

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. Her dissertation addressed a translation-based approach to code generation from formal specifications. She joined the faculty at Michigan State University in 1990, where she developed and has taught several courses in software engineering and formal methods, making software engineering one of the fundamental areas in the undergraduate and graduate curricula. 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 received the Withrow Teaching award in 1998. With funding from NSF, NASA, and EPA, she established the Software Engineering Research Group, involving 10-15 research assistants over a six-year period.

In 1996, Dr. Cheng co-founded the Software Engineering and Network Systems Laboratory, where funding from NSF Research Instrumentation grants provided funds for the computing infrastructure. The SENS laboratory has since grown to include six faculty members and supports approximately 30 graduate research assistants. She has been a PI or Co-PI on externally funded projects totaling more than \$9.5 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)* for the past several years. She was 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.

Site Director, NSF IUCRC Center on High Assurance for Ultra-Large Scale Systems, 2007–present.

8/09-10/09 *Visiting Professor* in Laboratoire Informatique de L'Université de Pau et des Pays de L'Adour

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

Refereed Book Chapters:

- “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:

- “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. 1–8, 2011, 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 Refereed Papers:

- “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 (Re-MoDD),” 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.
- “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:

- “A Taxonomy of Uncertainty for Dynamically Adaptive Systems” (Andres J. Ramirez and Betty H.C. Cheng), (accepted to appear) in *Proceedings of IEEE International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, 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*, 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)*, 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), To Appear in the *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.
- “Design Patterns for Developing Dynamically Adaptive Systems,” (Andres J. Ramirez, Betty H.C. Cheng), in *Proceedings of IEEE International Conference on Software Engineering Workshop Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2010, Capetown, South Africa, full paper.
- “Adaptive Monitoring of Software Requirements,” (Andres J. Ramirez, Betty H.C. Cheng, and Philip K. McKinley), In the *Proceedings of First International Workshop on Requirements Engineering (RRT10)*, Sydney, Australia. September, 2010.
- “On the Use of Genetic Programming for Automated Refactoring and the Introduction of Design Patterns” (Adam C. Jensen and Betty H.C. Cheng), *ACM Proceedings of the*

Genetic and Evolutionary Computation Conference (GECCO), pp. 1341–1348, Portland, Oregon, USA, July 2010.

- “Automatically Generating Adaptive Logic to Balance Non-functional Tradeoffs During Reconfiguration” (Andres J. Ramirez, Betty H.C. Cheng, Philip K. McKinley, and Benjamin E. Beckmann), In the Proceedings of the 7th International Conference on Autonomic Computing (ICAC-10), Washington, DC, USA, pp. 225-234.
- “Evolving Models at Run Time to Address Functional and Non-Functional Adaptation Requirements,” (Andres J. Ramirez and Betty H.C. Cheng), In the Proceedings of the Fourth International Workshop on Models at Run Time (MaRT09), Denver, Colorado, USA, October, 2009.
- “A Goal-Based Modeling Approach to Develop Requirements of an Adaptive System with Environmental Uncertainty” (Betty H.C. Cheng, Pete Sawyer, Nelly Bencomo, Jon Whittle), the *Proceedings of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MoDELS 2009)*, Denver, Colorado, 2009. (Full paper, 16% acceptance rate.)
- “RELAX: Incorporating Uncertainty into the Specification of Self-Adaptive Systems,” (Jon Whittle, Pete Sawyer, Nelly Bencomo, Betty H.C. Cheng, Jean-Michel Bruel), *Proceedings of 17th IEEE International Requirements Engineering Conference (RE09)*, September 2009, Atlanta, Georgia.
- “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)*, pp. 97–106, Barcelona, Spain, June 2009, (**received Best Paper Award**). (Full paper, 16% acceptance rate).
- ”Applying Design Patterns to an Adaptive News Server,” (Andres J. Ramirez and Betty H.C. Cheng) *Sixth IEEE International Conference on Autonomic Computing (ICAC09)*, Barcelona, Spain, June 2009, short paper.
- “Modular Verification of Dynamically Adaptive Systems” (Ji Zhang, Heather Goldsby, and Betty H.C. Cheng), the *Proceedings of Eighth International Conference on Aspect-Oriented Software Development (AOSD09)*, Charlottesville, Virginia, March 2009.
- “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**).
- “A Language for Self-Adaptive System Requirements” (Jon Whittle, Pete Sawyer, Nelly Bencomo, and Betty H.C. Cheng), *Proceedings for SOCCER’08: International Workshop on Service-Oriented Computing Consequences for Engineering Requirements* (co-located with RE08), Barcelona, Spain, September 2008.

