

# CURRICULUM VITAE

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## EDUCATION

2000, Ph.D. Computer Science, Purdue University, West Lafayette, Indiana.

Dissertation: *Testing Component-Based Distributed Applications* (Advisor: Aditya P. Mathur)

1995, M.S. Computer Science, Iowa State University, Ames, Iowa.

Project: *Executing Trait Specifications in the Larch Family of Languages* (Advisor: Albert L. Baker)

1993, B.Tech. Computer Science and Engineering, Indian Institute of Technology, Kanpur, India.

Project: *Terrain Modeling and Path Planning* (Advisor: Sanjay G. Dhande)

## ACADEMIC POSITIONS

Jul 2006-present: Associate Professor, Computer Science, Colorado State University.

Aug 2000-Jun 2006: Assistant Professor, Computer Science, Colorado State University.

Aug 1999-May 2000: Teaching Assistant, Computer Science, Purdue University.

Jun 1999: Teaching Assistant, Computer Science, Purdue University.

Jul 1998: Teaching Assistant, Computer Science, Purdue University.

Aug 1995-May 1999: Research Assistant, Software Engineering Research Center, Purdue University.

Aug 1993-May 1995: Teaching Assistant, Computer Science, Iowa State University.

## OTHER POSITIONS

Jun 1999-Aug 1999: Summer Intern, Tivoli Systems, Indianapolis.

Jun 1998-Aug 1998: Summer Intern, Tivoli Systems, Indianapolis.

Jun 1997-Aug 1997: Summer Intern, Bell Communications Research, Morristown.

May 1996-Aug 1996: Summer Intern, Bell Communications Research, Morristown.

## RESEARCH INTERESTS

Design and testing in the object-oriented, aspect-oriented, and component-based paradigms; middleware technologies; fault localization; higher order mutation testing; software reliability; data warehouse testing;

## PUBLISHED WORK

(Ghosh's advisees and students are marked with \*.)

### Journal Publications

- [1] Elmahdi Omar\*, Sudipto Ghosh, and Darrell Whitley. Subtle Higher Order Mutants, Special Issue on Mutation Testing, *Information and Software Technology*, 81:3-18 (2017).
- [2] F. Wedyan\*, S. Ghosh, and L. Vijayasarathy. An Approach and Tool for Measurement of State Variable Based Data-Flow Test Coverage for Aspect-Oriented Programs, *Information and Software Technology*, vol 59, issue C, pp: 233-253, March 2015.
- [3] S. Lozano-Fuentes, F. Wedyan, E. Hernandez-Garcia, D. Sadhu, S. Ghosh, J. Bieman, D. Tep-Chel, Julian Garcia-Rejon and Lars Eisen. Cell Phone-Based System (Chaak) for Surveillance of Immatures of Dengue Virus Mosquito Vectors. *Journal of Medical Entomology*, 50(4):879-889, 2013.
- [4] M. Mortensen\*, S. Ghosh, and J. M. Bieman. Aspect-Oriented Refactoring of Legacy Applications: An Evaluation, *IEEE Transactions on Software Engineering*, 38(1):118-140, January-February 2012.
- [5] F. Wedyan\* and S. Ghosh. On Generating Mutants for AspectJ Programs, *Information and Software Technology*, vol. 54, pp. 900-914, 2012.
- [6] R. Delamare, B. Baudry, S. Ghosh, S. Gupta\*, and Y. Le Traon. An Approach for Testing Point-cut Descriptors in AspectJ, *Journal of Software Testing, Verification and Reliability*, 21(3):215-239, September 2011.
- [7] B. Baudry, S. Ghosh, F. Fleurey, R. B. France, Y. Le Traon, and J.-M. Mottu. Barriers to Systematic Model Transformation Testing, *Communications of the ACM*, 53(6), Virtual Extension, June 2010.
- [8] S. Ghosh and J. L. Kelly\*. Bytecode Fault Injection for Java Software, *Journal of Systems and Software*, 81(11):2034-2043, November 2008.
- [9] M. Mortensen\*, S. Ghosh, and J. M. Bieman. A Test Driven Approach to Aspectualizing Legacy Software Using Mock Systems, *Information and Software Technology*, 50(7-8): 621-640, 2008.
- [10] O. Pilskalns, A. A. Andrews, A. Knight, S. Ghosh, and R. B. France. Testing UML Designs, *Information and Software Technology*, 49(8):892-912, August 2007.
- [11] D. Simmonds\*, A. Solberg, R. Reddy, R. B. France, S. Ghosh, and J. Øyvind Aagedal. Developing Service Oriented Systems Using an Aspect-Oriented Model Driven Framework, *International Journal of Cooperative Information Systems*, Special issue on Enterprise Distributed Computing, 15(4):535-564, December 2006.
- [12] R. B. France, S. Ghosh, T. Dinh-Trong\*, and A. Solberg. Model-Driven Development using UML 2.0: Promises and Pitfalls, invited cover feature, *IEEE Computer*, 39(2):59-66, February 2006.
- [13] Y. R. Reddy, S. Ghosh, R. B. France, G. Straw, J. M. Bieman, N. McEachen, E. Song, and G. Georg. Directives for Composing Aspect-Oriented Design Class Models, *Transactions on Aspect Oriented Software Development*, LNCS, Volume 3880, Springer-Verlag, pp. 75-105, 2006.

- [14] S. Ghosh, R. B. France, A. Bare, B. Kamalakar\*, R. P. Shankar\*, D. M. Simmonds\*, G. Tandon\*, and S. Yin. A Middleware Transparent Approach for Developing Distributed Applications, *Software — Practice and Experience*, 35(12):1131-1154, Wiley, October 2005.
- [15] R. B. France, I. K. Ray, G. Georg, and S. Ghosh. An Aspect-Oriented Approach to Design Modeling, *IEE Proceedings — Software, Special Issue on Early Aspects: Aspect-oriented Requirements Engineering and Architecture Design*, 151(4):173–185, August 2004.
- [16] D. K. Kim, R. B. France, and S. Ghosh. A UML-Based Language for Specifying Domain-Specific Patterns, *Journal of Visual Languages and Computing, Special Issue on Domain Modeling With Visual Languages*, 15(3-4):265—289, June–August 2004.
- [17] R. B. France, D. K. Kim, E. Song, and S. Ghosh. A UML-Based Pattern Specification Technique, *IEEE Transactions on Software Engineering*, 30(3):193-206, March 2004.
- [18] R. B. France, S. Ghosh, E. Song, and D. K. Kim. A Metamodeling Approach to Pattern-based Model Refactoring, *IEEE Software Special Issue on Model-Driven Development*, 20(5):52-58, September 2003.
- [19] A. Andrews, R. B. France, S. Ghosh, and G. Craig\*. Test Adequacy Criteria for UML Design Models, *Journal of Software Testing, Verification, and Reliability*, 13(2):95-127, April-June 2003.
- [20] R. B. France, S. Ghosh, and D. Turk. Supporting Effective Software Modeling, *L’Objet Software, Databases, Networks Journal, Hermes*, 9(4):11-30 2003.
- [21] S. Ghosh and A. P. Mathur. Interface Mutation, *Journal of Software Testing, Verification and Reliability*, 11(3):227-247, December 2001.
- [22] S. Ghosh, N. Bawa\*, G. Craig\*, and K. Kalgaonkar\*. An Extensible Framework for Testing Distributed Java Applications, *Journal of Research and Practice in Information Technology, Special Issue on Distributed Systems*, 33(2):120-132, May 2001.
- [23] H. Agrawal, J. L. Alberi, J. R. Horgan, J. J. Li, S. London, W. E. Wong, S. Ghosh, and N. Wilde. Mining System Tests to Aid Software Maintenance, *IEEE Computer*, 31(7):64-73, July 1998.

## Book Chapters

- [1] D. Simmonds, R. France, and S. Ghosh. Using Directives to Implement Model Transformations, *From MDD Concepts to Experiments and Illustrations*, editors: Jean-Philippe Babau, Joel Champeau, and Sebastien Gerard, ISTE Ltd., pp 25-41, 2006.
- [2] S. Ghosh and A. P. Mathur. Fault-based Testing of CORBA Component Software, *Book series on Component-Based Software Development*, vol. 1, World Scientific Press, pp. 187-210, March 2004.
- [3] R. B. France, D. K. Kim, E. Song, and S. Ghosh. Using Roles to Characterize Model Families, in *Practical foundations of business and system specifications*, Editor Haim Kilov, Kluwer Academic Publishers, September 2003.

## Books Edited

- [1] Editors: Robert B. France, Sudipto Ghosh, Gary T. Leavens: Proceedings of the 14th International Conference on Modularity, MODULARITY 2015, Fort Collins, CO, USA, March 16 - 19, 2015, ACM.
- [2] Editors: Robert B. France, Sudipto Ghosh, Gary T. Leavens: Companion Proceedings of the 14th International Conference on Modularity, MODULARITY 2015, Fort Collins, CO, USA, March 16 - 19, 2015, ACM.
- [3] Editors: S. Ghosh. Models in Software Engineering, Workshops and Symposia at MODELS 2009, Denver, CO, USA, October 4-9, 2009, Reports and Revised Selected Papers. Lecture Notes in Computer Science 6002 Springer 2010.
- [4] Editors: S. Ghosh, K. Arnold, and G. R. Gao. Java/Jini Technologies and High-Performance Pervasive Computing, Proceedings of SPIE, vol. 4863, 2002.
- [5] Editors: S. Ghosh. Java/Jini Technologies, Proceedings of SPIE, vol. 4521, 2001.

