scholar*, Motorola Labs, Schaumburg, Illinois.

Perform research into using integrated specification and analysis techniques for specifying telecommunication systems.

- 9/90–7/96 *Assistant Professor of Computer Science, Michigan State University.*  
Teach undergraduate courses in Software Engineering and Organization of Programming Languages, graduate courses in Formal Methods for Software Development and Analysis of Algorithms. Conduct research with M.S. and Ph.D. students in the areas of formal methods in software engineering and distributed multimedia systems. Developed techniques and tools to support automated reuse and reverse engineering.
- 6/93–8/93 *NASA/ASEE Faculty Fellow,*  
*Jet Propulsion Laboratory, California Institute of Technology.*  
Perform research into the application of formal methods and object-oriented analysis on a portion of software for the space shuttle.
- 1/86–8/90 *Graduate Research Assistant, University of Illinois, Computer Science Department.* Doctoral research has included the design and implementation of the automated program synthesis system. User-supplied formal specifications are transformed into a high-level language. The system is capable of synthesizing both procedural and data abstractions.
- 5/87–8/87 *Software Analyst, Digital Equipment Corporation, Maynard, Massachusetts.*  
Designed and implemented a parser and syntactic editor to handle the manipulation of information supplied to and retrieved from CAD systems used for VLSI design.
- 5/86–8/86 *Program Analyst and Developer, Data General, Research Triangle Park, North Carolina.*  
Designed and implemented software used in conjunction with expert systems.
- 8/85–12/85 *Graduate Assistant, University of Illinois, Computer Science Department.*  
Provided hardware and software support to customers of the Civil Engineering Research Laboratory for the U.S. Army Corps of Engineers.
- 6/85–8/85 *Program Analyst IBM, Research Triangle Park, North Carolina.*  
Developed software to enhance network management processes.

## Manuscripts and Publications

### Edited Volumes and Special Issues:

- “On the Globalization of Domain-Specific Languages,” (Betty H. C. Cheng, Benot Combemale, Robert B. France, Jean-Marc Jzquel, Bernhard Rumpe), in *Globalizing Domain-Specific Languages - International Dagstuhl Seminar Dagstuhl Castle, Germany, October 5-10, 2014, Revised Papers*, Springer, 2015, pp. 1-6.
- Nelly Bencomo, Robert B. France, Betty H. C. Cheng, Uwe Amann: *Modelsruntime - Foundations, Applications, and Roadmaps* [Dagstuhl Seminar 11481, November 27 - December 2, 2011]. *Lecture Notes in Computer Science 8378*, Springer 2014, ISBN 978-3-319-08914-0
- “Message from the Chairs,” (David Notkin, Betty H. C. Cheng, Klaus Pohl), *35th International Conference on Software Engineering, ICSE '13, San Francisco, CA, USA, May 18-26, 2013*. IEEE / ACM 2013, ISBN 978-1-4673-3076-3

- “Summary of the 6th International Workshop on Models@run.time. MoDELS Workshops 2011,” (Nelly Bencomo, Gordon S. Blair, Robert B. France, Betty H. C. Cheng, Cdric Jeannere), Proceedings of the *International Workshop on Models@run.time. MoDELS Workshops 2011*, pp. 149-151.
- “Fifth Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2010)” (Cheng, B.H.C.; de Lemos, Rogerio; Garlan, D.; Giese, H.; Litoiu, M.; Magee, J.; Muller, H.A.; Pezz, Mauro; Taylor, Richard) Software Engineering, 2010 ACM/IEEE 32nd International Conference on Year: 2010, Volume: 2 Pages: 447 - 448, DOI: 10.1145/1810295.1810422
- “SEAMS 2009: Software engineering for adaptive and self-managing systems,” (Cheng, B.H.C.; de Lemos, Rogerio; Garlan, D.; Giese, H.; Litoiu, M.; Magee, J.; Muller, H.A.; Taylor, Richard) Software Engineering - Companion Volume, 2009. ICSE-Companion 2009. 31st International Conference on Year: 2009 Pages: 463 - 464, DOI: 10.1109/ICSE-COMPANION.2009.5071063
- *SEAMS 2007: Software Engineering for Adaptive and Self-Managing Systems*, Cheng, B.H.C.; Lemos, Rogerio de; Fickas, S.; Garlan, D.; Litoiu, M.; Magee, J.; Muller, H.A.; Taylor, Richard Software Engineering - Companion, 2007. ICSE 2007 Companion. 29th International Conference on Year: 2007 Pages: 152 - 153, DOI: 10.1109/ICSECOMPANION.2007.64
- “Requirements engineering: integrating technology,” (Cheng, B.H.C.; Weiss, D.M.), in *IEEE Software*, vol.17, no.3, pp.18-20, May/June 2000 doi: 10.1109/MS.2000.896245.

#### Refereed Book Chapters:

- “Motivating Use Cases for the Globalization of DSLs,” (Betty H. C. Cheng, Thomas Dagueule, Colin Atkinson, Siobhán Clarke, Ulrich Frank, Pieter J. Mosterman, Janos Sztipanovits), in Globalizing Domain-Specific Languages - International Dagstuhl Seminar Dagstuhl Castle, Germany, October 5-10, 2014 Revised Papers, Springer, 2015, pp. 21–42.
- “Using Models at Runtime to Address Assurance for Self-Adaptive Systems,” (Betty H. C. Cheng, Kerstin I. Eder, Martin Gogolla, Lars Grunske, Marin Litoiu, Hausi A. Müller, Patrizio Pelliccione, Anna Perini, Nauman A. Qureshi, Bernhard Rumpe, Daniel Schneider, Frank Trollmann, Norha M. Villegas), Models@run.time, Springer International Publishing, 2014, pp. 101–136, ISBN: 978-3-319-08914-0.
- “Transparent Shaping: A Methodology for Adding Adaptive Behavior to Existing Software Systems and Applications” (Masoud Sadjadi, Betty H.C. Cheng, and Philip K. McKinley), An Adaptive Control Approach for Software Quality Improvement, edited by B. Cukic and E. Wong, World Scientific Press, 2011, pp. 77–114, ISBN: 978-981-4340-91-5.
- “Software Engineering for Self-Adaptive Systems: A Research Roadmap” (B.H.C. Cheng *et al*), Software Engineering for Self-Adaptive Systems, Eds. Cheng, de Lemos, Giese, Inverardi, Magee, 2009, Springer, pp. 1-26.
- “Current and Future Directions in Requirements Engineering” (Betty H.C. Cheng and Joanne M. Atlee), Design Requirements Engineering: A Ten-Year Perspective, Eds. J. Mylopoulos, Springer, 2009, pp. 11–43.

- “Transparent Shaping: A Methodology for Adding Adaptive Behavior to Existing Software Systems and Applications” (S. Masoud Sadjadi, P.K. McKinley, and B.H.C. Cheng), *An Adaptive Control Approach for Software Quality Improvement*, Eds. E. Wong and B. Cukic, World Scientific Publishing Company, in press.
- “A Pattern-Based Approach for Modeling and Analysis of Error Recovery,” Ali Ebne-nasir and Betty H.C. Cheng, *Architecting Dependable Systems IV*, Springer Lecture Notes for Computer Science, Vol. 4615, Eds. R. de Lemos, C. Gacek, and A. Romanovsky, Springer, 2007.
- “Repository for Model Driven Development (ReMoDD)” (Robert France, Jim Bieman, and Betty H.C. Cheng), *Models in Software Engineering*, Springer Lecture Notes for Computer Science, LNCS, Vol. 4364, 2007, pp. 311–317, Springer.
- “Automated Analysis of Natural Language Properties for UML Models,” Sascha Konrad and Betty H.C. Cheng, in Springer Lecture Notes in Computer Science, *Satellite Proceedings of ACM/IEEE MoDELS Conference*, vol. 3844, pp. 48-57, Springer, January 2006.
- “Enabling Safe Dynamic Component-Based Software Adaptation,” (J. Zhang, B.H.C. Cheng, Z. Yang, and P.K. McKinley), in *Architecting Dependable Systems*, Springer Lecture Notes for Computer Science, Springer, 2005, pp. 194-211.
- “A Semantic Foundation for Specification Matching” (with Y. Chen) in Foundations of Component-Based Systems Eds. M. Sitaraman and G. Leavens, Cambridge University Press, 2000.
- “Multiple Dimensions of Integrating Development Technology” in Computer Security, Dependability, and Assurance: From Needs to Solutions, Eds. P. Ammann, B. Barnes, S. Jajodia, and E. Sibley, IEEE Computer Society, 1999.
- “The Object-Oriented Development of Multimedia Information Systems,” (with G.C. Gannod), in Storage and Management of Multimedia Systems, Ed. S.M. Chung, Kluwer Academic Publishers, 1996.

#### Refereed Journal Articles:

- “AutoRELAX: Automatically RELAXing a Goal Model to Address Uncertainty” (Erik Fredericks, Byron DeVries, and Betty H.C. Cheng), *Journal of Empirical Software Engineering*, vol. 19, no. 5, pp. 1466–1501, 2014.
- “Applying evolutionary computation to mitigate uncertainty in dynamically-adaptive, high-assurance middleware,” (P.K. McKinley, B.H.C. Cheng, A.J. Ramirez, and A.C. Jensen), *Journal of Internet Services and Applications*, pp. 51–58, 2012, vol. 3, no. 1, Springer.
- “Plato: A Genetic Algorithm Approach to Run-Time Reconfiguration in Autonomic Computing Systems,” Andres Ramirez, David Knoester, Betty H.C. Cheng, and Philip K. McKinley, “Journal of Cluster Computing (Special Issue on Autonomic Computing),” pp. 229–244, vol 14, no. 3, 2011.
- “RELAX: A Language to Address Uncertainty in Self-Adaptive Systems Requirements,” Jon Whittle, Pete Sawyer, Nelly Bencomo, Betty H.C. Cheng, and Jean-Michel Bruel,” *Requirements Engineering Journal*, Springer, vol. 15, no. 2, pp. 177-196, 2010.

- “Harnessing Digital Evolution,” P. McKinley, B.H.C. Cheng, C. Ofria, D. Knoester, Be. Beckmann, and H. Goldsby, *IEEE Computer*, volume 41, number 1, January 2008, pp. 54–63.
- “Specifying Real-time Properties in Autonomic Systems,” J. Zhang, Z. Zhou, B.H.C. Cheng, and P.K. McKinley, *Innovations in Systems and Software Engineering*, Springer, vol. 3, number 1, March 2007, pp. 3–16.
- “Using Temporal Logic to Specify Adaptive Program Semantics,” Ji Zhang and Betty H.C. Cheng, *Journal of Systems and Software*, Elsevier. Special issue on Architecting Dependable Systems, Eds. R. de Lemos, C. Gacek, and A. Romanovsky, volume 79, issue 10, pp. 1361–1369, October, 2006.
- “Retrieval-By-Construction: A Traceability Technique to Support Verification and Validation of UML Formalizations” (M. Deng, R.E.K. Stirewalt, and B.H.C. Cheng), in *International Journal on Software Engineering and Knowledge Engineering*, Special issue on Traceability, Eds. George Spanoudakis and Andrea Zisman, October 2005.
- “Object Analysis Patterns for Embedded Systems” S. Konrad, B.H.C. Cheng, and L. Campbell), *IEEE Transactions on Software Engineering*, vol. 30, no. 12, pp. 970–992, December 2004.
- “Composing Adaptive Software,” P. K. McKinley, S. M. Sadjadi, E. P. Kasten, and B. H. C. Cheng, *IEEE Computer*, vol. 37, no. 7, pp. 56–64, 2004.
- “Interactive Distributed Applications and the Computer Science Curriculum” (P. McKinley, R.E.K. Stirewalt, B.H.C. Cheng, L.K. Dillon, and S. Kulkarni), *IEEE Distributed Systems Online Journal*, Vol. 3, Number 10, October 2002, URL: <http://dsonline.computer.org/0210/d/edu.htm>.
- “Automatically Detecting and Visualizing Errors in UML Diagrams,” (with Laura A. Campbell, William E. McUumber, R.E.K. Stirewalt), *Requirements Engineering Journal*, Springer-Verlag, Vol. 7, No. 4, 2002, pp. 264–287.
- “Formalizing and Integrating the Dynamic Model for Object-Oriented Modeling” (with Enoch Y. Wang), in *IEEE Transactions on Software Engineering*, Vol. 28, No. 8, August 2002, pp. 747–762.
- “Developing and Maintaining an Object-Oriented Distributed Multimedia Information System” (with Gerald C. Gannod), *Annals of Software Engineering* (Special issue on Multimedia Software Engineering), vol. 12, December 2001, pp. 95–118.
- “Formalizing the Functional Model within Object-Oriented Design” (with Enoch Y. Wang), *International Journal on Software Engineering and Knowledge Engineering*, Vol. 10, No. 1, February 2000, pp. 5–30.
- “Path-Based Multicast Communication in Wormhole-Routed Torus Networks,” (with D. F. Robinson and P. K. McKinley) *Journal of Parallel and Distributed Computing*, vol. 45, pp. 104–121, 1997.
- “Reusing Analogous Components” (with Jun-jang Jeng), in *IEEE Trans. on Knowledge and Data Engineering*, Vol 9., No. 2, March/April 1997, pp. 341–349.
- “Strongest Postcondition Semantics as the Formal Basis for Reverse Engineering” (with G.C. Gannod), *The Journal of Automated Software Engineering*, Vol. 3, No. 1/2, Kluwer

Academic Publishers, 1996. (Shortened preliminary version appeared in *Proc. of IEEE Working Conference on Reverse Engineering*, Toronto, Ontario, Canada, pp. 188–197, July 1995.)