- “Avida-MDE: A Digital Evolution Approach to Generating Models of Adaptive Software Behavior” (Heather J. Goldsby, Betty H.C. Cheng), *Proceedings of ACM Genetic and Evolutionary Computation Conference (GECCO-08)*, Atlanta, Georgia, July, 2008 (full paper).
- “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**).
- “Design Patterns for Monitoring Adaptive ULS Systems” (Andres Ramirez and Betty H.C. Cheng), *IEEE International Conference on Software Engineering Workshop on Ultra-Large Scale Software-Intensive Systems (ULSSIS)*, May 2008.
- “Verifying and Analyzing Adaptive Logic through UML State Models,” (Andres Ramirez and Betty H.C. Cheng), *IEEE International Conference on Software Testing*, April 2008.
- “Goal-based Modeling of Dynamically Adaptive System Requirements,” (Heather J. Goldsby, Pete Sawyer, Nelly Bencomo, Betty H.C. Cheng, and Danny Hughes), *Engineering of Computer-Based Systems (ECBS08)*, Ulster, Northern Ireland, April 2008 (full paper).
- “Goal-Oriented Patterns for UML-Based Modeling of Embedded Systems Requirements” Heather Goldsby, Sascha Konrad, and Betty H.C. Cheng, *Proceedings of IEEE Conference on High Assurance Software Engineering (HASE07)*, Dallas, Texas, November 2007, pp. 7–14.
- “Pattern-based Modeling and Analysis of Failsafe Fault-Tolerance in UML” Ali Ebne-nasir and Betty H.C. Cheng, *Proceedings of IEEE Conference on High Assurance Software Engineering (HASE07)*, Dallas, Texas, November 2007, pp. 275–282.
- “i2MAP: An Incremental and Iterative Modeling and Analysis Process” Sascha Konrad, Heather Goldsby, and Betty H.C. Cheng, *Proceedings of ACM/IEEE Int. Conference Model-Driven Engineering Languages and Systems (MoDELS/UML 2007)*, Nashville, Tennessee, October 2007, pp. 451-466.
- “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.
- “Visualizing the Analysis of Dynamically Adaptive Systems Using i* and DSLs*,” (Pete Sawyer, Nelly Bencomo, Danny Hughes, Paul Grace, Heather J. Goldsby, and Betty H.C. Cheng), *Proceedings of Second International Workshop on Requirements Engineering Visualization (REV07)*, New Delhi, India, October 2007.
- “Future Research Directions in Requirements Engineering” Betty H.C. Cheng and Joanne M. Atlee, *Proceedings of IEEE ICSE Future of Software Engineering*, eds. L. Briand and A. Wolf, Minneapolis, Minnesota, May 2007, pp. 285–303.
- “Applying Digital Evolution to the Development of Self-Adaptive ULS Systems” (Philip K. McKinley, Betty H.C. Cheng, and Charles A. Ofria), *IEEE International Conference on Software Engineering Workshop on Ultra-Large Scale Systems (ULS)*, May 2007, Minneapolis, MN.

