

**SPENCER RUGABER**  
**Adjunct Senior Research Scientist**  
**Schools of Computer Science and Interactive Computing**  
**Georgia Institute of Technology**

**November 1, 2025**

**EDUCATIONAL BACKGROUND:**

Ph.D.	1978	Yale University	Computer Science
M.S.	1971	Harvard University	Applied Mathematics
B.S.	1970	Yale University	Engineering and Applied Science

**EMPLOYMENT HISTORY:**

**Academic Experience:**

Adjunct Senior Research Scientist, College of Computing, Georgia Institute of Technology, 2012-present.  
Senior Research Scientist, College of Computing, Georgia Institute of Technology, 1993-2012.  
Program Director, Software Engineering and Languages Program, National Science Foundation, 2001-2002.  
Research Scientist II, College of Computing (formerly School of Information and Computer Science), Georgia Institute of Technology, 1988-1993.  
Adjunct Assistant Professor, Georgia Institute of Technology, School of Information and Computer Science, 1985-1987.  
Adjunct Assistant Professor, Rutgers University, Department of Computer Science, 1980-1981.  
Instructor, in-house Continuing Education Program, Bell Laboratories, 1971-1974, 1978-1981.

**Industrial Experience:**

Member of the Technical Staff, LogicBlox, Inc, Atlanta, Georgia, 2012-2014.  
National Advanced Systems Corporation, Senior Software Engineer, Atlanta, Georgia, 1987-1988.  
Unisys Incorporated (formerly Sperry Corporation), Professional Consultant, Atlanta, Georgia, 1985-1986.  
Interactive Systems Corporation, Senior Technical Staff, Estes Park, Colorado, 1981-1985.  
Bell Telephone Laboratories, Member of the Technical Staff, Murray Hill and Whippany, New Jersey, 1970-1974, 1977-1981.

**FIELDS OF INTEREST:**

Software Engineering: modeling, design, evolution and maintenance, reverse engineering and program comprehension; Programming Languages; Human-Computer Interaction; Artificial Intelligence.

**I. TEACHING**

**A. Recent Courses Taught (selected)**

<u>Qu/Year</u>	<u>Course</u>	<u>Students</u>
Fa,2006	CS 6300 Software Engineering Process	32
Fa,2007	CS 6390 Programming Language Design	16
Fa,2007	CS 4911 Design Project	37
Su,2008	CS 4342/6330 Software Generation, Testing and Maintenance	21
Su,2009	CS 4001 Computers and Society	33
Sp,2010	CS 4330/6310 Software Eng. Applications/Software Arch. and Design	44

Sp,2011	CS	4001	Computers and Society	32
Sp,2011	CS	3300	Introduction to Software Engineering	17
Su,2011	CS	4400	Introduction to Database Systems	39
Fa,2014	CS	6310	Software Architecture and Design (OMSCS)	154

## **B. Continuing Education**

Computer Aided Software Engineering, developed, taught five times.

Neural Networks, Genetic Algorithms, and Fuzzy Logic, developed and taught genetics algorithm segment, May 1995.

Weaving Web Pages / Introductory HTML, developed.

Samsung Summer Architecture Institute: two session (*Software Process*; *Software Architecture*); one panel organization and moderation (*Software Architecture in Practice*), Summer 2007.

## **C. Curriculum Development**

Engineering Software (undergraduate);

Principles of Software Design (graduate);

Software Generation, Testing, and Maintenance (graduate);

Requirements Analysis and Rapid Prototyping (graduate);

Software Evaluation (graduate);

Information Systems Design I (graduate)(complete revision);

Joint College of Engineering/College of Computing Committee on Engineering Software;

Teaching Effectiveness Committee, College of Computing;

Real World Laboratory (undergraduate);

Introduction to Computing I (graduate Bioinformatics Masters, with H. Venkateswaran);

Software Engineering Applications (undergraduate);

Software Architecture and Design (graduate);

Software Engineering Process (graduate);

Software Generation, Testing and Maintenance (graduate, undergraduate).

Design Project (undergraduate), revision of assessment mechanism.

Software Architecture and Design (on-line)

## **D. Individual Student Guidance**

### **2. Ph.D. Students Supervised**

Hernan Astudillo (administrative advisor), 1996, Professor, Departamento de Informática, Universidad Técnica Federico, Chile

Richard Clayton (administrative advisor), 1999, Adjunct Professor, Monmouth University

Rocky Dunlap, 2013, co-advised with Leo Mark, NOAA

Margaret Francel, 2002, Professor, The Citadel

Idris Hsi, 2005, co-advised with Colin Potts, Microsoft

Melody Jackson (nee Moore), 1998, co-advised with Jim Foley, Associate Professor, Georgia Tech

Chris Parnin, 2014, Microsoft

Richard Stirewalt, graduated 1997, LogicBlox.

Member of dissertation committee for forty-one Ph.D. students.

### **3. Ph.D. Special Problems Students**

Anton, Arnold (2), Astudillo, Browne(4), Clayton(3), DeBaud, Degani, Doddapaneni, Jermaine, Liebman, Nnadi, Parnin, Ravikumar, Santos, Shikano, Spoon (4), Taylor, Waters (4), Zook.

### **4. M.S. Students Supervised**

Acharya 2017, Ansari 2011, Bernard 2009, Chainani 2008, Colige 2012 (visiting student from University in Namur, Belgium), Crowe 2011, D'Andries, 2003, Gdalevich 2005, Gibby , Martie 2008, McNeely, 2001, Meyers 2008, Navarro 2007, Pawgi 2009-10, Popescu 2005, Scoccimaro, 2005.

### **5. M.S. Special Problems Students**

Baumgartner, Berzosa, D'Andries, Diaz, Hobbs (3), Nanduri (2), Ning, Pardun, Park, Rama (2), Sills, Stockton, Tiemans, Vick.

### **6. Undergraduate Senior Research and Special Problems Students**

Ansari (2), Asbell, Bare, Benau, Combee (2), D'Andries, Drysdale, Ellis, Feagin, Harris, Haygood, He, Hooda, Kane, Khatri (2), Kejriwal, Kobi, Li, Manning, Marcus, Moore, Neely, Newman, Oates, Park, Parker, Ragsdale, Rose, Rothman, Shi, Shumate, Sirotkin, Smith, Sprause, Standhardt, Steadman, Summer, Thomason, Tong, Valiveti, Vira, Wilson, Xue, Yang, Yuan (2), Zhao.

Supervised fourteen undergraduate /JuniorSenior Design projects.

Dissertation Opponent. Tarja Systa, University of Tampere, 2002.

## **II. RESEARCH AND CREATIVE SCHOLARSHIP**

### **A. Thesis**

*A Model of the Understandability of Computer Programs*, 1978, Alan J. Perlis advisor, Yale University, Ph.D. Thesis.

### **B. Published Journal Papers (refereed)**

"Validation and Verification of Reusable Ada Software," with C. Bullard, D. Guindi, W.B. Ligon, and W.M. McCracken. *Empirical Foundations of Information and Software Sciences V*, Pranas Zunde and Dan Hocking, editors, Atlanta, GA, 1988, pp. 437-454.

"Recognizing Design Decisions in Programs," with Stephen B. Ornburn and Richard J. LeBlanc, Jr., *IEEE Software*, Vol. 9, January 1990, pp. 46-54.

"Requirements Validation via Automated Natural Language Parsing," with Sastry Nanduri, *Journal of Management Information Systems*, 12(3): 9-19, Winter 1995-96.

"Understanding Interleaved Code," with Kurt Stirewalt and Linda Wills, *Automated Software Engineering*, 3(1/2):47-76, June 1996.