- “A Regional Information System for Environmental Data Analysis” (with R.H. Bourdeau and B.C. Pijanowski), *Journal of Photogrammetric Engineering & Remote Sensing*, Vol. 62, No. 7, July 1996, pp. 855–861.
- “Efficient Collective Data Distribution in All-Port Wormhole-Routed Hypercubes” (with D. F. Robinson, D. Judd, and P. K. McKinley), *Journal of Parallel and Distributed Computing*, Vol. 31, No. 1, November 1995.
- “A Formal Semantics of Object Models” (with R.H. Bourdeau), *IEEE Trans. on Software Engineering*, Vol. 21, No. 10, pp. 799–821, October 1995.
- “Optimal Multicast Communication in Wormhole-Routed Torus Networks” (with D.F. Robinson and P.K. McKinley), in *IEEE Trans. on Parallel and Distributed Systems*, Vol. 6, No. 10, pp. 1029 – 1042, October 1995.
- “Contention Free 2-D Mesh Cluster Allocation in Hypercubes” (with Stephen W. Turner and Lionel M. Ni), *IEEE Transactions on Computers*, Vol. 44, No. 8, pp. 1051–1055, August 1995.
- “Facilitating the Maintenance of Safety-Critical Systems,” *International Journal on Software Engineering and Knowledge Engineering*, (with G.C. Gannod), (Special issue on safety-critical systems), Vol. 4, No. 2, pp. 183–204, March 1994.
- “Applying Formal Methods in Automated Software Development,” *Journal of Computer and Software Engineering*, vol. 2, no. 2, pp. 137–164, 1994.
- “Data Parallel Program Visualizations from Formal Specifications” (with M.V. LaPolla, J.L. Sharnowski, and K. Anderson), *Journal of Parallel and Distributed Computing*, Vol. 18, No. 2, pp. 252–257, June, 1993.
- “Using Automated Reasoning Techniques to Determine Software Reuse” (with Jun-jang Jeng), *International Journal of Software Engineering and Knowledge Engineering*, Vol. 2, No. 4, pp. 523–546, December 1992.

#### Invited and Other Papers:

- “Dealing with Uncertainty for High-Assurance Self-Adaptive Systems,” **Invited Keynote** for *IEEE International Conference on Software Testing, Verification and Validation (ICST) 2016*, Chicago, Illinois, April 2016 (2 pages).
- “A Review of Dr. Robert France’s Contributions and Impact on Model-Driven Engineering and Software Engineering: Robert B. France (1960-2015).” Betty H. C. Cheng: *ACM SIGSOFT Software Engineering Notes*, 40(3): 23-31 (2015)
- “Harnessing Evolutionary Computation to Enable Dynamically Adaptive Systems to Manage Uncertainty” Betty H.C. Cheng, Andres J. Ramirez, and Philip K. McKinley, Keynote for *2013 1st International Workshop on Combining Modeling and Search-Based Software Engineering (CMSBSE)*, co-located with IEEE International Conference on Software Engineering (ICSE), May 2013, pp. 1–6.

- “Message from the Chairs”, David Notkin, Betty H. C. Cheng, Klaus Pohl (Eds.): 35th International Conference on Software Engineering, ICSE ’13, San Francisco, CA, USA, May 18-26, 2013. IEEE / ACM 2013.
- “Using Models@Run Time to Manage Ultra-Large Scale Systems,” Betty H.C. Cheng, Sidebar in Guest Editor’s Introduction, Gordon Blair, Nelly Bencomo, Robert France “Models at Run Time,” *IEEE Computer*, vol. 42, no, 10, October, 2009, pp. 30.
- “CRI Collaborative Project Report: Repository for Model Driven Development (ReMoDD),” Robert France, James Bieman, and Betty H.C. Cheng, Proceedings of CRI of PI Meeting, Snowbird, Utah, June 2006.
- “A Metamodel-Based Approach to Formalizing UML,” *Proc. of IEEE International Conference on Computer Software and Applications Conference (COMPSAC01)*, Chicago, Illinois, October 2001.
- “Properties of Separate Components” *IEEE 4th Component-Based Software Engineering Workshop*, Session Overview, May 2001.
- “Requirements Engineering: Integrating Technology” (with D. Weiss), *IEEE Software*, May 2000.
- “A Discussion about Integrated Techniques” (with R. France), in *Post-Proceedings of IEEE 2nd International Workshop on Industrial Strength Formal Specification Techniques (WIFT98)*, Boca Raton, Florida, April 1999.
- ”Integrating formal and informal specification techniques. why? how?,” (Bruel, J.-M.; Cheng, B.H.C.; Easterbrook, S.; France, R.; Rumpe, B.,) in *Industrial Strength Formal Specification Techniques, 1998. Proceedings.* 2nd IEEE Workshop on , vol., no., pp.50-57, 23-23 Oct. 1998 doi: 10.1109/WIFT.1998.766297
- “How do Formal Methods fit in Requirements Engineering?” (with M. A. Ardis, J. Goguen, and C. Heitmeyer), in *Proc. of IEEE International Conference on Requirements Engineering*, April 1996.
- “The Role of Multimedia and AI in GIS” (with N. Bourbakis, W. Campbell, M. Genert, and K. Makki), *Proc. of ACM Workshop on Advances in Geographic Information Systems*, Gaithersburg, Maryland, pp. 84–88, December 1994.
- “Are Formal Methods Useful for Software Development?” (with David Gries, Mark A. Ardis, N. Shankar, Joseph Urban, Kwei-Jay Lin, and Horst F. Wedde) *Proc. of IEEE 16th Annual International Computer Software and Applications Conference*, pp. 2–9. September 1992.

#### Refereed Conferences and Workshops:

- “An Evolutionary Approach to Discovering Execution Mode Boundaries for Adaptive Controllers,” Anthony J. Clark, Byron DeVries, Jared M. Moore, Betty H.C. Cheng, and Philip K. McKinley, in *Proceedings of the IEEE International Conference on Evolvable Systems, held in conjunction with the 2016 IEEE Symposium on Computational Intelligence (SSCI)*, Athens, Greece, December 2016, peer-reviewed full paper.
- “Automatic Detection of Incomplete Requirements via Symbolic Analysis,” Byron DeVries, Betty H. C. Cheng, *Proceedings of ACM/IEEE 18th International Conference on*



*Model Driven Engineering Languages and Systems (MODELS 2016)*, St. Malo, France, pp. 385–395.

- “Modeling for sustainability,” Benoit Combemale, Betty H. C. Cheng, Ana Moreira, Jean-Michel Bruel, and Jeff Gray. 2016. . In *Proceedings of the 8th International Workshop on Modeling in Software Engineering (MiSE '16)*. ACM, New York, NY, USA, 62-66.
- “UML Modeling for Visually-Impaired Persons,” (Brad Doherty and Betty H.C. Cheng), *Proceedings of the First International Workshop on Human Factors in Modeling* co-located with *ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MODELS 2015)*, Ottawa, Canada, pp. 4-10.
- “An Approach to Mitigating Unwanted Interactions between Search Operators in Multi-Objective Optimization” (Chad Byers and Betty H.C. Cheng) *ACM Proceedings of the Genetic and Evolutionary Computation Conference (GECCO 2015)*, Madrid, Spain, pp. 655–662.
- “Automated Generation of Adaptive Test Plans for Self-Adaptive Systems” (Erik M. Fredericks and Betty H. C. Cheng), in the *Proceedings of the 10th International Symposium on software Engineering for Adaptive and Self-managing Systems (SEAMS)*, 2015, Florence, Italy.
- “An Empirical Analysis of Providing Assurance for Self-Adaptive Systems at Different Levels of Abstraction in the Face of Uncertainty.” (Erik M. Fredericks and Betty H. C. Cheng) in the *Proceedings of 8th International Workshop on Search-Based Software Testing (SBST) 2015*, Florence, Italy.
- “Unwanted Feature Interactions Between the Problem and Search Operators in Evolutionary Multi-objective Optimization,” (Chad Byers and Betty H.C. Cheng), *Proceedings of 8th International Conference on Evolutionary Multi-Criterion Optimization (EMO)*, pp. 19–33, 2015, Portugal.
- “The Relevance of Model-Driven Engineering Thirty Years from Now,” (Gunter Mussbacher, Daniel Amyot, Ruth Breu, Jean-Michel Bruel, Betty H. C. Cheng, Philippe Collet, Benot Combemale, Robert B. France, Rogardt Heldal, James H. Hill, Jrg Kienzle, Matthias Schttle, Friedrich Steimann, Dave R. Stikkolorum, Jon Whittle), *Proceedings of the International Conference on Model Driven Engineering and Language Systems (MODELS'2014)*, pp. 183-200.
- Towards run-time adaptation of test cases for self-adaptive systems in the face of uncertainty, (Erik M. Fredericks, Byron DeVries, and B. H. C. Cheng), in the *Proceedings of the 9th International Symposium on software Engineering for Adaptive and Self-managing Systems (SEAMS)*, 2014, pp. 17–26.
- “Validating Code-Level Behavior of Dynamic Adaptive Systems in the Face of Uncertainty,” (Erik M. Fredericks, Andres J. Ramirez, and Betty H. C. Cheng), in the *Proceedings of Symposium on Search-based Software Engineering (SSBSE'13)*, 2013, pp. 81–95, Springer.
- “Exploring Automated Software Composition with Genetic Programming,” Erik M. Fredericks and Betty H. C. Cheng, in the *Proceedings of GECCO 2013*, 2013, pp. 1733–1734.

