

Curriculum Vitae

Tevfik Bultan

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Department of Computer Science
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Current Research Interests

automated testing, analysis, verification, and repair of software, string analysis, constraint solvers, quantitative information flow, design for verification, model checking, computer security, software engineering

Degrees

Ph.D., August 1998, Department of Computer Science, University of Maryland, College Park
Dissertation: *Automated Symbolic Analysis of Reactive Systems*
Advisor: Richard Gerber

M.S., January 1992, Department of Computer Engineering and Information Science, Bilkent University, Ankara, Turkey
Thesis: *Parallel Circuit Partitioning and Mapping Heuristics Based on Mean Field Annealing*
Advisor: Cevdet Aykanat

B.S., June 1989, Department of Electrical and Electronics Engineering, Middle East Technical University, Ankara, Turkey

Work Experience

Professor, Department of Computer Science, University of California, Santa Barbara, July 2009–present

Visiting Professor, Koc University, Istanbul, Turkey, March 2015–August 2015

Vice Chair, Department of Computer Science, University of California, Santa Barbara, November 2005–June 2009

Associate Professor, Department of Computer Science, University of California, Santa Barbara, July 2004–June 2009

Visiting Associate Professor, Department of Computer Science, University of Maryland, College Park, October 2004–September 2005

Visiting Scientist, Fraunhofer Center for Experimental Software Engineering, Maryland, October 2004–September 2005

Visiting Scientist, Naval Research Laboratory, Center for High Assurance Computer Systems, September 2004–September 2005

Assistant Professor, Department of Computer Science, University of California, Santa Barbara, September 1998–June 2004

Research/Teaching Assistant, Department of Computer Science, University of Maryland, College Park, January 1994–August 1998

Research/Teaching Assistant, Department of Computer Engineering and Information Science, Bilkent University, Ankara, Turkey, September 1989–August 1993

Honors and Awards

UCSB Academic Senate Outstanding Graduate Mentor Award, 2016

ACM Distinguished Scientist, 2016

Advisee Muath Alkhalaf received the ACM SIGSOFT Outstanding Doctoral Dissertation Award, 2015

Scientific and Technical Research Council of Turkey (TUBITAK) Visiting Scientist Fellowship, 2015

ACM SIGSOFT distinguished paper award, 29th IEEE/ACM International Conference on Automated Software Engineering (ASE 2014)

ACM Recognition of Service Award, 2012

Advisee Fang Yu received the UCSB Computer Science Outstanding Dissertation Award, 2010

Best paper award, 20th IEEE/ACM International Conference on Automated Software Engineering (ASE 2005)

ACM SIGSOFT distinguished paper award, 20th IEEE/ACM International Conference on Automated Software Engineering (ASE 2005)

National Science Foundation Faculty Early Career Development (CAREER) Award, 2000

Regents' Junior Faculty Fellowship, University of California, Santa Barbara, 1999

NATO Science Fellowship, 1993

Conference papers C17, C28, C38, C39, C40, C41, C49, C51, C54, C58, C60, C66, and workshop paper W8 were invited for submission to special journal issues dedicated to top papers from the conferences and workshop they appeared in, and extended versions of these papers were published as journal papers, J2, J6, J10, J11, J12, J13, J19, J20, J17, J22, J21, J26, and J9, respectively.

Grants

National Science Foundation

Project Title: *Differential Policy Verification and Repair for Access Control in the Cloud*

Grant: CCF 1817242 Amount: \$500,000 Period: 2018-2021 (sole PI)

Amazon

Project Title: *Automatically Detecting Bugs in Identity and Access Management Policies*

Amount: \$100,000 Period: 2018 (sole PI)

Committee on Research, University of California, Santa Barbara
Project Title: *Quantifying Information Leakage in Mobile Applications*
Amount: \$7,000 Period: 2017 (sole PI)

National Science Foundation
Project Title: *NSF Travel and Attendance Grant Proposal for ISSTA/SPIN 2017*
Grant: CCF 1741648 Amount: \$9,000 Period: 2017 (sole PI)

DARPA
Project Title: *Integrated Symbolic execution for Space-Time Analysis of Code (ISSTAC)*
Grant: FA8750-15-2-0087 Amount: \$6,000,000 Period: 2015-2019 (PI; joint with Gabor Karsai, Vanderbilt; Corina Pasareanu, CMU)

National Science Foundation
Project Title: *Leveraging Graph Databases for Incremental and Scalable Symbolic Analysis and Verification of Web Applications*
Grant: CCF 1548848 Amount: \$200,000 Period: 2015-2017 (PI; joint with Xifeng Yan; Alex Orso, Georgia Tech; Corina Pasareanu, CMU)

National Science Foundation
Project Title: *Data Model Verification for Web Applications*
Grant: CCF 1423623 Amount: \$500,000 Period: 2014-2017 (sole PI)

National Science Foundation
Project Title: *IGERT: Interdisciplinary Graduate Education Research and Training in Network Science*
Grant: CIF21-IGERT 1258507 Amount: \$2,800,000 Period: 2013-2018 (Faculty Participant; joint with Ambuj Singh, Divyakant Agrawal, Subhash Suri, John Mohr, Stephen Proulx)

National Science Foundation
Project Title: *Viewpoints: Discovering Client- and Server-side Input Validation Inconsistencies to Improve Web Application Security*
Grant: CNS 1116967 Amount: \$500,000 Period: 2011-2013 (PI; joint with Christopher Kruegel; Alex Orso, Georgia Tech)

National Science Foundation
Project Title: *Formal Analysis of Distributed Interactions*
Grant: CNS 1117708 Amount: \$494,000 Period: 2011-2014 (PI; joint with Oscar Ibarra; Samik Basu, Iowa State)

Committee on Research, University of California, Santa Barbara
Project Title: *Automated Verification of Web Application Data Model*
Amount: \$5,600 Period: 2012-2013 (sole PI)

Google Android Education Grant
Project Title: *Developing Android Applications in a Capstone Class*
Amount: \$8,700 Period: 2010 (sole PI)

Google Research Award
Project Title: *Automated Verification of the Native Client*
Amount: \$50,000 Period: 2010-2011 (PI; joint with Christopher Kruegel)

National Science Foundation

Project Title: *Automata Based String Analysis for Detecting Vulnerabilities in Web Applications*
 Grant: CCF-0614002 Amount: \$350,000 Period: 2009-2012 (PI; joint with Christopher Kruegel)

Instructional Development, University of California, Santa Barbara

Project Title: *Software Support for Web-based Interaction in Computer Science Capstone Projects*
 Amount: \$11,500 Period: 2008-2009 (sole PI)

National Science Foundation

Project Title: *Modeling and Analyzing Trust in Service-Oriented Architectures*
 Grant: CNS-0716095 Amount: \$850,000 Period: 2007-2010 (Co-PI; joint with Giovanni Vigna and Richard Kemmerer)

National Science Foundation

Project Title: *Design for Verification*
 Grant: CCF-0614002 Amount: \$200,000 Period: 2006-2008 (sole PI)

Committee on Research, University of California, Santa Barbara

Project Title: *Design for Verification: A New Approach for Developing Highly Dependable Software*
 Amount: \$7,000 Period: 2006-2007 (sole PI)

National Science Foundation

Project Title: *REU: Reliable Concurrent Software Development via Reliable Concurrency Controllers*
 Grant: CCF-0530377 Amount: \$6,000 Period: 2005-2006 (sole PI)

National Science Foundation

Project Title: *Reliable Concurrent Software Development via Reliable Concurrency Controllers*
 Grant: CCF-0341365 Amount: \$336,000 Period: 2003-2007 (sole PI)

Committee on Research, University of California, Santa Barbara

Project Title: *Developing Reliable Concurrency Controllers*
 Amount: \$8,900 Period: 2003-2004 (sole PI)

National Science Foundation Faculty Early Career Development (CAREER) Award

Project Title: *CAREER: Verifiable Specifications: Tools for Reliable Reactive Software Development*
 Grant: CCF-9970976 Amount: \$200,000 Period: 2000-2004 (sole PI)

National Science Foundation

Project Title: *A Composite Model Checking Toolset for Analyzing Software Systems*
 Grant: CCF-9984822 Amount: \$300,000 Period: 1999-2003 (sole PI)

Committee on Research, University of California, Santa Barbara

Project Title: *Tools and Techniques for Workflow Specifications*
 Amount: \$6,000 Period: 1999-2000 (Joint with Jianwen Su)

Publications

Books

- B1. String Analysis for Software Verification and Security. Tevfik Bultan, Fang Yu, Muath Alkhalaf, and Abdulbaki Aydin. Springer 2017, ISBN 978-3-319-68668-4.