"Mission-Oriented Legacy System Evolution through Architectural Recovery and Evaluation", with Gregory Abowd, Ashok Goel, Michael McCracken, Melody Moore, Colin Potts, and Linda Wills. *Proceedings ICSE-97 Workshop on Migration Strategies for Legacy System Evolution*, Boston, Massachusetts, May 1997.

"Restoring a Legacy: Lessons Learned," with Jim White, *IEEE Software*, 15(4):28-33, July-August 1998.

"Using Visualization for Architectural Localization and Extraction," with Dean Jerding, *Science of Computer Programming*, Volume 36:267-284, 2000.

"The Use of Domain Knowledge in Program Understanding," *Annals of Software Engineering*, volume 9:143-192, 2000.

"The Model-Composition Problem in User-Interface Generation," with R. E. Kurt Stirewalt, *Automated Software Engineering*, Volume 7:101-124, 2000.

"The Value of Slicing while Debugging," with Margaret Ann Francel, *Science of Computer Programming*, Volume 40, 2001, 151-169.

"Model-Driven Reverse Engineering," with Kurt Stirewalt, *IEEE Software*, 21(4):45-53, July-August 2004.

"Earth System Curator: Metadata Infrastructure for Climate Modeling," with Rocky Dunlap, Leo Mark, V. Balaji, Julien Chastang, Luca Cinquini, Cecelia DeLuca, Don Middleton and Sylvia Murphy, *Earth Science Informatics*, November 2008.

"Structure, Behavior, and Function of Complex Systems: The Structure, Behavior, and Function Modeling Language," with Ashok K. Goel and Swaroop Vattam, *Artificial Intelligence in Engineering Design, Analysis and Manufacturing*, Volume 23, pp. 23-35, Special Issue on Developing and Using Engineering Ontologies, February, 2009.

"Understanding Complex Natural Systems by Articulating Structure-Behavior-Function Models," with Swaroop S. Vattam, Ashok K. Goel, Cindy E. Hmelo-Silver, Rebecca Jordan, Steven Gray and Suparna Sinha. *Educational Technology & Society*, Volume 14(1):66-81, Special Issue on Creative Design, 2011.

"Managing Software Complexity and Variability in Coupled Climate Models", with Rocky Dunlap, Leo Mark and Sameer Ansari. *IEEE Software*, Volume 28(6):43-48, 2011.

"Resumption Strategies for Interrupted Programming Tasks", with Chris Parnin. *Software Quality Journal*, Volume 19(1):5-34, 2011.

"A Feature Model of Coupling Technologies for Earth System Models", with Rocky Dunlap and Leo Mark. *Computers & Geosciences*, 2011.

"Conceptual Representations for Transfer: A Case Study Tracing Back and Looking Forward" with Suparna Sinha, Steven Gray, Cindy E. Hmelo-Silver, Rebecca Jordan, Catherine Eberbach and Ashok Goel, in *Frontline Learning Research*, 1(1):3-23, 2013.

"Interactive Meta-Reasoning: Towards a CAD-Like Environment for Designing Game-Playing Agents", with Ashok K. Goel, in *Computational Creativity Research: Towards Creative Machines, Atlantis Thinking Machines*, Volume 7, 2015, pp 347-370.

"GAIA: A CAD-Like Environment for Designing Game-Playing Agents", with Ashok K. Goel, *IEEE Intelligent Systems*, 32(3):60-67, 2017.

"Intelligent Links: AI-supported connections between employers and colleges", with Robby Robson, Elaine Kelsey, Ashok Goel, Sazzad Nasir, Elliot Robson, Myk Garn, Matt Lisle, Jeanne Kitchen, Spencer Rugaber and Fritz Ray. *AI Magazine*, 4(21):75-82, Spring 2022. <https://doi.org/10.1002/aaai.12040>.

### **C. Published Books and Parts of Books**

"Validation and Verification of Reusable Ada Software," with C. Bullard, D. Guindi, W.B. Ligon, and W.M. McCracken, in P. A. Lesslie, R. O. Chester and M. F. Theofanos, editors, *Guidelines Document for Ada Reuse and Metrics*, Martin Marietta Energy, Systems for U.S. Army Institute for Research in Management Information, Communications and Computer Science, 1988.

"Recognizing Design Decisions in Programs," with Stephen B. Ornburn and Richard J. LeBlanc, Jr., in Robert S. Arnold, *Software Reengineering*, IEEE Computer Society Press 1993.

"Understanding Interleaved Code," with Kurt Stirewalt and Linda Wills, in *Reverse Engineering*, Linda M. Wills and Philip Newcomb editors, Kluwer Academic Publishers, June 1996.

"Program Understanding," Allen Kent and James G. Williams editors, *Encyclopedia of Computer Science and Technology*, Marcel Dekker, Volume 35, Supplement 20, 1996.

"Using Declarative Descriptions to Model User Interfaces with MASTERMIND". Thomas Browne, David Davila, Spencer Rugaber, and Kurt Stirewalt. *Formal Methods in Human Computer Interaction*, Fabio Paterno and Philippe Palanque, editors, Springer-Verlag, 1997.

"Learning Functional Models of Complex Systems: A Reflection on the ACT project on Ecosystem Learning In Middle School Science" with Ashok K. Goel, David Joyner, Swaroop S. Vattam, Julia Svoboda, Cindy E. Hmelo-Silver, Rebecca Jordan, Suparna Sinha, Sameer Honwad, and Catherine Eberbach. *International Handbook on Meta-Cognition and Self-Regulated Learning*, R. Azevedo & V. Aleven (editors), 2012.

"Learning Functional Models of Aquaria: The ACT Project on Ecosystem Learning in Middle School Science", with Ashok K. Goel, David A. Joyner, Swaroop S. Vattam, Cindy E. Hmelo-Silver, Rebecca Jordan, Suparna Sinha, Sameer Honwad, and Catherine Eberbach, *International Handbook of Metacognition and Learning Technologies, Springer International Handbooks of Education*, Volume 28, 2013, pp 545-559.

*LogiQL: A Query Language for Smart Databases* with Terry Halpin, CRC Press, November 21, 2014.

"Interactive Meta-Reasoning: Towards a CAD-Like Environment for Designing Game-Playing Agents." With Ashok K. Goel. Chapter 17 in Tarek R. Besold • Marco Schorlemmer Alan Smaill (eds.), *Computational Creativity Research: Towards Creative Machines*, Atlantis Press, pp. 347-370, 2015.

"Explanation as Question Answering Based on User Guides," with Ashok Goel, Vrinda Nandan, Eric Gregori, and Sungeun An. *Explainable Agency in Artificial Intelligence / Research and Practice*, Silvia Tulli and David W. Aha (editors), Routledge, 2024.

"A4L: An Architecture for AI-Augmented Learning," With Goel, Ashok, Ploy Thajchayapong, Vrinda Nandan and Harsh Sikka. To appear In *Online Higher Education Administration: Strategies for Maximizing Returns and Improving Learning Outcomes*, Kathleen S. Ives, Marie Cini, and Ray Schroder (editors), Routledge Press, 2025. arXiv 2502.06314.

"Evolution of A4L: A Data Architecture for AI-Augmented Learning." with Ploy Thajchayapong, Suzanne Carbonaro, Tim Couper, Blaine Helmick and Ashok Goel. *Generative Risks and Benefits Within Human-Machine Teams*, William Lawless et al. (editors), Elsevier Press. (2026; in press).

#### **D. Edited Proceedings**

*Proceedings Third Workshop on Program Comprehension*, with Aniello Cimitile, IEEE Computer Society, 1994.

*Proceedings of the Sixth Working Conference on Reverse Engineering*, with Michael Blaha and Françoise Balmas, IEEE Computer Society, 1999.

#### **E. Conference Presentations**

##### **2. Conference Presentations with Proceedings (refereed)**

"Programming with Idioms in APL" with Alan J. Perlis, *Proceedings of APL International Conference*, Rochester, NY, 1979, pp. 232-235.