- “Towards run-time testing of dynamic adaptive systems,” (Erik M. Fredericks, Andres J. Ramirez, and Betty H. C. Cheng), in *Proceedings of the 8th International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, 2013, pp. 169-174.
- “RELAXing Claims: Coping with Uncertainty While Evaluating Assumptions at Run Time,” (Andres J. Ramirez, Betty H.C. Cheng, Nelly Bencomo, and Pete Sawyer), in *Proceedings of the Fifteenth International Conference on Model Driven Engineering and Language Systems (MODELS12)*, pp. 53–69, Innsbruck, Austria, October 2012.
- “Automatically RELAXing Goal Models to Cope with Uncertainty” (Andres J. Ramirez, Erik M. Fredericks, Adam C. Jensen, and Betty H.C. Cheng), *Proceedings of the Fourth International Symposium on Search-based Software Engineering (SSBSE’12)*, pp. 198–212, Riva del Garda, Italy, September 2012.
- “An ecology-based evolutionary algorithm to evolve solutions to complex problems” (Sherri Goings, Heather Goldsby, Betty H.C. Cheng, and Charles Ofria) *Proceedings of Artificial Life (ALife)*, East Lansing, Michigan, July 2012, pp. 171–177.
- “Exploring the evolution of internal control structure using digital enzymes” (Chad M. Byers, Betty H. C. Cheng and Philip K. McKinley), in *Proceedings of ACM GECCO (Companion) 2012*, pp. 1407-1408, July 2012, Philadelphia, PA.
- “Repository for Model Driven Development (ReMoDD)” (Robert B. France, James M. Bieman, Sai Pradeep Mandalaparty, Betty H. C. Cheng, and Adam C. Jensen), in *Proceedings of ICSE 2012*, pp. 1471-1472, June 2012, Zurich, Switzerland.
- “A Taxonomy of Uncertainty for Dynamically Adaptive Systems” (Andres J. Ramirez and Betty H.C. Cheng), in *Proceedings of IEEE International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, pp. 99–108, June, 2012, Zurich, Switzerland.
- “Automatically Exploring How Uncertainty Impacts Behavior of Dynamically Adaptive Systems” (Andres J. Ramirez, Adam C. Jensen, Betty H.C. Cheng and David Knoester), in *Proceedings of 26th IEEE/ACM International Conference on Automated Software Engineering (ASE 2011)*, pp. 568–571, November, 2011, Lawrence, Kansas.
- “An Evolutionary Approach to Network Self-Organization and Resilient Data Diffusion” (Andres J. Ramirez and Betty H.C. Cheng), *Proceedings Fifth IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO)*, pp. 198–207, Ann Arbor, Michigan, USA; October, 2011.
- ”Automatic Derivation of Utility Functions for Monitoring Software Requirements” (Andres J. Ramirez and Betty H.C. Cheng), *Proceedings of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2011)*, pp. 501–516, Wellington, New Zealand, October, 2011.
- “A Toolchain for the Detection of Structural and Behavioral Latent System Properties” (Adam Jensen, Betty H.C. Cheng, Heather J. Goldsby, and Edward Nelson), *Proceedings of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2011)*, pp. 683–698, Wellington, New Zealand, October, 2011. **(Nominated for Best Paper)**.

- “Digital Enzymes: Agents of Reaction Inside Robotic Controllers for the Foraging Problem” (Chad Byers, Betty H.C. Cheng, and Philip K. McKinley), in *ACM Proceedings of the Genetic and Evolutionary Computation Conference (GECCO 2011)*, pp. 243-250, July 2011, Dublin, Ireland, full paper (**Nominated for Best Paper**).
- “An Aspect-Oriented Approach for Implementing Evolutionary Computation Applications” (Andres J. Ramirez, Adam C. Jensen, and Betty H.C. Cheng), Proceedings of the 10th International Conference on Aspect-Oriented Software Development (AOSD-11), pp. 153–164, Porto de Galinhas, Pernambuco, Brazil.
- “Automatically Discovering Properties that Specify the Latent Behavior of UML Models” (Heather J. Goldsby and Betty H.C. Cheng), Proceedings of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2010), pp. 316–330, Oslo, Norway, October 2010.
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- “Configuration Management: Design, Implementation, and Maintenance through the OMT Object Model” (with Steven R. Schafer), Technical Report, MSU-CPS-95-8, March 1995.
- “A Requirements Analysis Report for a Regional Decision Support System” (with Robert H. Bourdeau and Gerald C. Gannod), Technical Report, MSU-CPS-94-70, November 1994.
- “A Distributed, Object-Oriented Multimedia Environmental Information System: A Development Document” (with P. Fraley, G. Gannod, J. Kusler, S. Schafer, E. Wang), Technical Report, MSU-CPS-94-60, November 1994.
- “Extending the Unimodular Approach to Loop Blocking and Loop Coalescing” (with David R. Chesney), Michigan State University Technical Report, MSU-CPS-94-25 April 1994.
- “Graphical Development Environment for Larch Shared and Interface Languages” (with Michele Morin), Michigan State University Technical Report, MSU-CPS-94-18, April 1994.
- “Extending the Unimodular Approach to Other Transformation Techniques” (with David R. Chesney), Michigan State University Technical Report, MSU-CPS-93-24, September 1993.
- “Using Visualizations to Guide Data Partitioning” (with J. L. Sharnowski) Technical Report, Michigan State University, Department of Computer, CPS-93-19, May 1993.
- “Guideplus: An Interface-Building Tool for the Sun OpenWindows Environment” (with J.L. Sharnowski and K. Gidewall), Michigan State University Technical Report, MSU-CPS-92-04, July 1992.
- “Using Formal Specifications to Generate Visualizations of Data Parallelism” (with M.V. LaPolla, J.L. Sharnowski, and K. Anderson), Michigan State University Technical Report, MSU-CPS-92-05, July 1992.
- “Intelligent Browser for Formal Specifications of Software Components” (with D.K. Pierce), Michigan State University Technical Report, MSU-CPS-91-14, August 1991.
- “Synthesis of Procedural and Data Abstractions,” Tech Report UIUCDCS-R-90-1631, (Ph.D. Thesis). University of Illinois, Urbana, IL, August 1990.

## Funding Summary

### Federal Funding:

#### **AFRL:**

“X-PLORE: Combining Model-Driven Engineering, Bio-Inspiration and Formal Analysis to Mitigate Uncertainty in High-Assurance Software Systems,”

**PI:** B. Cheng; **Co-PI:** P. McKinley

**Duration:** 2016-2018

**Amount:** \$699,920

**Status:** Funded.

#### **NSF/DBI:**

“BEACON: An NSF Center for Studying Evolution in Action (Renewal),”

PI: E. Goodman; MSU Co-PI: Betty Cheng (also BEACON Knowledge Transfer Manager) Collaborative research center involving 5 universities (MSU primary; Univ. of Washington; Univ. of Texas-Austin; Univ. of Idaho; North Carolina A&T).

**Duration:** 2015-2020

**Amount:** \$25M

**Status:** Funded.

#### **NSF/CRI:** (*CNS-1305358*)

“Collaborative Research: CI-ADDO-EN: Research Repository for Model-Driven Software Development (REMODD),”

**Duration:** 8/16/2013-8/15/2016 (funds available 10/2013)

**Amount:** \$433,473

**Status:** funded.

#### **BAE Systems (DARPA subcontract):**

“Harnessing Evolutionary Computation to Support Software Composition with Code-Level Adaptors,”

**Duration:** 8/16/2012-8/15/13

**Amount:** \$129,128

**Status:** funded.

#### **NSF/DBI:** (*DBI-0939454*)

“BEACON: An NSF Center for Studying Evolution in Action,”

PI: E. Goodman; MSU Co-PI: Betty Cheng (also BEACON Knowledge Transfer Manager)

**Duration:** 2010-2015

**Amount:** \$25M,

**Status:** funded.

#### **NSF/CRI:** (*CNS 0854931*)

“Collaborative Research: CI-ADDON-NEW; Research Repository for Model-Driven Software Development (REMODD),”

**Duration:** 5/15/2009-5/14/2012 (extended to 5/2014)

**Amount:** \$188,934

**Status:** funded.

**NSF/SRS:** (*CCF 0820220*)

"ORCHID: Harnessing Digital Evolution to Design High-Assurance Adaptive Systems,"

PI: B. Cheng; Co-PIs: P. McKinley, C. Ofria, X. Tan

**Duration:** 2008-2011 (extended to 2013)

**Amount:** \$600,000,

**Status:** funded.

**NSF/CRI:** (*CNS 0751155*)

"A Testbed for Evolving Adaptive and Cooperative Behavior Among Autonomous Systems,"

PI: P. McKinley; Co-PIs: B. Cheng, C. Ofria, R. Pennock, X. Tan

**Duration:** 2008-2011

**Amount:** \$188,110,

**Status:** funded.

**ARO:** *ARMY W911NF-08-1-0495*

AWARE: Adaptive Software Monitoring and Dynamic Reconfiguration for Critical Infrastructure Protection

PI: P. McKinley; Co-PI: B. Cheng

**Duration:** 9/1/08- 8/30/11

**Amount:** \$315,000

**Status:** funded.

**NSF:** (*CCF-0750787*)

Applying Digital Evolution to Behavioral Models

PI: Cheng; Co-PIs: P. McKinley, C. Ofria, R. Lenski

**Duration:** 9/15/07-8/31/2008

**Amount:** \$100,000

**Status:** funded.

**NSF/IUCRC:** (*IIP-0700329*)

Planning grant for collaborative proposal: Center for Software-Intensive Ultra-Large-Scale Systems

PI: Cheng; Co-PIs: S. Biswas, C. Ofria, P. McKinley, and L. Dillon

**Duration:** 1/07-12/31/07

**Amount:** \$10,000

**Status:** funded.

**AFRL** (*MICH 06-S567-07-C2*)

Model-Driven Engineering of Adaptive Auditing of High Assurance Systems

PI: Cheng

**Duration:** 4/1/07-2/25/08

**Amount:** \$28,687

**Status:** funded.

**AFRL** (*MICH 06-S001-07-C1*)

Model-Driven Engineering of Adaptive Auditing of High Assurance Systems

PI: Cheng

**Duration:** 9/8/06-9/7/07

- Amount:** \$27,562  
**Status:** funded.
- NSF/CCF:** (*CCF-0541131*)  
Facilitating the Modeling and Analysis of Distributed Real-time Embedded Systems  
PI: Cheng  
**Duration:** 5/16/2006-5/15/2009  
**Amount:** \$330,000  
**Status:** funded.
- NSF/CNS:** (*CNS-0551622*)  
CRI: A Repository for Model Driven Development (Planning grant)  
PI: Cheng (Collaborative proposal with R. France, J. Bieman, Colorado State University)  
**Duration:** 5/16/2006-5/15/2007  
**Amount:** \$40,000  
**Status:** funded.
- ONR/CIP:** (*N00014-01-1-0744*)  
RAPIDware: Component-Based Adaptable and Dependable Middleware  
PI: P.K. McKinley; Co-PI: R.E.K. Stirewalt, **B. Cheng**, L.K. Dillon, and S. Kulkarni)  
**Duration:** 5/1/01-12/31/07  
**Amount:** \$3,145,609 (3-year base plus a renewed 2-year option)  
**Status:** funded.
- NSF/EIA:** (*EIA-0000433*)  
Meridian: An Integrated Toolkit for Developing Interactive Distributed Applications  
**PI:** **B. Cheng**; Co-PI: L.K. Dillon, P.K. McKinley, and R.E.K. Stirewalt  
**Duration:** 1/1/01-12/31/06  
**Amount:** \$ 1,934,076  
**Status:** funded.
- NSF/CISE:** (*CCR-9901017*)  
**Title:** “Object-Oriented Development and Analysis of Embedded Systems”  
**PI:** **B. Cheng**; Co-PI: R.E.K. Stirewalt  
**Duration:** 8/16/99-8/15/06  
**Amount:** \$379,000 (includes \$14,000 REU supplement)  
**Status:** funded.
- NSF/EIA:** (*EIA-0130724*)  
A Proxy-Centric Testbed For Mobile Internet Research  
PI: P. McKinley; Co-PI: K. Stirewalt, **B. Cheng**, S. Kulkarni, J. Lee, L. Dillon  
**Duration:** 8/16/01-8/15/04  
**Amount:** \$ 146,390 (includes \$ 50,000 MSU cost share)  
**Status:** funded.
- NSF/CRCD:** (*CDA-9700732*)  
**Title:** Visions for Embedded Systems Laboratories  
PI: Matt Mutka; Co-PI: Diane Rover, Chin-Long Wey, **B. Cheng**  
**Duration:** 6/1/97-5/31/02  
**Amount:** \$529,863 (includes \$133,206 MSU cost share)  
**Status:** funded.



