
Research Interests

Software Engineering and Applied Formal Methods, with a focus on Software Testing and Runtime Verification

Employment

July 2020 – Now Assistant Professor, CS Department, Cornell University

Education

- 2019 **Ph.D. Computer Science**, *University of Illinois at Urbana-Champaign (UIUC)*.
Dissertation: Evolution-Aware Runtime Verification
Advisors: Darko Marinov and Grigore Roşu
- 2012 **M.S. Computer Science**, *University of Texas at Dallas (UTD)*.
- 2007 **B.Sc. Computer Engineering**, *Obafemi Awolowo University (OAU), Nigeria*.

Honors and Awards

- 2017 Feng Chen Memorial Award in Software Engineering, CS Department, UIUC
- 2016 **ACM SIGSOFT Distinguished Paper Award**
- 2016 International Summer School Marktoberdorf Scholarship
- 2010 – 2011 Jonsson School Graduate Scholarship, UTD
- 2002 – 2007 National Merit Scholarship, Mobil Oil Producing Nigeria Unlimited
- 1997 National Mathematical Center Scholarship for Excellence in the Nigerian National Mathematics Olympiad

Publications

- OSDI 2020 [1] Xudong Sun, Runxiang Cheng, Jianyan Chen, Ran Ang, **Owolabi Legunsen**, and Tianyin Xu. “*Testing Configuration Changes in Context to Prevent Production Failures*”. 14th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2020), pages to appear, Banff, Alberta, Canada, November 2020. Acceptance rate: 17% (70/398)
- FSE 2020 [2] Qingrong Chen, Teng Wang, **Owolabi Legunsen**, Shanshan Li, and Tianyin Xu. “*Understanding and Discovering Software Configuration Dependencies in Cloud and Data-center Systems*”. 28th ACM European Software Engineering Conference & Symposium on the Foundations of Software Engineering (ESEC/FSE 2020), pages to appear, Sacramento, CA, November 2020. Acceptance rate: 28% (101/360)
- ICST 2020 [3] Breno Miranda, Igor Lima, **Owolabi Legunsen**, and Marcelo d’Amorim. “*Prioritizing Runtime Verification Violations*”. 13th IEEE International Conference on Software Testing, Verification and Validation (ICST 2020), pages to appear, Porto, Portugal, March 2020. Acceptance rate: 24% (27/114)