Edited Books

- E1. Proceedings of the 26th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2017), Tevfik Bultan and Koushik Sen, editors. ACM 2017, ISBN 978-1-4503-5076-1
- E2. Proceedings of the 28th IEEE/ACM International Conference on Automated Software Engineering (ASE 2013), Ewen Denney, Tevfik Bultan and Andreas Zeller, editors. IEEE 2013, ISBN: 978-1-4799-0215-6.
- E3. Proceedings of the ACM SIGSOFT 20th International Symposium on the Foundations of Software Engineering (FSE 2012), Will Tracz, Martin Robillard and Tevfik Bultan, editors. ACM 2012, ISBN 978-1-4503-1614-9.
- E4. Proceedings of the 9th International Symposium on Automated Technology for Verification and Analysis (ATVA 2011), Tevfik Bultan and Pao-Ann Hsiung, editors. Springer 2011, ISBN 978-3-642-24371-4.
- E5. Proceedings of the 7th International Workshop on Web Services and Formal Methods (WS-FM 2010), Tevfik Bultan and Mario Bravetti, editors. Springer 2011, ISBN 978-3-642-19588-4.
- E6. Proceedings of the Workshop on Testing, Analysis and Verification of Web Software (TAV-WEB 2008), Tevfik Bultan and Tao Xie, editors, ACM 2008, ISBN: 978-1-60558-052-4.
- E7. Proceedings of the Workshop on Testing, Analysis and Verification of Web Services and Applications (TAV-WEB 2006), Tevfik Bultan, editor, ACM 2006, ISBN: 1-59593-458-8.

Refereed Journal Papers

- J1. Samik Basu, Tevfik Bultan. “On Deciding Synchronizability for Asynchronously Communicating Systems.” *Theoretical Computer Science (TCS)*, vol. 656, pp. 60–75, 2016.
- J2. Jaideep Nijjar, Ivan Bocić and Tevfik Bultan. “Data Model Property Inference, Verification and Repair for Web Applications.” *ACM Transactions on Software Engineering and Methodology (TOSEM)*, special issue on top papers from the 2013 International Symposium on Software Testing and Analysis (ISSTA 2013), vol. 24, issue 4, no. 25, August 2015.
- J3. Fang Yu, Muath Alkhalaf, Tevfik Bultan, and Oscar H. Ibarra. “Automata-Based Symbolic String Analysis for Vulnerability Detection.” *Formal Methods in System Design*, vol. 44, no. 1, pp. 44–70, 2014.
- J4. Aysu Betin Can, Sylvain Hallé, and Tevfik Bultan. “Modular Verification of Asynchronous Service Interactions Using Behavioral Interfaces.” *IEEE Transactions on Services Computing*, vol. 6, no. 2, pp. 262–275, 2013.
- J5. Gwen Salaun, Tevfik Bultan, and Nima Roohi. “Realizability of Choreographies Using Process Algebra Encodings.” *IEEE Transactions on Services Computing*, vol. 5, no. 3, pp. 290–304, 2012.
- J6. Fang Yu, Tevfik Bultan, and Oscar Ibarra. “Relational String Verification Using Multi-Track Automata.” *International Journal of Foundations of Computer Science (IJFCS)*, special issue on top papers from the 15th International Conference on Implementation and Application of Automata (CIAA 2010), vol. 22, no. 8, pages 1909–1924, 2011.
- J7. Sylvain Hallé, Tevfik Bultan, Graham Hughes, Muath Alkhalaf, and Roger Villemaire. “Runtime Verification of Web Service Interface Contracts.” *IEEE Computer*, vol. 43, no. 3, pp. 59–66, March 2010.

- J8. Tuba Yavuz Kahveci and Tevfik Bultan. “Action Language Verifier: An Infinite State Model Checker for Reactive Software Specifications.” *Formal Methods in System Design*, vol. 35, no. 3, pp. 325–367, 2009.
- J9. Graham Hughes and Tevfik Bultan. “Automated Verification of Access Control Policies Using a SAT Solver.” *International Journal on Software Tools for Technology Transfer (STTT)*, special issue on top papers from the Workshop on Web Quality, Verification and Validation (WQVV 2007), vol. 10, no. 6, pp. 473–534, December 2008.
- J10. Graham Hughes and Tevfik Bultan. “Interface Grammars for Modular Software Model Checking.” *IEEE Transactions on Software Engineering (TSE)*, special issue on top papers from the 2007 ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2007), vol. 34, no. 5, pp. 614–632, 2008.
- J11. Tevfik Bultan and Xiang Fu. “Specification of Realizable Service Conversations Using Collaboration Diagrams.” *Service Oriented Computing and Applications (SOCA)*, special issue on top papers from the IEEE International Conference on Service Oriented Computing and Applications (SOCA 2007), vol. 2, no. 1, pp. 27–39, April 2008.
- J12. Tevfik Bultan and Constance Heitmeyer. “Applying Infinite State Model Checking and Other Analysis Techniques to Tabular Requirements Specifications of Safety-Critical Systems.” *Design Automation for Embedded Systems (DAEM)*, special issue on top papers from the Fourth ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2006), vol. 12, no. 1-2, pp. 97–137, June 2008.
- J13. Aysu Betin-Can, Tevfik Bultan, Mikael Lindvall, Benjamin Lux, and Stefan Topp. “Eliminating Synchronization Faults in Air Traffic Control Software via Design for Verification with Concurrency Controllers.” *Automated Software Engineering (ASE)*, special issue on top papers from the 20th International Conference on Automated Software Engineering (ASE 2005), vol. 14, no. 2, pp. 129–178, June 2007.
- J14. Mikael Lindvall, Ioana Rus, Paolo Donzelli, Atif Memon, Marvin Zelkowitz, Aysu Betin-Can, Tevfik Bultan, Chris Ackermann, Bettina Anders, Sima Asgari, Victor Basili, Jorg Fellmann, Daniel Hirschbach, Lorin Hochstein, Forrest Shull, Roseanne Tvedt and Daniel Pech. “Experimenting with Software Testbeds for Evaluating New Technologies.” *Empirical Software Engineering (ESE)*, vol. 12, no. 4, pp. 417–444, August 2007.
- J15. Aysu Betin-Can and Tevfik Bultan. “Highly Dependable Concurrent Programming Using Design for Verification.” *Formal Aspects of Computing (FACS)*, special issue on Verified Software: Theories, Tools, Experiments (VSTTE 2005) Conference, vol. 19, no. 2, pp. 243–268, June 2007.
- J16. Tevfik Bultan, Xiang Fu, Jianwen Su. “Analyzing Conversations of Web Services.” *IEEE Internet Computing*, vol. 10, no. 1, pp. 18–25, January/February 2006.
- J17. Constantinos Bartzis and Tevfik Bultan. “Efficient BDDs for Bounded Arithmetic Constraints.” *International Journal on Software Tools for Technology Transfer (STTT)*, special issue on top papers from the 9th International Conference on Tools and Algorithms for the Construction and Analysis of Software Systems (TACAS 2003), vol. 8, no. 1, pp. 26–36, February 2006.
- J18. Xiang Fu, Tevfik Bultan, Jianwen Su. “Synchronizability of Conversations among Web Services.” *IEEE Transactions on Software Engineering (TSE)*, special issue on Interaction and State-Based Modeling, vol. 31, no. 12, pp. 1042–1055, December 2005.