**NSF/CISE/CDA:** (*CDA-9617310*)

**Title:** “CISE Research Instrumentation for SMP Cluster” Testbed

**PI:** P.K. McKinley; Co-PI: **B. Cheng** and A.K. Jain

**Duration:** 1/1/97–3/31/99

**Amount:** \$190,200 (includes \$65,000 MSU cost share)

**Status:** funded

**NSF/DARPA:** (CCR-9633391 and F30602-96-1-0298 managed by Air Force’s Rome Lab.)

**Title:** “Integrating Informal and Formal Techniques: An Evolutionary Approach to Systems Development” (Project jointly sponsored by DARPA.)

**PI:** **B. Cheng**

**Duration:** 8/16/96–8/15/99

**Amount:** \$304,585

**Status:** funded.

**NSF/DARPA:** (CCR-9633391 and F30602-96-1-0298 managed by Air Force’s Rome Lab.)

**Title:** “Integrating Informal and Rewriting Techniques” (Project jointly sponsored by DARPA. Supplement to each of our EDCS projects.)

**Co-PIs:** **B. Cheng**; J. Meseguer (SRI), C. Talcott (Stanford)

**Duration:** 8/16/98–8/15/99

**Amount:** \$90,000

**Status:** funded.

**NSF/CISE:** (*CCR-9407318*)

**Title:** “A Formal Approach to Requirements Analysis and Design (Research Experience for Undergraduates Supplement)”

**PI:** **B. Cheng**

**Duration:** 5/1/95–12/31/96

**Amount:** \$5,000

**Status:** funded (no indirect costs)

**NSF/ILI:** (*DUE-9551180*)      **Title:** “Cooperative Multimedia Computing Laboratory”

**PI:** P. K. McKinley; Co-PI: **B. Cheng** and J. Weng

**Duration:** 6/1/95–5/30/97

**Amount:** \$194,610 (includes \$100,000 MSU cost share)

**Status:** funded.

**NASA Headquarters:**

**Title:** “An Approach to Reverse Engineering Based on Formal Methods and Object-Oriented Analysis Techniques” (Graduate Student Researchers Program Fellowship for Gerald C. Gannod)

**PI:** **B. Cheng**

**Duration:** 7/94–6/97

**Amount:** \$66,000 (no indirect costs)

**Status:** funded

**NSF/CISE:** (*CCR-9407318*)

**Title:** “A Formal Approach to Requirements Analysis and Design”

**PI:** **B. Cheng**

**Duration:** 1/1/95–12/31/96

**Amount:** \$76,991

**Status:** funded

**NSF/CISE:** *(CCR-9209873)*

**Title:** "Software Development Environment Supporting Formal Methods,"

**PI:** B. Cheng

**Duration:** 9/92-12/96

**Amount:** \$89,789

**Status:** funded

**EPA/CIESIN:**

**Title:** "Design and Prototyping of an Environmental Information and Decision Support System for Great Lakes Region Areas and Issues"

**PI:** B. Cheng

**Duration:** 4/94-9/95

**Amount:** \$219,920

**Status:** funded

**USDA/CIESIN:**

**Title:** "USDA Global Change Data Assessment and Integration Project"

**PI:** B. Cheng

**Duration:** 9/93-8/95

**Amount:** \$112,252

**Status:** funded

**U.S. Geological Survey:**

**Title:** "Contextual Information Browser for Water Quality Issues,"

**PI:** B. Cheng

**Duration:** 4/93-3/94

**Amount:** \$69,000

**Status:** funded

**NASA/CIESIN:**

**Title:** "User Needs Assessment for Watershed Prototype,"

**PI:** B. Cheng

**Duration:** 1/92-5/93

**Amount:** \$33,418

**Status:** funded

**USDA/CIESIN:**

**Title:** "Regional Watershed Demonstration Prototype"

**PI:** B. Cheng; Co-PI: A.K. Jain

**Duration:** 5/92-5/93

**Amount:** \$41,325

**Status:** funded.

**NASA Consortium for International Earth Science Information Network (CIESIN):**

**Title:** "Investigations for Software/Hardware Testbed of Data Exploitation Systems,"

**PI:** B. Cheng

**Duration:** 1/92/-5/93

**Amount:** \$158,732

**Status:** funded

**NSF Travel Grant (CDA-91-16850):**

**Title:** "Group Travel Grant to attend *IEEE 15th Annual International Computer and Software Applications Conference* in Tokyo,"

**PI:** B. Cheng

**Duration:** 9/91-2/92

**Amount:** \$6,000 (no indirect costs)

**Status:** funded.

## Industry Funding:

### Ford Motor Company:

**Title:** “[Crime Prevention] Situational Crime Prevention Framework for Automotive Cybersecurity,” **PI: B. Cheng ; Co-PI: T. Holt, J. Kennedy**

**Duration:** 2017-2019

**Amount:** \$200,000

**Status:** funded.

### Ford Motor Company:

**Title:** “Method for Executing Powertrain Features in Parallel in a Multicore Environment,” **PI: B. Cheng**

**Duration:** 2016-2018

**Amount:** \$193,807

**Status:** funded.

### BAE:

**Title:** “Harnessing Evolutionary Computation to Support Software Composition with Code-Level Adaptors,”

**PI: B. Cheng**

**Duration:** 2012-2013

**Amount:** \$129,128

**Status:** funded.

### General Motors Research:

**Title:** “Harnessing Evolutionary Computation and MDE to Detect and Mitigate Unwanted Feature Interactions in Onboard Systems,”

**PI: B. Cheng**

**Duration:** 2013-2018

**Amount:** \$100,000 (no indirect costs)

**Status:** funded.

### Ford Motor Research:

**Title:** “Model-Driven Approach to Detecting and Mitigating Unexpected Feature Interactions”

**PI: B. Cheng**

**Duration:** 2008-2011

**Amount:** \$120,000 (no indirect costs)

**Status:** funded.

### Siemens Corporate Research:

**Title:** “Behavior-Oriented Assurance Patterns for Rigorously Developing Distributed Real-Time Embedded Systems”

**PI: B. Cheng**

**Duration:** Open (Initiated October 2005)

**Amount:** \$47,000 (no indirect costs)

**Status:** funded.

### Siemens Corporate Research:

**Title:** “Assurance Patterns and Metrics-Based Analysis of UML Diagrams”

**PI: B. Cheng**  
**Duration:** Open (Initiated September 2004)  
**Amount:** \$43,041 (no indirect costs)  
**Status:** funded.

**Siemens Corporate Research:**

**Title:** “Analyzing UML Diagrams”  
**PI: B. Cheng**  
**Duration:** Open (Initiated May 2003)  
**Amount:** \$35,000 (no indirect costs)  
**Status:** funded.

**Motorola Labs:**

**Title:** “Specification and Analysis of Requirements of Telecommunication Systems”  
**PI: B. Cheng**  
**Duration:** Open  
**Amount:** \$28,082  
**Status:** funded.

**Motorola University Partnerships in Research Program:**

**Title:** “Integrating Automated Analysis Techniques”  
**PI: B. Cheng**  
**Duration:** 8/99-8/02  
**Amount:** \$77,897  
**Status:** funded.

**Eaton Corporation:**

**Title:** “Software Development for Embedded Systems”  
**PI: B. Cheng**  
**Duration:** Open  
**Amount:** \$24,000  
**Status:** funded

**Eaton Corporation:**

**Title:** “Software Process Improvement for Embedded Systems”  
**PI: B. Cheng**  
**Duration:** Open  
**Amount:** \$24,000  
**Status:** funded

**Eaton Corporation:**

**Title:** “Software Reuse for Embedded Systems”  
**PI: B. Cheng**  
**Duration:** Open  
**Amount:** \$32,000  
**Status:** funded

**Manufacturing Research Consortium (GM, Ford, Defense Logistics Agency):**

**Title:** “Environmental Information and Decision Support System for Secure Access to Distributed Multimedia Data”  
**PI: B. Cheng; Co-PI: P.K. McKinley**

**Duration:** 8/15/95-12/31/96  
**Amount:** \$42,360 (no indirect costs)  
**Status:** funded.

**Sun Microsystems: (EDUD-PTR-94-04-175) Title:** “Multimedia Research and Instruction (Equipment Grant)”

**PI: B. Cheng**  
**Duration:** 8/1/94-present  
**Amount:** \$7,990 (no indirect costs)  
**Status:** funded.

#### Other Funding:

**Michigan State University:** Quality Fund Concept Program

**Title:** “High Assurance Systems”

**PI: B. Cheng**

**Co-PIs:** P. McKinley

**Senior Personnel:** S. Biswas, S. Gage, B. Pentland, L. Dillon, S. Kulkarni, C. Radcliffe, K. Stirewalt, X. Tan

**Duration:** 1/1/2006–12/31/2008

**Amount:** \$797,815 (including \$ 427,815 matching funds)

**Status :** funded (no indirect costs).

**Michigan State University:**

**Title:** “A Multidisciplinary Approach to Integration and Analysis of Environmental Information using ENFORMS”

**PI: B. Cheng**

**Duration:** 1/1/94–6/30/95

**Amount:** \$40,500

**Status :** funded (no indirect costs).

**Michigan State University, *All University Research Initiation Grant:***

**Title:** “Using Formal Methods to Determine Software Reuse,”

**PI: B. Cheng**

**Duration:** 1/92/-6/93

**Amount:** \$9,815 (no indirect costs)

**Status:** funded

## Tutorials

“Formal Techniques for Safety-Critical Software Development” (with B. Auernheimer), presented at the *5th International Symposium on Software Reliability Engineering*, Monterey, California, November 1994.

## Keynotes and Other Invited Technical Presentations

- “Addressing Assurance for Self-Adaptive Systems in the Face of Uncertainty,” **Invited Keynote** for *13th IEEE International Conference on Autonomic Computing (ICAC 2016)*, Wuerzburg, Germany, July 2016.
- “Dealing with Uncertainty for High-Assurance Self-Adaptive Systems,” **Invited Keynote** for *IEEE International Conference on Software Testing, Verification and Validation (ICST) 2016*, Chicago, Illinois, April 2016.
- “Dealing with Uncertainty in Self-Adaptive Systems,” Univ. Rennes 1, Rennes, France, December 2015.
- “Applying Evolutionary Computation Techniques to Address Environmental Uncertainty in Dynamically Adaptive Systems,” Invited Presentation, University of Chile, November 2015.
- “Model-based Approaches to Managing Uncertainty for High-Assurance Dynamically Adaptive Systems,” **Invited Keynote** for *10th International Workshop on Modelsruntime.*, September 2015, Ottawa, Canada.
- “Managing Uncertainty for High-Assurance Dynamically Adaptive Systems,” **Invited Keynote** for *Engineering the Intelligent Systems of Tomorrow Interdisciplinary Challenges*, Heinz Nixdorf Institute, Paderborn University, Germany, September 2014.
- “Managing Uncertainty for High-Assurance Dynamically Adaptive Systems,” Computer Science Colloquium, Colorado State University, April 2014.
- “Managing Uncertainty for High-Assurance Dynamically Adaptive Systems,” Computer Science Colloquium, Western Michigan University, January 2014.
- “Managing Uncertainty for High-Assurance Dynamically Adaptive Systems”, General Motors Research Center, October 2013.
- “Exploring Automated Software Composition with Genetic Programming” for *ACM Genetic and Evolutionary Computation Conference (GECCO)*, Amsterdam, The Netherlands, July 2013.
- “Harnessing Evolutionary Computation to Enable Dynamically Adaptive Systems to Manage Uncertainty” **Invited Keynote** for *First International Workshop on Combining Modeling and Search-Based Software Engineering*, May 20, 2013, in conjunction with ICSE 2013, San Francisco, California, USA.
- “Model-Driven Development of High-Assurance Dynamically Adaptive Systems,” Keck Institute of Space Studies (KISS) *Workshop for Engineering Resilient Space Systems: Leveraging Novel System Engineering Techniques and Software Architectures*, February 2013, Pasadena, California.
- “Model-based Development of High-Assurance Dynamically Adaptive Systems,” **ISR Distinguished Speaker and Keynote** for *Institute for Software Research (ISR) Research Forum*, University of California, Irvine, May 2012, Irvine, California.