- “Digitally Evolving Models for Dynamically Adaptive Systems” (Heather J. Goldsby, David B. Knoester, Betty H.C. Cheng, Philip K. McKinley, and Charles A. Ofria), in *Proceedings of IEEE International Conference on Software Engineering Workshop Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, May 2007, Minneapolis, MN.
- “Re-engineering Legacy Systems for Assured Dynamic Adaptation” (Ji Zhang and Betty H.C. Cheng), in *Proceedings of IEEE International Conference on Software Engineering Workshop on Models in Software Engineering (MiSE)* May 2007, Minneapolis, MN.
- “A Visualization Framework for the Modeling and Formal Analysis of High Assurance Systems” (Heather Goldsby, Betty H.C. Cheng, Sascha Konrad, and Stephane Kamdoum), in *Proceedings of ACM/IEEE Int. Conference Model-Driven Engineering Languages and Systems (MoDELS/UML 2006)*, October 2006, Genova, Italy, pp. 707–721.
- “Visualizing Requirements in UML Models” (Sascha Konrad, Heather Goldsby, Karli Lopez, and Betty H.C. Cheng), *International Workshop on Requirements Engineering Visualization (REV 2006)*, held in conjunction with RE06, September 2006, Minneapolis/St. Paul, Minnesota.
- “Use Case-Based Modeling and Analysis of Failsafe Fault-Tolerance” (Ali Ebneenasir, Betty H.C. Cheng, Sascha Konrad), Poster Summary, *Proceedings of 14th IEEE International Requirements Engineering Conference (RE06)*, September 2006, Minneapolis/St. Paul, Minnesota, pp 343-344.
- “Goal-Oriented Modeling of Requirements Engineering for Dynamically Adaptive Systems” (H. Goldsby, B.H.C. Cheng), Poster Summary, *Proceedings of 14th IEEE International Requirements Engineering Conference (RE06)*, September 2006, Minneapolis/St. Paul, Minnesota, pp 345–346.
- “Pattern-based modeling and analysis of fault-tolerance” (Ali Ebneenasir and Betty H.C. Cheng), Abstract, *Proceedings of Dependable Systems and Networks*, June 2006, Philadelphia, Pennsylvania.
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- “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**), pp. 371–380. “Goal-oriented Specification of Adaptation Requirements in Adaptive Systems” (Gregory Brown, Betty H.C. Cheng, and Ji Zhang), in *Proceedings of IEEE ICSE Workshop of Software Engineering of Adaptive and Self-Managing Systems (SEAMS06)*, May, 2006, pp 23–29.
- “TA-LTL: Specifying Adaptation Timing Properties in Autonomic Systems” (Z. Zhou, J. Zhang, P. K. McKinley, and B. H. C. Cheng), *3rd IEEE Workshop on Engineering of Autonomic and Autonomous Systems (EASe 2006)*, Columbia, MD, April 2006.
- “UML formalization is a traceability problem” (R. E. K. Stirewalt, Min Deng, and Betty H. C. Cheng), *3rd International Workshop on Traceability in Emerging Forms of Software Engineering (TEFSE05)* (in conjunction with ASE05), pp. 31–36, November 2005.

- “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**. An extended and updated version of the paper appears in Lecture Notes in Computer Science, *Satellite Proceedings of ACM/IEEE MoDELS Conference*, vol. 3844, pp. 48-57, Springer-Verlag, 2006.
- “Lessons Learned from -Based Automated Analysis of Industrial UML Models,” Ryan Stephenson, Betty H.C. Cheng, Brian Berenbach, in *Proceedings of ACM/IEEE Int. Conference Model-Driven Engineering Languages and Systems (MoDELS/UML 2005)*, October 2005, Montego Bay, Jamaica. (25.5% acceptance rate).
- “The Four Levels of Requirements Engineering for and in Dynamic Adaptive Systems” (Daniel M. Berry, Betty H.C. Cheng, and Ji Zhang), *Proceedings of 11th International Workshop on Requirements Engineering Foundation for Software Quality (REFSQ)*, pp. 95-100, June 13-14, 2005, Porto, Portugal.
- “Facilitating the Construction of Specification Patterns-based Properties” (S. Konrad and B.H.C. Cheng), *13th IEEE International Requirements Engineering Conference (RE05)*, pp. 329–338, Paris, France, August-September 2005, pp. 329–338. (20% acceptance rate)
- “Real-time Specification Patterns,” (S. Konrad and B.H.C. Cheng), *IEEE International Conference on Software Engineering (ICSE05)*, pp. 372–381, St. Louis, Missouri, May 2005. (14% acceptance rate).
- “Transparent Shaping of Existing Software to Support Pervasive and Autonomic Computing” (S. Masoud Sadjadi, P.K. McKinley, and B.H.C. Cheng), *IEEE ICSE Workshop on Design and Evolution of Autonomic Computing Systems (DEAS)*, pp. 99–105, St. Louis, Missouri, May 2005. (also accepted for presentation).
- “An Approach to Implementing Dynamic Adaptation in C++” (Scott D. Fleming, B.H.C. Cheng, K. Stirewalt, P.K. McKinley), *IEEE ICSE Workshop on Design and Evolution of Autonomic Computing Systems (DEAS)*, pp. 118–124, St. Louis, Missouri, May 2005.
- “Specifying Adaptation Semantics,” (J. Zhang and B.H.C. Cheng), *IEEE ICSE Workshop on Architecting Dependable Systems (WADS)*, pp. 14–20, St. Louis, Missouri, May 2005.
- “Resource-based Approach to Feature Interaction in Adaptive Software,” (J. Bisbal and B.H.C. Cheng), *ACM SIGSOFT Workshop on Self-Managing Systems*, workshop colocated with *ACM SIGSOFT Foundations of Software Engineering (FSE)*, Newport Beach, CA, October 2004.
- “Enabling Collaborative Adaptation across Legacy Components” (Z. Yang, Z. Zhou, B. H. C. Cheng, and P. K. McKinley), In *Proceedings of the Third Workshop on Reflective and Adaptive Middleware (with Middleware’04)*, pp. 277-282, Toronto, Ontario, Canada, October 2004.
- “TRAP/J: Transparent Generation of Adaptable Java Programs” (S. M. Sadjadi, P. K. McKinley, B. H. C. Cheng, and R. E. K. Stirewalt), In *Proceedings of the 2004 International Symposium on Distributed Objects and Applications*, Agia Napa, Cyprus, October 2004.