- J19. Xiang Fu, Tevfik Bultan, and Jianwen Su. “Realizability of Conversation Protocols With Message Contents.” *International Journal of Web Services Research (JWSR)*, special issue on top papers from the 2004 IEEE International Conference on Web Services (ICWS 2004), vol. 2, no. 4, pp. 68–93, October 2005.
- J20. Xiang Fu, Tevfik Bultan and Jianwen Su. “Conversation Protocols: A Formalism for Specification and Verification of Reactive Electronic Services.” *Theoretical Computer Science (TCS)*, special issue on top papers from the 8th International Conference on Implementation and Application of Automata (CIAA 2003), vol. 328, no. 1–2, pp. 19–37, November 2004.
- J21. Zhe Dang, Tevfik Bultan, Oscar H. Ibarra and Richard A. Kemmerer. “Past Pushdown Timed Automata and Safety Verification.” *Theoretical Computer Science (TCS)*, special issue on top papers from the 6th International Conference on Implementation and Application of Automata (CIAA 2001), vol. 313, no. 1, pp. 57–71, February 2004.
- J22. Tuba Yavuz-Kahveci and Tevfik Bultan. “A Symbolic Manipulator for Automated Verification of Reactive Systems with Heterogeneous Data Types.” *International Journal on Software Tools for Technology Transfer (STTT)*, special issue on top papers from the 7th International Conference on Tools and Algorithms for the Construction and Analysis of Software Systems (TACAS 2001), vol. 5, no. 1, pp. 15–33, November 2003.
- J23. Constantinos Bartzis and Tevfik Bultan. “Efficient Symbolic Representations for Arithmetic Constraints in Verification.” *International Journal of Foundations of Computer Science (IJFCS)*, special issue on Verification and Analysis of Infinite State Systems, vol. 14, no. 4, pp. 605–624, August 2003.
- J24. Oscar H. Ibarra, Jianwen Su, Zhe Dang, Tevfik Bultan and Richard A. Kemmerer. “Counter Machines and Verification Problems.” *Theoretical Computer Science (TCS)*, vol. 289, no. 1, pp. 165–189, October 2002.
- J25. Oscar H. Ibarra, Tevfik Bultan and Jianwen Su. “On Reachability and Safety in Infinite-State Systems.” *International Journal of Foundations of Computer Science (IJFCS)*, vol. 12, no. 6, pp. 821–836, December 2001.
- J26. Tevfik Bultan, Richard Gerber and Christopher League. “Composite Model Checking: Verification with Type-Specific Symbolic Representations.” *ACM Transactions on Software Engineering and Methodology (TOSEM)*, special issue on top papers from the 1998 ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 1998), vol. 9, no. 1, pp. 3–50, January 2000.
- J27. Tevfik Bultan, Richard Gerber and William Pugh. “Model Checking Concurrent Systems with Unbounded Integer Variables: Symbolic Representations, Approximations and Experimental Results.” *ACM Transactions on Programming Languages and Systems (TOPLAS)*, vol. 21, no. 4, pp. 747–789, July 1999.
- J28. Cevdet Aykanat, Tevfik Bultan and İsmail Harिताoğlu. “A Fast Neural Network Algorithm for VLSI Cell Placement.” *Neural Networks*, vol. 11, no. 9, pp. 1671–1684, December 1998.
- J29. Tevfik Bultan and Cevdet Aykanat. “Circuit Partitioning Using Mean Field Annealing.” *Neurocomputing*, vol. 8, pp. 171–194, 1995.
- J30. Tevfik Bultan and Cevdet Aykanat. “A New Mapping Heuristic Based on Mean Field Annealing.” *Journal of Parallel and Distributed Computing (JPDC)*, vol. 16, pp. 292–305, December 1992.

Refereed Conference Papers

- C1. Abdulbaki Aydin, William Eiers, Lucas Bang, Tegan Brennan, Miroslav Gavrilov, Tevfik Bultan, and Fang Yu. “Parameterized Model Counting for String and Numeric Constraints,” To appear in the *Proceedings of the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2018)*, Lake Buena Vista, Florida, November 4-9, 2018.
- C2. Nestan Tsiskaridze, Lucas Bang, Joseph McMahan, Tevfik Bultan, and Timothy Sherwood. “Information Leakage in Arbiter Protocols,” To appear in the *Proceedings of the 16th International Symposium on Automated Technology for Verification and Analysis (ATVA 2018)*, October 7-10, 2018, Los Angeles, CA.
- C3. Tegan Brennan, Seemanta Saha, Tevfik Bultan, and Corina S. Pasareanu. “Symbolic path cost analysis for side-channel detection,” *Proceedings of the 27th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2018)*, pp. 27–37, Amsterdam, The Netherlands, July 16-21, 2018.
- C4. Lucas Bang, Nicolás Rosner, and Tevfik Bultan. “Online Synthesis of Adaptive Side-Channel Attacks Based On Noisy Observations,” *Proceedings of the 2018 IEEE European Symposium on Security and Privacy (EuroS&P 2018)*, pp. 307–322, London, United Kingdom, April 24-26, 2018.
- C5. Tegan Brennan, Nestan Tsiskaridze, Nicolás Rosner, Abdulbaki Aydin and Tevfik Bultan. “Constraint Normalization and Parameterized Caching for Quantitative Program Analysis.” *Proceedings of the 11th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2017)*, pp. 535–546, Paderborn, Germany, September 4-8, 2017.
- C6. Quoc-Sang Phan, Lucas Bang, Corina S. Pasareanu, Pasquale Malacaria, and Tevfik Bultan. “Synthesis of Adaptive Side-Channel Attacks.” *Proceedings of the 2017 IEEE Computer Security Foundations Symposium (CSF 2017)*, pp. 328–342, Santa Barbara, CA, USA, August 21-25, 2017.
- C7. Ivan Bocić and Tevfik Bultan. “Symbolic Model Extraction for Web Application Verification.” *Proceedings of the 39th International Conference on Software Engineering (ICSE 2017)*, pp. 724–734, Buenos Aires, Argentina, May 20–28, 2017.
- C8. Lucas Bang, Abdulbaki Aydin, Quoc-Sang Phan, Corina S. Pasareanu, and Tevfik Bultan. “String Analysis for Side Channels with Segmented Oracles.” *Proceedings of the 24th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2016)*, pp. 193–204, Seattle, WA, USA, November 13-18, 2016.
- C9. Ivan Bocić and Tevfik Bultan. “Finding Access Control Bugs in Web Applications with CanCheck.” *Proceedings of the 31st IEEE/ACM International Conference on Automated Software Engineering (ASE 2016)*, pp. 155–166, Singapore, September 3–7, 2016.
- C10. Fang Yu, Ching-Yuan Shueh, Chun-Han Lin, Yu-Fang Chen, Bow-Yaw Wang and Tevfik Bultan. “Optimal Sanitization Synthesis for Web Application Vulnerability Repair.” *Proceedings of the 2016 International Symposium on Software Testing and Analysis (ISSTA 2016)*, pp. 189–200, Saarbrücken, Germany, July 18-20, 2016.
- C11. Samik Basu and Tevfik Bultan. “Automated Choreography Repair.” *Proceedings of the, 19th International Conference on Fundamental Approaches to Software Engineering (FASE 2016)*, pp. 13–30, Eindhoven, The Netherlands, April 2–8, 2016.

- C12. Ivan Bocić and Tevfik Bultan. “Efficient Data Model Verification with Many-Sorted Logic.” *Proceedings of the 30th IEEE/ACM International Conference on Automated Software Engineering (ASE 2015)*, pp. 42–52, November 9–13, 2015, Lincoln, Nebraska, USA.
- C13. Lucas Bang, Abdalbaki Aydin, and Tevfik Bultan. “Automatically Computing Path Complexity of Programs.” *Proceedings of the 10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2015)*, pp. 61–72, Bergamo, Italy, August 30–September 4, 2015.
- C14. Abdalbaki Aydin, Lucas Bang, and Tevfik Bultan. “Automata-based model counting for string constraints.” *Proceedings of the 27th International Conference on Computer Aided Verification (CAV 2015)*, pp. 255–272, San Francisco, CA, USA, July 18–24, 2015.
- C15. Ivan Bocić and Tevfik Bultan. “Coexecutability for Efficient Verification of Data Model Updates.” *Proceedings of the 37th International Conference on Software Engineering (ICSE 2015)*, pp. 744–754, Florence, Italy, May 16–24, 2015.
- C16. Samik Basu and Tevfik Bultan. “Automatic Verification of Interactions in Asynchronous Systems with Unbounded Buffers.” *ACM SIGSOFT Distinguished Paper Award. Proceedings of the 29th IEEE/ACM International Conference on Automated Software Engineering (ASE 2014)*, pp. 743–754, Vasteras, Sweden, September 15–19, 2014.
- C17. Muath Alkhalaf, Abdalbaki Aydin and Tevfik Bultan. “Semantic Differential Repair for Input Validation and Sanitization.” *Proceedings of the 2014 International Symposium on Software Testing and Analysis (ISSTA 2014)*, pp. 225–236, San Jose, California, USA, July 21–25, 2014.
- C18. Ivan Bocić and Tevfik Bultan. “Inductive Verification of Data Model Invariants for Web Applications.” *Proceedings of the 36th International Conference on Software Engineering (ICSE 2014)*, pp. 620–631, Hyderabad, India, May 31–June 7, 2014.
- C19. Abdalbaki Aydin, Muath Alkhalaf and Tevfik Bultan. “Automated Test Generation from Vulnerability Signatures.” *Proceedings of the 7th International Conference on Software Testing, Verification and Validation (ICST 2014)*, pp. 193–202, Cleveland, Ohio, USA, March 31–April 4, 2014.
- C20. Meriem Ouderni, Gwen Salaun and Tevfik Bultan. “Compatibility Checking for Asynchronously Communicating Software.” *Proceedings of the 10th International Symposium on Formal Aspects of Component Software (FACS 2013)*, pp. 310–328, Nanchang, China, October 27–29, 2013.
- C21. Jaideep Nijjar and Tevfik Bultan. “Data Model Property Inference and Repair.” *Proceedings of the 2013 International Symposium in Software Testing and Analysis (ISSTA 2013)*, pp. 202–212, Lugano, Switzerland, July 15–20, 2013.
- C22. Jaideep Nijjar and Tevfik Bultan. “Unbounded Data Model Verification Using SMT Solvers.” *Proceedings of the 27th IEEE/ACM International Conference on Automated Software Engineering (ASE 2012)*, pp. 210–219, Essen, Germany, September 3–7, 2012.
- C23. Muath Alkhalaf, Shaubik Roy Choudhary, Mattia Fazzini, Tevfik Bultan, Alessandro Orso and Christopher Kruegel. “ViewPoints: Differential String Analysis for Discovering Client and Server-Side Input Validation Inconsistencies.” *Proceedings of the 2012 International Symposium on Software Testing and Analysis (ISSTA 2012)*, pp. 56–66, Minneapolis, USA, July 15–20, 2012.
- C24. Muath Alkhalaf, Tevfik Bultan, and Jose L. Gallegos. “Verifying Client-Side Input Validation Functions Using String Analysis.” *Proceedings of the 34th International Conference on Software Engineering (ICSE 2012)*, pp. 947–957, Zurich, Switzerland, June 2–9, 2012.