## Editorials

- [1] Sudipto Ghosh and J. Jenny Li. Guest Editors Introduction to the Special Issue on Program Debugging, Software Quality Journal, pp 1–3, 2017. DOI=10.1007/s11219-017-9354-x
- [2] Ana R. Cavalli and Sudipto Ghosh. Guest editors' introduction to the ICST 2010 Special Issue in Journal of Software Testing, Verification, and Reliability 23(5):351, 2013.
- [3] W. E. Wong, S. Ghosh, and C. O. Sung. Guest editors' introduction to the special section on the software engineering track of the 22nd annual ACM symposium on applied computing (ACM SAC-SE 2007). Software Quality Journal 16(3): 301, 2008.

## Conference Publications

- [1] M. Al-refai, S. Ghosh, and W. Cazzola. Model-based Regression Test Selection for Validating Runtime Adaptation of Software Systems, Proceedings of the 9th IEEE International Conference on Software Testing, Verification, and Validation, pp. 288-298, Chicago, IL, USA, April 10-15, 2016.
- [2] M. Al-refai\*, W. Cazzola, S. Ghosh, and R. B. France. Using Models to Validate Unanticipated, Fine-Grained Adaptations at Runtime, Proceedings of the 17th IEEE International Symposium on High Assurance Systems Engineering, pp. 23-30, Orlando, Florida, USA, January 7-9, 2016.
- [3] A. Jaksic, R. B. France, P. Collet, S. Ghosh. Evaluating the usability of a visual notation when developing new feature models, Proceedings of the 7th International Conference on Software Language Engineering, pp. 122-140, Vasteras, Sweden, September 15-16, 2014.
- [4] E. Omar\*, S. Ghosh and D. Whitley. Comparing Search Techniques for Finding Subtle Higher Order Mutants, Proceedings of the Genetic and Evolutionary Computation Conference, pp. 1271-1278, Vancouver, BC, Canada, July 12-16, 2014.
- [5] E. Omar\*, S. Ghosh and D. Whitley. Constructing Subtle Higher Order Mutants for Java and AspectJ Programs, Proceedings of the 24th IEEE International Symposium on Software Reliability Engineering, pp 340-349, Pasadena, CA, USA, November 4-7, 2013.

- [6] O. A. L. Lemos, F. C. Zanichelli, R. Rigatto, F. C. Ferrari and S. Ghosh. Visualization, Analysis, and Testing of Java and AspectJ Programs with Multi-Level System Graphs, Proceedings of the 27th Brazilian Symposium on Software Engineering (SBES), Brasilia/DF, Brazil, September 29-October 3, 2013.
- [7] E. Omar\* and S. Ghosh. An Exploratory Study of Higher Order Mutation Testing in Aspect-oriented Programming, Proceedings of the 23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012), Dallas, TX, November 27-20, 2012.
- [8] S. Lozano-Fuentes, S. Ghosh, J. M. Bieman, D. Sadhu, L. Eisen, F. Wedyan, E. Hernandez-Garcia, J. Garcia-Rejon, D. Tep-Chel. Using Cell Phones for Mosquito Vector Surveillance and Control, Proceedings of the 24th International Conference on Software Engineering & Knowledge Engineering (SEKE'2012), Redwood City, USA July 1-3, 2012.
- [9] A. Bandyopadhyay\* and S. Ghosh. Tester Feedback Driven Fault Localization, Proceedings of the 5th IEEE International Conference on Software Testing, Verification and Validation, pp. 41-50, Montreal, Canada, April 17-21, 2012.
- [10] A. Bandyopadhyay\* and S. Ghosh. On the Effectiveness of the Tarantula Fault Localization Technique for Different Fault Classes, Proceedings of the 13th IEEE International High Assurance Systems Engineering Symposium, Boca Raton, FL, USA, November 10-12, 2011.
- [11] A. Bandyopadhyay\* and S. Ghosh. Proximity Based Weighting of Test Cases to Improve Spectrum Based Fault Localization, Proceedings of the 26th IEEE/ACM International Conference on Automated Software Engineering (ASE), Lawrence, KS, USA, November 6-11, 2011.
- [12] F. Wedyan\* and S. Ghosh. A Dataflow Testing Approach for Aspect-Oriented Programs, Proceedings of the 12th IEEE International High Assurance Systems Engineering Symposium (HASE), pp. 64-73, San Jose, USA, November 1-4, 2010.
- [13] L. Yu, R. B. France, I. Ray, and S. Ghosh. A Rigorous Approach to Uncovering Security Policy Violations in UML Designs, Proceedings of the 14th International Conference on Engineering of Complex Computer Systems (ICECCS), Potsdam, Germany, June 2-4, 2009.
- [14] R. Delamare, B. Baudry, S. Ghosh, and Y. Le Traon. A Test-Driven Approach to Developing Pointcut Descriptors in AspectJ, Proceedings of the 2nd International Conference on Software Testing, Verification and Validation (ICST), Denver, Colorado, April 1-4, 2009.
- [15] A. Bandyopadhyay\* and S. Ghosh. Test Input Generation using UML Sequence and State Machines Models, Proceedings of the 2nd International Conference on Software Testing, Verification and Validation (ICST), Denver, Colorado, April 1-4, 2009.
- [16] F. Wedyan\* and S. Ghosh. A Joinpoint Coverage Measurement Tool for Evaluating the Effectiveness of Test Inputs for AspectJ Programs, Proceedings of the 19th International Symposium on Software Reliability Engineering (ISSRE), pp. 207-212, Seattle, Washington, November 11-14, 2008.
- [17] J. Hittle\* and S. Ghosh. Fault Injection Testing of User-space File Systems Using Traditional and Aspect-based Techniques, Proceedings of the 20th International Conference on Software Engineering and Knowledge Engineering (SEKE), pp. 873-876, Redwood City, CA, July 1-3, 2008.

- [18] A. Bandyopadhyay\* and S. Ghosh. Developing Model Transformation Tools Using the UML Meta-model: Challenges and Solutions, Proceedings of Software Engineering and Applications, pp. 545-550, Cambridge, MA, November 19-21, 2007.
- [19] R. B. France, F. Fleury, R. Reddy, B. Baudry, and S. Ghosh. Providing Support for Model Composition in Metamodels, Proceedings of the 11th International EDOC Conference, IEEE Computer Society Press, pp. 253-266, Annapolis, MD, October 15-19, 2007. (Acceptance rate: 33/115)
- [20] M. Mortensen\* and S. Ghosh. Refactoring Idiomatic Exception Handling in C++: Throwing and Catching Exceptions with Aspects, Industry Track of the International Conference on Aspect-Oriented Software Development (AOSD), Vancouver, Canada, March 12-16, 2007.
- [21] T. Dinh-Trong\*, S. Ghosh, and R. B. France. "A Systematic Approach to Generate Inputs to Test UML Design Models", Proceedings of the 17th International Symposium on Software Reliability Engineering (ISSRE), IEEE Computer Society Press, pp. 95-104, Raleigh, NC, November 2006. (Acceptance rate: 38/102)
- [22] M. Mortensen\*, S. Ghosh, and J. M. Bieman. "Testing During Refactoring: Adding Aspects to Legacy Systems", Proceedings of the 17th International Symposium on Software Reliability Engineering (ISSRE), IEEE Computer Society Press, pp. 221-230, Raleigh, NC, November 2006. (Acceptance rate: 38/102)
- [23] M. Mortensen\* and S. Ghosh. Using Aspects with Object-Oriented Frameworks, Proceedings of the Industry Track of the International Conference on Aspect-Oriented Software Development (AOSD), pp. 9-17, Bonn, Germany, March 20-24, 2006.
- [24] C. J. M. Geisterfer and S. Ghosh. Software Component Specification: A Study in Perspective of Component Selection and Reuse, Proceedings of the 5th International Conference on COTS Based Software Systems (ICCBSS), IEEE Computer Society Press, pp. 100-108, Orlando, USA, February 13-17, 2006.
- [25] D. Simmonds\*, A. Solberg, R. Reddy, R. B. France, and S. Ghosh. "An Aspect Oriented Model Driven Framework," Proceedings of the *9th International Enterprise Distributed Object Computing Conference (EDOC 2005)*, IEEE Computer Society Press, pp. 119-130, Enschede, The Netherlands, September 19-23, 2005. (Acceptance rate: 25/77)
- [26] A. Solberg, D. Simmonds\*, R. Reddy, S. Ghosh, and R. B. France. Using Aspect Oriented Techniques to Support Separation of Concerns in Model Driven Development, Proceedings of the *29th Annual International Computer Software and Applications Conference (COMPSAC 2005)*, IEEE Computer Society Press, pp. 121-126, Vol. 1, Edinburgh, Scotland, July 25-28, 2005. (Acceptance rate: 72/278)
- [27] T. Dinh-Trong\*, N. Kawane\*, S. Ghosh, R. B. France, and A. A. Andrews. A Tool-Supported Approach to Testing UML Design Models, Proceedings of the *10th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS'05)*, IEEE Computer Society Press, pp. 519-528, Shanghai, China, June 16-20, 2005. (Acceptance rate: 60/180)
- [28] S. Ghosh, J. Kelly\*, and R. Shankar\*. Enabling the Selection of COTS Components, *Proceedings of the 4th International Conference on COTS-Based Software Systems (ICCBSS'05)*, Springer Verlag LNCS, pp. 122-131, Bilbao, Spain, February 7-11, 2005.