"The Impact of Verification of Reusable Components on Software Productivity" with W.M. McCracken and D.S. Guindi, *Proceedings of the Hawaii International Conference on System Sciences*, Kailau-Kona, Hawaii, January 1989.

"Reuse and the Software Lifecycle" with D.S. Guindi and W.M. McCracken, *The Annual National Conference on Ada Technology*, Atlantic City, NJ, March 1989.

"Fault Localization Using Execution Traces" with Margaret Francel, *Proceedings of the 30th Annual ACM Southeast Conference*, Raleigh, North Carolina, April 8-10, 1992, pp. 60-76.

"A Quick Tools Strategy for Program Analysis and Software Maintenance" with B. Johnson and S. Ornburn, *Proceedings of the Conference on Software Maintenance*, Orlando, Florida, November 1992

"Reverse Engineering: Resolving Conflicts between Expected and Actual Software Designs" with S. Ornburn, *Proceedings of the Conference on Software Maintenance*, Orlando, Florida, November 1992.

"The Representation Problem in Reverse Engineering" with Richard Clayton, *Proceedings of the First Working Conference on Reverse Engineering*", Baltimore, Maryland, May 21-23, 1993.

"The Transition of Application Programs from COBOL to a Fourth Generation Language," with Sri Doddapenini, *International Conference Software Maintenance*, September, 1993, Montreal, Canada.

"Domain Analysis and Reverse Engineering," with Jean-Marc DeBaud and Bijith M. Moopen, *Proceedings of the 1994 International Conference on Software Maintenance*, Victoria, British Columbia, Canada, September 19-23, 1994, 326-335.

"Knowledge-based User Interface Migration," with Melody Moore and Phil Seaver, *Proceedings of the 1994 International Conference on Software Maintenance*, Victoria, British Columbia, Canada, September 19-23, 1994, 72-79.

"Requirements Validation via Automated Natural Language Parsing," with Sastry Nanduri, *Proceedings of the 28th Hawaii International Conference on System Sciences*, Wailea, Maui, Hawaii, January 3-6, 1995.

"Reengineering Army Software to an Open Systems Environment," with Melody Moore and Reginald Hobbs, *Proceedings of the Seventh Annual Software Technology Conference*, Salt Lake City, Utah, April 9-14, 1995.

"The Interleaving Problem in Program Understanding," with Kurt Stirewalt and Linda Wills, *2nd Working Conference on Reverse Engineering*, Toronto, Ontario, Canada, July 14-16 1995, 166-175.

"A Software Re-engineering Method Using Domain Models," with Jean-Marc DeBaud, *International Conference on Software Maintenance*, Opio (Nice), France, October 16-20, 1995.

"Detecting Interleaving," with Kurt Stirewalt and Linda Wills, *International Conference on Software Maintenance*, Opio (Nice), France, October 16-20, 1995, 265-274, Best Paper.

"Creating a Research Infrastructure for Reengineering," with Linda Wills, *3rd Working Conference on Reverse Engineering*, November 8-10, 1996, Monterey, California.

"MORALE-Mission Oriented Architectural Legacy Evolution". Gregory Abowd, Ashok Goel, Dean F. Jerding, Michael McCracken, Melody Moore, J. William Murdock, Colin Potts, and Linda Wills. *Proceedings International Conference on Software Maintenance'97*, Bari, Italy, September 29-October 3, 1997.

"Using Visualization for Architectural Localization and Extraction", with Dean Jerding. October 6-8, 1997, *Proceedings of the Fourth Working Conference on Reverse Engineering* Amsterdam, The Netherlands, IEEE Computer Society.

"Domain Analysis for Transformational Reuse" with Melody Moore, October 6-8, 1997, *Proceedings of the Fourth Working Conference on Reverse Engineering*, Amsterdam, Netherlands, IEEE Computer Society.

"Using Knowledge Representation to Understand Interactive Systems" with Melody Moore, May 28-30, 1997, *Proceedings of the Fifth International Workshop on Program Comprehension*, Dearborn, Michigan, IEEE Computer Society Press.

"A Case Study of Domain-based Program Understanding" with Richard Clayton, Lyman Taylor, and Linda Wills, May 28-30, 1997, *5th International Workshop on Program Comprehension*, Dearborn, Michigan.

"Dowsing: A Tools Framework for Domain-Oriented Browsing of Software Artifacts" with Richard Clayton and Linda Wills, May 1998, *Proceedings of the Conference on Automated Software Engineering 1998*, Honolulu, Hawaii.

"On the Knowledge Required to Understand a Program" with Richard Clayton and Linda Wills, October 1998, *Fifth IEEE Working Conference on Reverse Engineering'98*, Honolulu, Hawaii.

"Automating UI Generation by Model Composition" with Kurt Stirewalt, October 1998, *Proceedings of Automated Software Engineering 1998*, Honolulu, Hawaii.

"The Relationship of Slicing and Debugging to Program Understanding," with Margaret Francel, May 1999, *Proceedings of the 7th International Workshop on Program Comprehension*, Pittsburgh, Pennsylvania.

"Architectural Element Matching Using Concept Analysis," with Bob Waters and Gregory Abowd, *Proceedings of Automated Software Engineering 1999*, Cocoa Beach, Florida.

- "A Tool Suite for Evolving Legacy Software," *Proceedings of the International Conference on Software Maintenance*, Oxford, UK, August 1999.
- "Adequate Reverse Engineering," *Proceedings of the 16<sup>th</sup> International Conference on Automated Software Engineering*, November 26-29, 2001, Coronado Beach, California, IEEE, 232-241.
- "Automated Invariant Maintenance Via OCL Compilation," with Kurt Stirewalt, *Proceedings of Model Driven Engineering Languages and Systems '05*, October 2-7, 2005, Montego Bay, Jamaica, Lionel C. Briand and Clay Williams, editors, Springer-Verlag, Lecture Notes in Computer Science, volume 3713, pp. 616-632.
- "Enriching Revision History with Interactions," with Chris Parnin and Carsten Görg, *International Workshop on Mining Software Repositories*, Shanghai, China, 2006.
- "Cataloging Design Abstractions," *Proceedings of the Workshop on the Role of Abstractions in Software Engineering*, May 21, 2006, Shanghai, China, pp. 11-17.
- "Problems Modeling Web Sites and User Behavior," with N. Harel, S. Govindharaj, and D. Jerding, *The 8th IEEE International Symposium on Web Site Evolution*, September 23-24, 2006; Philadelphia, PA.
- "Earth System Curator: Spanning the Gap Between Models and Datasets," with Cecelia DeLuca, Don Middleton, V. Balaji, Serguei Nikonov, Chris Hill, Leo Mark, Rocky Dunlap, and Dean Williams, *2006 IEEE International Geoscience and Remote Sensing Symposium*, Denver Colorado, July 31-August 4, 2006.
- "Improving the Quality of Requirements Specifications via Automatically Created Object-Oriented Models," with Daniel Popescu, Nenad Medvidovic, and Daniel M. Berry, *14th Monterey Workshop on Requirements Analysis*, Monterey, California. September 10-13, 2007.
- "Teleological Modeling and Reasoning for Automated Software Adaptation," with Joshua Jones and Ashok Goel, *Proceedings of the Second International Conference on Design Research in Information Systems and Technology*, Claremont University, Los Angeles, May 2007.
- "Design Studies in Software Engineering Courses," *SoD '07: Science of Design Symposium 2007*, March 22-24, 2007, Humboldt State University, Arcata, California.
- "Automating Software Evolution," with Joshua Jones and Ashok Goel, *SoD '07: Science of Design Symposium 2007*, March 22-24, 2007, Humboldt State University, Arcata, California.
- "Teleological Reasoning in Software Adaptation: A Case Study in Game-Playing Agents," with Ashok Goel, Joshua Jones, Chris Parnin and Avik Sinharoy, *Proceedings of DESRIST-2008*, pp. 365-379, Atlanta, Georgia, May 2008.
- "Experience Report: Using Tools and Domain Expertise to Remediate Architectural Violations in the LogicBlox Software Base," with Kurt Stirewalt, Spencer Rugaber, Hwa-You Hsu and David Zook, *International Conference on Software Engineering, (ICSE 2009)*, 2009.
- "Reducing Ambiguities in Requirements Specifications via Automatically Creating Object-Oriented Models," with Daniel Popescu, Nenad Medvidovic and Daniel M. Berry, *Post-Proceedings of the Monterey Workshop on Innovations for Requirements Analysis: From Stakeholder Needs to Formal Design*, Lecture Notes in Computer Science, 2009.
- "Resumption Strategies for Interrupted Programming Tasks," with Chris Parnin, *Proceedings of the International Conference on Program Comprehension (ICPC)*, Vancouver, Canada, 2009.
- "Teleological Software Adaptation", with Joshua Jones, Chris Parnin, Avik Sinharoy, Ashok K. Goel, *Proceedings of the Third IEEE Conference on Self-Adaptive and Self-Organizing Systems*, San Francisco, California, September 14-18, 2009, 198-205, IEEE Computer Society Press.
- "Adapting Game-Playing Agents to Game Requirements," Joshua Jones, Chris Parnin, Avik Sinharoy, and Ashok Goel, *Proceedings of the Fifth AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE-09)*, 148-153, Stanford University, California, October 14-16, 2009.