- C25. Samik Basu, Tevfik Bultan, and Meriem Ouederni. “Deciding Choreography Realizability,” *Proceedings of the 39th ACM SIGACT-SIGPLAN Symposium on Principles of Programming Languages (POPL 2012)*, pp. 191–202, Philadelphia, Pennsylvania, USA, January 22–28, 2012.
- C26. Samik Basu, Tevfik Bultan, and Meriem Ouederni. “Synchronizability for Verification of Asynchronously Communicating Systems,” *Proceedings of the 13th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2012)*, LNCS 7148, pp. 56–71, Philadelphia, Pennsylvania, USA, January 22–24, 2012.
- C27. Jaideep Nijjar and Tevfik Bultan. “Bounded Verification of Ruby on Rails Data Models.” *Proceedings of the 2011 International Symposium on Software Testing and Analysis (ISSTA 2011)*, pp. 67–77, Toronto, Ontario, Canada, July 17–21, 2011.
- C28. Samik Basu and Tevfik Bultan. “Choreography Conformance via Synchronizability.” *Proceedings of the 20th International World Wide Web Conference (WWW 2011)*, pp. 795–804, Hyderabad, India, March 28–April 1, 2011.
- C29. Fang Yu, Muath Alkhalaf and Tevfik Bultan. “Patching Vulnerabilities with Sanitization Synthesis.” *Proceedings of the 33rd International Conference on Software Engineering (ICSE 2011)*, pp. 251–260, Waikiki, Honolulu, Hawaii, USA, May 21–28, 2011.
- C30. Sylvain Hallé and Tevfik Bultan. “Realizability Analysis for Message-based Interactions Using Shared-State Projections.” *Proceedings of the 18th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2010)*, pp. 27–36, Santa Fe, New Mexico, November 2010.
- C31. Sylvain Hallé, Taylor Ettema, Chris Bunch and Tevfik Bultan. “Eliminating Navigation Errors in Web Applications via Model Checking and Runtime Enforcement of Navigation State Machines.” *Proceedings of the 25th IEEE/ACM International Conference on Automated Software Engineering (ASE 2010)*, pp. 235–244, Antwerp, Belgium, 20–24 September 2010.
- C32. Fang Yu, Tevfik Bultan and Oscar Ibarra. “Relational String Verification Using Multi-track Automata.” *Proceedings of the 15th International Conference on Implementation and Application of Automata (CIAA 2010)*, pp. 290–299, Winnipeg, Manitoba, Canada, August 2010.
- C33. Tevfik Bultan, Fang Yu, and Aysu Betin Can. “Modular Verification of Synchronization with Reentrant Locks.” *Proceedings of the 8th ACM/IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2010)*, Grenoble, France, July 2010.
- C34. Sylvain Hallé, Graham Hughes, Tevfik Bultan, and Muath Alkhalaf. “Generating Interface Grammars from WSDL for Automated Verification of Web Services.” *Proceedings of the 7th International Conference on Service Oriented Computing (ICSOC 2009)*, pp. 516–530, Stockholm, Sweden, November 2009.
- C35. Zachary Stengel and Tevfik Bultan. “Analyzing Singularity Channel Contracts.” *Proceedings of the 2009 International Symposium on Software Testing and Analysis (ISSTA 2009)*, pp. 13–24, Chicago, Illinois, July 2009.
- C36. Tevfik Bultan, Chris Ferguson and Xiang Fu “A Tool for Choreography Analysis Using Collaboration Diagrams.” *Proceedings of the 7th IEEE International Conference on Web Services (ICWS 2009)*, pp. 856–863, Los Angeles, CA, July 2009.
- C37. Fang Yu, Tevfik Bultan and Oscar H. Ibarra. “Symbolic String Verification: Combining String Analysis and Size Analysis.” *Proceedings of the 15th International Conference on Tools and Algorithms for the*

- Construction and Analysis of Systems (TACAS 2009)*, Stefan Kowalewski and Anna Philippou, eds., *Lecture Notes in Computer Science*, vol. 5505, pp. 322–336, York, UK, 2009.
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Invited Papers

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- O3. Tevfik Bultan and Tao Xie: “Workshop summary for the workshop on testing, analysis and verification of web software (TAV-WEB 2008).” *Proceedings of the 2008 International Testing and Analysis (ISSTA 2008)*, pp. 311–312, 2008.
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Software Tools

AUTOMATA BASED PATH COUNTER (ABC) is a constraint solver for string and numeric constraints that also performs model counting. ABC characterizes the set of solutions to string and numeric constraints in the form of a deterministic finite automaton. Additionally, ABC produces symbolic representation of the number of solutions within a given bound that satisfy a set of constraints. ABC can also output the number of satisfying solutions for a specific bound. ABC has been integrated with the Symbolic Path Finder (SPF) for side channel analysis.

ABSTRACT DATA STORE LIBRARY (ADSL) Modern web applications are frequently built using two software patterns: Model/View/Controller (MVC) and REpresentational State Transfer (REST). Based on these patterns, the business logic of the application is organized in actions that can be arbitrarily invoked by the user, and the actions are implemented in the model, isolated from the issues such as user navigation and response synthesis. It is paramount to ensure that the model schema and model state updates are correct as errors may lead to unrecoverable corruption or loss of data. Our tool addresses this problem by extracting an ADSL specification from a given Ruby on Rails application, which is an abstraction of both the data model schema and the updates that can be done to the data model state, and verifying it using a first order logic theorem prover. Invariants on the data store can be specified using our own Rails extension. ADSL also supports analysis of access control policies and detection of access control bugs.

PATH COMPLEXITY ANALYZER (PAC) is a tool for computing path complexity of programs. Path complexity is a complexity measure that provides an upper bound for the number of paths in a program, and hence, can be used for assessing the difficulty of achieving path coverage for a given method. Path complexity is defined as a function that takes a depth bound as input and returns the number of paths in the control flow graph that are within that bound. PAC computes the path complexity function in closed form, and the asymptotic path complexity which identifies the dominant term in the path complexity function. Experiments on PAC demonstrate that path complexity can be computed efficiently, and it is a better complexity measure for path coverage compared to cyclomatic complexity and NPATH complexity.

SEMREP is an automated semantic differential repair tool that analyzes and repairs validation and sanitization functions against each other. SEMREP takes dependency graphs of two functions as input and looks for differences in validation and sanitization operations for string variables. If a difference is found, the tool generates three patch functions that together fix the difference. One application of this tool is fixing the differences between a sanitizer function on the client-side and the corresponding one on the server-side in web applications. SEMREP is language agnostic and can be used with Java, PHP or ASP.NET web applications.

IDAVER (AN INTEGRATED DATA MODEL VERIFIER): Most modern web applications are built using development frameworks based on the Model-View-Controller (MVC) pattern. In MVC-based web applications the data model specifies the types of objects used by the application and the relations among them. Since the data model forms the foundation of such applications, its correctness is crucial. IDAVER is a tool for automated verification of data models written in Ruby on Rails MVC framework. After automatically extracting formal data model specifications from Rails code, IDAVER implements two types of verification 1) SAT-based bounded verification via translation to Alloy, 2) unbounded verification via translation to the quantified theory of uninterpreted functions and an SMT Solver. IDaVer provides property templates that facilitate manual property specification. It also implements heuristics for automated property inference and automated repair for the properties that fail.

