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Donald Bren School of Information and Computer Sciences
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Research Interests

My research interests are in software engineering with a focus on software analysis and testing, software security, software architecture, and software maintenance and re-engineering.

Education

Ph.D., Computer Science, August 2014

*University of Southern California
Los Angeles, CA, U.S.A.*

Dissertation: A Unified Framework for Studying Architectural Decay of Software Systems

Master of Science, Computer Science, December 2008

*University of Southern California
Los Angeles, CA, U.S.A.*

Bachelor of Science in Computer Engineering and Computer Science, Minor in Philosophy, May 2006

*University of Southern California
Los Angeles, CA, U.S.A.*

Employment History

University of California, Irvine, USA

July 2018–Present

Assistant Professor

Department of Informatics

University of California, Irvine, USA

July 2015–June 2018

Postdoctoral Associate

Institute for Software Research

George Mason University, Fairfax, VA, USA

July 2014–June 2015

Postdoctoral Research Fellow

Software Design and Analysis Laboratory

University of Southern California, Los Angeles, CA, USA

January 2008–June 2014

Research Assistant

Software Architecture Research Group

May 2007–August 2007

Research Assistant

Southern California Earthquake Center

May 2005–May 2006

Research Intern

Southern California Earthquake Center

NASA Jet Propulsion Laboratory, La Cañada Flintridge, CA, USA

June 2009–August 2010

Software Engineer

Xerox Special Information Systems, Monrovia, CA, USA

June 2006–August 2006

Software Development Intern

Threshold Marketing, Los Angeles, CA, USA

August 2004–April 2005

Software Development Intern

Digital Computing Systems, LLC, Van Nuys, CA, USA

May 2003–August 2003

IT Consultant

Notre Dame High School, Sherman Oaks, CA, USA

June 2001–September 2002

Assistant Network Admin

Publications

Book Chapter

[BC1] Sam Malek, Hamid Bagheri, Joshua Garcia, Alireza Sadeghi. (2019) Security and Software Engineering. In: Kang, K., Taylor, R., and Cha, S., (eds) *Handbook of Software Engineering*. Springer.

Journals

[J11] Negar Ghorbani, Reyhaneh Jabbarvand, Navid Salehnamadi, Joshua Garcia, and Sam Malek. DeltaDroid: Dynamic Delivery Testing in Android. *ACM Transactions on Software Engineering and Methodology (TOSEM)*, August 2022, Accepted for Publication.

[J10] Joshua Garcia, Ehsan Kouroshfar, Negar Ghorbani, and Sam Malek. Forecasting Architectural Decay from Evolutionary History. *IEEE Transactions on Software Engineering (TSE)*, vol. 48, issue 7, July 2022..

[J9] Thibaud Lutellier, Devin Chollak, Joshua Garcia, Lin Tan, Derek Rayside, Nenad Medvidovic, and Robert Kroeger. Measuring the Impact of Code Dependencies on Software Architecture Recovery Techniques. *IEEE Transactions on Software Engineering (TSE)*, vol. 44, issue 2, February 2018.

[J8] Joshua Garcia, Mahmoud Hammad, and Sam Malek. Lightweight, Obfuscation-Resilient Detection and Family Identification of Android Malware. *ACM Transactions on Software Engineering and Methodology (TOSEM)*, vol. 26, issue 3, no. 11, January 2018.

[J7] Alireza Sadeghi, Hamid Bagheri, Joshua Garcia, and Sam Malek. A Taxonomy and Qualitative Comparison of Program Analysis Techniques for Security Assessment of Android Software. *IEEE Transactions on Software Engineering (TSE)*, vol. 43, no. 6, pp. 492–530, June 2017.

[J6] Pooyan Behnamghader, Duc Minh Le, Joshua Garcia, Daniel Link, Arman Shahbazian, and Nenad Medvidović. A Large-Scale Study of Architectural Evolution in Open-Source Software Systems. *Empirical Software Engineering*, vol. 22, no. 3, pp. 1146–1193, June 2016.

[J5] Hamid Bagheri, Joshua Garcia, Alireza Sadeghi, Sam Malek, Nenad Medvidović. Software Architectural Principles in Contemporary Mobile Software: From Conception to Practice. *Journal of Systems and Software (JSS)*, vol. 119, pp. 31–44, September 2016.

[J4] Hamid Bagheri, Alireza Sadeghi, Joshua Garcia, and Sam Malek. COVERT: Compositional Analysis of Android Inter-App Permission Leakage. *IEEE Transactions on Software Engineering (TSE)*, vol. 41, no. 9, pp. 866–886, September 2015.

[J3] Chris A. Mattmann, Joshua Garcia, Ivo Krka, Daniel Popescu, and Nenad Medvidović. Revisiting the Anatomy and Physiology of the Grid. *Journal of Grid Computing*, vol. 13, no. 1, pp. 19–34, January 2015

[J2] Nenad Medvidović, Hossein Tajalli, Joshua Garcia, Yuriy Brun, Ivo Krka, and George Edwards. Engineering Heterogeneous Robotics Systems: A Software Architecture-Based Approach, *IEEE Computer*, vol. 44, no.5, pp. 62–71, May 2011.

[J1] Sam Malek, George Edwards, Yuriy Brun, Hossein Tajalli, Joshua Garcia, Ivo Krka, Nenad Medvidović, Marija Mikic-Rakic, and Gaurav Sukhatme. An Architecture-Driven Software Mobility Framework. *Journal of Systems and Software (JSS), Special Issue on Software Architecture and Mobility*, vol. 83, no. 6, pp. 972–989, June 2010.