- [29] B. Kamalakar\*, S. Ghosh, and P. Vile\*. Middleware Transparent Development of Dependable CORBA Applications, Proceedings of the *15th IEEE International Symposium on Software Reliability Engineering (ISSRE'04)*, pp. 352-364, IEEE Computer Society Press, St. Malo, France, November 2-5, 2004. (Acceptance rate: 39/120)
- [30] G. Straw, Geri Georg, E. Song, S. Ghosh, R. B. France, and J. M. Bieman. Model Composition Directives, Proceedings of the *7th International Conference on the Unified Modeling Language (UML'04)*, Springer Verlag LNCS, pp. 84-97, Lisbon, Portugal, October 10-15, 2004. (Acceptance rate: 30/135)
- [31] G. Tandon\* and S. Ghosh. Using Subject-Oriented Modeling to Develop Jini Applications, Proceedings of the *8th IEEE International Enterprise Distributed Object Computing Conference (EDOC'04)*, pp. 111-122, IEEE Computer Society Press, Monterey, USA, September 20-24, 2004.
- [32] S. Ghosh, R. B. France, C. Braganza\*, N. Kawane\*, A. Andrews, and O. Pilskalns. Test Adequacy Assessment for UML Design Model Testing, In the *Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE'03)*, IEEE Computer Society Press, pp. 332-343, Denver, USA, November 17-20, 2003.
- [33] D. K. Kim, R. B. France, S. Ghosh, and E. Song. A Role-Based Metamodeling Approach to Specifying Design Patterns, In the *27th Annual International Computer Software and Applications Conference (COMPSAC'03)*, IEEE Computer Society Press, pp. 452-457, Dallas, USA, November 3-6, 2003.
- [34] O. Pilskalns, A. Andrews, S. Ghosh, and R. B. France. Rigorous Testing by Merging Structural and Behavioral UML Representations, In the *6th International Conference on the Unified Modeling Language (UML'03)*, Springer Verlag LNCS, pp. 234-248, San Francisco, USA, October 20-24, 2003. (Acceptance rate: 30/143)
- [35] S. Ghosh, N. Bawa\*, S. Goel, and Y. R. Reddy. Validating Run-Time Interactions in Distributed Java Applications, *Proceedings of the 8th IEEE International Conference on Engineering of Complex Computer Systems, (ICECCS'02)*, IEEE Computer Society Press, pp. 7-16, Greenbelt, USA, December 2-4, 2002. (Acceptance rate: 23/49)
- [36] D. K. Kim, R. B. France, S. Ghosh, and E. Song. Using Role-Based Modeling Language (RBML) as Precise Characterizations of Model Families. *Proceedings of the 8th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS'02)*, IEEE Computer Society Press, pp. 107-116, Greenbelt, USA, December 2-4, 2002. (Acceptance rate: 23/49)
- [37] R. T. Alexander, J. M. Bieman, S. Ghosh, and B. Ji. Mutation of Java Objects, *Proceedings of the 13th IEEE International Symposium on Software Reliability Engineering (ISSRE'02)*, IEEE Computer Society Press, pp. 341-351, Annapolis, USA, November 12-15, 2002. (Acceptance rate: 33/73)
- [38] A. Andrews, S. Ghosh, and Eun Man Choi. A Model for Understanding Software Components, *Proceedings of the IEEE International Conference on Software Maintenance (ICSM'02)*, IEEE Computer Society Press, pp. 359-369, Montreal, Canada, October 3-6, 2002. (Acceptance rate: 61/129)
- [39] D. Simmonds\* and S. Ghosh. Middleware Transparency through Aspect-Oriented Programming using AspectJ and Jini, *Proceedings of the SPIE ITCOM Conference on Java/Jini Technologies*, pp. 16-27, SPIE press, Boston, USA, August 1, 2002, (*abstract refereed*).
- [40] J. M. Bieman, S. Ghosh, and R. T. Alexander. A Technique for Mutation of Java Objects (short paper), *Proceedings of the 16th IEEE International Conference on Automated Software Engineering (ASE'01)*,

November 23-26, San Diego, IEEE Computer Society Press, pp. 337-340, USA, 2001. (acceptance rate: 32 long, 28 short /164)

- [41] S. Ghosh, N. Bawa\*, G. Craig\*, and K. Kalgaonkar\*. A Test Management and Software Visualization Framework for Heterogeneous Distributed Applications, *Proceedings of the IEEE High Assurance Systems Engineering (HASE'01)*, IEEE Computer Society Press, pp. 106-116, Fort Lauderdale, USA, October 22-24, 2001.
- [42] R. B. France, S. Ghosh, and D. E. Turk. Towards a Model-Driven Approach to Reuse, *Proceedings of the International Conference on Object Oriented Systems (OOIS'01)*, Springer Verlag, pp. 181-190, Calgary, Canada, August 27-29, 2001.
- [43] S. Ghosh, N. Bawa\*, G. Craig\*, and K. Kalgaonkar\*. A Framework for Measuring Test Coverage of Java Applications, *Proceedings of IASTED Software Engineering and Applications (SEA'01)*, pp. 158-163, Anaheim, USA, August 21-24, 2001.
- [44] S. Ghosh, N. Bawa\*, G. Craig\*, and K. Kalgaonkar\*. A Testing Tool for Distributed Java Applications, *Proceedings of the SPIE ITCOM Conference on Java/Jini Technologies*, SPIE Press, pp. 74-85, August 22, 2001, Denver, USA, (abstract refereed).
- [45] S. Ghosh. Fault Injection Testing for Distributed Object Systems, *Proceedings of 39th Conference and Exhibition on Technology of Object-Oriented Languages and Systems (TOOLS USA) 2001*, IEEE Computer Society Press, pp. 276 - 285, July 29-August 3, 2001, Santa Barbara, USA.
- [46] S. Ghosh and N. Bawa\*. A Comparison of Java-Based Management Technologies, *Proceedings of the 2001 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'02)*, CSREA Press, June 25-28, 2001, Las Vegas, USA.
- [47] S. Ghosh, P. Govindarajan, and A. P. Mathur. TDS: A Tool for Testing Distributed Component-Based Applications, *Proceedings of MUTATION 2000*, Kluwer Academic Publishers, pp. 103-112, October 6-7, 2000, San Jose, USA.
- [48] S. Ghosh and A. P. Mathur. Interface Mutation, *First published in pre-proceedings of MUTATION 2000*, selected for publication as an expanded version in special issue of JSTVR, October 6-7, 2000, San Jose, USA.
- [49] S. Ghosh and A. P. Mathur. Interface Mutation to Assess the Adequacy of Tests for Components, *Proceedings of the 34th Conference on Technology of Object-Oriented Languages and Systems (TOOLS USA) 2000*, IEEE Computer Society Press, pp. 37-46, Santa Barbara, USA, Jul 30-Aug 2, 2000.
- [50] A. P. Mathur, S. Ghosh, P. Govindarajan, and B. Sridharan. A Framework for Assessing Test Adequacy, Architecture Extraction, Metering, Monitoring and Controlling Distributed Component-Based Systems, *Proceedings of the 1st Symposium on Reusable Architectures and Components for Developing Distributed Information Systems*, Orlando, USA, August 2-3, 1999, (abstract refereed).
- [51] S. Ghosh and A. P. Mathur. On Errors And Failures in Distributed Systems Built to CORBA and COM Standards, *Proceedings of the International Conference on Software Engineering and its Application*, pp. 56-64, December 19-20, 1997, Hyderabad, India.
- [52] S. Ghosh, A. P. Mathur, J. R. Horgan, J. J. Li, and W. E. Wong. Software Fault Injection Testing on a Distributed System - A Case Study, *Proceedings of the First International Software Quality Week Europe*, November 4-7 1997, Brussels, Belgium, (abstract refereed).