LIBSTRANGER is an Automata-Based Symbolic String Analysis Library. One can use LIBSTRANGER to solve string constraints and/or compute pre and post-images of string manipulation operations such as concatenation and replacement. It can handle complex regular-expression based replace operations such as PHP's `preg_replace` and approximate these operations in the presence of unbounded loops with high precision. Additionally, LIBSTRANGER provides fast and precise modeling for common string functions such as `trim`, `substring`, `toUpperCase` and `toLowerCase` and complex sanitization functions such as PHP's `addslashes` and `htmlspecialchars`.

STRANGER (STRING AUTOMATON GENERATOR) is a string analysis tool for PHP web applications that detects vulnerabilities such as XSS and SQL injection. STRANGER uses Pixy as a front end and MONA automata package for automata manipulation. STRANGER takes a PHP program as input and automatically analyzes it and outputs the possible XSS and SQL injection vulnerabilities in the program. Additionally, for each input that leads to a vulnerability, it outputs an automaton in a dot format that characterizes all possible string values for this input which may exploit the vulnerability, i.e., it outputs the vulnerability signature.

TUNE: Singularity is an experimental operating system developed by Microsoft Research. In order to improve the dependability of software systems, Singularity operating system uses process isolation. Singularity processes are not allowed to share memory to avoid situations where a buggy process crashes the whole system. Instead, all inter-process communication occurs via message passing over bidirectional conduits, called channels. Singularity processes are required to specify a channel contract that identifies the sequences of messages that can be sent through a given channel. TUNE is a tool that analyzes Singularity channel contracts and verifies their properties. Singularity processes can deadlock even when they faithfully implement a channel contract. By analyzing the channel contracts, TUNE can prevent such deadlocks and ensure that when processes faithfully implement a channel contract, the properties of the contract are preserved by the implementation.

NETSTUB is a tool for analyzing distributed programs by decoupling the behavior of the programs from the behavior of the network. It consists of a set of stub classes that replace the native methods used in network communication and enables both unit and integration verification for distributed Java applications.

WSAT (WEB SERVICE ANALYSIS TOOL) is a tool for analyzing interactions among web services. It consists of: 1) An intermediate representation for web services that supports XML data manipulation; 2) Synchronizability analysis, which determines if the asynchronous communication among web services can be synchronized without changing their interaction behavior; 3) Realizability analysis, which determines if an interaction specification can be realized by asynchronously communicating web services; 4) Translators from a subset of BPEL to the WSAT intermediate representation and from the WSAT intermediate representation to Promela, input language of the SPIN model checker.

COMPOSITE SYMBOLIC LIBRARY: A symbolic manipulator for automated verification that combines different symbolic representations using an object oriented design. COMPOSITE SYMBOLIC LIBRARY supports BDDs for representing boolean logic formulas, and polyhedral and automata representations for linear arithmetic formulas. An extension to Composite Symbolic Library implements shape analysis for checking properties of linked lists.

ALV (ACTION LANGUAGE VERIFIER): Action Language is a specification language for reactive software systems that supports both synchronous and asynchronous compositions and hierarchical specifications. ALV consists of 1) a compiler that converts Action Language specifications to composite symbolic representations, and 2) an infinite state model checker that verifies CTL properties of Action Language specifications.

Keynote and Distinguished Talks

- “Side Channel Analysis Using a Model Counting Constraint Solver and Symbolic Execution.” Keynote, 36th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2016), Chennai Mathematical Institute, Chennai. December 13, 2016.
- “Side Channel Analysis Using a Model Counting Constraint Solver and Symbolic Execution.” Keynote, 14th International Symposium on Automated Technology for Verification and Analysis (ATVA 2016), October 18, 2016, Chiba, Japan.
- “String Analysis for Vulnerability Detection and Repair.” Distinguished Lecture, University of Luxembourg, Interdisciplinary Center for Security, Reliability and Trust (SnT), July 21, 2016.
- “String Analysis for Vulnerability Detection and Repair.” Keynote, 22nd International Symposium on Model Checking Software (SPIN 2015), Stellenbosch, South Africa, August 24, 2015.
- “Analyzing Interactions of Asynchronously Communicating Software Components.” Keynote, 2nd International Workshop on Quality Assurance for Service-based Applications (QASBA 2013), Lugano, Switzerland, July 15, 2013.
- “Analyzing Interactions of Asynchronously Communicating Software Components.” Keynote, 2013 IFIP Joint International Conference on Formal Techniques for Distributed Systems (33rd FORTE / 15th FMOODS), Florence, Italy, June 3, 2013.
- “Analyzing Interactions of Asynchronously Communicating Software Components.” Keynote, 9th International Symposium on Formal Aspects of Component Software (FACS 2012), Mountain View, USA, September 12, 2012.
- “String Analysis for Dependable Input Validation.” Distinguished Lecture, The Center for Embedded Systems for Critical Applications (CESCA), Virginia Tech, April 6, 2012.
- “String Analysis for Dependable Input Validation.” Keynote, 13th International Workshop on Verification of Infinite-State Systems (Infinity 2011), Taipei, Taiwan, October 10, 2011.
- “Web Yazılımlarındaki Hataları Otomatik Doğrulama Yöntemleri ile Düzeltmek.” Keynote, 5th National Software Engineering Symposium (UYMS 2011), September 26, 2011.
- “Eliminating Web Software Vulnerabilities Using Automated Verification.” Keynote, Workshop on Formal Methods, Koc University, Istanbul, Turkey, May 31, 2010.
- “Modularity, Interfaces, and Verification.” Keynote, 8th ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE 2008), November 9, 2008.
- “Service Choreography and Orchestration with Conversations.” Keynote, 19th International Conference on Concurrency Theory (CONCUR 2008), August 21, 2008.
- “Infinite State Model Checking with Presburger Arithmetic.” Keynote, 6th ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2008), Anaheim, CA, June 6, 2008.

Invited Talks

“Side Channel Analysis Using a Model Counting Constraint Solver and Symbolic Execution.”

- 6th International Symposium on High Confidence Software (ISHCS 2016), December 17, 2016, Institute of Software and Key Laboratory of High Confidence Software Technologies, Ministry of Education, Peking University, Beijing, China.
- 5th ACM SIGPLAN International Workshop on the State Of the Art in Program Analysis (SOAP 2016), Santa Barbara, California, June 14, 2016.

“Detecting and Repairing Security Vulnerabilities in Web Applications.”

- Middle East Technical University, Ankara, Turkey, May 14, 2015.
- Bilkent University, Ankara, Turkey, May 14, 2015.
- Bogazici University, Istanbul, Turkey, May 4, 2015.
- Sabanci University, Istanbul, Turkey, April 29, 2015.
- Koc University, Istanbul, Turkey, March 30, 2015.

“Differential String Analysis.”

- Microsoft Research, Redmond, Washington, January 5, 2015.
- Academia Sinica, Taipei, Taiwan, November 14, 2014.

“Data Model Analysis and Verification.”

- NTU, Taipei, Taiwan, November 15, 2014.

“String Analysis for Dependable Input Validation”

- IFIP Working Group 2.3 Programming Methodology Meeting, Istanbul, Turkey, March 27, 2015.
- NASA Ames Research Center, August 18, 2014.
- Fujitsu Laboratories of America, August 18, 2014.
- Aarhus University, Denmark, April 24, 2013.

“Analyzing Interactions of Asynchronously Communicating Software Components.”

- Institut de Recherche en Informatique de Toulouse (IRIT), Toulouse, France, July 10, 2013.
- Computer Engineering Department, TOBB Economics and Technology University, Ankara, Turkey, September 27, 2011.
- IFIP Working Group 2.3 Programming Methodology Meeting, Santa Barbara, CA, January 20, 2011.

“Eliminating Web Software Vulnerabilities Using Automated Verification”

- Georgia Tech, Atlanta, September 8, 2010.
- CalPoly, San Luis Obispo, California, November 5, 2010.

“Service Choreography and Orchestration with Conversations”

- Bilkent University, Ankara, Turkey, January 2, 2009.
- Middle East Technical University, Ankara, Turkey, December 24, 2008.

“Infinite State Model Checking with Presburger Arithmetic”

- First International Workshop on Numerical Abstractions for Software Verification, Princeton, NJ, July 8, 2008.

“Structuring Software for Verifiability”

- University of California, Riverside, December 13, 2007.
- NEC Labs, Princeton, NJ, November 5, 2007.

“Modeling Interactions of Web Software”

- Second International Workshop on Automated Specification and Verification of Web Systems (WWV 2006), Paphos, Cyprus, November 19, 2006.

“Analyzing Conversations of Web Services”

- State University of New York at Stony Brook, December 2, 2005.