"Modeling Practices as a Function of Task Structure," with Rebecca Jordan, Cindy Hmelo-Silver, Steven Gray, and Ashok Goel, *Annual Meeting of the American Educational Research Association*, San Diego, California, April, 2009.

"From Conceptual Models to Agent-Based Simulations: Why and How", with Swaroop Vattam, Ashok Goel, Cindy Hmelo-Silver and Rebecca Jordan, *Proceeding of the Fourteenth International Conference on AI in Education*, Brighton, UK, July 2009, 593-595.

"Appropriating Conceptual Representations: A Case of Transfer among Middle School Science Teachers," with Cindy E. Hmelo-Silver, Suparna Sinha, Steven Gray, Sameer Honwad, Catherine Eberbach, Rebecca Jordan, Spencer Rugaber, Swaroop Vattam, Ashok Goel, Wendy Ford, and Casey Schmidt, *Proceedings of the 2010 NARST Annual International Conference*, March 21 - 24, 2010, Philadelphia, Pennsylvania.

"Appropriating Conceptual Representations: A Case of Transfer in a Middle School Science Teacher," with Suparna Sinha, Steven Gray, Cindy Hmelo-Silver, Rebecca Jordan, Sameer Honwad, Catherine Eberbach, Swaroop Vattam and Ashok Goel, *Proceedings of the Ninth International Conference of the Learning Sciences*, Chicago, Illinois, June 28-29, 2010.

"CodePad: Interactive Spaces for Maintaining Concentration in Programming Environments", with Chris Parnin and Carsten Görg. *SOFTVIS*, 2010, 15-24.

"Learning Functional and Causal Abstractions of Classroom Aquaria", with Ashok K. Goel, Swaroop S. Vattam, David Joyner, Cindy E. Hmelo-Silver, Rebecca Jordan, Sameer Honwad, Steven Gray, Suparna Sinha. *Proceedings of the 32nd Annual Meeting of the Cognitive Science Society*, Portland, August 2010.

"Connecting the Visible to the Invisible: Helping Middle School Students Understand Complex Ecosystem Processes", with Sameer Honwad, Cindy Hmelo-Silver, Rebecca Jordan, Catherine Eberbach, Steven Gray, Suparna Sinha, Ashok. K. Goel, Swaroop Vattam and David Joyner. *Proceedings of the 32nd Annual Meeting of the Cognitive Science Society*, Portland, Oregon, August 2010.

"Evolution of an Integrated Technology for Supporting Learning about Complex Systems", with David A. Joyner, Ashok K. Goel, Cindy E. Hmelo-Silver, Rebecca Jordan. *11th IEEE International Conference on Advanced Learning Technologies*, Athens, Georgia, USA, 6-8 July 2011. IEEE Computer Society 2011, 257-259.

"Behavior Patterns: Bridging Conceptual Models and Agent-Based Simulations in Interactive Learning Environments", with Swaroop Vattam, Ashok K. Goel, *11th IEEE International Conference on Advanced Learning Technologies*, Athens, Georgia, USA, 6-8 July 2011. IEEE Computer Society 2011, 139-141.

"Design Patterns and Cross-Domain Analogies in Biologically Inspired Sustainable Design", with Ashok K. Goel, Bert Bras, Michael E. Helms, Craig Tovey, Swaroop Vattam, Marc Weissburg, Bryan Wiltgen, Jeannette Yen: *AAAI Spring Symposium: Artificial Intelligence and Sustainable Design*, 2011, 45-51.

"Computer-Aided Biologically Inspired Design: A Bridge Between Artificial Intelligence and Sustainable Development", with Ashok Goel, Bert Bras, Michael Helms, Craig Tovey, Swaroop Vattam, Marc Weissburg, Bryan Wiltgen, and Jeannette Yen. *Proceedings of the AAAI Spring Symposia on AI and Sustainable Design*, Stanford University, Palo Alto, March 2011.

"Foregrounding Behaviors and Functions to Promote Ecosystem Understanding," with Cindy Hmelo-Silver, Rebecca Jordan, Sameer Honwad, Catherine Eberbach, Suparna Sinha, Ashok Goel, and David Joyner. *Proceedings of the Ninth Hawaii International Conference on Education*, Honolulu, Hawaii, 2011.

"Learning about Ecosystems in a Computer Supported Collaborative Learning Environment", with Sameer Honwad, Cindy Hmelo-Silver, Rebecca Jordan, Suparna Sinha, Catherine Eberbach and Ashok Goel. *Proceedings of the Ninth International Conference on Computer Supported Collaborative Learning*, Hong Kong, July 2011.



"Understanding the Why and Uncovering the How; Transfer of Conceptual Representations", with Suparna Sinha, Cindy E. Hmelo Silver, Catherine Eberbach, Sameer Honwad, Rebecca Jordan and Ashok Goel. *Proceedings of the 2011 Annual Meeting of AERA*, New Orleans, April 2011.

"Systems and Cycles: Learning about Aquatic Ecosystems", with Cindy E. Hmelo-Silver, Rebecca Jordan, Catherine Eberbach, & Ashok Goel, *Proceedings of the 2011 Science for Research on Education Effectiveness Conference*, Washington, D.C., September 8-10, 2011.

"Programmer Information Needs After Memory Failure", with C. Parnin. *International Conference on Program Comprehension (ICPC . 2012)*, Passau, Germany, June 2012, pp. 123–132, Best Paper.

"GAIA: A CAD Environment for Model-Based Adaptation of Game-Playing Software Agents", with A. Goel, and L. Martie, *11th Annual Conference on Systems Engineering Research (CSER)*, 2013, pages 29–38.

"Meta-Reasoning Over Goals: A Summary of the GAIA Project", with Ashok K. Goel and Lee Martie, 2015 Annual Conference on Advances in Cognitive Systems: Workshop on Goal Reasoning, Atlanta, Georgia, May 28, 2015.

"Knowledge Extraction and Annotation for Cross-Domain Textual Case Based Reasoning in Biologically Inspired Design", with S. Bhati, V. Goswami, E. Spiliopoulou, S. Azad, S. Koushik, R. Kulkarni, M. Kumble, S. Sarathy and A. Goel, *International Conference On Case-Based Reasoning*, 2016.