- JASE 2019 [4] **Owolabi Legunsen**, Nader Al Awar, Xinyue Xu, Wajih Ul Hassan, Grigore Roşu, and Darko Marinov. “*How Effective are Existing Java API Specifications for Finding Bugs during Runtime Verification?*”. Automated Software Engineering Journal (JASE), pages 26(4): 795-837, Invited journal submission, December 2019. Journal Extension of ASE 2016 paper.
- OOPSLA 2019 [5] August Shi, Milica Hadzi-Tanovic, Lingming Zhang, Darko Marinov, and **Owolabi Legunsen**. “*Reflection-Aware Static Regression Test Selection*”. 34th ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA 2019), pages 187:1–187:29, Athens, Greece, October, 2019. Acceptance rate: 36% (72/201)
- ICSE 2019 [6] Chenguang Zhu, **Owolabi Legunsen**, August Shi, and Milos Gligoric. “*A Framework for Checking Regression Test Selection Tools*”. 41st IEEE/ACM International Conference on Software Engineering (ICSE 2019), pages 430–441, Montreal, Canada, May 2019. Acceptance rate: 21% (109/529)
- ICST 2019 [7] **Owolabi Legunsen**, Yi Zhang, Milica Hadzi-Tanovic, Grigore Roşu, and Darko Marinov. “*Techniques for Evolution-Aware Runtime Verification*”. 12th IEEE International Conference on Software Testing, Verification and Validation (ICST 2019), pages 312–322, Xi’an, China, April 2019. Acceptance rate: 28% (31/110)
- FSE 2018 [8] Saikat Dutta, **Owolabi Legunsen**, Zixin Huang, and Sasa Misailovic. “*Testing Probabilistic Programming Systems*”. 26th ACM European Software Engineering Conference & Symposium on the Foundations of Software Engineering (ESEC/FSE 2018), pages 574–586, Lake Buena Vista, FL, November 2018. Acceptance rate: 21% (61/295)
- ISSRE 2018 [9] Alex Gyori, **Owolabi Legunsen**, Farah Hariri, and Darko Marinov. “*Evaluating Regression Test Selection Opportunities in a Very Large Open-Source Ecosystem*”. 29th IEEE International Symposium on Software Reliability Engineering (ISSRE 2018), pages 112–122, Memphis, TN, October 2018. Acceptance rate: 24% (23/96)
- ICSE 2018 [10] Jonathan Bell, **Owolabi Legunsen**, Michael Hilton, Lamyaa Eloussi, Tiffany Yung and Darko Marinov. “*DEFLAKER: Automatically Detecting Flaky Tests*”. 40th IEEE/ACM International Conference on Software Engineering (ICSE 2018), pages 433–444, Gothenburg, Sweden, May-June 2018. Acceptance rate: 21% (105/502)
- ICST 2018 [11] Farah Hariri, August Shi, **Owolabi Legunsen**, Milos Gligoric, Sarfraz Khurshid, and Sasa Misailovic. “*Approximate Transformations as Mutation Operators*”. 11th IEEE International Conference on Software Testing, Verification and Validation (ICST 2018), pages 285–296, Västerås, Sweden, April 2018. Acceptance rate: 25% (30/119)
- ASE Demo '17 [12] **Owolabi Legunsen**, August Shi, and Darko Marinov. “*STARTS: STAtic Regression Test Selection*”. 32nd IEEE/ACM International Conference on Automated Software Engineering, Tool Demo (**ASE Demo 2017**), pages 949–954, Urbana-Champaign, IL, November 2017. Acceptance rate: 63% (20/32)
- FSE 2016 [13] **Owolabi Legunsen**, Farah Hariri, August Shi, Yafeng Lu, Lingming Zhang, and Darko Marinov. “*An Extensive Study of Static Regression Test Selection in Modern Software Evolution*”. 23rd ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2016), pages 583–594, Seattle, WA, November 2016. Acceptance rate: 28% (74/273)
- FSE Demo '16 [14] Alex Gyori, Ben Lambeth, August Shi, **Owolabi Legunsen**, and Darko Marinov. “*NonDex: A Tool for Detecting and Debugging Wrong Assumptions on Java API Specifications*”. 23rd ACM SIGSOFT International Symposium on the Foundations of Software Engineering, Tool Demo (FSE Demo 2016), pages 993–997, Seattle, WA, November 2016. Acceptance rate: 41% (13/32)

- ASE 2016 [15] **Owolabi Legunsen**, Wajih Ul Hassan, Xinyue Xu, Grigore Roşu, and Darko Marinov. “How Good are the Specs? A Study of the Bug-Finding Effectiveness of Existing Java API Specifications”. 31st IEEE/ACM International Conference on Automated Software Engineering (ASE 2016), pages 602–613, Singapore, Singapore, September 2016. Acceptance rate: 20% (57/298)
This paper won an ACM SIGSOFT Distinguished Paper Award and was invited for journal submission
- ICST 2016 [16] August Shi, Alex Gyori, **Owolabi Legunsen**, and Darko Marinov. “Detecting Assumptions on Deterministic Implementations of Non-deterministic Specifications”. 9th IEEE International Conference on Software Testing, Verification and Validation (ICST 2016), pages 80–90, Chicago IL, April 2016. Acceptance rate: 27% (34/130)
- ICSE NIER ’15 [17] **Owolabi Legunsen**, Darko Marinov, and Grigore Roşu. “Evolution-Aware Monitoring-Oriented Programming”. 37th IEEE/ACM International Conference on Software Engineering, NIER Track (ICSE NIER 2015), pages 615–618, Florence, Italy, May 2015. Acceptance rate: 19%, (25/135)
- ASE 2014 [18] Milos Gligoric, Stas Negara, **Owolabi Legunsen**, and Darko Marinov. “An Empirical Evaluation and Comparison of Manual and Automated Test Selection”. 29th IEEE/ACM Conference on Automated Software Engineering (ASE 2014), pages 361–372, Västerås, Sweden, September 2014. Acceptance rate: 20% (55/276)
- JSS [19] Lawrence Chung, Tom Hill, **Owolabi Legunsen**, Zhenzhou Sun, Adip Dsouza, and Sam Supakkul. “A Goal-Oriented Simulation Approach for Obtaining Good Private Cloud-Based System Architectures”. Journal of Systems and Software (JSS), pages 86(9): 2242–2262, Invited journal submission, 2013.