- “Automated Analysis of Timing Information in UML Diagrams,” (Sascha Konrad, Laura Campbell, and Betty H.C. Cheng), *Proc. of IEEE International Conference on Automated Software Engineering*, Poster Summary, September 2004, Linz Austria.
- “Generation of self-optimizing wireless network applications” (S. M. Sadjadi, P. K. McKinley, R. E. K. Stirewalt, and B. H.C. Cheng), *Proceedings of of the International Conference on Autonomic Computing (ICAC-04)*, pages 310-311, New York, NY, May 2004.
- “Adding Safeness to Dynamic Adaptation Techniques,” *Workshop on Architecture for Dependable Systems (WADS04)* associated with *IEEE International Conference on Software Engineering (ICSE04)*, May 2004, Edinburgh, Scotland, 2004.
- “Using Security Patterns to Model and Analyze Security Requirements” (with S. Konrad, L. Campbell, and R. Wassermann), *IEEE Workshop on Requirements for High Assurance Systems*, (RHAS03), September 2003, Monterey, California.
- “A Requirements Pattern-Driven Approach to Specify Systems and check Properties” (with Sascha Konrad, Laura Campbell, and Min Deng), in *IEEE SPIN 2003 Workshop*, Portland, Oregon, May 2003.
- “Requirements Patterns for Embedded Systems” (with Sascha Konrad), *IEEE Joint International Requirements Engineering Conference (RE02)*, September 2002, Essen Germany.
- “Adding Formal Specifications to Requirements Patterns” (with Sascha Konrad and Laura Campbell), *IEEE Workshop on Requirements for High Assurance Systems*, (RHAS02), September 2002, Essen, Germany. (Workshop affiliated with RE02).
- “An Aspect-Oriented Approach to Dynamic Adaptation” (with Z. Yang, R. E. K. Stirewalt, J. Sowell, S. M. Sadjadi, and P. K. McKinley), *Proceedings of the ACM SIGSOFT Workshop on Self-Healing Systems (WOSS02)*, November 2002.
- “Automated Development and Run-time Adaptation of Interactive Distributed Applications” (B. Cheng, L. Dillon, K. Stirewalt, P. McKinley, S. Kulkarni, and J. Lee), accepted for *NCO Workshop on New Visions for Software Design and Productivity: Research and Applications*, Nashville, Tennessee, December 2001.
- “Integrating Informal and Formal Approaches to Requirements Modeling and Analysis” (with L. Campbell), *IEEE Proceedings Requirements Engineering (RE01)*, August 2001, Toronto, Canada.
- “A Suite of Tools for Facilitating Reverse Engineering Using Formal Methods” (with G. Gannod), in *Proc. of IEEE International Workshop on Program Comprehension*, Toronto, Canada, May 12-13, 2001.
- “A General Framework for Formalizing UML” (with W. E. McUumber), in *Proc. of IEEE International Conference on Software Engineering (ICSE01)*, Toronto, Canada, May 2001.
- “Object-Oriented Modeling and Automated Analysis of a Telemedicine Application” (with L. A. Campbell), *IEEE International Workshop on Software Specification and Design*, November 2000.