Conferences

[C20] Ziwen Wan, Junjie Shen, Jalen Chuang, Xin Xia, Joshua Garcia, Jiaqi Ma, and Qi Alfred Chen. Too Afraid to Drive: Systematic Discovery of Semantic DoS Vulnerability in Autonomous Driving Planning under Physical-World Attacks. *Network and Distributed Systems Security (NDSS) Symposium*, San Diego, California, April 2022.

[C19] Joshua Garcia, Mehdi Mirakhorli, Lu Xiao, Yutong Zhao, Ibrahim Mujhid, Khoi Pham, Ahmet Okutan, Sam Malek, Rick Kazman, Yuanfang Cai and Nenad Medvidović. Constructing a Shared Infrastructure for Software Architecture Analysis and Maintenance. *18th IEEE International Conference on Software Architecture (ICSA 2021)*, Stuttgart, Germany, March 2021.

[C18] Sumaya Almanee, Arda Unal, Mathias Payer, and Joshua Garcia. Too Quiet in the Library: An Empirical Study of Security Updates in Android Apps' Native Code. *In the 43rd International Conference on Software Engineering (ICSE 2021)*, Madrid, Spain, May 2021.

[C17] Joshua Garcia, Yang Feng, Junjie Shen, Sumaya Almanee, Yuan Xia, and Qi Alfred Chen. A Comprehensive Study of Autonomous Vehicle Bugs. *In the 42nd International Conference on Software Engineering (ICSE 2020)*, Seoul, South Korea, May 2020.

[C16] Negar Ghorbani, Joshua Garcia, and Sam Malek. Detection and Repair of Architectural Inconsistencies in Java. *In the 41st International Conference on Software Engineering (ICSE 2019)*, Montreal, Canada, May 2019.

[C15] Mahmoud Hammad, Joshua Garcia and Sam Malek. SALMA: Self-Protection of Android Systems from Inter-Component Communication Attacks. *In the 33rd IEEE/ACM International Conference on Automated Software Engineering (ASE 2018)*, Montpellier, France, September 2018.

[C14] Mahmoud Hammad, Joshua Garcia and Sam Malek. A Large-Scale Empirical Study on the Effects of Code Obfuscations on Android Apps and Anti-Malware Products. *In the 40th International Conference on Software Engineering (ICSE)*, Gothenburg, Sweden, May 2018.

[C13] Jun-Wei Lin, Reyhaneh Jabbarvand, Joshua Garcia and Sam Malek. Nemo: Multi-Criteria Test-Suite Minimization with Integer Nonlinear Programming. *In the 40th International Conference on Software Engineering (ICSE)*, Gothenburg, Sweden, May 2018.

[C12] Joshua Garcia, Mahmoud Hammad, Negar Ghorbani, and Sam Malek. Automatic Generation of Inter-Component Communication Exploits for Android Applications. *In the 11th joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE)*, Paderborn, Germany, September 2017.

[C11] Nariman Mirzaei, Joshua Garcia, Hamid Bagheri, Alireza Sadeghi, and Sam Malek. Reducing Combinatorics in GUI Testing of Android Applications. *In the 38th International Conference on Software Engineering (ICSE)*, Austin, Texas, May 2016.

[C10] Duc Le, Pooyan Behnamghader, Joshua Garcia, Daniel Link, Arman Shahbazian and Nenad Medvidović. An Empirical Study of Architectural Change in Open-Source Software Systems. *In the 12th Working Conference on Mining Software Repositories (MSR)*, Florence, Italy, May 2015.

[C9] Thibaud Lutellier, Devin Chollack, Joshua Garcia, Lin Tan, Derek Rayside, Nenad Medvidović and Robert Kroeger. Comparing Software Architecture Recovery Techniques Using Accurate Dependencies. *In the 37th International Conference on Software Engineering (ICSE), Software Engineering In Practice Track*, Florence, Italy, May 2015.

[C8] Joshua Garcia, Igor Ivkovic, and Nenad Medvidović. A Comparative Analysis of Architecture Recovery Techniques. *In the Proceedings of the 28th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, Palo Alto, California, November 2013.

[C7] Joshua Garcia, Daniel Popescu, Gholamreza Safi, William G.J. Halfond, and Nenad Medvidović. Identifying Message Flow in Distributed Event-Based Systems. *In the Proceedings of the 9th joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE)*, Saint Petersburg, Russia, August 2013.

[C6] Joshua Garcia, Ivo Krka, Chris Mattmann, and Nenad Medvidović. Obtaining Ground-Truth Software Architectures. *In the 35th International Conference on Software Engineering (ICSE), Software Engineering In Practice Track*, San Francisco, California, May 2013.

[C5] Daniel Popescu, Joshua Garcia, Kevin Bierhoff, and Nenad Medvidović. Impact Analysis for Distributed Event-Based Systems. *In the Proceedings of the 6th ACM International Conference on Distributed Event-Based Systems (DEBS)*, Berlin, Germany, July 2012.

[C4] Isela Macia Bertrán, Joshua Garcia, Daniel Popescu, Alessandro Garcia, Nenad Medvidović and Arndt Von Staa. Are Automatically-Detected Code Anomalies Relevant to Architectural Modularity? An Exploratory Analysis of Evolving Systems. *In the Proceedings of the 11th Annual International Conference on Aspect-oriented Software Development (AOSD)*, Hasso-Plattner-Institut Potsdam, Germany, March 2012.