- “Computer Science + Other Disciplines = Endless Possibilities” **Invited Keynote** for *Michigan Celebration of Women in Computing*, Oakland University, Auburn Hills, Michigan, April 2011.
- “Towards Modal Modelling of Biological Systems” (Manuel Capon, Theresa Casey, Laura Dillon, Betty H.C. Cheng Robert Seymour), *Brussels, Belgium, Virtual Physiological Human Network of Excellence*, September/October, 2010.
- “Model-Driven Approach to Detecting and Mitigating Unexpected Feature Interactions,” presented to researchers from Ford Motor Company Research, May 2010.
- “A Goal-Based Modeling Approach to Develop Requirements of an Adaptive System with Environmental Uncertainty,” Presentation to the IFIP WG 2.9 (Requirements Engineering), Feb. 2010, La Jolla, California.
- “Model-Driven Development of High-Assurance Adaptive Systems” Presentation to Army Research Program Officer, Michigan State University, February 20, 2009.
- “Orchid: A Digital Evolution Approach to Designing Dynamically High-Assurance Adaptive System,” IBM Hawthorne, New York, October 2009.
- “RELAX: A Requirements Specification Language Addressing Uncertainty in Adaptive Systems,” IFIP WG 2.9 (Working Group on Requirements Engineering), San Juan, Puerto Rico, February 2009.
- “Digitally Evolving Behavioral Models and Properties of Software” IFIP WG 2.9 (Working Group on Requirements Engineering), Salvador, Brazil, February 2008.
- “Model-Driven Development of High-Assurance Adaptive Systems ... harnessing Digital Evolution to generate the software models” Dagstuhl Seminar on Software Engineering of Self-Adaptive Systems, Schloss Dagstuhl, Germany, January 2008.
- “High-Assurance Systems: From Cyberinfrastructure to Consumers” to Texas Instruments, November 2007.
- ”Challenges to bring Formal Methods to the Masses,” Panel Statement, *IEEE Conference on High Assurance Software Engineering (HASE07)*, Dallas, Texas, November 2007,
- “A Day in the Life of a Computer Science Student”, EGR 100: Engineering Careers, November 2007.
- “Model-Driven Development of High Assurance Adaptive Systems, **Frontiers of Software Practice Plenary Presentation**, CASCON, Toronto, Canada, October 2007. item ”Model-Driven Engineering of High-Assurance and Adaptive Systems” NSF Kickoff Meeting for Ultra-Large Scale Software Intensive Systems IUCRC, Crystal City, Virginia, October 2007.
- “Modeling and Formally Analyzing Dynamically Adaptive Software” **Keynote** for IEEE/ACM MoDELS Workshop, MoDeVVA07 (Integrating V&V in MDE), October 2007.
- “Model-Driven Requirements Engineering for High Assurance Embedded Systems” Ford Research Laboratory, Dearborn, Michigan, June 2007.



- “Addressing Assurance for Dynamically-Adaptive Systems” **Keynote** for ICSE Workshop for Software Engineering for Adaptive and Self-Managing Systems”, May 26-27, 2007, Minneapolis, Minnesota.
- “Model-Driven Requirements Engineering for High Assurance Embedded Systems” Computer Science Colloquium, Michigan Technological University, Houghton, Michigan, April 2007.
- “Model-Driven Requirements Engineering for High Assurance Embedded Systems” **Keynote** for Siemens Requirements Engineering Workshop, Auburn Hills, Michigan, April 2007.
- “Model-Driven Requirements Engineering for High Assurance Embedded Systems” Georgia Institute of Technology, April 2007.
- “Model-Driven Engineering of Adaptive Auditing for High-Assurance Systems” Minority Leaders Sensors Program Review, Panama City, Florida, March 2007.
- “Modeling and Analyzing Adaptive Software” University of Alabama, Birmingham, February 2007.
- “High-Assurance Systems: From Cyberinfrastructure to Consumers” to Michigan Department of Information Technology, January 2007.
- “Model-Driven Development and Analysis of Dynamically Adaptive Systems,” **Keynote** Presentation, *IEEE MoDELS Workshop for Models @ Runtime*, Genova, Italy, October 2006.
- “ReMoDD: Repository for Model-Driven Development” Invited presentation, *IEEE MoDELS Workshop for Model-size Metrics*, Genova, Italy, October 2006.
- “Model-Driven Requirements Engineering for High Assurance Embedded Systems,” **Keynote** for *IEEE Workshop on Automotive Requirements Engineering (AuRE06)*, Minneapolis, Minnesota, September 2006.
- “High Assurance Autonomic Systems: Model-Driven Engineering” Motorola Labs, Schaumburg, Illinois, August 2006.
- “A Requirements Pattern-Driven Approach to Modeling and Analyzing Embedded Systems,” Invited Colloquium, Computer School of Science & Technology at Nanjing University of Science & Technology, Nanjing, China, June 2006.
- “A Requirements Pattern-Driven Approach to Modeling and Analyzing Embedded Systems,” Invited Colloquium, Beijing University, Beijing, China, June 2006.
- “Assurance Patterns for Modeling and Analyzing Embedded Systems,” Siemens Corporate Research, March 2006.
- “The Four Levels of Requirements Engineering for and in Dynamic Adaptive Systems,” (D. Berry, B.H.C. Cheng, and J. Zhang) *ICSE Workshop on Design and Evolution of Autonomic Computing Systems (DEAS)*, St. Louis, Missouri, May 2005.
- “A Requirements-Pattern Driven Approach to Modeling and Analyzing Embedded Systems,” IBM Lecture Series, University of Notre Dame, October 2004.

- “A Requirements-Pattern Driven Approach to Modeling and Analyzing Embedded Systems,” Colloquium, Wayne State University October 2004.
- “A Requirements-Pattern Driven Approach to Modeling and Analyzing Embedded Systems,” Colloquium, University of Minnesota, September 2004.
- “From Diagrams to Automatic Code Generation,” Cedarcrest College, January 2003.
- “An Aspect-Oriented Approach to Dynamic Adaptation,” IFIP WG 2.9 (Working Group on Requirements Engineering), St. Thomas, Virgin Islands, February 2003.
- “Enabling Safe Dynamic Adaptation,” ONR Project Review, Leesburg, Virginia, June 2003.
- “Component-based Approach Dynamic Adaptation”, ONR Third Year Project Review, Baltimore, Maryland, December 2003.
- “Detecting and Visualizing Structural and Behavioral Errors in Formalized UML Diagrams,” International Workshop on Requirements Engineering, Essen, Germany, April 2002.
- “Requirements Patterns,” IFIP WG 2.9 (Working Group on Requirements Engineering), Duck Key, Florida, February 2002.
- “Integrating Informal and Formal Approaches to Requirements Engineering,” *International Workshop on Requirements Engineering*, London, UK, April 2001.
- “A General Framework for Formalizing Object-Oriented Modeling Techniques” Faculty Seminar, University of Michigan, February 2001.
- “Meridian: An Integrated Toolkit for Developing Interactive Distributed Applications,” Colloquium Series, Rose-Hulman Institute, Terre Haute, Indiana, November 2000.
- “Formally Specifying Product Family Architectures,” Presentation at Motorola, Schaumburg, Illinois, April 1999.
- “Software Engineering for Embedded Systems,” Presentation to subcontractors of VESL project, Michigan State University, May 1999.
- “Correct and Automated Software Development,” Presentation at Vehicular Advanced Software Technology Consortium Workshop, TACOM, Warren, Michigan May 1999.
- “Software Engineering and Network Systems Laboratory,” Presentation to Dr. George Strawn, Executive Officer for CISE at NSF, June 1999.
- “Integrating Informal and Formal Methods”, NSF and ONR-sponsored workshop, *From Needs To Solutions Workshop (the future of Security from Fault Tolerance, Formal Methods, and Security perspectives)*, (Experts from these three domains were invited to workshop), Williamsburg, Virginia, November 1998.
- “Integrating Informal and Formal Approaches to Software Engineering,” General Motors, Detroit, Michigan, July 1998.

- “How can we facilitate technology exchange with industry?” Workshop on Empirical Research in Software Engineering, Greenbelt, Maryland, June 1998.
- “Integrating Informal and Formal Approaches to Object-Oriented Development” Colloquium Series, Iowa State University, February 1998.
- “Integrating Informal and Formal Techniques, DARPA PI Meeting,” Sonoma, California, October 1998.
- “Informal Discussion about Formal Methods for Software Engineering,” Motorola, Cellular Infrastructure Group Sector, Arlington Heights, February 1998
- “Integrating Informal and Formal Techniques to Object-Oriented Design,” DARPA PI Meeting, Sante Fe, New Mexico, April 1997.
- “Integrating Informal and Formal Approaches to Software Development,” Presentation to Rome Laboratory, April 1997.
- “Integrating Informal and Formal Techniques to Object-Oriented Design,” DARPA PI Meeting, Sante Fe, New Mexico, April 1997.
- “Formal Methods for Software Engineering,” Presentation to NASA/WVU Software Research Laboratory at the NASA/WVU Software Independent Verification and Validation Facility, Fairmont, West Virginia, May 1996. (Invited as part of Technical Lecture Series.)
- “Overview of Formal Methods for Validation and Verification of Traditional and Heuristics-based software,” Presentation to NASA Ames Research Center, Moffett Field, California, February 1995.
- “Formal Methods for Software Engineering,” Presentation to Cellular Infrastructure Group, Motorola, Arlington Heights, Illinois, November 1994.
- “Formalizing Object-Oriented Analysis and Design Models,” Presentation to NASA Johnson Space Center, Houston, Texas, November 1994.
- “Saginaw Bay Watershed Computer Prototype: Regional Environmental Information and Decision Support System,” Presentation to EPA, Chicago, Illinois, May 1994.
- “Object-Oriented Distributed Multimedia Decision Support System for Environmental Science Information,” Presentation to Deans from Agriculture and Natural Resources, Engineering, Natural Science, and Social Sciences, Michigan State University, January 1994.

## Professional Activities and Awards

- **Awards and Professional Recognition:**

- “Model-Based Development of Dynamically Adaptive Software” (Ji Zhang and Betty H.C. Cheng), in *Proceedings of IEEE International Conference on Software Engineering (ICSE06)*, Shanghai, China, May 2006. (9% acceptance rate) (**Runner Up for Most Influential Paper Award**, ICSE 2016).

- Michigan State University, College of Engineering *Withrow Distinguished Scholar Award*, 2008.
- Michigan State University *Distinguished Faculty Award*, 2007.
- *Best Paper Awards*
  - \* “A Toolchain for the Detection of Structural and Behavioral Latent System Properties” (Adam Jensen, Betty H.C. Cheng, Heather J. Goldsby, and Edward Nelson), Proceedings of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2011), pp. 683–698, Wellington, New Zealand, October, 2011. (**Nominated for Best Paper**).
  - \* “Digital Enzymes: Agents of Reaction Inside Robotic Controllers for the Foraging Problem” (Chad Byers, Betty H.C. Cheng, and Philip K. McKinley), in *ACM Proceedings of the Genetic and Evolutionary Computation Conference (GECCO 2011)*, pp. 243-250, July 2011, Dublin, Ireland, full paper (**Nominated for Best Paper**).
  - \* “Evolution of Robust Data Distribution Among Digital Organisms,” (David Knoester, Andres J. Ramirez, Philip K. McKinley, and Betty H.C. Cheng), *Proceedings of ACM Genetic and Evolutionary Computation Conference (GECCO-09)*, Montreal, Canada, July 2009 (full paper, **nominated for Best Paper**).
  - \* ”Applying Genetic Algorithms to Decision Making in Autonomic Computing Systems,” (Andres J. Ramirez, Betty H.C. Cheng, David Knoester, and Philip K. McKinley) *Sixth IEEE International Conference on Autonomic Computing (ICAC09)*, Barcelona, Spain, June 2009, full paper (**received Best Paper Award**). (Full paper, 16% acceptance rate).
  - \* “Automatically Generating Behavioral Models of Adaptive Systems to Address Uncertainty” (Heather Goldsby and Betty H.C. Cheng), the Proceedings of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MoDELS 2008), Toulouse, France, October 2008 (**Selected as one of the Best Papers**).
  - \* “Digital Evolution of Behavioral Models for Autonomic Systems” (Heather J. Goldsby, Betty H.C. Cheng, Philip K. McKinley, David B. Knoester, and Charles A. Ofria), *Fifth IEEE International Conference on Autonomic Computing (ICAC08)*, Chicago, Illinois, June, 2008, pp. 87–96 (received **Best Paper Award**).
  - \* “AMOEBART: Run-time Verification of Adaptive Software,” (Ji Zhang, Betty H.C. Cheng, and Heather Goldsby) in Proceedings for *Workshop on Models at Run-time*, selected as a **Best Paper**, Nashville, Tennessee, October 2007.
  - \* “Model-Based Development of Dynamically Adaptive Software” (Ji Zhang and Betty H.C. Cheng), in *Proceedings of IEEE International Conference on Software Engineering (ICSE06)*, Shanghai, China, May 2006. (9% acceptance rate) (**Received Distinguished Paper Award**).
  - \* “Automated Analysis of Natural Language Properties for UML Models,” Sascha Konrad and Betty H.C. Cheng, in MoDELS Workshop on Model Design and Validation (MoDEVA), selected as a **Best Paper**.
  - \* “Formalizing and Integrating the Functional Model within Object-Oriented Design” (with Enoch Y. Wang), in *Proc. of International Conference on Software Engineer-*

*ing and Knowledge Engineering*, San Francisco, California, June 1998 (**Nominated for Best Paper**).