## Workshops and Fast Abstracts

- [1] E. Omar\*, S. Ghosh, and D. Whitley. HOMAJ: A Tool for Higher Order Mutation Testing in AspectJ and Java, Proceedings of the ICST 2014 Workshop on Mutation, pp. 165-170, Cleveland, OH, USA, Mar 31-Apr 4, 2014.
- [2] A. Bandyopadhyay\* and S. Ghosh. STUDENT PAPER: Using UML Sequence Diagrams and State Machines for Test Input Generation, Proceedings of the 19th International Symposium on Software Reliability Engineering (ISSRE), pp. 309-310, Seattle, Washington, November 11-14, 2008.
- [3] B. Baudry, A. Faivre, S. Ghosh, and A. Pretschner. 4th International workshop on Model Design, Verification, and Validation. Models in Software Engineering: Workshops and Symposia at MoDELS 2007, Nashville, TN, Springer LNCS 5002, pp. 145-150, 2008.
- [4] F. Fleurey, B. Baudry, R. France and S. Ghosh. A Generic Approach For Automatic Model Composition, MoDELS workshop on Aspect Oriented Modeling, Nashville, USA, September 30 - October 5, 2007, Springer LNCS 5002, pp. 7-15, 2008. (Selected as one of two best papers in the workshop.)
- [5] R. Reddy, A. Solberg, R. B. France, and S. Ghosh. Composing Sequence Models using Tags, MoDELS workshop on Aspect Oriented Modeling, Genova, Italy, October 1-6, 2006.
- [6] B. Baudry, T. Dinh-Trong\*, J.-M. Mottu, D. Simmonds\*, R. France, S. Ghosh, F. Fleurey, and Y. Le Traon. Model Transformation Testing Challenges, ECMDA workshop on Integration of Model Driven Development and Model Driven Testing, Bilbao, Spain, July 10-13, 2006.
- [7] M. P. Mortensen\* and S. Ghosh. Extra-functional Aspects: Design Tradeoffs and Challenges, 5th AOSD Workshop on Aspects, Components, and Patterns for Infrastructure Software, Bonn, Germany, March 20-24, 2006.
- [8] T. Dinh-Trong, S. Ghosh, R. B. France, M. Hamilton, and B. Wilkins. UMLAnT: An Eclipse Plugin for Animating and Testing UML Designs, Eclipse Technology Exchange Workshop in conjunction with OOPSLA, San Diego, October 15-16, 2006. (Acceptance rate: 27/47)
- [9] B. Baudry, C. Gaston, and S. Ghosh. Report on the 2nd MoDeVa workshop - Model Design and Validation, MoDELS 2005 Satellite Events Proceedings, Springer-Verlag LNCS 3844, pp. 32-38, Montego Bay, Jamaica, October 2005.
- [10] R. Reddy, R. B. France, S. Ghosh, F. Fleury, and B. Baudry. Model Composition — A Signature-Based Approach, *Aspect Oriented Modeling workshop*, in conjunction with UML/MoDELS, Montego Bay, Jamaica, October 2, 2005.
- [11] T. Dinh-Trong, S. Ghosh, R. B. France, B. Baudry, and F. Fleury. A Taxonomy of Faults for UML Designs, *2nd MoDeVa workshop (Model Design and Validation)*, in conjunction with UML/MoDELS, Montego Bay, Jamaica, October 3, 2005.
- [12] T. Dinh-Trong, S. Ghosh, R. B. France, and A. A. Andrews. Generating test data to test UML Design Models, *2nd MoDeVa workshop (Model Design and Validation)*, in conjunction with UML/MoDELS, Montego Bay, Jamaica, October 3, 2005.
- [13] T. Dinh-Trong, S. Ghosh, R. B. France, and A. A. Andrews. A Systematic Approach to Testing UML Design Models, *4th International Workshop on Critical Systems Development Using Modeling Languages*, in conjunction with SAFECOMP, Fredrikstad, Norway, September 27, 2005.

- [14] A. Andrews, A. Stefik, N. Picone, and S. Ghosh. A COTS Component Comprehension Process, *Proceedings of the 13th IEEE International Workshop on Program Comprehension (IWPC'05)*, IEEE Computer Society Press, pp. 135–144, St. Louis, USA, May 15-16, 2005. (Acceptance rate: 24/55)
- [15] T. Dinh-Trong\*, N. Kawane\*, S. Ghosh, R. B. France, and A. A. Andrews. “EPTUD: An Eclipse Plugin for Testing UML Designs”, *UML 2004 Satellite Events*, Lisbon, Portugal, *Lecture Notes in Computer Science*, Volume 3297, Springer-Verlag GmbH, 2005.
- [16] S. Ghosh and B. Kamalakar\*. An Aspect-Oriented Approach to Developing Middleware-based Applications, *OOPSLA and GPCE Workshop on Best Practices for Model Driven Software Development*, Vancouver, Canada, October 25, 2004.
- [17] B. Kamalakar\* and S. Ghosh. A Middleware Transparent Approach for Developing CORBA-based Distributed Applications, *Workshop on Aspect-Oriented Modeling at the 7th International Conference on the Unified Modeling Language*, Lisbon, Portugal, October 10-15, 2004.
- [18] R. B. France, S. Ghosh, I. Ray, J. M. Bieman, G. Georg, and R. T. Alexander. Evaluating Competing Dependability Concern Realizations in an Aspect-Oriented Modeling Framework (fast abstract), In *the Supplementary Proceedings of the International Symposium on Software Reliability Engineering, ISSRE 2003*, Denver, USA, November 17-20, 2003.
- [19] D. K. Kim, R. B. France, S. Ghosh, and E. Song. A UML-Based Metamodeling Language to Specify Design Patterns. *Workshop in Software Model Engineering (WisME)*, UML 2003, San Francisco, USA, October 20-24, 2003.
- [20] D. Simmonds\*, S. Ghosh, and R. B. France. Middleware Transparent Software Development and the MDA, *Workshop in Software Model Engineering (WisME)*, UML 2003, San Francisco, USA, October 20-24, 2003.
- [21] D. Simmonds\*, S. Ghosh, and R. B. France. An MDA Framework for Middleware Transparent Software Development, *IEEE RTAS 2003 Model-Driven Embedded Systems Workshop*, Washington, DC, USA, May 27, 2003.
- [22] N. Bawa\* and S. Ghosh. Visualizing Interactions in Distributed Java Applications, In *Proceedings of the IEEE International Workshop on Program Comprehension (IWPC'03)*, IEEE Computer Society Press, IEEE Computer Society Press, pp. 292–293, Portland, USA, May 9–10, 2003.
- [23] D. Simmonds\*, S. Ghosh, and R. B. France. An Aspect Oriented Model Driven Architectural Framework for Middleware Transparency, *Early Aspects 2003, Workshop on Aspect-Oriented Requirements Engineering and Architecture Design*, AOSD 2003, Boston, USA, March 17, 2003.
- [24] S. Ghosh. Fault Insertion in Concurrent Object-Oriented Programs for Mutation Analysis and Testability Measurement, *Proceedings of the 13th IEEE International Symposium on Software Reliability Engineering (ISSRE 2002) Fast Abstracts*, Annapolis, USA, November 12-15, 2002, (fast abstract).
- [25] D. K. Kim, R. B. France, S. Ghosh, and E. Song. Software Component Specification Using Role-Based Modeling Language, *Proceedings of the 11th OOPSLA Workshop on Behavioral Semantics*, Seattle, USA, November 4, 2002.
- [26] S. Ghosh. Towards Measurement of Testability of Concurrent Object-Oriented Programs using Fault Insertion: A Preliminary Investigation, *Proceedings of the 2nd IEEE International Workshop on*

*Source Code Analysis and Manipulation (SCAM'02)*, pp. 17–25, IEEE Computer Society Press, Montreal, Canada, October 1, 2002.

- [27] E. Song, R. B. France, D. K. Kim, and S. Ghosh. Using Roles for Pattern-based Model Refactoring, *Proceedings of the Workshop on Critical Systems Development with UML*, Dresden, Germany, September 30, 2002.
- [28] S. Ghosh. Improving Current Component Development Techniques for Successful Component-Based Software Development, *Proceedings of the 7th International Conference on Software Reuse Workshop on Component-based Software Development Processes*, Austin, USA, April 16, 2002.
- [29] R. B. France, D. K. Kim, E. Song, and S. Ghosh. Using Roles to Characterize Model Families, *Proceedings of the Tenth OOPSLA Workshop on Behavioral Semantics: Back to the Basics*, Tampa, USA, October 15, 2001.
- [30] S. Ghosh and A. P. Mathur. Certification of Distributed Component Computing Middleware and Applications, *Proceedings of the 4th Component Based Software Engineering Workshop during ICSE 2001*, May 14-15, 2001, Toronto, Canada.
- [31] S. Ghosh. On Testing Distributed Systems With Broker Architecture, *Proceedings of On-going Student Research, 29th Fault Tolerant Computing Symposium (FTCS)*, June 15-18 1999, Madison, USA (student paper).
- [32] S. Ghosh and A. P. Mathur. Issues in Testing Distributed Component-Based Systems, *Proceedings of the First ICSE Workshop on Testing Distributed Component-Based Systems*, Los Angeles, USA, May 17, 1999.

### **Invited Workshops**

- [1] D. Simmonds\*, S. Ghosh, and R. B. France. Middleware Transparent Software Development and the MDA, *Workshop in SIVOEES-MDA*, UML 2003, San Francisco, USA, October 20-24, 2003.
- [2] D. Simmonds\*, S. Ghosh, and R. B. France. An MDA Framework for Middleware Transparent Software Development and Quality of Service, *Workshop on Qos in Component-Based Software Engineering*, Toulouse, France, June 20, 2003.