"Question Answering with *Encyclopedia of Life*: Accessing Large-Scale Biological Knowledge." With P. Ballapuram, C. Cassion, A. Subramanian, S. An, R. Bates, J. Hammock, and A. Goel. *AAAI Fall Symposium on Artificial Intelligence and Natural Systems*, 2018.

"Scientific Modeling Using Large Scale Knowledge. With An, S., Bates, R., Hammock, J., Weigel, E., and Goel, A. In *International Conference on Artificial Intelligence in Education*, July 2020. pp. 20-24, Springer.

"Towards a Virtual Librarian for Biologically Inspired Design." With Ashok Goel, Shimin Zhang, and Kaylin Hagopian. *DCC20*.

"Cognitive Strategies for Navigating Parameter Spaces in Model Exploration." With Sungeun An, Emily Weigel, and Ashok Goel. *CogSci* 2021.

"Recognizing Novice Learner's Modeling Behaviors." With Sungeun An, William Broniec, Emily Weigel, Jennifer Hammock, and Ashok Goel. *Proceedings of the 17th International Conference on Intelligent Tutoring Systems*, ITS 2021, Athens, Greece, 7-11 June 2021.

"Guiding Parameter Estimation of Agent-Based Modeling Through Knowledge-based Function Approximation." With William Broniec, Sungeun An and Ashok Goel. *AAAI-2021 Spring Symposium on Combining Machine Learning and Knowledge Engineering*.

"AI-supported connections between Employers and Colleges." With Robby Robson, Elaine Kelsey, Ashok Goel, Elliot Robson, Myk Garn, Matt Lisle, Fritz Ray, Jeanne Kitchens, and Sazzad M. Nasir. *Intelligent Links: Invited paper in AI Magazine*, Special Issue on the NSF Convergence Accelerator program, April 2022.

"Explanation as Question Answering based on a Task Model of the Agent's Design". With Ashok Goel, Harshvardhan Sikka, Vrinda Nandan, Jeonghyun Lee, and Matt Lisle. *IJCAI-2022 Workshop on Explanation in AI*. Vienna, Austria, July 23, 2022. <https://doi.org/10.48550/arXiv.2206.05030>

"Contextualizing Large-Scale Domain Knowledge for Conceptual Modeling and Simulation". With Sungeun An, Jennifer Hammock and Ashok Goel. *IJCAI-2022 Workshop on Qualitative Reasoning*, Vienna, Austria, July 2022.

"Recognizing the Structure of Biological Designs in Text Documents". With Helen Lu, Andrew Hornback and Ashok Goel. *Design Computing and Cognition*, July 2022.

"Incorporating Habitats in Conceptual Models and Agent-Based Simulations: Expanding the Virtual Ecological Research Assistant". With Scott Bunin, Willventchy Celestin and Andrew Hornback. *Proceedings of the Ninth ACM Conference on Learning @ Scale (L@S '22)*, June 1–3, 2022, New York.

"Exploring the Effects of Guidance on Learning about Ill-defined Problems". With Sungeun An, Emily Weigel, and Ashok Goel. 18th International Conference on Intelligent Tutoring Systems, Bucharest, Romania, June 29–July 1, 2022.

"Explanation as Question Answering based on User Guides." with Ashok Goel, Vrinda Nandan, Eric Gregori and Sungeun An. *Proceedings of AAAI-2022 Workshop on Explainable Agency in AI*, 2022.

"AI Tai Chi / Using AI to Combat Technological Unemployment Caused by AI", with Ashok Goel. *23rd Annual Hawaii International Conference on Education*, Kona, Hawaii, January 2-6, 2024.

"A Highly Configurable Data Analytics Pipeline for Learning", with J.A. Santana, P. Thajchayapong and A. Goel. *EduLearn Proceedings*, 8737-8746, 2025.

### **3. Conference Presentations with Proceedings (non-refereed)**

"A Uniform and Simple User Interface for UNIX", *UNIX User's Conference*, San Diego, CA, 1983.

"Hypertext and Software Maintenance", CASE'88: *Second International Conference on Computer-Aided Software Engineering*, Cambridge, MA, July 1988, pp. 15-24,15-27.

"Requirements for a Hypertext Software Maintenance System", *Compcon Spring'89*, San Francisco, CA, February 1989, pp. 254-256.

"Program Comprehension for Reverse Engineering," *American Association for Artificial Intelligence Workshop on AI and Automated Program Understanding*, San Jose, California, July 1992.

"Issues in User Interface Migration," with Melody Moore, *Proceedings of 3rd Software Engineering Research Forum*, Orlando, Florida, 1993.

"Position Paper: Domain Analysis and Reverse Engineering," *Software Engineering Techniques Workshop on Software Reengineering* at the Software Engineering Institute, Pittsburgh, Pennsylvania, May 3-5, 1994.

"Position Paper on Research Infrastructure for Reengineering" with Linda Wills. *5th International Workshop on Program Comprehension*, Dearborn, Michigan, May 28-30, 1997, IEEE Computer Society.

Panelist, *5th International Workshop on Program Comprehension*, Dearborn, Michigan, May 28-30, 1997.

Panelist, "Intermediate Representations," *Working Conference on Reverse Engineering 1998*, May 1998, Honolulu, Hawaii.

Panel organizer, "Year 2000—Lessons Learned," *International Conference on Software Maintenance*, Bethesda Maryland, November 1998.

Panelist, "On the Threshold of Y2K," *International Conference on Software Maintenance*, Oxford U.K, August, 1999.

Panelist, "Managing Requirements Change," British Computer Society (BCS) Requirements Engineering Specialist Group (RESG), Oxford, U.K, August 1999.'

Panelist, *International Workshop on Mining Software Repositories*, Shanghai, China, 2006.

Poster, "TaskBoard: Tracking Pertinent Task Artifacts and Plans" with Chris Parnin and Carsten Görg, *International Conference on Program Comprehension (ICPC)*, Vancouver, Canada, 2009.

Poster, "Approaching Conceptual Representations: A Case of Transfer among Middle School Science Teachers", with Cindy E. Hmelo-Silver, Suparna Sinha, Steven Gray, Sameer Honwad, Catherine Eberbach, Rebecca Jordan, Swaroop Vattam, Ashok Goel, Wendy Ford, and Casey Schmidt. *Proceedings of the 2010 NARST Annual International Conference*, March 21-24, 2010, Philadelphia, Pennsylvania.

"Intelligent Search for Biologically Inspired Design" with Spiliopoulou, Evangelia, Goel, Ashok, et al., *Proceedings of the 20th International Conference on Intelligent User Interfaces Companion (IUI Companion '15)*, pp. 77-80, 2015.

“Extracting Structural Knowledge from Natural Language Documents to Support Biologically Inspired Design.” With Ashok Goel, Swapnal Acharya, Kimisha Mody, Kaylin Hagopian, and Shimin Zhang, *Proceedings of the AAAI 2018 Fall Symposium on Gathering for AI and Natural Systems*, Washington DC, October 2018.

“Learning by doing: Supporting experimentation in inquiry-based modeling.” With An, S., Bates, R., Hammock J., Weigel, E., and Goel, A. Poster presented at the *41st Annual Meeting of the Cognitive Science Society*, Montreal, July 2019.

“Cognitive Assistance for Inquiry-based Modeling.” With An, S., Bates, R., Hammock J., Weigel, E., and Goel, A. Poster presented at the *7th Annual Conference on Advances in Cognitive Systems (ACS)*, Cambridge, August 2019.

#### **4. Conference Presentations without Proceedings**

"Integrating Software Tools", Sperry Technical Symposium, Gull Lake, MN, 1986.

Panelist, *AAAI workshop on AI and Automated Program Understanding*, San Jose, CA., July 12, 1992.

"Model-based User Interfaces", Workshop on Model-based User Interfaces, Georgia Tech, 1994.