\* “Time and/or Space Sharing in a Workstation Cluster Environment” (with S. W. Turner and L. M. Ni), *Proc. of IEEE Supercomputing’94*, pp. 630–639, November 1994 (**Received Best Paper Award**).

- *ACM SIGSOFT* appreciation award for dedicated service to the Software Engineering community in promoting student participation through the Conference Attendance Program for Students (CAPS), May 2003.
- Elected *Senior Member*, IEEE, 2000.
- *Most Valuable Player Award*, IEEE ICRE200 recognition for outstanding contributions and dedication to the organization and success of conference.
- *1998 Withrow Teaching Award*, Department of Computer Science and Engineering, Michigan State University (selected by students).

• **Associate Editor for Journals,**

- *IEEE Transactions on Software Engineering* (2002-2006), (2010-2015)
- *ACM Transactions on Autonomous and Adaptive Systems* (2011-2012)
- *Requirements Engineering Journal* (Kluwer Publishing, 2002-present)
- *Journal on Software and Systems Modeling* (Springer-Verlag, 2001-present)

• **Other Journal Activities:**

- *IEEE* Transactions and Magazine publications, EIC search committees.

• **Federal Agency Activities:**

- *Reviewer, National Science Foundation*, serve regularly on funding panels for a broad range of programs (1991-present).
- *Reviewer, Science Foundation Ireland Site Review for Lero*, the Irish Software Engineering Research Center, June 2008.
- *Member, Committee of Visitors*, perform review of CISE programs within National Science Foundation, July 2000.
- *Site Visit Panelist*, NSF Center Program Review, National Science Foundation, March 1999.
- *Member, Advisory Panel*, National Science Foundation (1993, 1998, 2002, 2003, 2004, 2005, 2006).
- *Ad-Hoc and Panel Proposal Reviewer*, National Science Foundation, 1993-present.

• **Selected Conference and Workshop Activities over past ten years:**

- *Program Co-Chair*, IEEE International Conference on Software Engineering (ICSE-13), San Francisco, California, 2013.
- *Program Board*,

- \* *IEEE International Conference on Software Engineering (ICSE-17)*, Buenos Aires, Argentina, 2017.
- \* *IEEE International Conference on Software Engineering (ICSE-16)*, Austin, Texas 2016.
- \* *IEEE International Conference on Software Engineering (ICSE-14)*, Hyderabad, India, 2014.
- \* *ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS-2016)*, St. Malo, France, 2016.
- \* *ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS-2015)*, Ottawa, Canada, 2015.
- \* *ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS-2012)*, Innsbruck, Austria, 2012.
- \* IEEE International Requirements Engineering Conference 2014 (RE2014)
- \* IEEE International Requirements Engineering Conference 2006 (RE06).
- Co-organizer (with Benoit Combemale, Robert France, Jean-Marc Jezequel, Bernhard Rumpe), Dagstuhl Seminar on Globalizing Domain-Specific Languages, October, 2014.
- Co-organizer (with Nelly Bencomo, Robert France, Gordon Blair, Uwe Assmann), Dagstuhl Seminar on Models at Runtime, November-December, 2011.
- *Program Chair*, 6th IEEE International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), 2011. (Co-located with ICSE-11.)
- Co-organizer (with Ana Moreira, Benoit Combemale, Jean-Michel Bruel, Jeff Gray, and Robert B. France), Modularity’15 Workshop on Sustainability, co-located with Modularity, March 2015.
- Co-organizer (with Nelly Bencomo, Robert France, Gordon Blair), Workshop on Models at Runtime, co-located with MODELS, October, 2011.
- Co-organizer (with Geri Georg, Ana Moreira, Gunter Mussbacher, Robert France) Workshop on Comparing Modeling Methods, co-located with MODELS, October, 2011.
- *Steering Committee Member* International Conference on Autonomic Computing (ICAC, 2013-present); IEEE International Conference on Software Engineering (ICSE, 2010-2016); IEEE International Requirements Engineering Conference (RE, 2000-2005); Workshop on Architecting Dependable Systems (WADS, 2004-2006).
- *Tool and Formal Research Demos Co-Chair (with Holger Giese)*, IEEE International Conference on Software Engineering (ICSE08), Leipzig, Germany, 2008.
- *Organizing Committee and Program Committee*,
  - \* *New Faculty Symposium Co-Chair*, IEEE International Conference on Software Engineering (ICSE), 2018.
  - \* *Doctoral Symposium Co-Chair*, IEEE International Conference on Software Engineering (ICSE), 2017.
  - \* Co-organizer (with Ana Moreira, Benoit Combermale, Robert France, Jeff Gray), *Sustainability Workshop*, co-located with *Modularity 2015*, Ft. Collins, Colorado.
  - \* Co-organizer (with Hausi Müller, David Garlan, Rogerio de Lemos, Jeff Magee, Marin Litiou), *IEEE ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2009, Vancouver, Canada.

- \* Co-organizer (with Hausi Müller, David Garlan, Rogerio de Lemos, Jeff Magee, Marin Litiou), *IEEE ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2008, Leipzig, Germany.
- \* *Awards Selection Committees*, Several ACM SIGSOFT awards, 2015.
- \* *Tutorial Selection Committee*, ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS2015), Ottawa, Canada, 2015.
- \* *First International Workshop on Combining Modeling and Search-Based Software Engineering*, part of the ICSE 2013 program, San Francisco, California, May 2013. IEEE International Conference on Software Engineering (ICSE11), Chair of Mentoring Program.
- \* *Managing Uncertainties and Incompleteness in Software Development*, *IEEE ASE Workshop*, 2007, (with A. Egyed, M. Chechik, A. Orso, K. Sullivan).
- \* Co-organizer (with Holger Giese, Rogerio de Lemos, Hausi Müller, David Garlan, Jeff Magee, Richard Taylor), *Dagstuhl Workshop on Self-adaptive Systems*, January, 2008.
- \* Co-organizer (with Michel R.V. Chaudron, Christian Lange, Jacqueline McQuillan, Frank Weil, Andrij Neczwid) *IEEE/ACM MoDELS Workshop on Model Size Metrics*, October 2007.
- \* Co-organizer with Alex Wolf, *IEEE/ACM International Workshop on the Engineering of Software Services for Pervasive Environments (ESSPE)*, 2007 (held in conjunction with ESEC/FSE2007), Dubrovnik, Croatia.
- \* Co-organizer (with Hausi Müller, David Garlan, Rogerio de Lemos, Jeff Magee, Marin Litiou), *IEEE ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2007, Minneapolis, Minnesota.
- \* Co-organizer (with Frank Weil, Brian Berenbach, AW Brown, Robert France, Andrij Neczwid) *IEEE/ACM MoDELS Workshop on Model Size Metrics*, October 2006.
- \* *Workshop co-organizer (with Frank Houdek, DaimlerChrysler AG, Germany and Shigeyuki Kawana, Toyota Motor, Japan)*, *International Workshop on Automotive Requirements Engineering (AuRE)*, Minneapolis, Minnesota, September 2006.
- \* Co-organizer (with David Garlan, Carnegie Mellon Univ. and Rogerio de Lemos, Univ of Kent), *IEEE ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 21-22, 2006, Shanghai, China.
- *Doctoral Symposium Chair*, IEEE International Requirements Engineering Conference (RE06), 2006, Minneapolis, Minnesota.
- *Emerging Results Track Chair* (B. Shen, Shanghai, China, Asia Co-Chair) IEEE International Conference on Software Engineering (ICSE06), Shanghai, China, 2006.
- *Formal Research Demos Chair*, IEEE International Conference on Software Engineering (ICSE04), Edinburgh, Scotland, 2004.
- *Doctoral Symposium Chair*, ACM SIGSOFT Foundations of Software Engineering/European Software Engineering Conference (FSE/ESEC 2003),
- *Organizing Committee*, IEEE International Conference on Software Engineering (ICSE03), Chair of Frontiers of Software Practice Track.
- *Workshops Chair*, IEEE International Requirements Engineering Conference (RE03),

- *Program Co-Chair*, IEEE International Conference on Requirements Engineering (ICRE00), Schaumburg, Illinois, 2000. IEEE/NSF Workshop on Industrial Strength Formal Specification Techniques, 1995.
- *Doctoral Symposium Program Committee and Panelist*,
  - \* IEEE International Conference on Software Engineering (ICSE 2015), Florence, Italy.
  - \* ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS10), Oslo, Norway.
  - \* ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS09), Denver, Colorado.
  - \* ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS08), Toulouse, France.
  - \* ACM International Conference on Foundations of Software Engineering, 2008 (FSE08), Atlanta, Georgia.
  - \* IEEE/ACM International Conference on Software Engineering, 2007 (ICSE07), Minneapolis, Minnesota.
  - \* IEEE/ACM MoDELS Conference, October 2005, Jamaica,
  - \* IEEE International Requirements Engineering Conference (RE05), 2005, Paris, France.
- *Program Committee Member* (Over the past ten years)
  - \* International Workshop on Modeling in Automotive Software Engineering (MASE 2015), Ottawa, Canada.
  - \* European Software Engineering Conference and Foundations for Software Engineering (ESEC/FSE), Bergamo, Italy, August/September 2015.
  - \* North American Search Based Software Engineering Symposium (NASBASE), Dearborn, Michigan, March 2015.
  - \* IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO), 2015.
  - \* IEEE Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), 2015.
  - \* IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO), 2014, Imperial College London.
  - \* International Symposium on Search-based Software Engineering (SSBSE-14), Brazil.
  - \* IEEE International Conference on Software Engineering Workshop on Models in Software Engineering (MiSE), Hyderabad, India, 2014.
  - \* International Workshop on Combining Modeling with Search- and Example-Based Approaches, Valencia, Spain, 2014.
  - \* International Workshop on Model-Driven Requirements Engineering (MODRE), Karlskrona, Sweden, 2014.
  - \* Seventh IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO), Philadelphia, PA, 2013.
  - \* International Workshop on Combining Modeling and Search-based Software Engineering (CMSBSE), part of ICSE 2013, San Francisco, California, May 2013.