### **Technical Reports**

- [1] T. T. Dinh-Trong\*, N. Kawane\*, S. Ghosh, R. B. France, and A. A. Andrews. A Tool-Supported Approach to Testing UML Design Models, Department of Computer Science, Colorado State University, Technical Report 04-108, October 2004.
- [2] B. Kamalakar\* and S. Ghosh. A Middleware Transparent Approach for Developing CORBA-based Distributed Applications, Department of Computer Science, Colorado State University, Technical Report 04-104, April 2004.
- [3] G. Straw, G. Georg, E. Song, S. Ghosh, R. B. France, and J. M. Bieman. Primitives of Composition Directives, Department of Computer Science, Colorado State University, Technical Report 04-103, April 2004.

- [4] S. Ghosh. Testing Component-Based Distributed Applications - A Thesis, SERC Technical Report TR-180-P, August 2000.
- [5] S. Ghosh, P. Govindarajan, and A. P. Mathur. TDS 1.1: A Tool for Testing Distributed Object Systems, SERC Technical Report TR-179P, August 1999.
- [6] S. Ghosh and A. P. Mathur. Testing for Fault Tolerance, SERC Technical Report TR-175P, August 1997.

## **CONTRACTS AND GRANTS**

### **Funded Projects as PI**

1. 2010, "Dengue Decision Support System", Qualcomm gift, \$5,000.
2. 2005, "Providing Support for Executing and Testing UML Designs," IBM Eclipse Innovation Grant, \$23,500.
3. 2004, "Providing Support for Executing and Testing UML Designs," IBM Eclipse Innovation Grant, \$20,000.
4. 2002-2003, "Career Enhancement Grant," Colorado State University, \$2,000.
5. 2001-2002, "A Software Visualization System for CORBA-based Heterogeneous Distributed Applications," CASI Undergraduate Research, \$2,500.
6. 2001-2002, "Fault Injection Testing of Java Objects," Faculty Research Grant, Colorado State University, \$4,500.

### **Funded Projects as coPI**

1. 2016-2018, "Enhancing the reliability, efficiency, and usability of Bayesian population PBPK modeling", \$250,000, Sponsor: HHS-NIH, Brad Reisfeld (PI), Sudipto Ghosh and others (co-PI).
2. 2015-2016, "ETL Testing in Data Warehouses", \$34,182.00, Sponsor: University of Colorado at Denver, Indrakshi Ray (PI), Sudipto Ghosh (co-PI).
3. 2015-2016, "Collaborative Research: CI-ADDO-EN: Research Repository for Model-Driven Software Development (REMODD)", NSF, \$499,290.
4. 2015-2016, "International: Research Experience for US Students at INRIA - REUSSI 2", NSF, \$50,000.
5. 2016, VPR Investment Funding Colorado State University: Office of the Vice President, "Creating a CSU Center for Mobile Health Technologies and Applications", \$10,000.
6. 2009-2012, "Use of Cell Phones for Field Data Capture in a Dengue Decision Support System", NIH, \$365,971.
7. 2005-2007, "Planning Visits: Collaborative Research on Model Driven Development of Complex Software Systems," NSF, \$23,000.
8. 2005-2006, Cost Extension for NSF Grant #0203285 "Testing UML Designs", R. B. France, S. Ghosh, A. A. Andrews, NSF, \$60,000.

9. 2002-2005, "Testing UML Designs," R. B. France, A. Andrews and S. Ghosh, NSF Software Engineering and Languages Program, \$300,000.
10. 2005, "Testing UML Designs," Research Experience for Undergraduates, R. B. France, A. Andrews and S. Ghosh, NSF, \$8,350.
11. 2001-2002, "An Architectural Approach to Reuse of Business and System Models," R. B. France, S. Ghosh and D. E. Turk, Colorado Advanced Software Institute, \$86,000.
12. 2001, "Introducing Computer Science: A Summer Program," Y. K. Malaiya, S. Ghosh and S. Schleifers, Colorado Institute of Technology, \$20,000.

### **Pending Projects as PI**

1. 2017-2020, "SHF: Small: Supporting Testing of Evolving Executable UML Models," \$498,899, NSF.

### **Pending Projects as co-PI**

1. 2017-2018, "A novel tool to aid in the diagnosis and treatment of acetaminophen poisoning", P.I. Brad Reisfeld, co-PI Sudipto Ghosh, CCTSI Colorado Pilot Program (CO-Pilot).

### **Travel Grants**

1. 1999, Student Travel Scholarship from the 29th Fault Tolerant Computing Symposium, Madison, Wisconsin.

## **PROFESSIONAL AFFILIATIONS AND ACTIVITIES**

- Current Memberships in Professional Societies
  - Association of Computing Machinery
  - IEEE
  - IEEE Computer Society
- Associate Editor:
  - Software Quality Journal, 2011 –
- Member, Editorial Board
  - IEEE Transactions on Reliability, 2017 –
  - Information and Software Technology, 2008 –
  - Journal of Software Testing, Verification, and Reliability, 2006 –
  - Software Quality Journal, 2006 –
- Volume Editor, MODELS 2009 post-proceedings, LNCS 6002, Springer, appeared in 2010.
- Guest Editor/Co-Editor
  - Guest co-editor for Software Quality Journal Special Issue on Program Debugging (started in 2015, to appear in 2017).
  - Guest co-editor for papers selected from ICST 2010 for special issue in Journal of Software Testing, Verification, and Reliability.

- Guest Editor for 3 papers in regular issues for Journal on Software and Systems Modeling, Springer
- Guest co-editor of special section in Software Quality Journal for papers selected from ACM SAC 2007
- Grant Review
  - NSF, USA
  - NSERC, Canada
  - CASI, Colorado, USA
  - Austrian Science Fund, Austria
  - Texas Higher Education Advanced Research Program, USA
  - Fundamental Research Program at University of Mons, Belgium
- External Reviewer
  - VIDII Program, Innovational Research Incentives Scheme (Vernieuwingsimpuls), 2002
  - Habilitation Thesis, University Of Vienna, Austria, 2004
  - PhD thesis, University of Western Australia, 2012
  - MS thesis, Universidade de São Paulo, Brazil, 2014
- Conference/Workshop Steering Committee
  - International Conference on Modularity (MODULARITY)
  - International Conference on Programming <Programming>
  - Workshop on Model Driven Engineering, Verification, and Validation (MODEVVA)
- Conference General Chair
  - SPIE’s ITCOM 2003 - Conference on Java/Jini Technologies
  - SPIE’s ITCOM 2002 - Conference on Java/Jini Technologies
  - SPIE’s ITCOM 2001 - Conference on Java/Jini Technologies
- Conference General Co-Chair
  - MODULARITY 2015 – 14th International Conference on Modularity
  - MODELS 2009 – ACM/IEEE 12th International Conference on Model Driven Engineering Languages and Systems
- Conference Program Co-Chair
  - ICST 2010 – IEEE International Conference on Software Testing, Verification and Validation
- Program Committee Member (Conferences)
  - 10th International Conference on Software Testing, Verification, and Validation (ICST 2017)
  - 12th European Conference on Modelling Foundations and Applications (ECMFA 2016)
  - 9th International Conference on Software Testing, Verification, and Validation (ICST 2016)
  - 28th International Conference on Testing Software and Systems (ICTSS 2016)
  - 27th International Symposium on Software Reliability Engineering (ISSRE 2016)
  - IEEE International Conference on Software Quality, Reliability, and Security (QRS 2016)
  - Rocky Mountain Celebration of Women in Computing (RMCWiC 2016)
  - Asia-Pacific Software Engineering Conference (APSEC 2015)
  - 27th International Conference on Testing Software and Systems (ICTSS 2015)