[C3] Isela Macia, Alessandro Garcia, Arndt von Staa, Joshua Garcia, and Nenad Medvidović. On the Impact of Aspect-Oriented Code Smells on Architecture Modularity: An Exploratory Study. *In the Proceedings of the 5th Brazilian Symposium on Software Components, Architectures and Reuse (SBCARS)*, São Paulo, Brazil, September 2011.

[C2] Hossein Tajalli, Joshua Garcia, George Edwards, and Nenad Medvidović. PLASMA: A Plan-Based Layered Architecture for Software Model-Driven Adaptation. *In the Proceedings of the 25th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, Antwerp, Belgium, September 2010.

[C1] Joshua Garcia, Daniel Popescu, George Edwards and Nenad Medvidović. Toward a Catalogue of Architectural Bad Smells. *In the Proceedings of the Fifth International Conference on the Quality of Software Architectures (QOSA)*, East Stroudsburg, Pennsylvania, June 2009.

Workshops and Short Papers

[W12] Marcelo Schmitt Laser, Duc Minh Le, Joshua Garcia, and Nenad Medvidović. Architectural Archipelagos: Technical Debt in Long-Lived Software Research Platforms. *In the Proceedings of the IEEE/ACM International Conference on Technical Debt (TechDebt)*, May 2021.

[W11] Marcelo Schmitt Laser, Nenad Medvidović, Duc Minh Le, and Joshua Garcia. ARCADE: An Extensible Workbench for Architecture Recovery, Change, and Decay Evaluation. *In Proceedings of the 28th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2020)*, November 2020.

[W10] Reyhaneh Jabbarvand, Alireza Sadeghi, Joshua Garcia, Sam Malek, and Paul Ammann. EcoDroid: An Approach for Energy-Based Ranking of Android Apps. *In the 4th International Workshop on Green and Sustainable Software in Conjunction with ICSE*, Florence, Italy, May 2015.

[W9] Youn Kyu Lee, Jae young Bang, Joshua Garcia, and Nenad Medvidović. ViVA: A Visualization and Analysis Tool for Distributed Event-Based Systems. *36th International Conference on Software Engineering (ICSE), Formal Demonstrations Track*, Hyderabad, India, June 2014.

[W8] Ran Mo, Joshua Garcia, Yuanfang Cai, and Nenad Medvidović. Mapping Architectural Decay Instances into Dependency Models. *In the Proceedings of the Fourth International Workshop on Managing Technical Debt in Conjunction with ICSE*, San Francisco, California, May 2013.

[W7] Joshua Garcia, Ivo Krka, Nenad Medvidović, and Chris Douglas. A Framework for Obtaining the Ground-Truth in Architectural Recovery. *In the joint 10th Working IEEE/IFIP Conference on Software Architecture & 6th European Conference on Software Architecture (WICSA/ECSA)*, Helsinki, Finland, August 2012.

[W6] Joshua Garcia, Daniel Popescu, Chris Mattmann, Nenad Medvidović, and Yuanfang Cai. Enhancing Architectural Recovery Using Concerns. *In the Proceedings of the 26th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, Lawrence, Kansas, November 2011.

[W5] Ivo Krka, Yuriy Brun, Daniel Popescu, Joshua Garcia, Nenad Medvidović. Using Dynamic Execution Traces and Program Invariants to Enhance Behavioral Model Inference. *In the 32nd International Conference on Software Engineering (ICSE), New Ideas and Emerging Results Track*, Cape Town, South Africa, May 2010.

[W4] George Edwards, Joshua Garcia, Hossein Tajalli, Daniel Popescu, Nenad Medvidović, Gaurav Sukhatme, and Brad Petrus. Architecture-Driven Self-Adaptation and Self-Management in Robotics Systems. *In the Proceedings of the Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*, Vancouver, Canada, May 2009.

[W3] Daniel Popescu, Joshua Garcia, and Nenad Medvidović. Enabling More Precise Dependency Analysis in Event-Based Systems. *In the Proceedings of the 17th International Conference on Program Comprehension (ICPC)*, Vancouver, Canada, May 2009.

[W2] Joshua Garcia, Daniel Popescu, George Edwards and Nenad Medvidović, Identifying Architectural Bad Smells. *In the Proceedings of the 13th European Conference on Software Maintenance and Reengineering (CSMR)*, Kaiserslautern, Germany, March 2009.

[W1] Chris A. Mattmann, Joshua Garcia, Ivo Krka, Daniel Popescu, and Nenad Medvidović. The Anatomy and Physiology of the Grid Revisited. *In the Proceedings of the 8th Working IEEE/IFIP Conference on Software Architecture (WICSA)*, Cambridge, United Kingdom, September 2009.

Funding Grants and Contracts

- [F11] Interim Covid-19 Research Recovery Program,
Sponsored by the UCI Office of the Provost and Executive Vice Chancellor
“Autonomous Vehicle Software System Testing and Debugging ”
Duration: 03/18/2022–06/30/2022
Investigators: Joshua Garcia (Sole PI)
Award Amount: \$25,000
- [F10] Academic Senate Council on Research, Computing and Libraries (CORCL) Award Initiative
“Automated Repair of Configuration-Related Bugs for Autonomous Vehicle Systems”
Duration: 03/18/2022–06/30/2022
Investigators: Joshua Garcia (Sole PI)
Award Amount: \$2,800
- [F9] Academic Senate Council on Research, Computing and Libraries (CORCL) Award Initiative
“Multi-Agent Search-Based Autonomous Vehicle Testing Framework ”
Duration: 03/18/2022–06/30/2022
Investigators: Joshua Garcia (Sole PI)
Award Amount: \$2,500
- [F8] UCI Institute for Software Research (ISR) Affiliate Learning Program
“Learning Program for Untouched Code Analysis”
Duration: 1/01/2022–03/31/2022
Investigators: Joshua Garcia
Award Amount: \$11,000
- [F7] Donald Bren School of Information and Computer Sciences (ICS) Research Award
“SAHARA: Software Analysis for Hardware Acceleration with Reconfigurable Architectures”
Duration: 4/21/2021–6/30/2022
Investigators: Joshua Garcia (Lead PI) Sang-Woo Jun, Alberto Krone-Martins, Aparna Chandramowlishwaran, Sam Malek, Cristina Videira Lopes, and James S. Bullock
Award Amount: \$75,000