- \* IEEE/ACM MoDELS Workshop on Models at Run Time, October 2012.
- \* IEEE International Conference on Software Engineering (ICSE-12).
- \* IEEE/ACM MoDELS Workshop on Models at Run Time, October 2011.
- \* Workshop on Requirements Engineering Patterns (REP-2011).
- \* IEEE International Symposium on Search-Based Software Engineering (SSBSE-2011).
- \* IEEE International Conference on Software Engineering (ICSE-11).
- \* Workshop on Living with Inconsistency (LWI-10), 2010, co-located with IEEE Automated Software Engineering Conference.
- \* IEEE Workshop on Composition: Objects, Aspects, Components, Services and Product Lines, co-located with IEEE International Conference on Aspect-Oriented Software Development (AOSD10).
- \* ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE 2010).
- \* IEEE International Conference on Aspect-Oriented Software Development (AOSD10).
- \* International Conference on Autonomic Computing (ICAC-10), 2010.
- \* International Symposium on Architecting Critical Systems (ISARCS2010).
- \* IEEE/ACM MoDELS Workshop on Models at Run Time, October 2010.
- \* Annual IEEE ICSE International Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), 2010.
- \* IEEE International Conference on Software Engineering (ICSE09).
- \* IEEE 2009 International Conference on Vehicular Electronics and Safety.
- \* IEEE/ACM MoDELS Workshop on Models at Run Time, October 2009.
- \* Symposium on Automotive/Avionics Systems Engineering 2009.
- \* 7th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2009).
- \* IEEE International Conference on Aspect-Oriented Software Development (AOSD09).
- \* Symposium on Automotive/Avionics Systems Engineering, 2008.
- \* International Workshop on Requirements Engineering Visualization (REV 2008), September 2008.
- \* National Workshop on Automotive Cyber-Physical Systems, Troy, Michigan, April 2008.
- \* IEEE/ACM MoDELS Conference, October 2008.
- \* IEEE/ACM MoDELS Workshop on Models at Run Time, October 2008.
- \* IEEE International Requirements Engineering Conference (RE08).
- \* 8th Working IEEE/IFIP International Conference on Software Architecture (WICSA), 2008.
- \* IEEE ICSE Workshop on Ultra-Large Scale Systems (ULSSIS08).
- \* IEEE/ACM International Workshop on the Engineering of Software Services for Pervasive Environments (ESSPE), 2007 (held in conjunction with ESEC/FSE2007), Dubrovnik, Croatia.

- \* IEEE ICSE Workshop on Models in Software Engineering (MiSE07, MiSE08).
- \* International Symposium on Grand Challenges in Traceability (GCT), 2007.
- \* IEEE/ACM International Conference on Software Engineering, 2007 (ICSE07), Educators Symposium.
- \* Annual IEEE International Workshop on Engineering of Autonomic and Autonomous Systems (EASe), 2007, 2008.
- \* Annual IEEE ICSE International Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), May, 2007, 2008.
- \* Software Engineering and Middleware (SEM) Workshop, co-located with Foundations of Software Engineering Symposium, Portland, Oregon, November 2006.
- \* International Workshop on Requirements Engineering Visualization (REV 2006), September 2006.
- \* International Conference on Dependable Systems and Networks (DSN) Workshop on Architecting Dependable Systems (WADS), 2006.
- \* First Annual IEEE ICSE International Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), May, 2006.
- \* IEEE RE05 Workshop on Requirements Engineering Education and Training (REET), 2005.
- \* IEEE International Requirements Engineering Conference (RE01,RE02, RE03, RE04, RE05).
- \* IEEE UML (1999, 2000, 2001, 2002, 2004, 2005 (MODELS: Research and Education PCs)).
- \* IEEE/ACM SIGSOFT *Workshop on Specification and Verification of Component-Based Systems (SAVCBS)* affiliated with the *Foundations of Software Engineering (FSE)/ESEC*, September 2005, Lisbon, Portugal.
- \* IEEE/ACM Workshop on Architecting Dependable Systems (WADS05), associated with ICSE05, May 2005.
- \* *ACM SIGSOFT Workshop on Self-Managing Systems (WOSS04)*, workshop co-located with *ACM SIGSOFT Foundations of Software Engineering (FSE)*, October 2004.
- \* IEEE/ACM *CSDUML (Workshop on Critical Systems Development with UML)*, associated with *UML Conference*, October 2004.
- \* IEEE/ACM SIGSOFT *Workshop on Specification and Verification of Component-Based Systems (SAVCBS)* affiliated with the *Foundations of Software Engineering (FSE)*, November 2004.
- \* IEEE *Second International Workshop on Comparative Evaluation in Requirements Engineering (CERE04)*, affiliated with *Requirements Engineering (RE04)*, Kyoto, Japan, September 2004.
- \* IEEE Software Engineering for High Assurance Systems Workshop (SEHAS03).
- \* IEEE Requirements for High Assurance Systems Workshop (RHAS02).
- \* IEEE ICSE Workshop on Component-based Software Engineering (CBSE4,CBSE5, CBSE6), 2001, 2002, 2003.
- \* IEEE Multimedia Software Engineering (MSE 2002).

- \* *ACM OOPSLA01 Workshop on Specification and Verification of Component-Based Systems*, Tampa, Florida, October 2001.
- \* IEEE International Conference on Requirements Engineering (1998, 1996).
- \* ACM Symposium on Software Reusability (1999, 1997).
- \* IEEE International Conference on Software Engineering, Kyoto, Japan 1998.
- \* IEEE International Conference on Distributed Computing Systems (1999, 1995).
- *Session Chair*, (Over the past ten years)
  - \* *IEEE ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2009, Vancouver, Canada.
  - \* *Eighth International Conference on Aspect-Oriented Software Development (AOSD09)*, Charlottesville, Virginia, March 2009.
  - \* *IEEE ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2008, Leipzig, Germany.
  - \* *IEEE Conference on High Assurance Software Engineering (HASE07)*, November 2007, Dallas, Texas.
  - \* *Managing Uncertainties and Incompleteness in Software Development, IEEE ASE Workshop*, 2007, Atlanta, Georgia.
  - \* IEEE International Symposium on Requirements Engineering (RE06), Minneapolis, Minnesota, September 2006.
  - \* ACM/IEEE 8th International Conference on Model Driven Engineering Languages and Systems (MoDELS05), October, Montego Bay, Jamaica.
  - \* IEEE Joint International Requirements Engineering Conference (RE02), September, Essen, Germany.
  - \* IEEE Workshop for Requirements for High Assurance Systems (RHAS02), September, Essen, Germany.
  - \* IEEE International Symposium on Requirements Engineering (RE01), August, Toronto, Canada.
  - \* IEEE 4th ICSE Workshop on Component-based Software Engineering (CBSE4), 2001, May 2001, Toronto, Canada.
- *Member*, International Federation of Information Processing Working Group on Requirements Engineering (IFIP WG 2.9), 2008-present.
- *ACM CAPS Director* (Conference Attendance Program for Students), (1996-2003), Evaluate applications and allocate travel funds to students to attend conferences. Received ACM SIGSOFT Outstanding Service Recognition Award, 2003.
- *External Examiner*, PhD Thesis, Brice Morin, Advisor: Jean-Marc Jezequel, INRIA, France, 2010.
- *External Examiner*, PhD Thesis, Jianwei Niu, Advisor: Joanne Atlee and Nancy Day, University of Waterloo, Canada, 2005.
- *External Examiner*, PhD Thesis, Rossana De Castro, Advisor: Luigi Logrippo, University of Ottawa, Canada, 2001.

- *External Examiner*, MSc Thesis, Charlotte Ackerman, Department of Computer Science, University of Stellenbosch, South Africa, 1993.
- *Reviewer*, ACM Transactions on Software Engineering and Methodologies, Architecting Dependable Systems V (Chapter Review), IEEE Trans. on Software Engineering, IEEE Software, IEEE Trans. on Knowledge and Data Engineering, IEEE Computer, IEEE Expert, Int'l J. of Software Engineering and Knowledge Engineering, J. of Computer and Software Engineering, J. of Parallel and Distributed Computing, Information Processing Letters, J. of Automated Software Engineering, and numerous conferences.
- *Senior Member*, IEEE.
- *Member*, IEEE Computer Society, IEEE Technical Council on Software Engineering, Committees for Reusability, Reverse Engineering, Software Engineering Education, Software Reliability Engineering, and Technology Transfer
- *Member*, Association for Computing Machinery, ACM SIGSOFT and SIGPLAN.
- *Book Reviewer*, Software Engineering, Programming Language, and Discrete Mathematics text books.

## Theses Supervision

### Doctoral

- Chad Byers “Harnessing Evolutionary Computation for the Design and Generation of Adaptive Embedded Controllers within the Context of Uncertainty” (PhD, defended October 2015).
- Erik Fredericks “Harnessing Evolutionary Computation to Mitigate Uncertainty in High-Assurance Dynamically Adaptive Systems” (PhD, December 2014), Oakland University.
- Andres Ramirez “Applying Evolutionary Computation Techniques to Address Environmental Uncertainty in Dynamically Adaptive Systems” (PhD, May 2013), Citadel.
- Ji Zhang “A Formal Approach to Providing Assurance to Dynamically Adaptive Software” (PhD, May 2007), PayPal.
- S. J. Konrad “Model-Driven Development and Analysis of High Assurance Systems,” (PhD, September 2006), Siemens Corporate Research.
- L. A. Campbell “Integrating and Visualizing Analysis Techniques for Object-Oriented Designs,” co-advisor with K. Stirewalt, (PhD, August 2004), Central Michigan University.
- W. E. McUumber “A Generic Framework for Formalizing Object-Oriented Modeling Notations for Embedded Systems Development” (PhD, August 2000), Managing Partner, Mackinac Software, President, Object Software Research.
- Y. Chen “Automating Component-Based Software Development” (PhD, August 1999), Product Manager, Cadence, San Jose, California.
- G. C. Gannod “Integrating Informal and Formal Techniques to Reverse Engineer Imperative Programs” (PhD, August 1998), Professor at Miami University, Ohio.

- E. Y. Wang “Integrating Informal and Formal Approaches to Object-Oriented Analysis and Design” (PhD, March 1998), Distinguished Member of Technical Staff, Lucent Technologies, Ohio.
- J. L. Sharnowski “The Integration of an On-line Parallel Debugger with a Visualization Methodology for Modeling Expected Behavior” (PhD, May 1995), Senior Project Manager at PTC, Michigan.
- D. R. Chesney “Matrix-based Representations of Loop Transformations” (PhD, February 1995), University of Michigan, Ann Arbor, Michigan.
- S. W. Turner “Processor Scheduling in a Distributed-Memory Computing Environment,” co-advisor with L. M. Ni, (PhD, January 1995), Department Chairperson, Associate Professor at University of Michigan at Flint, Michigan.
- D. F. Robinson “Scalable Multicast Communication in Massively Parallel Computers” co-advisor with P. K. McKinley, (PhD, August 1994), Professor of Computer Science at Quincy University, Illinois.
- J. J. Jeng “Applying Formal Methods to Software Reuse” (PhD, December 1993), IBM T. J. Watson Research Center, New York.
- Heather Goldsby “Model-Driven Engineering Approaches to Developing Dynamically Adaptive Software” (PhD, started January 2006 and in January 2009 switched to Biological emphasis of evolution under supervision of Charles Ofria and completed in 2012).

## Current Doctoral Students

Adam Jensen “Using Evolutionary Computation to Refactor Software Models” (PhD, started January 2010, on personal leave 2012).

Byron DeVries “Detecting and Mitigation Feature Interactions in Onboard Systems in the Face of Uncertainty” (PhD, started Fall 2013).

## Masters

Rachael Ross “ Detect Feature Interaction and Exploiting Multicore computing for onboard vehicle systems,” (MS, expected May 2018).

Gabrielle Nguyen “ Crime Prevention for Cybersecurity,” (MS, expected May 2018).

Saptarshi Mitra “Automotive Cybersecurity,” (MS, expected May 2017).

Austin Gregory “Harnessing Evolutionary Computation to Manage Nonfunctional Requirements of Dynamically Adaptive Systems” (MS, expected August 2013).

Adam Jensen “Using Evolutionary Computation to Refactor Software Models” (MS, December 2009).

Andres Ramirez “Design Patterns for Developing Adaptive Systems” (MS, December 2008).

Daniel Fiedler “Goal-Driven Modeling and Analysis of Security Requirements” (MS, December 2007).

Greg Brown “Enabling Model-Driven Engineering” (MS, August 2007).

Stephane Kamdoun “A Generic Visualization Environment for Model-Driven Analysis” (MS, Spring 2006).