- “Enabling Automated Analysis through Object-Oriented Modeling Diagrams” (with Laura A. Campbell and Enoch Y. Wang), in *Proceedings of IEEE Dependable Systems and Networks (FTCS-30 and DCCA-8)*, New York, NY, June 2000.
- “UML-Based Analysis of Embedded Systems Using a Mapping to VHDL” (with William E. McUumber), in *Proceedings of IEEE High Assurance Software Engineering*, Washington, DC, November 1999.
- “A Framework for Classifying and Comparing Software Reverse Engineering and Design Recovery Techniques,” (with Gerald C. Gannod), in *Proceedings of the 6th IEEE Working Conference on Reverse Engineering*, Atlanta, Georgia, October 1999.
- “A Formal Approach to Reverse Engineering: A Case Study,” (with Gerald C. Gannod), in *Proceedings of the 6th IEEE Working Conference on Reverse Engineering*, Atlanta, Georgia, October 1999.
- “A Specification Matching Based approach to Reverse Engineering”, (with Gerald C. Gannod), in *Proc. of IEEE International Conference on Software Engineering (ICSE99)*, Los Angeles, California, May 1999.
- “PackRat: A Software Re-Engineering Case Study” (with G.C. Gannod, Gora Sudindranath, and Mark Fagnani) in *Proc. of IEEE Working Conference on Reverse Engineering*, October 1998.
- “An Automated Approach for Supporting Software Reuse via Reverse Engineering” (with G.C. Gannod and Y. Chen) in *Proc. of IEEE International Automated Software Engineering Conference*, October 1998.
- “A Rigorous Object-Oriented Design Process” (with Enoch Y. Wang), in *International Conference on Software Process (ICSP5)*, June 1998.
- “Formalizing and Integrating the Functional Model within Object-Oriented Design” (with Enoch Y. Wang), in *Proc. of International Conference on Software Engineering and Knowledge Engineering*, San Francisco, California, June 1998 (*Nominated for Best Paper Award*).
- “Formalizing and Automating Component Reuse” (with Yonghao Chen), in *IEEE Proc. of International Conference on Tools with Artificial Intelligence*, November 1997.
- “A Formal Automated Approach for Reverse Engineering Programs with Pointers” (with Gerald C. Gannod), in *Proc. of IEEE Automated Software Engineering*, November 1997.
- “Facilitating an Automated Approach to Architecture-based Software Reuse” (with Yonghao Chen), in *Proc. of IEEE Automated Software Engineering*, November 1997.
- “Formalizing and Integrating the Dynamic Model within OMT” (with Enoch Y. Wang and Heather A. Richter), in *IEEE Proc. of International Conference on Software Engineering (ICSE97)*, Boston, Massachusetts, May 1997, pp. 45–55.
- “Formally Specifying and Analyzing Architectural and Functional Properties of Components for Reuse” (with Yonghao Chen), *Proc. Eighth Annual Workshop on Software Reuse (WISR8)*, Columbus, OH, March 1997.
- “Integration of Informal and Formal Methods for the Reverse Engineering of C Programs” (with G. C. Gannod), in *IEEE Proc. of International Conference on Software Maintenance and IEEE Proc. of Working Conference on Reverse Engineering*, November 1996.