- [F6] Donald Bren School of Information and Computer Sciences (ICS) Research Award
 “Acquisition of a Production Autonomous Driving Development Kit for ICS Research and Education Competence in Autonomous System”
 Duration: 4/21/2021–6/30/2022
 Investigators: Qi Alfred Chen (Lead PI), Joshua Garcia, Sang-Woo Jun, Roy Fox, Marco Levorato, Amelia Regan, Ian Harris, and Gene Tsudik
 Award Amount: \$75,000
- [F5] Academic Senate Council on Research, Computing and Libraries (CORCL) Award Initiative
 “Detecting and Mitigating Timing Side-Channel Vulnerabilities in Software Systems”
 Duration: 4/22/2020–6/01/2022
 Investigators: Joshua Garcia (Lead PI) and Sang-Woo Jun
 Award Amount: \$3,500
- [F4] Academic Senate Council on Research, Computing and Libraries (CORCL) Award Initiative
 “NativeBomb: Automatic Exploit Generation of Native Vulnerabilities in Android Apps”
 Duration: 4/22/2020–6/01/2022
 Investigators: Joshua Garcia (Sole PI)
 Award Amount: \$2,000
- [F3] Donald Bren School of Information and Computer Sciences (ICS) Research Award
 “Towards Robust and Secure Autonomy”
 Duration: 4/03/2020–12/31/2021
 Investigators: Qi Alfred Chen (Lead PI) and Joshua Garcia
 Award Amount: \$75,000
- [F2] National Science Foundation (NSF)
 “Constructing a Community-Wide Software Architecture Infrastructure”
 Duration: 7/1/2018–8/31/2021
 Investigators: Sam Malek (PI at University of California, Irvine), Joshua Garcia (Co-PI at University of California, Irvine), Nenad Medvidović (Lead PI at University of Southern California), Mehdi Mirakhorli (PI at Rochester Institute of Technology), Rick Kazman (PI at University of Hawai’i at Mānoa), Yuanfang Cai (PI at Drexel University), and Lu Xiao (PI at Stevens Institute of Technology)
 Award Amount: \$1,660,000
- [F1] National Science Foundation (NSF)
 “Planning and Prototyping a Community-Wide Software Architecture Instrument”
 Duration: 8/8/2016–7/31/2018
 Investigators: Sam Malek (PI at UCI), Joshua Garcia (Co-PI at UCI), Nenad Medvidović (Lead PI at University of Southern California), and Mehdi Mirakhorli (PI at Rochester Institute of Technology)
 Award Amount: \$130,000

Formal Presentations

- [P41] Keynote, *Analyzing Android Native Code: Where Are We? Where Should We Go?*, The 5th International Workshop on Advances in Mobile App Analysis, held in conjunction with the 37th IEEE/ACM International Conference on Automated Software Engineering (ASE 2022), Ann Arbor, Michigan, October 2022.
- [P40] *From Managed to Native Code: Android Application Vulnerabilities and Exploits*, NortonLifeLock, Culver City, CA, July 2022.
- [P39] *Mobile Application Security: Exploits, Malware, and Updates*, Amazon, Online, July 2021.
- [P38] *Android Malware Detection: From Obfuscation Susceptibility to Obfuscation Resilience*, NortonLifeLock, Culver City, CA, March 2020.
- [P37] *Detection and Repair of Architectural Inconsistencies in Java*. In the 41st International Conference on Software Engineering (ICSE), Montreal, Canada, May 2019.

- [P36] *Panel Post-PhD career: What are the tradeoffs between a research career in industry, academia (research track, teaching track), and government?*. In the Student Mentoring Workshop (SMeW) at the 41st International Conference on Software Engineering (ICSE), Montreal Canada, May 2019.
- [P35] *Lightweight, Obfuscation-Resilient Detection and Family Identification of Android Malware*. In the 40th International Conference on Software Engineering (ICSE), Gothenburg, Sweden, May 2018.
- [P34] *A Large-Scale Empirical Study on the Effects of Code Obfuscations on Android Apps and Anti-Malware Products*. In the 40th International Conference on Software Engineering (ICSE), Gothenburg, Sweden, May 2018.
- [P33] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. McGill University, Montreal, Quebec, Canada, April 2018.
- [P32] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. McGill University, Montreal, Quebec, Canada, April 2018.
- [P31] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. Arizona State University, Tempe, Arizona, April 2018.
- [P30] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Texas at Dallas, Richardson, Texas, March 2018.
- [P29] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. Northeastern University, Boston, Massachusetts, March 2018.
- [P28] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Victoria, Victoria, British Columbia, Canada, March 2018.
- [P27] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Waterloo, Waterloo, Ontario, Canada, March 2018.
- [P26] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of California, Irvine, February 2018.
- [P25] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Utah, Salt Lake City, Utah, February 2018.
- [P24] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Maryland, College Park, February 2018.
- [P23] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Notre Dame, South Bend, Indiana, February 2018.
- [P22] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of California, Davis, January 2018.
- [P21] *Automated Android Security Assessment: Malware, Vulnerabilities, and Exploits*. University of Southern California, Los Angeles, CA, January 2018.
- [P20] *Automatic Generation of Inter-Component Communication Exploits for Android Applications*. Intelligence Community (IC) Academic Research Symposium, Washington, D.C., September 2017.
- [P19] *Automatic Generation of Inter-Component Communication Exploits for Android Applications*. 11th joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE), Paderborn, Germany, September 2017.