- IEEE International Conference on Software Quality, Reliability, and Security (QRS 2015)
- 26th International Symposium on Software Reliability Engineering (ISSRE 2015)
- 37th International Conference on Software Engineering (ICSE 2015), New Ideas and Emerging Results (NIER)
- 30th ACM/SIGAPP Symposium On Applied Computing (SAC 2015)
- 25th International Symposium on Software Reliability Engineering (ISSRE 2014)
- 14th International Conference on Quality Software (QSIC 2014)
- Software Engineering In Practice (SEIP), International Conference on Software Engineering (ICSE 2014)
- Testing: Academic & Industrial Conference - Practice and Research Techniques (TAIC PART 2014)
- New Ideas and Emerging Results (NIER), International Conference on Software Engineering (ICSE 2013)
- 6th International Conference on Software Testing, Verification, and Validation (ICST 2013)
- 24th International Symposium on Software Reliability Engineering (ISSRE 2013)
- 13th International Conference on Quality Software (QSIC 2013)
- 23rd International Symposium on Software Reliability Engineering (ISSRE 2012)
- 5th International Conference on Software Testing, Verification, and Validation (ICST 2012)
- ACM/IEEE 15th International Conference on Model Driven Engineering Languages and Systems (MODELS 2012)
- 14th International Conference on Component Based Software Engineering (CBSE 2011)
- 13th IEEE International High Assurance Systems Engineering Symposium (HASE 2011)
- 22nd International Symposium on Software Reliability Engineering (ISSRE 2011)
- 11th International Conference on Quality Software (QSIC 2011)
- 21st International Symposium on Software Reliability Engineering (ISSRE 2010)
- 13th International Conference on Component Based Software Engineering (CBSE 2010)
- 10th International Conference on Quality Software (QSIC 2010)
- ACM/IEEE 13th International Conference on Model Driven Engineering Languages and Systems (MODELS 2010)
- 4th IEEE International Conference on Secure Software Integration and Reliability Improvement (SSIRI 2010)
- 12th International Conference on Component Based Software Engineering (CBSE 2009)
- 3rd IEEE International Conference on Secure Software Integration and Reliability Improvement (SSIRI 2009)
- 9th International Conference on Quality Software (QSIC 2009)
- 2nd International Conference on Software Testing, Verification, and Validation (ICST 2009)
- 19th International Symposium on Software Reliability Engineering (ISSRE 2008)
- 8th International Conference on Quality Software (QSIC) 2008
- 2nd IEEE International Conference on Secure System Integration and Reliability Improvement (SSIRI 2008)
- 23rd Annual ACM Symposium on Applied Computing, SE Track (SAC 2008)
- First International Conference on Software Testing, Verification, and Validation (ICST 2008)
- 7th IEEE International Conference on COTS Based Software Systems (ICCBSS 2008)
- 7th International Conference on Quality Software (QSIC 2007)
- 18th IEEE International Symposium on Software Reliability Engineering (ISSRE 2007)
- ACM/IEEE 10th International Conference on Model Driven Engineering Languages and Systems (MoDELS/UML) 2007

- 22nd Annual ACM Symposium on Applied Computing, SE Track (SAC 2007)
  - 6th IEEE International Conference on COTS-based Software Systems (ICCBSS 2007)
  - First IEEE International Conference on System Integration and Reliability Improvements (SIRI 2006)
  - 17th IEEE International Symposium on Software Reliability Engineering (ISSRE 2006)
  - ACM/IEEE 9th International Conference on Model Driven Engineering Languages and Systems (MoDELS/UML) 2006
  - ACM/IEEE 8th International Conference on Model Driven Engineering Languages and Systems (MoDELS/UML) 2005
  - 29th Annual International Computer Software and Applications Conference (COMPSAC) 2005
  - 16th IEEE International Symposium on Software Reliability Engineering (ISSRE 2005)
  - 15th IEEE International Symposium on Software Reliability Engineering (ISSRE 2004)
  - 13th IEEE International Symposium on Software Reliability Engineering (ISSRE 2002)
  - 10th IEEE International Conference on Computer Communications and Networks (ICCCN 2001)
  - 12th IEEE International Symposium on Software Reliability Engineering (ISSRE 2001)
- Workshop Chair
    - IWPD – International Workshop on Program Debugging at ISSRE 2014 (co-chair)
    - MoDeVVA – Model Design, Verification, and Validation at MoDELS 2008 (co-chair)
    - MoDeVVA – Model Design, Verification, and Validation at MoDELS 2007 (co-chair)
    - MoDeVA – Model Design and Validation at MoDELS 2005 (co-chair)
- Program Committee Member (Workshops)
    - Advances in Model-Based Testing (AMOST) at ICST 2017
    - Mutation Analysis at ICST 2017
    - Modularity in Modeling Workshop at Modularity 2017
    - Educators Symposium at MODELS 2017
    - ACM Student Research Competition at ICSE 2016
    - Advances in Model-Based Testing (AMOST) at ICST 2016
    - Mutation Analysis at ICST 2016
    - Modularity in Modelling Workshop (MOMO) at Modularity 2016
    - 8th Brazilian Workshop on Systematic and Automated Software Testing (SAST 2014) at CBSOft 2014
    - Posters track at ACM/IEEE 17th International Conference on Model Driven Engineering Languages and Systems
    - 4th International Workshop on Regression Testing (Regression 2014) at ICST 2014
    - 7th Brazilian Workshop on Systematic and Automated Software Testing, 2013
    - 3rd International Workshop on Regression Testing (Regression 2013) at ICST 2013
    - 2nd International Workshop on Regression Testing (Regression 2012) at ICST 2012
    - 5th International Workshop on Automation of Software Test at ICSE 2010
    - Workshop on Quality of Model-Based Testing at ICST 2010
    - International workshop on Validation and Verification of Dynamic Software Systems at ICST 2010
    - Aspect-Oriented Modeling Workshop at MODELS 2009
    - Model-Driven Engineering, Verification, and Validation Workshop at MODELS 2009
    - 4th International Workshop on Automation of Software Test at ICSE 2009
    - 4th International Workshop on Mutation Analysis at ICST 2009



- Doctoral Symposium at 11th ACM/IEEE Conference on Model Driven Engineering, Languages, and Systems, 2008
- 4th Workshop on Advances in Model-based Software Testing (A-MOST'07) at ICST 2008
- Third International Workshop on Automation of Software Test at ICSE 2008
- Aspect Oriented Modeling Workshop at AOSD 2008
- Eclipse Technology eXchange (ETX) workshop at OOPSLA 2007
- Aspect Oriented Modeling (AOM) workshop at MoDELS 2007
- Second International workshop on Model Size Metrics (MSM) at MoDELS 2007
- Domain-Specific Approaches to Software Test Automation (DoSTA) at ESEC/FSE 2007
- 1st IEEE International Workshop on Testing Emerging Software Technology at COMPSAC 2007
- Second International Workshop on Automation of Software Test at ICSE 2007
- 3rd Workshop on Advances in Model-based Software Testing (A-MOST'06) at ISSTA 2007
- Aspect Oriented Modeling Workshop at AOSD 2007
- 3rd Workshop on Mutation Analysis at TAIC Part 2007
- 2nd Workshop on Advances in Model-based Software Testing (A-MOST'06) at ISSRE 2006
- 2nd Workshop on Mutation Analysis at ISSRE 2006
- Eclipse Technology Exchange Workshop (eTX) at OOPSLA 2006
- 5th International Workshop on Critical Systems Development Using Modeling Languages at MoDELS 2006
- 2nd International Workshop on Testing and Quality Assurance for Component-based Systems (TQACBS) at COMPSAC 2006
- Aspect Oriented Modeling Workshop at MoDELS 2006
- Aspect Oriented Modeling Workshop at AOSD 2006
- Aspect Oriented Modeling Workshop at MoDELS 2005
- Aspect Oriented Modeling Workshop at AOSD 2005
- Workshop on Quality Assurance and Testing of Web-Based Applications at COMPSAC 2004
- Workshop on Software Cybernetics at COMPSAC 2004
- IEEE Workshop on Source Code Analysis and Manipulation (SCAM 2003)
- PhD Symposium Co-Chair
  - International Conference on Software Testing, Verification, and Validation (ICST 2015)
- Workshops Chair
  - International Symposium on Software Reliability Engineering (ISSRE 2016)
- Student Paper Chair
  - International Symposium on Software Reliability Engineering, 2013
  - International Symposium on Software Reliability Engineering, 2012
- Fast Abstracts Chair
  - International Symposium on Software Reliability Engineering, 2008
  - International Symposium on Software Reliability Engineering, 2007 (co-chair)
  - International Symposium on Software Reliability Engineering, 2006
  - International Symposium on Software Reliability Engineering, 2005 (co-chair)
- Poster Co-chair
  - ACM/IEEE 16th International Conference on Model Driven Engineering Languages and Systems (MODELS 2013)

- Conference Publications Chair
  - International Symposium on Software Reliability Engineering, 2010
  - International Symposium on Software Reliability Engineering, 2009
- Conference Local Arrangements Chair
  - International Symposium on Software Reliability Engineering, 2003
- Conference Panel Chair
  - ACM/IEEE 11th International Conference on Model Driven Engineering Languages and Systems, 2008
- Conference Publicity Chair
  - 8th IEEE International Conference on Software Security and Reliability (SERE), 2014
- Conference Tools and Demonstrations Co-Chair
  - ACM/IEEE 20th International Conference on Model Driven Engineering Languages and Systems (MODELS 2017)
- Conference Web Chair
  - 1st International Conference on Software Testing, Verification, and Validation (ICST) 2008
  - ACM/IEEE 8th International Conference on Model Driven Engineering Languages and Systems (MoDELS/UML) 2005
- Journal Reviewer
  - ACM Transactions on Software Engineering and Methodologies
  - IEEE Computer
  - IEEE Internet Computing
  - IEEE Software
  - IEEE Systems, Man and Cybernetics - Part A: Systems and Humans
  - IEEE Transactions on Computers
  - IEEE Transactions on Software Engineering
  - IET Software
  - Information and Software Technology, Elsevier
  - Information Technology and Management, Springer
  - International Journal of Software Engineering and Knowledge Engineering
  - International Journal of Software Maintenance and Evolution, Wiley
  - International Journal of Computers and Applications, Acta
  - Journal of the Brazilian Computer Society, Springer
  - Journal of Software Testing Verification and Reliability, Wiley
  - Journal of Systems and Software, Elsevier
  - Software and Systems Modeling, Springer
  - Software Quality Journal, Kluwer
  - Software: Practice and Experience, Wiley
  - Transactions of the Society for Modeling and Simulation International
  - Transactions on Aspect-Oriented Software Development, Springer
- IEEE Contest Reviewer