- “Bridging the Gap Between the Informal and Formal Approaches to Software Development” (with E.Y. Wang, R.H. Bourdeau, and H.A. Richter), in *Proc. of Software Engineering Research Forum*, November 1995.
- “A Scheduling Facility for Network of Workstations” (with Stephen W. Turner and Lionel M. Ni), *Proc. of High Performance Computing-Asia*, September 1995.
- “Strongest Postcondition Semantics as the Formal Basis for Reverse Engineering” (with G.C. Gannod), in *Proc. of IEEE Working Conference on Reverse Engineering*, Toronto, Ontario, Canada, pp. 188–197, July 1995.
- “A Distributed Multimedia Environmental Information System” (with J. L. Sharnowski and G.C. Gannod), *Proc. of IEEE International Conference on Multimedia and Computing Systems*, pp. 142–149, May 1995.
- “Specification Matching for Software Reuse: A Foundation” (with Jun-jang Jeng), *Proc. of ACM Symposium on Software Reuse*, pp. 97–105, April 1995.
- “A Visualization-Based Environment for Top-down Debugging of Parallel Programs” (with Joseph L. Sharnowski) *Proc. of 9th IEEE International Parallel Processing Symposium*, pp. 640–645, April 1995.
- “Generalizing the Unimodular Approach” (with D. R. Chesney), in *Proc. of IEEE 1994 International Conference on Parallel and Distributed Systems*, pp. 398–403, December 1994.
- “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**).
- “A Top-down Approach to Visualization-based Debugging of Parallel Programs” (with Joseph L. Sharnowski), presented in a poster session at *IEEE Supercomputing’94*, November 1994.
- “A Graphical Environment for Formally Developing Object-Oriented Software” (with E. Y. Wang and R. H. Bourdeau), *Proc. of IEEE Int’l Conf. on Tools with Artificial Intelligence*, pp. , November 1994 .
- “A Formal Approach to Reusing More General Components” (with Jun-jang Jeng), *Proc. of IEEE 9th Knowledge-Based Software Engineering Conference*, September 1994, pp. 90–97.
- “Optimal Multicast Communication in Torus Networks” (with D.F. Robinson and P.K. McKinley), *Proc. of International Conference on Parallel Processing*, Vol. I, pp. 134–141, August 1994.
- “A Formal Approach to Modeling Expected Behavior in Parallel Program Visualizations,” (with J.L. Sharnowski), *Proc. of Parallel Architectures and Languages Europe (PARLE’94)*, Lecture Notes in Computer Science, Vol. 817, Springer Verlag, pp. 202–213, July 1994.
- “The Object-Oriented Development of a Distributed Multimedia Environmental Information System” (with R.H. Bourdeau and G.C. Gannod), *Proc. of 6th International Conference on Software Engineering and Knowledge Engineering*, pp. 70–77, Jurmala, Latvia, June 1994.

- “Application of the Unimodular Approach to Loop Fission and Loop Fusion” (with David R. Chesney) presented at the *Scalable High Performance Computing Conference*, Knoxville, Tennessee, May 1994.
- “Applying Formal Methods and Object-Oriented Analysis to Existing Flight Systems,” (with Brent Auernheimer), *Proc. of 18th Annual Software Engineering Workshop*, pp. 274–282, Greenbelt, Maryland, December 1993.
- “Using Analogy to Determine Program Modifications Based on Specification Changes” (with Jun-jang Jeng), *Proc. of IEEE Int’l Conf. on Tools with Artificial Intelligence*, pp. 113–119, November 1993.
- “Efficient Collective Data Distribution in All-Port Wormhole-Routed Hypercubes” (with D. F. Robinson, D. Judd, and P. K. McKinley), *Proc. of IEEE Supercomputing’93*, pp. 792–803, November 1993.
- “A Temporal Model for Transparent Monitoring of Shared-Memory Multiprocessors” (with David F. Robinson) *Proc. of the IEEE 17th Annual International Computer Software and Applications Conference*, pp. 388–394, November 1993.
- “Using Formal Methods to Construct a Software Component Library,” (with Jun-jang Jeng), *Proc. of Fourth European Software Engineering Conference (ESEC)*, published in *Lecture Notes in Computer Science*, Vol. 717, Springer-Verlag, pp. 397–417, September 1993.
- “Contention Free 2-D Mesh Cluster Allocation in Hypercubes” (with Stephen W. Turner and Lionel M. Ni), *Proc. of International Conference on Parallel Processing*, pp. 125–129, August 1993.
- “A Two-Phase Approach to Reverse Engineering using Formal Methods,” (with Gerald C. Gannod), in *Lecture Notes in Computer Science*, Springer-Verlag, *Proc. of Formal Methods in Programming and Their Applications Conference*, pp. 335–348, June 1993.
- “An Integrated Development Environment for Formal Specifications” (with Michael R. Laux and Robert H. Bourdeau), *Proc. of the 5th International Conference on Software Engineering and Knowledge Engineering*, pp. 681–688, San Francisco, California, June 1993.
- “A Decision Support System for Regional Environmental Analysis” (with R.H. Bourdeau and B.C. Pijanowski), *Proc. of 25th International Symposium on Remote Sensing and Global Environment Change: Tools for Sustainable Development*, Vol. II, pp. 223–233, April 1993.
- “The Stride Interval Tests for Data Dependence Analysis,” (with Jianchang Mao and Lionel M. Ni), in *Proc. of 1992 International Conference on Parallel and Distributed Systems*, pp. 409–416. December 1992.
- “Formal Methods Applied to Reuse” (with Jun-jang Jeng), *Proc. of the Fifth Annual Workshop on Software Reuse*, October 1992.
- “A Transparent Monitoring Tool for Shared-Memory Multiprocessors,” (with David F. Robinson and Richard J. Enbody), *Proc. of IEEE 16th Annual International Computer Software and Applications Conference*, pp. 227–232, September 1992.