- [P18] *Automatic Generation of Inter-Component Communication Exploits for Android Applications*. Institute for Software Research (ISR) Research Forum, University of California, Irvine, June. 2017.
- [P17] *A Taxonomy and Qualitative Comparison of Program Analysis Techniques for Security Assessment of Android Software*. 39th International Conference on Software Engineering, Buenos Aires, Argentina, May 2017.
- [P16] *Lightweight, Obfuscation-Resilient Detection and Family Identification of Android Malware*. IEEE Orange County CyberSecurity Monthly Technical Talk, Tustin, California, September 2016.
- [P15] *Effective, Lightweight Analysis of Android Apps: A Security and Testing Perspective*. Aerospace Corporation, El Segundo, California, July 2016.
- [P14] *Reducing Combinatorics in GUI Testing of Android Applications*. 38th International Conference on Software Engineering (ICSE), Austin, Texas, May 2016.
- [P13] *A Comparative Analysis of Architecture Recovery Techniques*. 28th IEEE/ACM International Conference on Automated Software Engineering (ASE), Palo Alto, California, November 2013.
- [P12] *Identifying Message Flow in Distributed Event-Based Systems*. 9th joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE), Saint Petersburg, Russia, August 2013.
- [P11] *Obtaining Ground-Truth Software Architectures*. *Software Engineering In Practice Track of the 35th International Conference on Software Engineering (ICSE)*, San Francisco, California, May 2013.
- [P10] *A Framework for Obtaining the Ground-Truth in Architectural Recovery*. 10th joint Working IEEE/IFIP Conference on Software Architecture & 6th European Conference on Software Architecture (WICSA/ECSA), Helsinki, Finland, August 2012.
- [P9] *Architectural Recovery to Aid Detection of Architectural Degradation*. USC Center for Software and Systems Engineering Annual Research Review, Los Angeles, California, March 2012.
- [P8] *Enhancing Architectural Recovery Using Concerns*. 26th IEEE/ACM International Conference on Automated Software Engineering (ASE), Lawrence, Kansas, November 2011.
- [P7] *Cataloging and Detecting Architectural Smells*. USC Center for Software and Systems Engineering Annual Research Review, Los Angeles, California, March 2011.
- [P6] *Cataloging and Detecting Architectural Smells*. Ground Systems Architecture Workshop (GSAW), Architecture-Centric Evolution (ACE) Working Group, Los Angeles, California, March 2011.
- [P5] *Model- and Plan-Based Software Architecture Adaptation*. USC Center for Software and Systems Engineering Annual Research Review, Los Angeles, California, March 2010.
- [P4] *The Anatomy and Physiology of the Grid Revisited*. 8th Working IEEE/IFIP Conference on Software Architecture (WICSA), Cambridge, United Kingdom, September 2009.
- [P3] *Toward a Catalogue of Architectural Bad Smells*. 5th International Conference on the Quality of Software Architectures (QOSA), East Stroudsburg, Pennsylvania, June 2009.
- [P2] *Architecture-Driven Self-Adaptation and Self-Management in Robotics Systems*. USC Center for Software and Systems Engineering Annual Research Review, Los Angeles, California, March 2009.
- [P1] *An Architectural Approach to Robotics Software Design, Implementation, and Deployment*. USC Center for Software and Systems Engineering Annual Research Review, Los Angeles, California, March 2008.

Service Activities

Organization

- Co-Chair, Diversity, Equity, and Inclusion for ICSE 2023.
- Co-Chair, Journal-First Track for ICSE 2023.
- Co-Chair, ACM Student Research Competition for ICSE 2022.
- Co-Organizer, The Celebration of Automated Software Engineering at ASE 2019.
- Co-Chair, Early Career Researchers Forum at the IEEE International Conference on Software Architecture (ICSA ECRF 2020).
- Program Co-Chair, International Workshop on Establishing the Community-Wide Infrastructure for Architecture-Based Software Engineering (ECASE 2019), Montreal, Canada, May 2019.
- Co-Organizer, NSF Sponsored Workshop on Infrastructures and Instruments for Software Architecture (REINFORCE), co-located with the International Conference on Automated Software Engineering, Urbana-Champaign, Illinois, October 2017.
- Program Co-Chair, International Workshop on Establishing the Community-Wide Infrastructure for Architecture-Based Software Engineering (ECASE 2017), Buenos Aires, Argentina, May 2017.
- Co-Organizer, NSF Sponsored Workshop on Infrastructures and Instruments for Software Architecture (REINFORCE), Los Angeles, California, January 2017.