Panelist, "Tool Interoperability" in *7th International Workshop on Program Comprehension*, Pittsburgh, Pennsylvania, May 1999.

Tutorial, "MORALE: Architectural support for evolution of legacy systems," with Gregory Abowd and Colin Potts, to be presented at *International Conference on Software Maintenance*, Oxford U.K, August, 1999.

"Extending CRC Cards into a Complete Design Process." with Kathy A. Gray and Mark Guzdial, (2003) Innovation and Technology in Computer Science Education Conference. Thessalonika, Greece, June. p. 226.

"Fostering Human Understanding of Complex Systems for Software Modeling and Design", with Ashok Goel, *AFOSR Workshop on Cognitive Modeling and Software Engineering: Synergistic Approaches to Representing Human Behavior*, Arlington, Virginia, July 2008.

"Software Engineering for Climate Modeling," *International Conference on Software Engineering*, Vancouver, Canada, May 2009.

"Programmer Information Needs After Memory Failure", with C. Parnin. International Conference on Program Comprehension (ICPC . 2012), Passau, Germany, June 2012, pp. 123–132, Best Paper.

"Live Logic Programming", with Zef Hemel and Kurt Stirewalt, LIVE 2013, San Francisco, California, 2013.

"Position Paper: Benchmark Criteria for Function Modeling", with B. Wiltgen, A. Jagannathan and A.K. Goel, in Workshop on Benchmarking Functional Models at the Sixth International Conference on Design Computing and Cognition (DCC14), 2014.

"DSL Design for Reinforcement Learning Agents," with Christopher Simpkins and Charles L. Isbell, *Workshop on Domain-Specific Language Design and Implementation (DSLDI)*, October, 2016.

"VERA: Popularizing Science through AI." With Sung An, Robert Bates, Jennifer Hammock and Ashok Goel, *19th International Conference on Artificial Intelligence in Education (AIED 2018)*, London UK, June 27-30, 2018.

#### **4. Published Papers (non-refereed)**

##### **a.) Professional Society Magazines**

"Reverse Engineering Projects at Georgia Tech," Reverse Engineering Newsletter, Software Engineering Technical Committee Newsletter, Volume 12, Number 2, October 1992.

"Speaker Cites Standard Data Sets as a Major Challenge Facing Software Reverse Engineering Researchers," with James H. Cross II, IEEE Computer, 26(11):83-4, 11/93.

"Reengineering Army Software to an Open Systems Environment". Reengineering Newsletter, with Melody Moore and Reginald Hobbs. Committee on Reengineering, Technical Council on Software Engineering, IEEE

Computer Society, No. 14, Spring 1997. Reprint from Proceedings of the Seventh Annual Software Technology Conference”, Salt Lake City, Utah, April 9-14, 1995.

“Message from the Vice Chairman”. Reengineering Newsletter, Committee on Reengineering. Technical Council on Software Engineering, IEEE Computer Society, No. 14, Spring 1997.

“Focusing on Function: Thinking Below the Surface of Complex Natural Systems, “ with Cindy E. Hmelo-Silver, Rebecca Jordan, Lei Liu, Steven Grey, Marylee Demeter, Swaroop Vattam and Ashok Goel, *Science Scope*, 31(9), Summer 2008.

#### **b.) Trade Publications**

“Reverse Engineering a Program,” *Atlanta Computer Currents*, July 1994.

#### **c.) Webinar**

“Applications of ontologies to biologically inspired design,” *Ontology Summit 2017: AI, Learning, Reasoning, and Ontologies*. 2017, <http://bit.ly/2xdOm9u>.

#### **d.) Software**

“Locate a Point on the Earth's Surface,” *Wolfram Demonstrations Project*, March 21, 2017, <http://demonstrations.wolfram.com/LocateAPointOnTheEarthsSurface/>.

#### **e.) Research Project Final Reports**

“Design Decision Analysis Research Project”, with K. Kamper, GIT-SERC-90/01, Software Engineering Research Center, Georgia Institute of Technology, January 28, 1990.

“Joint Georgia Tech/BNR, Inc., Reverse Engineering Project”, with K. Kamper and Software Engineering Research Center, School of Information and Computer Science, September 18, 1990.

“ISA 97-Compliant Architecture Testbed (ICAT) Project Tools and Database Transition”, with B. Johnson, and G. Pardun. SRC-TR-92/01, Software Engineering Research Center, Georgia Institute of Technology, January 1992.

“Knowledge Worker Platform Analysis Final Report”, with Melody Moore and Hernan Astudillo, Center for Information Management Research, College of Computing, Georgia Institute of Technology, 1993.

“Transitioning to the Open Systems Environment (TRANSOPEN) Final Report”, with Melody Eidbo, Mostafa Ammar, Russ Clark, Rich Clayton, Srinivas Doddapaneni, Rob Dodge, Mike McCracken, Binh Nguyen, Webb Roberts, and Steve Rogers. Center for Information Management Research, College of Computing, Georgia Institute of Technology, April 14, 1993.

“NASA Final Report, The Detection and Extraction of Interleaving Code Segments”, with Kurt Stirewalt and Linda Wills, GIT-CC-95-49, College of Computing, Georgia Institute of Technology, December 20 1995.

“Domain Based Design Documentation and Component Reuse and their Application to a System Evolution Record Final Report”, with Linda Wills and Richard Clayton, October 31, 1997.

“MASTERMIND: Knowledgeable Development Environments for Human-Computer Interaction Software,” November 1998.

“MORALE: Mission Oriented Architectural Legacy Evolution,” March 2000.

“Software Evolution and Interleaving,” March 2000.

“Dynamic Assembly from Models (DYNAMO),” October 2003.

“Ectropic Design: Intelligent Collaboration Spaces”, with Mark Guzdial, October 2004.

“Enterprise Legacy Evolution”, with Leo Mark, December 2005.

#### **f.) Video**

*The Scientific Way of Thinking using VERA*, with Emily Weigel. [https://youtu.be/ Rn5e9fWmPqI](https://youtu.be/Rn5e9fWmPqI).

#### **F. Other Publications**

"Using VERA to explain the impact of social distancing on the spread of COVID-19." With Broniec, W., An, S. and Goel, A. K. arXiv preprint arXiv:2003.13762, 2020.

"Explanation as Question Answering based on Design Knowledge", with Ashok Goel, Vrinda Nandan, Eric Gregori and Sungeun An; arXiv:2112.09616, December 16, 2021.

"Designing a Communication Bridge between Communities: Participatory Design for a Question-Answering AI Agent". With Jeonghyun Lee, Vrinda Nandan, Harshvardhan Sikka and Ashok Goel. August 1, 2023. <https://doi.org/10.48550/arXiv.2308.00813>.

#### **G. Research Grants (Principal Investigator)**

"Hypertext and Software Maintenance", National Science Foundation \$40,000, 1989-1990.

"Reverse Engineering of Telecommunications Software," Bell Northern Research, Norcross, Georgia 1991-1992, \$85,212.12. Continued awards in support of research 1993-present.

"Hypertext and Software Maintenance," National Science Foundation, Washington, D. C., Grant ECD-8904815, 1992, \$30,000.00.

Recipient, unrestricted gifts from Bell Northern Research as part of their University Interaction Program, 1992-6.

"Extending the UIDE to Distributed System Management Applications," Digital Equipment Corporation, 1993, \$50,000 with P. Sukviriya.

"The Detection and Extraction of Interleaved Code Segments," ARPA, BAA 93-11, 1993, \$83,771.98, with L. Wills.

"MASTERMIND: Knowledgeable Development Environments for Human-Computer Interaction Software," ARPA, BAA 93-42, 1993, \$1,421,055, with Robert Neches (ISI), Pedro Szekely (ISI), James Foley, P. Sukaviriyia, and Scott Hudson.