- “An Object-Oriented Toolkit for Constructing Specification Editors,” (with Robert H. Bourdeau), *Proc. of IEEE 16th Annual International Computer Software and Applications Conference*, 239–244, September 1992.
- “A Formal Approach to Automatic Source Code Translation for Parallel Architectures” (with D.R. Chesney), *Proc. of Minnowbrook Workshop on Software Engineering for Parallel Computing*, pp. 16–27, August 1992.
- “Mapping Formal Specifications to Parallel Program Visualizations” (with J.L. Sharnowski and M.V. LaPolla), *Proc. of Minnowbrook Workshop on Software Engineering for Parallel Computing*, pp. 29–34. August 1992.
- “Constructing Formal Specifications from Program Code”, (with Gerald C. Gannod) in *Proc. of the IEEE Third International Conference on Tools in Artificial Intelligence*, San Jose, California, pp. 125–128. November 1991.
- “Synthesis of Procedural Abstractions from Formal Specifications,” *Proc. of The IEEE 15th International COMPSAC’91: Computer Software and Applications Conference*, pp. 149–154. Tokyo, Japan, September 1991.
- “Constructing Formal Specifications from Informal Descriptions”, *Proc. of Fourteenth Minnowbrook Software Engineering Workshop*, Minnowbrook Conference Center, New York, pp. 22–23, July 1991.
- “Automated Synthesis of Data Abstractions,” *Proc. of Irvine Software Symposium*, Irvine, California, pp. 161–176, June 1991.
- “A Semantically Oriented Program Synthesis System,” *Proc. of IEEE Hawaii International Conference on System Sciences-22*, (with Simon M. Kaplan), pp. 85–94, Kona, Hawaii, January 1989.

Pedagogical Papers and Presentations:

- “Integrating Multimedia Technology into the Undergraduate Curriculum,” (P. McKinley, Betty H.C. Cheng, and J. Weng, *International Journal of Engineering Education*), volume 22, number 4, pp. 829–838. 2006.
- “Incorporating Large-Scale Projects into a Multi-Disciplinary Approach to Embedded Systems” (D. Rover, B. Cheng, C.L. Wey, and M. Mutka), *Proc. of 2000 International Conference on Engineering Education*, Taipei Taiwan, August 2000, pp. 105-108.
- “Embedded System Design in VESL,” (with M. Mutka, D. Rover, A. Niemi), Presentation at *ASEE 2000 Annual Conference*, June 2000.
- “Moving Industry-Guided Multimedia into the Classroom” (P.K. McKinley, B. Cheng, and J. J. Weng), *Proc. of the 30th ACM SIGCSE Technical Symposium on Computer Science Education*, New Orleans, Louisiana, pp. 160–164, March 1999.
- “A Multi-Pronged Approach to Bringing Embedded Systems into Undergraduate Education” (B. Cheng, D. T. Rover and M. Mutka) in *Proc. of ASEE*, June 1998.

Technical Reports:

- “A Pattern-Based Approach to Providing User Guidance for Specifying and Analyzing Properties,” Sascha Konrad and Laura A. Campbell and Betty H.C. Cheng, Technical Report MSU-CSE-04-3, January, 2004, submitted for publication.