“Tools for Automated Verification of Web Services”

- Naval Research Laboratory, Center for High Assurance Computer Systems, Washington, D.C., November 24, 2004.
- Second International Symposium on Automated Technology on Verification and Analysis (ATVA 2004), Taipei, Taiwan, November 1, 2004.
- Software Chat, Computer Science Department, University of Maryland, College Park, Maryland, September 27, 2004.
- Computer Science Department, Brown University, Providence, Rhode Island, July 9, 2004.
- Nokia Research Center, Boston, Massachusetts, July 12, 2004.
- Bell Laboratories, Lucent Technologies, Murray Hill, New Jersey, May 18, 2004.

“Automated Verification of Concurrent Software and Web Services”

- Fraunhofer Center, College Park, Maryland, October 5, 2004.

“Tools for Automated Verification of Concurrent Software”

- Naval Research Laboratory, Center for High Assurance Computer Systems, Washington, D.C., September 29, 2004.
- Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, September 26, 2003.
- Department of Computer Science and Engineering, University of California, San Diego, California, August 18, 2003.

“Integrating Arithmetic Constraint Based Verification and Shape Analysis”

- Dagstuhl Seminar on Deduction and Infinite-state Model Checking, Schloss Dagstuhl, Wadern, Germany, April 23, 2003.

“Tools for Specification, Verification, and Synthesis of Reactive Systems”

- Computer Science Department, University of Massachusetts, Amherst, Massachusetts, March 25, 2002.
- Computer Science Department, State University of New York at Stony Brook, Stony Brook, New York, March 22, 2002.

“A Specification Language and a Verification Engine for Reliable Reactive Software Development”

- School of Computer Science, Carnegie Mellon University, Pittsburgh, Pennsylvania, November 19, 2001.

“Automated Symbolic Analysis of Reactive Systems”

- Computer Engineering and Information Science Department, Bilkent University, Ankara, Turkey, December, 1998.

“Symbolic Model Checking Systems with Unbounded Integer Variables.”

- Logic and Computation Seminar, University of Pennsylvania, Philadelphia, Pennsylvania, November 17, 1997.

“Model Checking Infinite State Systems: Recent Results and New Challenges.”

- Naval Research Laboratory, Center for High Assurance Computer Systems, Washington, D.C., September 29, 1997.

Invited Panels

Served on two National Science Foundation CAREER award review panels

Served on five National Science Foundation proposal review panels

Proof Tools Panel at the IFIP Working Conference on Verified Software: Theories, Tools, Experiments, ETH Zurich, Switzerland (2005)

Invited Tutorials

“String Analysis for Vulnerability Detection and Repair.” Invited tutorial, 14th International Symposium on Automated Technology for Verification and Analysis (ATVA 2016), October 17-20, 2016, Chiba, Japan.

“A Tutorial on Automated Verification.” 5th National Software Engineering Symposium (UYMS 2011), September 27, 2011.

“Modeling Interactions of Web Software,” 2nd Int’l Workshop on Automated Specification and Verification of Web Systems (WWV 2006), Paphos, Cyprus, November 19, 2006.

Tutorials

“Automata-based String Analysis.” 37th annual ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI 2016), Santa Barbara, California, June 13, 2016.

“String Analysis.” 22nd ACM SIGSOFT International Symposium on Foundations of Software Engineering, November 17, 2014.

Professional Activities

Steering Committee

Steering Committee Member, International Conference on Software Engineering (ICSE) (2016–present)

Steering Committee Member, IEEE/ACM International Conference on Automated Software Engineering (ASE) (2013–present)

Steering Committee Member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA) (2015–present)

Steering Committee Chair, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA) (2017–2018)

Journal Editor

Associate Editor, ACM Transactions on Software Engineering and Methodology (TOSEM) (2018–present)

Associate Editor, IEEE Transactions of Software Engineering (TSE) (2014–present)

Editorial Board Member, Service Oriented Computing and Applications Journal (2006–2013)

Technical Program Committee Chair, Co-Chair

- Program Committee Co-Chair, 41st International Conference on Software Engineering (ICSE 2019)
- Program Committee Co-Chair, 28th IEEE/ACM International Conference on Automated Software Engineering (ASE 2013)
- Program Committee Co-Chair, 20th ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE 2012)
- Program Committee Co-Chair, 9th International Symposium on Automated Technology for Verification and Analysis (ATVA 2011)
- Program Committee Co-Chair, 7th International Workshop on Web Services and Formal Methods (WS-FM 2010)
- Program Committee Co-Chair, Workshop on Testing, Analysis and Verification of Web Software (TAV-WEB 2008)
- Program Committee Chair, Workshop on Testing, Analysis and Verification of Web Services and Applications (TAV-WEB 2006)
- Program Committee Co-Chair, Workshop on Testing, Analysis and Verification of Web Services (TAV-WEB 2004)

Technical Program Board Member

- International Conference on Software Engineering (ICSE 2017, 2018)

Technical Program Committee Member

- International Conference on Software Engineering (ICSE 2005, 2015, 2016)
- ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2002, 2007, 2009, 2016, 2018)
- International Symposium on Automated Technology for Verification and Analysis (ATVA 2003, 2004, 2015, 2016, 2018)
- International Conference on Coordination Models and Languages (COORDINATION 2016)
- ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE 2016) Visions and Reflections Track
- International Conference on Computer Aided Verification (CAV 2015)
- ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2011, 2014, 2018, 2019)
- IEEE/ACM International Conference on Automated Software Engineering (ASE 2005, 2006, 2007, 2008, 2010, 2011, 2014, 2015, 2018)
- International Conference on Software Engineering and Formal Methods (SEFM 2014, 2015)
- Haifa Verification Conference (HVC 2014)
- International Conference on Software Testing, Verification and Validation (ICST 2013, 2014)

International Symposium on Formal Aspects of Component Software (FACS 2013)
2013 IFIP Joint International Conference on Formal Techniques for Distributed Systems (33rd FORTE/15th FMOODS)
International Workshop on Foundations of Interface Technologies (FIT 2012)
International Conference on Software Engineering (ICSE 2012) Doctoral Symposium
International Workshop on Searching and Integrating New Web Data (VLDS 2011)
International Workshop on Principles of Engineering Service-Oriented Systems (PESOS 2009, 2010)
IEEE International Conference on Web Services (ICWS 2005, 2010, 2011)
International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS 2010)
Workshop on Testing, Analysis and Verification of Web Software (TAV-WEB 2010)
International Conference on Service Oriented Computing (ICSOC 2005, 2006, 2007, 2008)
International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2008)
International Workshop on Formal Aspects of Component Software (FACS 2008)
International Workshop on Software Quality Assurance (SOQUA 2007)
IEEE International Conference on Service-Oriented Computing and Applications (SOCA 2007)
Automated Formal Methods Workshop (AFM 2007)
International Workshop on Automated Specification and Verification of Web Systems (WWV 2007)
International Workshop on Service Oriented Software Engineering (IW-SOSWE 2007)
International Workshop on Web Service Composition and Adaptation (WSCA 2007)
International Workshop on Software Verification and Validation (SVV 2004, 2005, 2006)
International Workshop on Service Oriented Software Engineering (IW-SOSE 2006)
International Conference on Software Engineering, Emerging Results Track (ICSE 2006)
Dependability in Large-scale Service-oriented Systems (DILSOS 2006)
Workshop on Software Model Checking (SoftMC 2005)
International Workshop on Automated Verification of Infinite-State Systems (AVIS 2005)
Poster Committee Member, International World Wide Web Conference (WWW 2004)
International Conference on Implementation and Application of Automata (CIAA 2003)

Organizing Committees

General Chair, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2017)

Doctoral Symposium Co-Chair, 27th IEEE/ASE International Conference on Automated Software Engineering (ASE 2012)

Workshop Co-chair, 25th IEEE/ACM International Conference on Automated Software Engineering (ASE 2010)

Co-organizer, 7th Workshop on Formal Methods and Web Services (WS-FM 2010)

Co-organizer, Workshop on Testing, Analysis and Verification of Web Software (TAV-WEB 2008)

Organizing Committee Member, Workshop on Web quality, Verification and Validation (WQVV 2007)

Organizing Committee Member, Workshop on Testing, Analysis and Verification of Web Services and Applications (TAV-WEB 2006)

Panel Chair, Third ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2005)

Co-organizer, Workshop on Testing, Analysis and Verification of Web Services (TAV-WEB 2004)

Organizing Committee Chair, 8th International Conference on Implementation and Application of Automata (CIAA 2003)

Professional Organizations

Member of IEEE, Computer Society

Distinguished member of ACM, SIGSOFT, SIGPLAN

Teaching, Advising, Research Supervision and Collaboration

Undergraduate Courses

Problem Solving with Computers I: Spring 2014, Spring 2016.