"The Detection and Extraction of Interleaved Code Segments," Advanced Research Projects Agency, \$83,771.98, 1993, with Linda Wills.

"Mission Oriented Architectural Legacy Evolution," DARPA, BAA 95-40, 1996-2000, \$1,226,108, with Gregory Abowd, Ashok Goel, Michael McCracken, Melody Moore, Colin Potts, and Linda Wills.

"MAGIC: MASTERMIND Assisted Generation of Interface Components," SUN Microsystems, 1996, \$30,000.00.

"Scaleable User Interfaces," DARPA/AASERT, 1995-8, \$85,000.

"Domain Based Design Documentation and Component Reuse and their Application to a System Evolution Record," Army Research Laboratory, 1996-7, \$75,000.00.

"Software Evolution and Interleaving", NSF 1997-9, with Linda Wills, \$160,000.00.

"Dowsing," Spectra Research, 1999, \$36,248.00.

"DYNAMO," DARPA, \$350,000, 2000-3.

"Ectropic Design," NSF 2001-2003, \$200,000, with Mark Guzdial.

Gift in support of research, ClickFox, Inc., \$50,000, 2003-2006.

"Software Self-Awareness Using Dynamic Analysis And Markov Models", NSF and NASA 2004-2007, \$236,000, three years, with Mary Jean Harrold and Jim Rehg.

"Enterprise Legacy Transformation," Aflac Corp. and the Georgia Research Alliance, 2005, \$100,000, with Leo Mark.

“Earth System Curator,” NSF 2004-2007, \$486,000 over 5 years (Georgia Tech portion only), with Leo Mark, National Center for Atmospheric Research, U.S. Geophysical Fluid Dynamics Laboratory (Princeton University), Earth, Atmospheric and Planetary Sciences program at MIT.

“Collaborative Research: Learning About Complex Systems in Middle School by Constructing Structure-Behavior-Function Models,” NSF 2006-2009, \$313,923 (Georgia Tech portion only), with Ashok Goel, Cindy Hmelo-Silver (Rutgers University) and Rebecca Jordan (Rutgers University).

“SoD-TEAM: Teleological Reasoning in Adaptive Software Design,” NSF 2006-2010, \$639,998, with Ashok Goel.

“MAJOR: Computational Tools for Enhancing Creativity in Biologically Inspired Engineering Design,” NSF 2009-2012, \$767,457 with Ashok Goel, Bert Bras, Craig Tovey, Marc Weissburg, and Jeannette Yen.

“REU: Computational Tools for Enhancing Creativity in Biologically Inspired Design,” NSF (CreativeIT). \$16,000. PI: Ashok Goel. Co-PIs: Bert Bras, Spencer Rugaber, Craig Tovey, Mark Weissburg, Jeannette Yen.. May 2011– December 2011.

“Systems and Cycles: Using Structure-Behavior-Function Thinking as a Conceptual Tool for Understanding Complex Natural Systems in Middle School Science,” Institute for Educational Sciences, U.S. Department of Education, 2010-2013, \$216,488 (Georgia Tech portion), with Ashok Goel, Cindy Hmelo-Silver, and Rebecca Jordan.

“Videoconferencing Support for International Programs,” Georgia Tech Technology Fee fund, 2010, \$17,364, with Leo Mark and Mike McCracken..

#### **H. Research Proposals and Grants (Contributor)**

“Knowledge Worker for Investigation of User Interface Transition”, Corps of Engineers Research Laboratory. Faculty Participant. “Transopen, for the Investigation of the Factors Involved in Moving Existing Army Information Systems to a Distributed Fourth Generation Open Systems Environment”. Department of the Army Contract No. DAKF11-91-D-004-0014 1992-93. Faculty Participant.

“ISA Compliant Architecture Test Bed for the investigation of the Factors Involved in Making a Decision to Reverse Engineer an Information System”. Department of the Army Contract No. DAKF11-91-D-0004, ISA-97, 1991. Faculty Participant.

“Ada Transition Research Project for the Investigation of Software Engineering,” Department of the Army Contract, #DAKF11-86-D-0015, \$64,933, 1989-1990.

“Systems and Cycles: Using Structure-Behavior-Function Thinking as a Conceptual Tool for Understanding Complex Natural Systems in Middle School Science”, Department of Education, Institute of Educational Sciences, PI: Cindy Hmelo-Silver (Rutgers University).. Co-PIs: Ashok Goel, Rebecca Jordan and Spencer Rugaber. \$1,725,000, June 2009 to May 2012.

“CUPID: An IDE for NASA Development and Modeler Training.” NASA program: Research Opportunities in Space and Earth Sciences – 2011, Award #NNX12AP51G, with Leo Mark and Cecelia Deluca (University of Colorado), \$298681 (Georgia Tech share \$192331), 2012-2014.

“Bringing IBM’s Watson System to Georgia Tech Educational Programs and Classes. GT-Fire Grant. Approximately \$10K (GTF). PI: Ashok Goel. Co-PIs: Edward Coyle, Wayne Li, Julie Linsey, John McDonald, Wendy Newstetter, Spencer Rugaber, William Underwood, Robert Waters, Jeannette Yen. 2015.

“SPOKE: Using Big Data for Environmental Sustainability: Big Data + AI,” NSF program: Big Data Regional Innovation Hubs and Spokes, Award #1636848, with Ashok Goel and Jennifer Hammock (Smithsonian Institution), \$1, 2017-2019.740

“Semantic Processing for Financial Services: Proof-of-Principle. . .”, Georgia Research Alliance, with Ashok Goel, \$26000, 2016-2018.

“Is the Jill Watson Technology Transferable and Scalable?” with PI: A. Goel, D. Joyner, and K. McGreggor, GT Fire, \$40000, 2017-2018.

"Cognopsi: Semantic Processing for Financial Analysis", Georgia Research Alliance, PI: Ashok Goel; Co-PI: Spencer Rugaber. Approximately \$82,000, 2016-17; No-cost extension through 2020.

Is the Jill Watson Technology Transferable and Scalable? GT Fire, \$40,000, PI: Ashok Goel; Co-PIs: David Joyner, Keith McGreggor and Spencer Rugaber, August 2017 – August 2018.

"Competency Catalyst." NSF (Convergence Accelerator Program). PI: Robby Robson (EduWorks), Co-PIs: Ashok Goel, Myk Garn (USG), Jeanne Kitchens (Credentials Engine). Approximately \$5M. September 2020 – August 2022.

"AI Institute: AI-Augmented Learning: Adult Learning. Novel AI Systems for Online Education", National Science Foundation. Approximately \$20M. PI: Myk Garn. October 2021 - October 2026.

### **I. Research Honors and Awards**

Outstanding Contribution over Time: *4th Working Conference on Reverse Engineering*, 1997.

Best paper award: *International Conference on Software Maintenance*, 1995.

Best paper nominations: *Hawaii International Conference on System Sciences*, 1995; *Automated Software Engineering Conference*, 1998.

Best-submitted pattern: *CHI Workshop on Patterns*, 1997.

Women of the College of Computing recognition, 2006.

Best paper award: *International Conference on Program Comprehension*, 2012.

*Thank a Teacher Award*, Georgia Tech Center for the Enhancement of Teaching & Learning, 2015.

### **X. Industrial Research Support**

Nortel, Digital Equipment, SUN Microsystems, Aflac, ClickFox, LogicBlox.

## **III. SERVICE**

### **A. Professional Activities**

NSF Panelist/Reviewer, CISE, 1999, 2005, 2007, 2008.

Vice Chairman, Reverse Engineering Subcommittee of the IEEE Technical Committee on Software Engineering, 1992 - present.

College of Computing liaison, Southeastern Software Association, Technology Forum, 1994-7.

College of Computing, Software Engineering liaison to Clark Atlanta University.