Program Committee

- The International Conference on Software Engineering (ICSE), Technical Track, 2021-2023.
- The Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), Research Track, 2020.
- The International Conference on Automated Software Engineering (ASE), Technical Track, 2019-2020.
- The International Conference on Software Architecture (ICSA), 2020-2022.
- The European Conference on Software Architecture (ECSA), 2020-2022.
- The International Conference on Software Engineering (ICSE), Poster Track, 2020.
- IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER), Tool Demo Track, 2019.
- The International Conference on Software Engineering (ICSE), Artifact Evaluation, 2019.
- The International Conference on Software Engineering (ICSE), Demonstrations Track, 2016.
- Innovations in Software Engineering Conference (ISEC), 2017-2019.

Reviewer

- IEEE Transactions on Software Engineering (TSE), 2013-2022.
- IEEE Transactions on Software Engineering (TSE) Review Board, 2018-2020.
- ACM Transactions on Software Engineering and Methodology (TOSEM), 2014-2022.
- Empirical Software Engineering Journal, 2017-2020.
- Journal of Systems and Software (JSS), 2015-2018, 2022.
- Communications of the ACM (CACM), 2022.
- Automated Software Engineering Journal, 2019.
- International Conference on Learning Representations (ICLR 2019).
- IEEE Software, 2017-2018, 2020-2021.
- IEEE Transactions on Mobile Computing (TMC), 2018.
- IEEE Transactions on Dependable and Secure Computing (TDSC), 2018.
- ACM Transactions on Autonomous and Adaptive Systems (TAAS), 2018.
- Information and Software Technology (IST), 2015-2016.
- Science of Computer Programming, Special Issue: CompArch 2012.
- Computing, 2017-2018.
- CIT. Journal of Computing and Information Technology, 2018-2019.

External Reviewer

- The European Conference on Software Architecture (ECSA), 2013-2018.
- IEEE/ACM International Conference on Automated Software Engineering (ASE), 2013.

- The Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE), 2013.
- The ACM International Conference on Distributed Event-Based Systems (DEBS), 2013.
- The International ACM SIGSOFT Symposium on Component-Based Software Engineering (CBSE), 2013.
- The International ACM SIGSOFT Symposium on Architecting Critical Systems (ISARCS), 2013.
- The International Conference on Distributed Event-Based Systems (DEBS), 2012.
- The International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), 2012.
- The International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), 2011. The Workshop on Software Engineering for Adaptive and
- Self-Managing Systems (SEAMS 2010), May 2010.
- The First International Workshop on Quantitative Stochastic Models in the Verification and Design of Software Systems (QUOVADIS), May 2010.
- The IEEE/ACM International Conference on Automated Software Engineering (ASE), 2009.
- The DSN 2009 Workshop on Architecting Dependable Systems (WADS), June 29, 2009.
- The International Conference on Autonomic Computing and Communications (ICAC 2009), June 2009.
- The International Workshop on the Foundations of Coordination Languages and Software Architectures (FOCLASA), 2008.

University Service

- Chair, Software Engineering Graduate Admissions Committee, Department of Informatics, Donald Bren School of Information and Computer Sciences, 2021-2022.
- Member, Software Engineering Steering Committee (Curricular Oversight Service), Department of Informatics, Donald Bren School of Information and Computer Sciences, 2021-2022.
- Member, MSWE Steering/Admissions Committee, Department of Informatics, Donald Bren School of Information and Computer Sciences, 2021-2022.
- Member, Software Engineering Steering Committee (Curricular Oversight Service), Department of Informatics, Donald Bren School of Information and Computer Sciences, 2020-2021.
- Chair, Software Engineering Graduate Admissions Committee, Department of Informatics, Donald Bren School of Information and Computer Sciences, 2020-2021.
- Member, Software Engineering Graduate Admissions Committee, Department of Informatics, Donald Bren School of Information and Computer Sciences, 2019-2020.
- Panel Member, ICS Grad School Faculty Panel, Donald Bren School of Information and Computer Sciences, 2019.
- Member, Graduate Fellowship Committee, Department of Informatics, Donald Bren School of Information and Computer Sciences, 2018-2019.
- Chair, Software Engineering Graduate Admissions Committee, Department of Informatics, Donald Bren School of Information and Computer Sciences, 2018-2019.
- Panel Member, Improving Your Graduate School Application, Donald Bren School of Information and Computer Sciences, 2018.

Webmaster

- The International ACM SIGSOFT Symposium on Component Based Software Engineering (CBSE), 2011.

Teaching Experience

Lecturer

- University of California, Irvine, SWE 214, **Program Analysis**, Fall 2022
- University of California, Irvine, SWE 266P, **Software Security and Dependability**, Spring 2022
- University of California, Irvine, SWE 214, **Program Analysis**, Fall 2021
- University of California, Irvine, SWE 266P, **Software Security and Dependability**, Spring 2021
- University of California, Irvine, SWE 221, **Software Architecture**, Winter 2021
- University of California, Irvine, INF 122, **Software Design: Structure and Implementation**, Winter 2021
- University of California, Irvine, SWE 266P, **Software Security and Dependability**, Spring 2020
- University of California, Irvine, INF 122, **Software Design: Structure and Implementation**, Winter 2020

- University of California, Irvine, INF 219, **Program Analysis**, Fall 2020
- University of California, Irvine, INF 219, **Program Analysis**, Spring 2019
- University of California, Irvine, INF 122, **Software Design: Structure and Implementation**, Winter 2019
- University of California, Irvine, INF 219, **Software Environments**, Spring 2016

Teaching Assistantships

- University of Southern California, CSCI578, **Software Architecture**, Spring 2011
- University of Southern California, CSCI499, **Introduction to Programming for Computer Scientists**, Fall 2010
- University of Southern California, CSCI588, **Specification and Design of User Interface Software**, Fall 2010
- University of Southern California, CSCI578, **Software Architecture**, Spring 2008
- University of Southern California, CSCI101, **Fundamentals of Computer Programming**, Fall 2007