Sascha Konrad “Defining and Using Requirements Patterns for Embedded Systems” (MS, August 2003).

Ronald Wassermann “Security Patterns” (Completed thesis as part of international student exchange program with Kaiserslautern University, Germany, June 2003).

Gretel Coombs “Object-Oriented Design of Embedded Systems with Translation to VHDL” (MS, June 1998).

Amy Christensen “A Three-Pronged Approach to the Development of Software-Based Safety Critical Systems” (MS, July 1995).

Steve R. Schafer “Configuration Management Based on Software Component Locality and System Structure” (MS, May 1995).

Enoch Y. Wang “A Graphical Environment for a Formal Approach to Object-Oriented Analysis Modeling” (MS, May 1995).

Gerald C. Gannod “The Application of Formal Methods to the Reverse Engineering of Imperative Program Code” (MS, May 1994).

William E. McUmber “Temporal Specification Systems for Distributed Systems” (MS, August 1993).

## Other Research Projects

### Postdoctoral Research

- A. Ebnenasir (Michigan Technological Univ), 2005-2006, “Model-driven development of fault-tolerant systems”.

- J. Bisbal (University of Dublin), 2003-2004, “Resource-based Feature Interaction”.

### **Master’s Projects Supervision**

- Ryan Stephenson “Design Metrics and Guidelines for UML Diagrams” (MS, May 2005).
- Michelle Pirtle “Dynamically Adapting Intrusion Detection Systems” (MS, May 2003).
- Gary Holms “Reverse Engineering and Configuration Management Framework for Object-Oriented Systems” (MS, May 1998).
- Shu Yi Lin “A Generic Postscript Generation Library for Window Systems” (MS, August 1995).
- April Lee “A Framework for Integrating Databases and Geographical Information Systems” (MS, August 1995).
- Paul E. Fraley “Spectacle II: A Toolkit for Graphical Specification Editors” (MS, May 1995).
- Michelle Morin “Graphical Development Environment for Larch Shared and Interface Languages” (MS, April 1994).
- Michael. Laux “An Integrated Development Environment for Formal Specifications” (MS, August 1993).
- Tom Danieli “Construction of Formal Specifications from an Object-oriented Decomposition of Informal Problem Descriptions” (MS, August 1992).
- Doug Pierce “Intelligent Browser for Formal Specifications of Software Components” (MS, August 1991).

### **Undergraduate Research**

- Brad Doherty “UML Modeling for Visually-Impaired Persons” (Summer 2015-present)
- Marcus Botros “3D Printing of UML Diagrams” (Fall 2014).
- Geoff Carlson “Harnessing Evolutionary Computation for adaptive robot controllers in the Webots Environment” (Fall 2010-Fall 2012)
- James Gung “Goal-based modeling of cyberphysical adaptive systems” (Summer 2010).
- Hanqing Hu “Program Analysis and Visualization of Digital Organisms” (Summer 2009-present).
- Randee Bierlein “Model-driven Code Generation” (Spring 2006-Fall 2006).
- Jill Randall “Trusted Web applications” (Fall 2002).
- Sherri Goings “Aspect-oriented development of adaptive software” (2002) (co-advised with L. Dillon and K. Stirewalt).
- Anjani Shah “Tools for Visualizing Automated Analysis” (Spring 2001-2002). (Started as a McNair/SROP Fellow, and is continuing as an undergraduate research assistant).
- Ryan Stephenson “Developing Configurable Graphical Editors” (Fall 99 –Spring 2002). (Started as a Professorial Assistant and is continuing as an undergraduate research assistant.)
- Yin Lau “Translating Graphical Models into Textual Representations” (Fall 99).
- Brian Cox “Visual Tools for Reverse Engineering” (Summer 1998).
- Sergio Marti “Multimedia-Based Web Authoring Techniques” (May 1997 - 1998).
- Joe Budzyn “Object-Oriented development of Room Scheduling Utility” (January 1995 - May 96).

Heather Richter “Formalizing and Integrating the Functional Model into the Object Modeling Technique;” “Multimedia Applications” (Fall 1994- December 1995).

Jason Goris “Graphical environment for developing object-oriented software” (Spring 94).

Patrick Luhman “Graphical environment for developing object-oriented software” (Spring 94).

Steve R. Schafer “Classifying Multimedia Information” (Fall 1992-Summer 1993).

Gerald C. Gannod “A Formal Approach to Reverse Engineering” (Fall 1990-Summer 1992).

Jennifer Rodriguez “Formally Specifying and Deriving Programs” (Fall 1990-Spring 1992).

## University Teaching Experience

### Courses developed:

- Model-Driven Engineering of High-Assurance Adaptive Systems (CSE891), Spring 2008.
- Requirements Engineering (CSE491-602), Fall 2006.
- Topics in Formal Methods for Software Development, CSE914, (Fall 2002: Formal Methods for Security; Fall 2003: High Assurance for Adaptive Software).
- Advanced Software Engineering (lecture/project), CSE870 (2000-present)
- Software Engineering for Embedded Systems (lecture/industry project), CSE470 (1999-present)
- Software Engineering (lecture/project), CPS470 (1992-1994)
- Software Engineering (lecture/lab), CPS470 (1995)
- Software Engineering Capstone (lecture/project), CPS478 (1995) (with M. Heimdahl)
- Organization of Programming Languages (lecture/lab), CPS452.
- Formal Methods for Software Development (lecture), CPS814
- Topics in Formal Methods, CPS914 (reading/paper)
- Formal Methods for Software Engineering (Honor’s College), CPS491, reading/project.
- Building Graphical User Interfaces, CPS801
- Building Multimedia Applications, CPS890
- Building CASE tools using Object-Oriented Analysis and Design, CPS890.
- Formally Reasoning about the Correctness of Programs with Pointers and Recursion, CPS890.

### Courses taught in addition to above:

- Software Engineering, CSE435 (Fall 2007).
- Senior Software Engineering Capstone course, CPS478 (Spring 1998). (Involved corporate sponsored projects).
- Senior Capstone course: Tools for Concurrent Systems, CPS479 (Spring 1996).
- Organization of Programming Languages (lecture/projects), CSE452 (semester).
- Organization of Programming Languages (lecture/lab), CPS400 (qtr)



- Analysis of Algorithms (lecture), CPS834 (qtr).

### **Teaching Innovations:**

- Introduction of formal specification languages to undergraduate software engineering (including Z, Larch, and more recently Promela).
- Introduction and significant growth of Software Engineering area in Department.
  - New undergraduate and new graduate level course in Software Engineering
  - Significant impact of software engineering on Senior Capstone course (required for all students)
- Introduction of Formal Methods area to Department
  - Two new graduate level courses
- Introduction of Embedded Systems into the Software Engineering education.
- Incorporation of projects from industrial partners for Software Engineering course and Capstone course.
- Development of object-oriented modeling tools for use in undergraduate and graduate software engineering course.
- Development of graphical browser for formal specification repository (Larch Development Environment), used by CSE courses and other universities.

## **Committee Activities, Michigan State University**

### **Department Level:**

- *Chair* Department of Computer Science and Engineering Tenure and Promotion Committee, 2005-2007.
- *Chair* of Graduate Studies and Research Committee, 1999-2003.
- Advisory Committee (elected by Faculty), 1993-1995; 1995-1997; 2003-present.
- Graduate Studies and Research Committee, 1992-1993, 1997-98, 2003-2005, 2009-present.
- Awards Committee, 1999-2000; 2011-present.
- Withrow Teaching Awards Committee, 1999-2000.
- Undergraduate Curriculum Committee, 1990-1991, 1995-1996.
- Computing Environment Committee, 1993-1994, 2005-present.
- Faculty Search Committee, 1991-92; 1993-94; 1995-96; 1996-97; 2000-2001 (elected by faculty); 2001-2002 (elected by faculty); 2004-2005 (elected by faculty).
- Chair Search Committee (elected by faculty), 1994-95; 2001-2002.
- Ad Hoc Computing Committee (appointed by Chair), 1995.
- Systems Analyst Search Committee, 1995.
- Undergraduate Advisor Search Committee, 1992-93.
- Qualifier Examination Committee, 1990-1996.

- PhD Committees, Czerny (PhD, 1998), Judd (PhD,ABD), S. Kim (PhD, 1994), Galsterer (PhD, 1995), Sass (PhD, 1999), White (PhD, 2000), **R. De Castro (PhD, 2001, Univ. of Ottawa)**, Behrends (CSE PhD, 2003), Biyani (CSE, PhD), Ebneenasir (PhD, 2004), E. Kasten (CSE, PhD), **G He, Fisheries and Wildlife (PhD)**, P. Ge (CSE, PhD, 2004), Sadjadi (CSE, PhD, 2004), Sowell (CSE, PhD), L. Wang (CSE, PhD).
- MS Committees, Arumugam (CSE, MS), Bonakdarpour (CSE, MS), P. Midlin (MS), M. Malinak (MS), Goldsby (MS) V. Vishram (MS, 1993), P. Hovland (MS, 1993), R. Cerra (MS, 1993), Wiggins (MS, 1993), **C. Ackerman (MS thesis, Univ. of Stellenbosch, South Africa, 1993)**, K. Oostendorp (MS, 1995), N. Feng (MS, 1995), Y. Chen (MS, 1994), J. Kusler (MS, 1995), M. Ramirez (MS, 1995), Y. Hui (MS, 1996), A. Kurtz (MS, 1996), W.S. Hwang (MS, 1996), D. Keenan (MS, 1996), Malenfont (MS, 1999).

#### College Level:

- CSE representative for College of Engineering Tenure and Promotion Committee, 2004-2008.
- College of Engineering Dean's Search committee (2005-2006).
- Chairperson, Engineering Research Council (2001-2003).
- Engineering Research Council (elected), 2000-2005.
- Mechanical Engineering Chair Search Committee, 2003-2004.
- Engineering College Advisory Council (elected), 1995-1996; 2014-present.
- Mechanical Engineering Faculty Search Committee, 1992-93.
- Mechanical Engineering Chair Search Committee, 1991-92.
- Dean's Advisory Committee on Women in Engineering, 1994-present.

#### University Level:

- Travel Advisory Committee, 2008.
- Ad Hoc University committee on Risk Analysis and Management Research at MSU (2005-present).
- Women's Advisory Committee to the Provost (appointed by Provost), 2002-2006.
- University Committee on Academic Policy (elected by Engineering faculty), 2002-2004.
- Honor's College Advisor, 1990-present.
- Advisory Committee for MSU/CIESIN, 1992-1994.
- Steering Committee for Alliance for Changing Environment, 1994-95.
- University Committee on GIS, 1995-present.

#### Outreach Activities

- "A Day in the Life of a Computer Science Student, " Presentation for EGR100, November 2007, April 2008.

- “High Assurance Computing,” Presentation to Computer Science and Engineering Strategic Partners Council, Fall 2005.
- “High Assurance Computing at Michigan State University,” Presentation for College of Engineering Brown Bag Seminar Series, April 2003.
- Mentoring minority high school student interested in Computer Science, Fall 2000.
- “Top Ten Reasons to Attend Graduate School” recruitment presentation to seniors at Rose-Hulman Institute, Terre Haute, Indiana, November 2000.
- “What is Computer Science and Software Engineering?” Presentation to Incoming Freshman at Michigan State University (approximately 200 students), Fall 1999.
- Annual Presentations for Graduate Seminar Series, Michigan State University, Fall 1994-present.
- MERIDIAN: An Integrated Framework for Developing Interactive Distributed Applications,” Presentation to Multidisciplinary Group (approximately 60 faculty and scientists) at Michigan State University for facilitating inter-disciplinary collaboration, May 1999.
- “Integrating Informal and Formal Approaches to Object-Oriented Development” Colloquium Series, Iowa State University, February 1998.
- “Formal Methods and Software Engineering,” Presentation to Alumni Visiting Board, Michigan State University, October 1994.
- “Computer Science and Software Engineering” Presentation to ROSES (Residential Option for Science and Engineering Students) program, Michigan State University, November 1994.

## References

Available upon request.