College of Computing liaison, Blackstone and Cullen Inc., 1996-8.

College of Computing liaison, Harris Corp., 2000-4.

College of Computing liaison, Aflac Inc., 2000-4.

Opponent, PhD Defense, University of Tampere, Tampere Finland, 2000.

Program Director, Software Engineering and Languages Program, National Science Foundation, November 2001 - August 2002.

CNO (Chief of Naval Operations) Strategic Studies Group XXV; Way Ahead Plan reviewer.

Proposal Reviewer: University of Toledo, U. S. Civilian Research and Development Foundation.

Canadian Natural Science and Engineering Research Council, site visit committee, 2004.

NSF MRI reviews, CISE, 2003.

NSF INT review, CISE, 2004.

Natural Science and Engineering Council of Canada site visit and proposal review, 2004.

Israel Science Foundation, 2005

CNO (Chief of Naval Operations) Strategic Studies Group XXV; Way Ahead Plan reviewer, 2005.

Board of Advisors, Model-Driven Design Repository initiative (NSF), 2006-2009.

Oakland University, Reappointment Review packet evaluation, 2007.

*Design Computing and Cognition (DCC'08)*, local arrangements committee, doctoral symposium, Atlanta Georgia, 2008.

Session co-organizer, "Software Engineering for the Planet," International Conference on Software Engineering, Vancouver, Canada, May 2009.

## **B. On-Campus Committees**

Chairman, Task Force on Software Transitions and User Interfaces for the Georgia Institute of Technology Office of the Vice President of Information Technology.

Member of the College of Computing Computer Laboratory Committee, 1991.

Member of the College of Computing Research Committee, 1992.

Elected member of the College of Computing Dean's Advisory Committee, 1992.

Member of the College of Computing Committee on Teaching Effectiveness, 1993.

Member of the College of Computing Software Engineering Curriculum committee.

Member of the College of Computing Graduate Admissions committee, 1992-94, 1997.

Member of the College of Computing Industrial Partners Association planning committee, 1993.

Member of the Engineering Strategic Planning committee, 1992.

Member of the College of Computing Space Planning committee, 1999.

Member of the College of Computing Faculty Recruiting Committee, 1998.

Member, Georgia Institute of Technology Library Focus Group on graduate students, 1999.

Member, Georgia Institute of Technology Library Advisory subcommittee, 1998-2002.

Member of the College of Computing Graduate Committee and area advisor for the Programming Languages area, 1999-2000.

College of Computing, Research Scientist promotion review, 1999.

Member, College of Computing, Undergraduate Research Committee, 1999-2001.

Member, College of Computing, Undergraduate Curriculum Committee, 2001, 2003-5.

Member, College of Computing Graduate Curriculum Committee, 2004-5.

Institute committee to develop a program on System Science and Engineering, 2005-2006.

College of Computing, National Science Foundation Resource Office, 2005-2006.

Institute Advisory Committee on promotion of research faculty, 2006-2007.

Session instructor, Summer Reading Program, 2006.

Area advisor for the Software Engineering area, 2007-2009.

Undergraduate Research Opportunities in Computing, Symposium judge, 1999-2001, 2003-2009.

## **C. Consulting**



Bolt, Beranek and Newman, Inc., Cambridge, MA. 1975-1976. Communications Oriented Language (COL) for the Department of Defense.

System Works, Inc., Atlanta, GA., 1987. Management consulting on software engineering management and process.

ClickFox, LLC, Atlanta, GA., 2000-2001. Technical and management consulting.

#### **D. Civic Activities**

Member, Board of Directors, Estes Park Public Library, 1985-86.

Volunteer coach: Odyssey of the Mind: 1991-1993

Volunteer coach: Girls recreational softball, 1989-1995

Volunteer advisor: three software startups: 2014-2017

Volunteer: Atlanta Science Festival: 2019-present

Contributor: Wikipedia (Kepler's third law), 2020

### **IV. NATIONAL & INTERNATIONAL PROFESSIONAL RECOGNITION**

#### **B. Invited Conference Session Chairmanships**

International Conference on Software Engineering, 1999.

Working Conference on Reverse Engineering, 1993,5,7.

International Conference on Software Maintenance, 1993,8-9.

International Conference on Automated Software Engineering, 2001.

Moderator, Southeastern Software Association, Technical Forum on Client/Server, 1994.

Master of Ceremonies, Southeastern Software Association, Technical Forum on Year 2000, 1998.

#### **C. Professional Registration**

Association for Computing Machinery, 1971-present.

IEEE Computer Society, 1992 (intermittent).

#### **E. Editorial and Reviewer Work for Technical Journals**

Conference Steering Committee: International Workshop on Program Comprehension, 1997-8.

Program Co-Chair: Third Workshop on Program Comprehension, 1994; Working Conference on Reverse Engineering, 1999.

Tools Fair Co-Chair: International Conference on Software Maintenance, 1999.

Program Committee: Working Conference on Reverse Engineering, 1993-2001; International Conference Software Maintenance, 1993-9; International Workshop on Program Comprehension, 1995-2001; International Conference on Software Engineering, 1998 (ICSE Research Demonstration Committee, 2000), Automated Software Engineering Conference 2000-1, ACS 2016, International Conference on Case Based Reasoning 2016, 9th International Conference on Knowledge Capture 2017.

Referee: *ACM Computing Surveys*, *ACM Transactions on Software Engineering and Methodology*, *Communications of the ACM*, *Advances in Cognitive Systems*, *Artificial Intelligence for Engineering Design*, *Analysis and Manufacturing*, *Communications of the ACM*, *Data & Knowledge Engineering*, *Hawaii International Conference on System Sciences*, *International Conference on Software Engineering*, *IEEE Journal - Software*, *Journal of Man-Machine Studies*, *International Journal on Software Engineering and Knowledge Engineering*, *IEEE Computer*, *IEEE Software*, *IEEE Transactions on Human-Machine Systems*, *IEEE Transactions on Software Engineering*, *Indo-US Science and Technology Forum*, *Journal of Automated Software*

*Engineering, Journal of Software: Evolution and Process, Journal of Mechanical Design, Journal of Software Maintenance, Journal of System Integration, Journal of Systems and Software, Journal of Very Large Data Bases, Second International Conference on Information and Knowledge Management, Software—Practice and Experience, Empirical Software Engineering, Simulation: Transactions of the Society for Modeling and Simulation International, IEEE Transactions on Service Computing, Mind and Machine.*

Book Reviews: Kluwer, Plus Publishers, Springer-Verlag.

External Reviewer: University of Toledo, Oakland University, U.S. Chief of Naval Operations, Strategic Studies Group, Israel Science Foundation, National Research Council Canada, National Science Foundation.

#### **G. Expert Witness Testimony**

EPL versus USA Federal Credit, Federal Court, 1995.

PMSC versus Liberty Life, South Carolina State Court, 1998.

### **V. OTHER CONTRIBUTIONS**

#### **A. Seminar Presentations**

LogicBlox, HBO (2); Nortel (12); Clark Atlanta University, State of Georgia Regents Library Board.

Invited talk, University of Naples, 1997.

Invited talks (2), Fraunhofer Institute, Kaiserslautern, Germany, 1997.

Invited talk, British Computer Society, Oxford, England, 1999.

Invited talk, Technical University of Tampere, Finland, 2000.

Invited talk, Nokia Research Laboratory, Helsinki, Finland, 2000.

Invited talk, Georgia Institute of Technology, Blue Skies Symposium, 2000.

Invited talk, University of Alabama at Birmingham, 2006.

Invited talks (3), Xian University, Xidian China, 2006.

Invited talk, Community Surface Dynamics Modeling System Conference, San Antonio, Texas, 2010.

Invited talk: Georgia Tech Astronomy Club, November 7, 2016.