1. IEEE CHC60 2006
  2. IEEE CSIDC 2006, 2005, 2004, 2003
- Book Reviewer
    - Addison-Wesley Longman
    - McGraw Hill
    - Wiley

## HONORS AND AWARDS

1. Outstanding Reviewer, Information and Software Technology (Elsevier journal), 2015-2016
2. Outstanding Reviewer, Information and Software Technology (Elsevier journal), 2014-2015
3. Best Paper Award: MODELS 2007 Workshop on Aspect Oriented Modeling (AOM) — A Generic Approach For Automatic Model Composition, F. Fleurey, B. Baudry, R. France, and S. Ghosh.
4. 2000, Maurice H. Halstead Memorial Award for Recognizing Outstanding Research in Software Engineering, Purdue University, West Lafayette, Indiana.
5. 1999-2000, Schlumberger Award for Outstanding Graduate Teaching Assistant in the Department of Computer Sciences, Purdue University, West Lafayette, Indiana.
6. 1999-2000, Outstanding Graduate Teaching Assistant Award, Purdue University, West Lafayette, Indiana.
7. 1998, Jim Nolen Memorial Award from Upsilon Pi Epsilon, California.
8. 1995, Member, inducted to Upsilon Pi Epsilon, Computer Science Honor Society, Purdue University.
9. 1991, Best project award in Engineering Design Project, IIT Kanpur, India.
10. 1990, Academic Proficiency Award, IIT Kanpur, India.
11. 1989, Merit Certificate from IIT Kanpur for high rank in the IIT Joint Entrance Examination, Kanpur, India.
12. 1987, National Talent Scholarship, Government of India.
13. 1987, Merit Certificate and Notional Prize, All India Secondary School Examination, India.

## PRESENTATIONS

### Panels

1. 2007, S. Ghosh (moderator), R. B. France, Y. Labiche, F. Weil, and J. Whittle. Evaluating MDE Research: Are We Doing Enough? ACM/IEEE 10th International Conference on Model Driven Engineering Languages and Systems, September 30 - October 5, 2007, Nashville, TN, USA.
2. 2006, B. Murphy (moderator), N. Rouquette, L. Williams, P. Santhanam, J. Richardson, S. Ghosh. The Relevance of Software Modeling to the Software Industry, 17th IEEE Symposium on Software Reliability Engineering, Raleigh, NC, USA.
3. 2005, C. Williams (moderator), C. Campbell, P. Baker, L. Briand, and S. Ghosh. Building better systems: Modeling, Verification, and Testing, ACM/IEEE 8th International Conference on Model Driven Engineering Languages and Systems, October 2-7, Montego Bay, Jamaica.
4. 2004, L. Briand (moderator), S. Ghosh, A. Pretschner, F. Terrier, and Y. Le Traon. Model Driven Verification and Validation, 15th IEEE International Symposium on Software Reliability Engineering, St. Malo, France.

## Talks

1. HOMAJ: A Tool for Higher Order Mutation Testing in AspectJ and Java, ICST 2014 Workshop on Mutation, Cleveland, OH, USA, Mar 31-Apr 4, 2014.
2. Constructing Subtle Higher Order Mutants for Java and AspectJ Programs, 24th IEEE International Symposium on Software Reliability Engineering (ISSRE 2013), Pasadena, CA, November 4-7, 2013.
3. An Exploratory Study of Higher Order Mutation Testing in Aspect-oriented Programming, 23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012), Dallas, TX, November 27-20, 2012.
4. Research Challenges in Testing Aspect-Oriented Programs, Keynote speech at 6th Latin American Workshop on Aspect-Oriented Software Development, Natal, Brazil, September 23, 2012.
5. RanTGen: A Tool for Random Generation of Valid Object Configurations for Testing Object-Oriented Programs, Invited Talk at Department of Computer Science, University of Texas, Dallas, In conjunction with IEEE Dallas Section and IEEE Reliability Society, Dallas Chapter, 2012 Spring Student Outreach.
6. On the Effectiveness of the Tarantula Fault Localization Technique for Different Fault Classes, 13th IEEE International High Assurance Systems Engineering Symposium, Boca Raton, FL, USA, November 10-12, 2011.
7. Aspect-Oriented Refactoring of Legacy Applications: An Evaluation, presented on November 15, 2010, at University of Alabama, Tuscaloosa.
8. Aspect-Oriented Refactoring of Legacy Applications: An Evaluation, presented on November 16, 2010, at University of Alabama, Birmingham.
9. A Dataflow Testing Approach for Aspect-Oriented Programs, 12th IEEE International High Assurance Systems Engineering Symposium (HASE), San Jose, USA, November 1-4, 2010.
10. A Systematic Approach to Testing UML Designs, keynote speech at Model-Driven Engineering, Verification, and Validation (MoDeVVA 2009) workshop at MODELS 2009, October 5, 2009.
11. A Test Driven Approach to Aspectualizing Legacy Software Using Mock Systems, Invited Talk at IRISA, France, June 8, 2007.
12. A Systematic Approach to Generate Inputs to Test UML Design Models (ISSRE 2006), Raleigh, NC, Nov 7-10, 2006.
13. Testing During Refactoring: Adding Aspects to Legacy Systems (ISSRE 2006), Raleigh, NC, Nov 7-10, 2006.
14. Software Component Specification: A Study in Perspective of Component Selection and Reuse, (IC-CBSS 2007), Orlando, Florida, Feb 23-26, 2006.
15. A COTS Component Comprehension Process, 13th IEEE International Workshop on Program Comprehension (IWPC 2005), St. Louis, MO, May 15-16, 2005.
16. Middleware Transparent Development of Dependable CORBA Applications, 15th IEEE International Symposium on Software Reliability Engineering (ISSRE 2004), St. Malo, France, November 2-5, 2004.

17. An Aspect-Oriented Approach to Developing Middleware-based Applications, OOPSLA and GPCE Workshop on Best Practices for Model Driven Software Development, Vancouver, Canada, October 25, 2004.
18. Model Composition Directives, 7th International Conference On the UML (UML 2005), Portugal, Lisbon, October 11-15, 2004.
19. A Middleware Transparent Approach for Developing CORBA-based Distributed Applications, Workshop on Aspect-Oriented Modeling at the 7th International Conference on the UML, Lisbon, Portugal, October 10-15, 2004.
20. Using Subject-Oriented Modeling to Develop Jini Applications, 8th IEEE International Enterprise Distributed Object Computing (EDOC 2004), Monterey, California, September 20-24, 2004.
21. Test Adequacy Assessment for UML Design Model Testing, International Symposium on Software Reliability Engineering (ISSRE 2003), Denver, November 17-20, 2003.
22. Evaluating Competing Dependability Concern Realizations in an Aspect-Oriented Modeling Framework, International Symposium on Software Reliability Engineering (ISSRE'03), fast abstract, Denver, November 17-20, 2003.
23. Middleware Transparent Software Development and the MDA, Workshop in Software Model Engineering (WisME), UML 2003, San Francisco, October 20-24, 2003.
24. Middleware Transparent Software Development and the MDA, Workshop on SIVOES-MDA, UML 2003, San Francisco, October 20-24, 2003.
25. Validating Run-Time Interactions in Distributed Java Applications, 8th IEEE International Conference on Engineering of Complex Computer Systems, (ICECCS 2002), Greenbelt, MD, December 2-4, 2002.
26. Fault Insertion in Concurrent Object-Oriented Programs for Mutation Analysis and Testability Measurement, 13th IEEE International Symposium on Software Reliability Engineering (ISSRE 2002) Fast Abstracts, Annapolis, November 12-15, 2002.
27. A Model for Understanding Software Components, IEEE International Conference on Software Maintenance (ICSM 2002) Montreal, October 3-6, 2002.
28. Towards Measurement of Testability of Concurrent Object-Oriented Programs using Fault Insertion: A Preliminary Investigation, 2nd IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2002), IEEE Computer Society Press, Montreal, October 1, 2002.
29. Middleware Transparency through Aspect-Oriented Programming using AspectJ and Jini, SPIE IT-COM Conference on Java/Jini Technologies, Boston, August 1, 2002.
30. Improving Current Component Development Techniques for Successful Component-Based Software Development, 7th International Conference on Software Reuse Workshop on Component-based Software Development Processes, Austin, April 16, 2002.
31. A Test Management and Software Visualization Framework for Heterogeneous Distributed Applications, IEEE High Assurance Systems Engineering 2001, October 22-24, 2001.