- “TRAP: Transparent Reflective Aspect Programming” S.M. Sadjadis, P.K. McKinley, R.E.K. Stirewalt, and B.H.C. Cheng, Technical Report MSU-CSE-03-31, November 2003, submitted for publication.
- “Security Patterns,” R. Wassermann and B.H.C. Cheng, Technical Report MSU-CSE-03-23, August 2003.
- “Adding and Analyzing Timing Information for UML Diagrams for Embedded Systems,” Technical Report MSU-CSE-03-17, July 2003, submitted for publication.
- “Enabling Validation of UML Formalizations,” B.H.C. Cheng, R.E.K. Stirewalt, M. Deng, and L. Campbell, Technical Report MSU-CSE-03-20, July 2003, (revised November 2003).
- “Enabling Safe Dynamic Adaptation,” B.H.C. Cheng, Z. Yang, and J. Zhang, Technical Report MSU-CSE-03-11, May 2003, submitted for publication.
- “An OO-Framework Approach to a Generic UML Formalization Tool” R.E.K. Stirewalt, Betty H.C. Cheng, and William E. McUumber, MSU-CSE-02-16, June 2002.
- “A Suite of Tools for Facilitating Reverse Engineering Using Formal Methods,” (with G. C. Gannod), MSU-CSE-00-30, December 2000.
- “Formalized UML for Embedded Systems Design,” (with W. E. McUumber), MSU-CSE-00-11, May 2000.
- “A Generic Framework for Formalizing UML with Formal Languages” (with W. E. McUumber), MSU-CPS-99-10, February 1999 (revised February 2000), submitted for publication.
- “Design Document for ENFORMS II: Decision Support System for Great Lakes Regional Environmental Information System” (with Y. Chen, P. Fraley, G. Gannod, D. Judd, J. Kusler, H. Richter, S. Schafer, J. Sharnowski, S. Wagner, and E. Wang), Technical Report, MSU-CPS-95-24, May 1995.
- “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:

NSF/DBI: *DBI-0939454*

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

PI: E. Goodman

Duration: 2010-2015

Amount: \$25M,

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

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. ORCHID: A Digital Evolution Approach to Designing Adaptive Systems

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

Duration: 5/16/2008-5/15/2011

Amount: \$600,000

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 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.

Invited Technical Presentations

- “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 Autonomous 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:**

- Michigan State University, College of Engineering *Withrow Distinguished Scholar Award*, 2008.
- Michigan State University *Distinguished Faculty Award*, 2007.
- *Best Paper Awards*
 - * “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 Engineering 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-present)
 - *ACM Transactions on Autonomous and Adaptive Systems* (2011-present)
 - *Requirements Engineering Journal* (Kluwer Publishing)
 - *Journal on Software and Systems Modeling* (Springer-Verlag)
- **Other Journal Activities:**
 - *IEEE* Transactions and Magazine publications, EIC search committees.
- **Federal Agency Activities:**
 - *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.
 - 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 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.

- *Organizing Committee*, IEEE International Conference on Software Engineering (ICSE11), Chair of Mentoring Program.
- *Program Board (Associate Program Chair)*, IEEE International Requirements Engineering Conference 2006 (RE06).
- *Steering Committee Member* IEEE International Requirements Engineering Conference (RE, 2000-2005); Workshop on Architecting Dependable Systems (WADS, 2004-present).
- *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*,
 - * 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.
 - * 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*,
 - * 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)
 - * IEEE International Conference on Software Engineering (ICSE-12).
 - * 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

- 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. McUmber “A Generic Framework for Formalizing Object-Oriented Modeling Notations for Embedded Systems Development” (PhD, August 2000), Adjunct Faculty, Michigan State University and Object Software Research.
- Y. Chen “Automating Component-Based Software Development” (PhD, August 1999), Cadence, Chelmsford, Massachusetts.
- G. C. Gannod “Integrating Informal and Formal Techniques to Reverse Engineer Imperative Programs” (PhD, August 1998), Associate 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), 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 at Quincy University, Illinois.
- J. J. Jeng “Applying Formal Methods to Software Reuse” (PhD, December 1993), IBM T. J. Watson Research Center, New York.

Current Doctoral Students

- 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).
- Andres Ramirez “Automatically Generating Models for Adaptive Logic for Autonomous Systems” (PhD, started Fall 2008).
- Adam Jensen “Using Evolutionary Computation to Refactor Software Models” (PhD, started January 2010).

Chad Byers “Harnessing Digital Evolution for Software Product Lines” (MS/PhD, started June 2008).

Masters

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

- Geoff Carlson “Harnessing Evolutionary Computation for adaptive robot controllers in the Webots Environment” (Fall 2010-present)
- 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.
- 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), Ebnenasir (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.
- 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.