Translation of Programming Languages: Winter 1999, Fall 1999, Fall 2000, Fall 2001, Winter 2004, Fall 2010, Winter 2011, Fall, 2011, Winter 2012, Winter 2013, Fall 2013, Fall 2015, Spring 2017, Fall 2017.

Software Engineering/Capstone Project: Winter 2000, Winter 2002, Winter 2003, Winter 2004, Winter 2006, Winter 2007, Winter 2008, Winter 2009, Winter 2010.

Graduate Courses

String Analysis: Winter 2016, Winter 2018.

Automated Verification: Spring 1999, Spring 2000, Winter 2001, Fall 2002, Spring 2006, Spring 2008, Fall 2009, Spring 2010, Spring 2011, Spring 2012, Winter 2014, Winter 2017.

Formal Models for Web Software: Spring 2010, Spring 2013.

Software Engineering: Spring 2003, Spring 2007, Fall 2008, Fall 2012.

Static Analysis: Spring 2002, Spring 2004.

Concurrent Program Design and Verification: Spring 2000.

Graduate Seminars

Side Channel Analysis via Model Counting Constraint Solvers: Fall 2016

Automated Worst Case and Side Channel Analysis for Software: Fall 2015

Automated Decision Procedures: Winter 2013

Analysis and Verification Techniques for Improving Dependability of Web Software: Fall 2011

Domain Specific Languages and Analyses for Web Applications: Spring 2010

Dependable Web Applications via String Analysis: Spring 2009

Static String Analysis: Spring 2008

Architectural Support for Dynamic Software Analysis: Spring 2007

Environment Generation and Model Based Testing: Spring 2006.

Web Services and Security: Winter 2006.

Web Services: Spring 2003, Fall 2003.

Interfaces, Web Services and Verification: Winter 2003.

Topics in Automated Verification: Fall 2000, Spring 2002, Spring 2004.

Automated Verification of Infinite State Systems: Spring 1999, Fall 1999.

Workflow Specification Languages: Winter 1999.

Undergraduate Seminars

What is Computing?: Spring 2012, Spring 2013, Spring 2014.

Visitors

Daniele Fani, Ph.D. Candidate, University of Camerino, Italy
February 2014–September 2014

Joanne M. Atlee, Professor, University of Waterloo, Canada
February 2014–August 2014

Meriem Ouderni, Associate Professor, IRIT/INP Toulouse, France
December 2010–March 2011

Samik Basu, Associate Professor, Iowa State University
August 2010–December 2010

Gwen Salaun, Associate Professor, ENSIMAG, Grenoble INP, France
June 2008–July 2008

Postdoctoral Advisees

Nicolás Rosner, Postdoctoral researcher, 2016–present

Nestan Tsiskaridze, Postdoctoral researcher, 2016–present

Sylvain Hallé, Postdoctoral researcher, 2008–2010

Research topic: Formal Modeling and Analysis of Web Applications and Web Services

Current position: Assistant Professor, Université du Québec à Chicoutimi, Canada

Ph.D. Advisees

William Eiers, Ph.D. student

Seemanta Saha, Ph.D. student

Burak Kadron, Ph.D. student

Tegan Brennan, Ph.D. candidate

2018 NCWIT Collegiate Award, honorable mention

IGERT Fellow, UCSB

Lucas Bang, Ph.D. 2018

Outstanding Graduate Student Award 2017, Computer Science Department, UCSB

Best Presentation Award 2016, Computer Science Department Graduate Student Workshop, UCSB

Lead Teaching Assistant 2014-2015, Computer Science Department, UCSB

Outstanding Teaching Assistant 2014, Computer Science Department, UCSB

Doctoral Scholar Fellow, UCSB

Lopker Fellow, Computer Science Department, UCSB

Dissertation: “Software Side-Channel Analysis.”

Current position: Assistant Professor, Computer Science Department, Harvey Mudd College.

Abdulbaki Aydin, Ph.D. 2017

Best paper award, Computer Science Department Graduate Student Workshop (GSW 2014)

Outstanding Teaching Assistant 2012, Computer Science Department, UCSB

Dissertation: “Automata-based Model Counting String Constraint Solver for Vulnerability Analysis.”

Current position: Software Engineer, Microsoft.

Ivan Bocić, Ph.D. 2016

Outstanding Publication Award 2014, Computer Science Department, UCSB

Best paper award runner-up, Computer Science Department Graduate Student Workshop (GSW 2014)

Outstanding Teaching Assistant 2011, Computer Science Department, UCSB

Dissertation: “Data Model Verification via Theorem Proving.”

Current position: Software Engineer, Google.

Muath Alkhalaf, Ph.D. 2014

2015 ACM SIGSOFT Outstanding Doctoral Dissertation Award

Dissertation: Automatic Detection and Repair of Input Validation and Sanitization Bugs

Current position: Assistant Professor, Computer Science Department, King Saud University.

Jaideep Nijjar, Ph.D. 2014

Best Poster Award, Graduate Student Workshop 2010, Computer Science Department, UCSB

Clare Boothe Luce Fellowship, UCSB

Dissertation: Analysis and Verification of Web Application Data Models

Fang Yu, Ph.D. 2010

Outstanding Dissertation Award 2010, Computer Science Department, UCSB

Best Paper Award, Graduate Student Workshop 2008, Computer Science Department, UCSB

UCSB Deans Fellowship 2008

Dissertation: Automatic Verification of String Manipulating Programs

Current position: Associate Professor, Department of Management Information Systems, National Chengchi University, Taiwan

Graham Hughes, Ph.D. 2009

Dissertation: Interface Grammars for Modular Software Verification

Position after graduation: Research scientist, Acelot, Inc.

Aysu Betin-Can, Ph.D. 2005

IEEE/ACM International Conference on Automated Software Engineering (ASE) Best Paper Award, 2005

ACM SIGSOFT Distinguished Paper Award, 2005

Dissertation: Design for Verification for Concurrent and Distributed Systems

Current Position: Associate Professor, Informatics Institute, Middle East Technical University, Ankara, Turkey

Constantinos Bartzis, Ph.D. 2004

Dissertation: Symbolic Representations for Integer Sets in Automated Verification

Position after graduation: Post Doctoral Fellow, Computer Science Department, Carnegie Mellon University

Xiang Fu, Ph.D. 2004 (co-advised with Jianwen Su)

Dissertation: Formal Specification and Verification of Asynchronously Communicating Web Services

Current position: Associate Professor, Department of Computer Science, Hofstra University

Tuba Yavuz-Kahveci, Ph.D. 2004

Dissertation: Specification and Automated Verification of Concurrent Software Systems

Current position: Assistant Professor, Electrical and Computer Engineering Department, University of Florida, Gainesville

Zhe Dang, Ph.D. 2000 (co-advised with Richard A. Kemmerer)

Dissertation: Verification and Debugging of Infinite State Real-time Systems

Current position: Associate Professor, School of Electrical Engineering and Computer Science, Washington State University, Pullman

M.S. Advisees

Plane Janthong, M.S. 2017

Project: Safety Checking for Domain Relational Calculus Queries Using Alloy Analyzer

Zachary Stengel, M.S. 2010

Project: Analyzing Singularity Channel Contracts

Current Position: Software Engineer, Microsoft

Ben Rubinger, M.S. 2010

Project: A Code Contracts Case Study for a Facebook Application

Current Position: Software Engineer, IBM

Muath Alkhalaf, M.S. 2008

Project: Automated Web Service Testing Using Interface Grammars

Current position: Ph.D. candidate, UCSB

Chris Ferguson, M.S. 2008

Project: Collaboration Diagram Analysis Toolkit

Current position: Student Information Systems and Technology, UCSB

Elliot Barlas, M.S. 2007

Project: A Framework for Verification of Distributed Java Programs Using Java PathFinder

Current position: Software Engineer, Citrix Online

Jennifer Choe, M.S. 2006

Project: An Extended Finite State Machine Approach for Automated GUI Testing

Current position: Software Engineer, Veeco Systems

Undergraduate Projects Supervised

Supervised 19 Capstone team projects as the Capstone Course instructor.