Guest Lecturer

- University of Illinois Urbana-Champaign, CS247, **Software Engineering**, Fall 2021
- University of California, Irvine, CS205, **Computer and Systems Security**, Spring 2021
- University of California, Irvine, CS295, **Advanced Computer and Network Security**, Spring 2020
- University of California, Irvine, CS295, **Advanced Computer and Network Security**, Spring 2019
- University of California, Irvine, INF133, **User Interaction Software**, Fall 2019
- University of California, Irvine, ICS90, **New Student Seminar**, Fall 2018
- University of California, Irvine, INF211, **Software Engineering**, Fall 2018
- University of California, Irvine, INF221, **Software Architecture**, Fall 2017
- University of California, Irvine, INF221, **Software Architecture**, Fall 2016
- University of Southern California, CSCI578, **Software Architecture**, Spring 2011
- University of Southern California, CSCI588, **Specification and Design of User Interface Software**, Fall 2010

Supervised or Mentored Students and Researchers

Doctoral Dissertation Committee Chair

- Sumaya Almanee (as PhD advisor),
Status: Graduated, August 2022
- Negar Ghorbani (as PhD co-advisor, co-advised with Sam Malek),
Status: Graduated, August 2022
- Arda Unal (as PhD advisor),
Status: Passed Dissertation Topic Defense
- Yuqi Huai (as PhD advisor),
Status: Started Fall 2020
- Yuntianyi Chen (as PhD advisor),
Status: Started Fall 2021
- Yirui He (as PhD advisor),
Status: Starting Fall 2022
- Jessy Ayala (as PhD advisor),
Status: Starting Fall 2022

Doctoral Dissertation Committee Member

- Vanessa Klotzman, Advisor: Cristina Lopes, UCI, 2022
- Elahe Paikari, Advisor: André van der Hoek, UCI, 2022
- Abdulaziz Alshayban, Advisor: Sam Malek, UCI, 2022
- Caio Batista de Melo, Advisor: Nikil Dutt, UCI, 2021
- Matthew Dees, Advisor: Michael Franz, UCI, 2021
- Min-Yih Hsu, Advisor: Michael Franz, UCI, 2020
- Hsin-Wei Hung, Advisor: Ardan Amiri Sani, UCI, 2020
- Alexios Voulimeneas, Advisor: Michael Franz, UCI, 2020
- Hsin-Wei Hung, Advisor: Ardan Amiri Sani, UCI, 2020

- Junjie Shen, Advisor: Qi Alfred Chen, UCI, 2020-2022 (Graduated)
- Seyed Mohammadjavad Seyed Talebi, Advisor: Ardalan Amiri Sani, UCI, 2019
- Yingtong Liu, Advisor: Ardalan Amiri Sani, UCI, 2019
- Dalal Alharthi, Advisor: Amelia Regan, 2019
- Milad Asgari, Advisor: Athina Markopoulou, 2019
- Luke Fredericks, Advisor: Nathan Kaplan, UCI, 2018

Master's Thesis Students Supervised

- Canyang Shi, Advisor: Joshua Garcia, UCI, 2021–2022 (Graduated)
- Yu Lu, Advisor: André van der Hoek, UCI, 2022–
- Aaron Preston Matthews, Advisor: Joshua Garcia, UCI, 2020–2021 (Graduated)
- Saumitra Kadge, Advisor: Crista Lopes, UCI, 2020
- Faraz Yazdani, Advisor: Sam Malek, UCI, 2020
- Pritha Dawn, Advisor: Crista Lopes, UCI, 2020
- Jun Yeon Won, Advisor: Qi Alfred Chen, UCI, 2019

Undergraduate Students Supervised as Professor

- Yirui He, UCInspire and Undergraduate Student Researcher, 2021–2022
- Zhengyuan Zhang, UCInspire, 2021
- Xiafa Wu, UCI ICS Honors Program and Undergraduate Student Researcher, 2019–2021
- Xiafa Wu, UCI ICS Honors Program and Undergraduate Student Researcher, 2019–2021
- Hongyu Chen, UCI, Undergraduate Student Researcher, 2020–2021
- Muxi Chen, UCInspire and Undergraduate Student Researcher, 2020–2021
- Yuxiang He, UCInspire, 2020
- Siyun Ji, UCI, Undergraduate Student Researcher, 2020
- Mohammed Haque, UCI, Individual Study, 2019
- Zhaoxu Zhang, UCInspire, 2019
- Yuan Xia, UCI ICS Honors Program, 2019
- Shubham Mahajan, UCI ICS Honors Program, 2019
- Agnes Jang, UCI ICS Honors Program, 2019
- Liangze Yu, UCI ICS Honors Program, 2019

Students Supervised as a Postdoc (2014-2018)

- Mahmoud Hammad (PhD, UCI)
- Alireza Sadhegi (PhD, UCI)
- Reyhaneh Jabbarvand (PhD, UCI)
- Negar Ghorbani (PhD, UCI)
- Jun-Wei Lin (PhD, UCI)
- Nariman Mirzaei (PhD, GMU)
- Ehsan Kouroshfar (PhD, GMU)
- Riyadh Mahmoud (PhD, GMU)

Students Mentored at USC as a Ph.D. Student (2008-2014)

- Youn Kyu Lee (PhD)
- Gholamreza Safi (PhD)
- Duc Le (PhD)
- Arman Shahbazian (PhD)
- Pooyan Behnamghader (PhD)
- Bassel Haddad (Masters)
- Anita Singh (Undergraduate)