32. A Framework for Measuring Test Coverage of Java Applications, IASTED Software Engineering and Applications (SEA 2001), Anaheim, California, August 21-24, 2001.
33. A Testing Tool for Distributed Java Applications, SPIE ITCOM Conference on Java/Jini Technologies, August 22, 2001, Denver, Colorado.
34. Fault Injection Testing for Distributed Object Systems, 34th Conference on Technology of Object-Oriented Languages and Systems (TOOLS USA) 2001, July 29–August 3, 2001, Santa Barbara, California.
35. A Comparison of Java-Based Management Technologies, 2001 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA 2001), June 25-28, 2001, Las Vegas, Nevada.
36. TDS: A Tool for Testing Distributed Component-Based Applications, MUTATION 2000, October 6-7, 2000, San Jose, CA.
37. Interface Mutation, MUTATION 2000, October 6-7, 2000, San Jose, CA.
38. Interface Mutation to Assess the Adequacy of Tests for Components, 34th Conference on Technology of Object-Oriented Languages and Systems (TOOLS USA) 2000, Santa Barbara, Jul 30-Aug 2, 2000.
39. An Interface-based Testing Methodology for Distributed Component-based Systems, Department of Computer Science, Clemson University, March 2000.
40. An Interface-based Testing Methodology for Distributed Component-based Systems, Department of Computer Science, University of Delaware, March 2000.
41. An Interface-based Testing Methodology for Distributed Component-based Systems, Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore County, March 2000.
42. An Interface-based Testing Methodology for Distributed Component-based Systems, Department of Computer Science, Colorado State University, March 2000.
43. An Interface-based Testing Methodology for Distributed Component-based Systems, Department of Computer Science, Ball State University, February 2000.
44. An Interface-based Testing Methodology for Distributed Component-based Systems, Bell Communications Research, December 1999.
45. Issues in Testing Distributed Component-Based Systems, First ICSE Workshop on Testing Distributed Component-Based Systems, Los Angeles, California, May 17, 1999.
46. On Errors And Failures in Distributed Systems Built to CORBA and COM Standards, International Conference on Software Engineering and its Application, December 19-20, 1997, Hyderabad, India.
47. Software Fault Injection Testing on a Distributed System - A Case Study, First International Software Quality Week Europe, November 4-7 1997, Brussels, Belgium.
48. On Testing Distributed Systems With Broker Architecture, On-going Student Research, 29th Fault Tolerant Computing Symposium (FTCS), June 15-18 1999, Madison, Wisconsin.

## **Posters and Demonstrations**

1. 2011, Aritra Bandyopadhyay and Sudipto Ghosh, Proximity Based Weighting of Test Cases to Improve Spectrum based Fault Localization, 26th IEEE/ACM International Conference on Automated Software Engineering (ASE 2011), Lawrence, KS, USA.
2. 2010, Devadatta Sadhu, Aritra Bandyopadhyay, Sudipto Ghosh, Robert B. France, Random Generation of Test Inputs for Model Based Unit Testing of Object-Oriented Programs, poster presented at CCWIC 2010, Golden, Colorado.
3. 2004, T. Dinh-Trong, N. Kawane, S. Ghosh, R. B. France, and A. A. Andrews. EPTUD: An Eclipse Plugin for Testing UML Designs, poster at the eclipse Technology eXchange (eTX) Reception at the 19th Annual ACM Conference on Object- Oriented Programming, Systems, Languages, and Applications, Vancouver, Canada.
4. 2004, T. Dinh-Trong, N. Kawane, S. Ghosh, R. B. France, A. A. Andrews. EPTUD: An Eclipse Plugin for Testing UML Designs, UML 2004, Lisbon, Portugal.
5. 2000, S. Ghosh, P. Govindarajan, and A. P. Mathur. Interface Mutation Tool, Mutation 2000, San Jose, California.
6. 1997, S. Ghosh and A. P. Mathur. Fault Injection Testing Tool, ACM 97 Expo, San Jose, California.

## **COMMITTEES**

### **University Committees**

1. IStEC Research Advisory Committee Co-Chair 2011–Present
2. IStEC Distinguished Lecture Sub-committee Chair 2012–Present
3. IStEC Research Advisory Committee Member 2010–Present

### **Department Committees**

1. Undergraduate Operations and Diversity Committee 2016–Present
2. Graduate Recruitment Committee 2016–Present
3. Chair, Graduate Recruitment Committee 2014–2016
4. Graduate Program Committee 2013–2014
5. Operations Committee 2011–2013
6. Graduate Recruitment Committee 2011–2013
7. Graduate Program Committee 2010–2011
8. Awards Committee 2009-2010
9. Awards Committee 2008-2009
10. Graduate Committee 2007-2008
11. Graduate Committee 2006-2007
12. Facilities Committee 2005-2006
13. Research Committee 2004-2005
14. Research Committee 2003-2004
15. Research Committee 2002-2003
16. Undergraduate Committee 2001-2002
17. Research Committee 2000-2001

## **Qualifying Examination Committees**

1. Spring 2005, software engineering (chair): 1
2. Fall 2004, fault tolerant computing: 1
3. Spring 2004, software engineering: 2
4. Fall 2003, fault tolerant computing (chair): 3
5. Spring 2003, fault tolerant computing: 3
6. Fall 2002, software engineering: 3
7. Spring 2002, software engineering: 3; computer vision: 1
8. Spring 2001, computer vision: 1

## **Research Examination Committees**

1. Fall 2012: 2 (member)
2. Spring 2012: 1 (member)
3. Spring 2011: 1 (chair)
4. Spring 2010: 1 (chair)
5. Fall 2006: 1 (chair)

## **STUDENT ADVISING/GRADUATE SUPERVISION**

### **UNDERGRADUATE STUDENTS**

- Strand, Abigail (Undergraduate thesis advisor), 2016-
- Larison, Josh (Undergraduate thesis advisor), 2015-2016
- Egeland, Alexander (Undergraduate thesis advisor), 2015-2016
- Adams, Laura (Undergraduate thesis advisor), 2011-2012

### **GRADUATE STUDENTS**

#### **Current Graduate Advisees**

1. Homayouni, Hajar (MS advisor)
2. Al-Refai, Mohammad (Ph.D. advisor), completed preliminary exam

#### **Current Graduate Committee Memberships**

- 1 MS
- 7 Ph.D.

#### **Past Graduate Committee Memberships**

- 13 MS
- 10 Ph.D.

#### **Graduate Degrees Completed Under Supervision**

- Omar, Elmahdi Farag, 2015, Ph.D. Dissertation: *Constructing Subtle Higher Order Mutants from Java and AspectJ Programs*



- Bandyopadhyay, Aritra, 2013, Ph.D. dissertation: *Mitigating the Effect of Coincidentally Correct Test Cases on Spectrum Based Fault Localization*
- Sadhu, Devadatta, 2011, M.S. thesis: *Random Generation of Valid Object Configurations for Testing Object-Oriented Programs*
- Wedyan, Fadi I., 2011, Ph.D. dissertation: *Data-Flow Testing of Aspect-Oriented Programs*
- Mortensen, Michael E., 2009, Ph.D. dissertation: *Improving Software Maintainability through Aspectualization*
- Bandyopadhyay, Aritra, 2009, MS thesis: *Test Input Generation from UML Design Models*
- Dinh-Trong, Trung Thanh, 2007, co-advised Ph.D. dissertation: *A Systematic Approach to Testing UML Designs*
- Simmonds, Devon, 2007, co-advised Ph.D. dissertation: *A Transformation Language for UML Class Diagrams*
- Tandon, Gagan, 2006, MS thesis: *Subject Oriented Development of Middleware-Based Applications*
- Kawane, Nilesh Rameshchandra, 2005, MS thesis: *EPTUD: An Eclipse Plugin for Testing UML Design Models*
- Shankar, Roopashree Patil, 2005, MS project: *Understanding Software Components*
- Kamalakar, Brahmila, 2004, MS thesis: *Aspect-oriented Development of CORBA-based Applications*
- Bawa, Nishant, 2003, MS project: *On Testing and Visualizing Distributed Java Applications*
- Craig, Gerald Nichols, 2002, MS project: *RiOT: A Tool For System Level Testing of Distributed Java RMI Applications*

## OTHER ACTIVITIES

### CONSULTING

1. Consultant on network project, Advanced Energy, Fort Collins, Colorado, June-August 2002.

### UNIVERSITY ACTIVITIES

1. Co-organized NSF-REUSSI workshop, Fort Collins, CO, June 2014.
2. Computer Science co-organizer for RamWelcome, Fall 2010, 2011.
3. Department newsletter faculty advisor, Fall 2006 and Spring-Summer 2007.
4. Co-organizer, CS Department Research Poster Symposium, Colorado State University, 2005.
5. Faculty Advisor, Colorado Beta Chapter of Upsilon Pi Epsilon at Colorado State University, 2002-present.
6. Faculty Representative, Upsilon Pi Epsilon, Colorado State University, 2001-2002.
7. Faculty Advisor, Indian Students Association at Colorado State University, 2002-2004.
8. Faculty Advisor, Thai Students Association at Colorado State University, 2001-2002.
9. President, Beta Chapter of Upsilon Pi Epsilon at Purdue, 1997-1998.
10. Historian, Beta Chapter of Upsilon Pi Epsilon at Purdue, 1996-1997.
11. General Secretary, India Students Association, Iowa State University, 1994-1995.