William Eiers, 2016–2017

Project: Automata-based String Constraint Solving

Elliot Barlas, Spring, Summer 2006

Project: Modular Verification of Distributed Programs

Thomas Wilson, Spring 2002

Project: Use of Assertions in Object Oriented Programming Languages

Christophe G. Joubert, Spring 2001

Project: Shape Analysis

Ph.D. Committee Membership

Mehmet Emre, Ph.D. candidate

Miroslav Gavrilov, Ph.D. candidate

Mohammad Javad Amiri, Ph.D. candidate

Lawton Nichols, Ph.D. candidate

Fish Wang, Ph.D. 2018

Dissertation: Decloaking Binary Programs for Fun and Profit

Antonio Bianchi, Ph.D. 2018

Dissertation: Identifying and Mitigating Trust Violations in the Mobile Ecosystem

Faisal Nawab, Ph.D. 2017

Dissertation: Global-Scale Data Management with Strong Consistency Guarantees

Kyle Dewey, Ph.D. 2017

Dissertation: Automated Black Box Generation of Structured Inputs for Use in Software Testing

Stratos Dimopoulos, Ph.D. 2017

Dissertation: Resource Allocation in Multi-Analytics, Resource-Constrained Environments

- Christopher Hall, Ph.D. 2017
Dissertation: A New Human-Readability Infrastructure: Structured Data as a Visual Programming Language
- Hiranya Jayathilaka, Ph.D. 2016
Dissertation: Governance of Cloud-hosted Web Applications
- Yutian Sun, Ph.D. 2015
Dissertation: Management of Data and Collaboration for Business Processes
- Merritt Miller, Ph.D. 2015
Dissertation: Realization and Formal Analysis of Asynchronous Pulse Communication Circuits
- Kunal Arya, Ph.D. 2014
Dissertation: Hierarchical Transactions for Hardware/Software Cosynthesis
- Nagy Mostafa, Ph.D. 2012
Dissertation: Towards Enabling Better Understanding and Performance for Managed Languages
- Mohit Tiwari, Ph.D. 2011
Dissertation: Design and Verification of Information Flow Secure Systems
- Marco Cova, Ph.D. 2010
Dissertation: Taming the Malicious Web: Avoiding and Detecting Web-based Attacks
- Vika Felmetzger, Ph.D. 2010
Dissertation: Toward Automated Detection of Logic Vulnerabilities in Web Applications
- Sunil Soman, Ph.D. 2008
Dissertation: Memory Management in Multi-Application Managed Runtime Environments
- Cagdas Gerede, Ph.D. 2007
Dissertation: Modeling, Analysis and Composition of Business Processes
- Ganapathy Parthasarathy, Ph. D. (Electrical and Computer Engineering) 2005
Dissertation: Hybrid Methods for Satisfiability Checking in Register-Transfer Level Circuits
- Madhu K. Iyer, Ph.D. (Electrical and Computer Engineering) 2005
Dissertation: Techniques for efficient satisfiability checking
- Mirek Riedewald, Ph.D. 2002
Dissertation: Efficient aggregation for data warehouses and digital libraries
- Jeff Bogda, Ph.D. 2001
Dissertation: Program Analysis Alleviates Java Synchronization
- Steve Haynal, Ph.D. (Electrical and Computer Engineering) 1999
Dissertation: Symbolic Automata-Based Scheduling
- Paul Kolano, Ph.D. 1999
Dissertation: Tools and Techniques for the Design and Systematic Analysis of Real-Time Systems

External Ph.D. Committee Membership

- Daniele Fani, Ph.D. 2015, Universita degli Studi di Camerino, Italy
Dissertation: Dynamic Verification of Service-Based Systems

Simon Holm Jensen, Ph.D. 2013, Aarhus University, Denmark
Dissertation: Static Analysis of JavaScript

Mathias Romme Schwarz, Ph.D. 2013, Aarhus University, Denmark
Dissertation: Design and Analysis of Web Application Frameworks

Domenico Bianculli, Ph.D. 2012, University of Lugano, Italy
Dissertation: Open-World Software: Specification, Verification, and Beyond

Naghmeh Ghafari, Ph.D. 2009, University of Waterloo, Canada
Dissertation: Algorithmic Analysis of Innite-State Systems

Ming-Ying Chung, Ph.D. 2007, University of California at Riverside
Dissertation: Distributed Symbolic Reachability Analysis

Beata Sarna-Starosta, Ph.D. 2005, SUNY, Stony Brook
Dissertation: Constraint-based Analysis of Security Properties

M.S. Committee Membership

Aleksandra Potapova, M.S. 2010
Project: On Nondeterministic Workflow Executions

Yiming Li, M.S. 2010
Project: Efficient Front-End Support for Cloud Platforms

Puneet Lakhina, M.S. 2010
Project: Analysis and Evaluation of a Hypervisor Hosted Java Virtual Machine

Alon Levi, M.S. 2007
Project: Building a Semantic Web Service Registry

Anders Smestad, M.S. 2006
Project: Increasing Sharing in a Multitasking Java Virtual Machine

Ariane Gravel, M.S. 2006
Project: A Monitoring Tool for BPEL Services

John Yoder, M.S. 2006
Project: Using a Binary Tree of Conditionals (BTC) for Dynamic Dispatch in ISE Eiffel

Milly Strelzoff, M.S. 2001
Project: Hidden Markov Models in TetraGene

University Service

University of California, Santa Barbara

2000–present, Director, Verification Laboratory

2015–2018, Faculty Member, Program Review Panel, UCSB

2016–2017, Faculty Member, Faculty Recruitment Committee, Computer Science Department

2017, Faculty Member, Committee on Outstanding Graduate Mentor Awards, UCSB Academic Senate

2016, Faculty Member, Committee on Instructional Improvement Program Grants, UCSB

2016–2017, Faculty Member, Vision Committee, Computer Science Department

2015–2016, Chair, Faculty Recruitment Committee, Computer Science Department

2015–2016, Faculty Member, Vision Committee, Computer Science Department

2005–2009, Vice Chair, Computer Science Department

2014, Chair, Task Force on Undergraduate Program Growth, Computer Science Department

2013–2014, 2010–2011, Chair, Graduate Admissions Committee, Computer Science Department

2011–2012, Chair, Committee on Graduate Funding and Fellowships, Graduate Council, UCSB Academic Senate

2009–2012, Faculty Member, Graduate Council, UCSB Academic Senate

2006, Chair, UCSB Committee on International Graduate Student Issue

2005–2009, Vice Chair, Computer Science Department

2005–2009, Graduate Advisor, Computer Science Department

2011–present, Faculty Member, Center for Cybersecurity

2012–2013, 1999–2004, Faculty Member, Graduate Admissions Committee, Computer Science Department

2013, Member, MSO Search Committee, Department of Computer Science

2011–2013, Faculty Member, Executive Committee, College of Engineering

2011–2012, Faculty Member, Committee on Self-Supporting and Professional Graduate Programs, Graduate Council, UCSB Academic Senate

2010–2011, Faculty Member, Committee on Program Review, Graduate Council, UCSB Academic Senate

2009–2010, Faculty Member, Committee on Graduate Student Affairs, Graduate Council, UCSB Academic Senate

2012–2013, Faculty Member, Graduate Division Central Continuing Fellowship Committee

2011–2012, Faculty Member, Graduate Division Central Recruitment Fellowship Committee

2011–2012, 2017–2018, Faculty Member, Graduate Advising and Affairs Committee, Computer Science Department

2009–2011, Faculty Member, Undergraduate Affairs Committee, Computer Science Department

2005–2009, Co-Chair, Graduate Affairs Committee, Computer Science Department

2005–2009, Co-Chair, Graduate Admissions Committee, Computer Science Department

2005–2009, Teaching Coordinator, Computer Science Department

2008–2011, Coordinator, Distinction in the Major Program, Computer Science Department

2006–2010, Faculty Member, Strategic Planning Committee, Computer Science Department
2006–2007, Faculty Member, Acceleration Committee, Computer Science Department
2002–2004, Faculty Member, Recruitment Committee, Computer Science Department
2000–2003, Faculty Member, Curriculum Committee, Computer Science Department
2001–2002, Faculty Member, Accreditation Committee, Computer Science Department
2000–2001, Academic Senate Representative, Computer Science Department
1998–2001, ACM Liaison, Computer Science Department
1998–1999, Library Liaison, Computer Science Department
1999–2000, Colloquium and Distinguished Lecture Series Coordinator, Computer Science Department
2006, Faculty Member, Packard Fellowship Nomination Review Committee, College of Engineering
2006, Faculty Member, NSF PIRE Grant Review Committee, College of Engineering
1999–present, Faculty Member, Computer Engineering Program
2013–2014, 1999–2000, Faculty Member, Recruitment Committee, Computer Engineering Program
2009–2013, 2002–2004, Faculty Member, Long Range Planning Committee, Computer Engineering Program
2006–2009, Teaching Coordinator, Computer Engineering Program
2006–2007, Faculty Member, Graduate Curriculum and Affairs Committee, Computer Engineering Program
2005–2006, Faculty Member, Seminar Series Committee, Computer Engineering Program
2005–2006, Faculty Member, Student Awards Committee, Computer Engineering Program
1999–2004, Seminar Coordinator, Computer Engineering Program