High-School Students Supervised at UCI

- Erel Ozen, Arnold O. Beckman High School, Summer Intern 2022
- Purav Patel, Arnold O. Beckman High School, Summer Intern 2022
- Alex Kim, Valencia High School, Val Tech Intern 2022

- Kerry Wang, Valencia High School, Val Tech Intern 2022
- Jason Aviles, Valencia High School, Val Tech Intern 2021
- Khushi Kaushik, Valencia High School, Val Tech Intern 2021
- Janav Shah, Valencia High School, Val Tech Intern 2021
- William Shin, Valencia High School, Val Tech Intern 2021
- Jagdeep Sidhu, Valencia High School, Val Tech Intern 2021

Publicly Available Software and Datasets

- DeltaDroid, a tool for test generation to support dynamic delivery in Android apps, and its dataset. <https://sites.google.com/view/deltadroid/home> (from [J11])
- Architectural decay prediction scripts and data. <https://github.com/jgarci40/arch-prediction-tools> (from [C10])
- Software Architecture INstrument (SAIN), a first-of-its-kind integration framework for assembling architecture-related techniques and tools with the goal of enabling empirical research in the context of software maintenance. <http://sain.usc.edu> (from [C19])
- Librarian: a tool designed to identify native libraries and their versions as found in Android apps, input data, and extended evaluation results. <https://github.com/salmanee/Librarian> (from [C18])
- Dataset from A Comprehensive Study of Autonomous Vehicle bugs. <https://sites.google.com/view/av-bug-study/home> (from [C17])
- Darcy: a tool that detects and repairs architectural inconsistencies in the Java Platform Module System. <https://sites.google.com/view/darcy-project/home> (from [C16])
- RevealDroid: a tool suite for detection of malicious Android apps and identification of a malicious app's family. Users include FBI; Department of Homeland Security; and Zimperium, a mobile threat defense company. <http://seal.ics.uci.edu/projects/revealdroid/index.html> (from [J8])
- LetterBomb: a framework for automatic generation of inter-component communication exploits for Android apps. Users include FBI and IBM. <http://seal.ics.uci.edu/projects/letterbomb/index.html> (from [C12])
- SALMA: Self-Protection of Android Systems from Inter-Component Communication Attacks [C15] <http://seal.ics.uci.edu/projects/salma/index.html>
- Classification of Android security analysis papers from [C7] <http://seal.ics.uci.edu/projects/droid-sec-taxonomy/index.html>
- Obfuscation framework and datasets from [C14] <http://seal.ics.uci.edu/projects/obfuscation/index.html>
- COVERT: an approach for identifying collections of Android apps that together combine their permissions to escalate privileges. (from [J4]) <http://seal.ics.uci.edu/projects/covert/index.html>
- Architectural Recovery using Concerns (ARC): an approach for recovery of the components of a software systems architecture that leverages topic models. Users include Huawei, Northrup Grumman, and Boeing. (from [C6], [C8], [C10], [J6]) <https://softarch.usc.edu/wiki/doku.php?id=arcade:start>
- Architecture Recovery, Change, And Decay Evaluator (ARCADE): a software workbench that employs a suite of architecture-recovery techniques and a set of metrics for measuring different aspects of architectural change. Users include Huawei, Northrup Grumman, and Boeing. (from [C10] and [J6]) <https://softarch.usc.edu/wiki/doku.php?id=arcade:start>
- Eos: a tool for identifying messages, inter-component dependencies based on messages, intra-component dependencies based on messages, and attributes of a message in a distributed event-based system. (from [C7]) <https://softarch.usc.edu/projects/automated-recovery-of-software-system-designs/> <https://softarch.usc.edu/wiki/doku.php?id=mfa:start>
- Ground-Truth Software Architectures: architectures recovered with the aid of a software system's architect or long-time architecturally aware developer.
 - Includes Apache Hadoop, Bash (Bourne Again Shell), Apache OODT, and ArchStudio. (from [C6]) <https://softarch.usc.edu/wiki/doku.php?id=recoveries:start>
 - Includes Google Chromium. (from [C9] and [J9]) <http://asset.uwaterloo.ca/ArchRecovery/>

- Apache Object Oriented Data Technology (OODT) (as an Apache Committer): a framework for large-scale distributed data management and processing. Users include NASA, DARPA, and National Cancer Institute. <https://oodt.apache.org/>

Honors, Awards, and Selected Statistics

- Award, ESEC/FSE 2020 Distinguished Reviewer
- h-index on Google Scholar (September 2022): 27
- Intelligence Community (IC) Postdoctoral Research Fellow, 2014–2017
- Award, Best Research Assistant Award, USC Computer Science Department, 2014
- Award, USC School of Engineering Doctoral Fellowship, 2006–2010
- Award, International Conference in Program Comprehension 2009, Best Poster Award
- Award, First Place, Special Interdisciplinary Award, USC Undergraduate Symposium for Scholarly and Creative Work, 2006
- Award, NSF Travel Grant for ICSE 2018
- Award, NSF Travel Grant for ICSE 2017
- Award, SIGSOFT CAPS Travel Grant for ICSE 2013
- Award, SIGSOFT CAPS Travel Grant for ICSE 2009
- Member, Association for Computing Machinery (ACM)
- Member, ACM Special Interest Group on Software Engineering (SIGSOFT)
- Member, Institute of Electrical and Electronics Engineers (IEEE)
- Member, Golden Key International Honors Society
- USC Renaissance Scholar