Research Advising

*Mentored and co-advised the research of **four female** graduate students and **three undergraduate** students. Among the seven, five co-authored at least one submission to a top Software Engineering venue with me.*

- Milica Hadzi-Tanovic (MS, UIUC. Siebel Scholar ’18. Next: Ph.D., TU Munich)
- Xinyue Xu (MS, UIUC. First job: Google)
- Tiffany Yung (MCS, UIUC. First job: Groupon)
- Felicia Chandra (MCS, UIUC. ASE 2017 Web Chair. First job: NextCapital)
- Benjamin (Ben) Lambeth (BS, UIUC)
- Nader Al Awar (Summer REU at UIUC. BS, American University of Beirut)
- Karl Hajal (Summer REU at UIUC. BS, American University of Beirut)

Teaching Experience

- UIUC, Fall 2017 Project Mentor for CS 527: Advanced Topics in Software Engineering (10 graduate students)
- UIUC, Fall 2014 Project Mentor for CS 527: Advanced Topics in Software Engineering (3 graduate students)
- UIUC, Fall 2013 Teaching Assistant for CS 427: Software Engineering I (204 students)
- UTD, Spring 2013 Teaching Assistant for CS 6371: Advanced Programming Languages (20 students)
- UTD, Spring 2013 Teaching Assistant for CS 6362: Software Architectural Design (60 Students)
- UTD, Fall 2012 Teaching Assistant for CS 6367: Software Testing, Validation and Verification (54 students)
- UTD, Fall 2012 Teaching Assistant for CS 6387: Advanced Software Engineering Project (16 Students)

Open-Source Software Contributions

- My GitHub ID <https://github.com/owolabileg>
- Found 500+ bugs in 100+ open-source projects
Bugs reported under the following GitHub pseudonyms for double-blind review: **emopers**, **flakycov**, **lazypanda1**, and **testingsavvy**. My research helped discover over 500 bugs in more than 100 open-source projects, including critical and well-tested applications (Apache Zookeeper, Apache Pig, Joda-Time, ActiveMQ, CheckStyle, etc.), testing/analysis frameworks (TestNG, bcel, Clover, Ekstazi, etc.), probabilistic programming systems (Edward, Pyro, Stan), and machine learning frameworks (TensorFlow and PyTorch)
- STARTS (Static Regression Test Selection)
I lead research and development of STARTS, a tool to reduce regression testing costs by rerunning only tests that can change behavior due to code changes. STARTS saves up to 80% of testing time on medium-sized open-source projects. STARTS can be found at <https://github.com/TestingResearchIllinois/starts>
- JavaMOP
JavaMOP is a runtime verification tool. It allows developers to monitor program executions against formal specifications. I contribute regularly to the development of JavaMOP as part of my research to make runtime verification easier to use during software testing. JavaMOP can be found at <https://github.com/runtimeverification/javamop>
- NonDex
NonDex detects flaky tests caused by developers' wrong assumptions about under-determined specification. Flaky tests non-deterministically pass or fail for the same code. NonDex was adopted by CheckStyle. NonDex can be found at <https://github.com/TestingResearchIllinois/nondex>
- DeFlaker
DeFlaker determines that a test is flaky if the test failed but did not cover any changed code. DeFlaker uses a novel differential coverage approach to check if test failures are flaky. DeFlaker can be found at <http://www.deflaker.org>
- ProbFuzz
ProbFuzz extends compiler fuzzing to the domain of probabilistic and approximate programming, and is the first automated framework for systematically testing probabilistic programming systems. ProbFuzz can be found at <https://www.probfuzz.com>

Funding

- 2020 – 2021 *FMitF: Track II: EMOP: A Tool for Evolution-Aware Runtime Verification*, PI: Owolabi Legunsen, NSF Formal Methods in the Field grant CCF-2019277. Funded amount: \$100k, Cornell amount: \$100k

Service to Professional Community

- Co-Organizer International Symposium on Model Checking of Software (SPIN), 2022
- PC Member Languages and Tools for Next Generation Testing Workshop (LANGETI), 2020
- PC Member OOPSLA Student Research Competition, 2020
- PC Member International Conference on Automated Software Engineering (ASE), 2020
- Demo Co-Chair International Symposium on Software Testing and Analysis (ISSTA), 2020
- PC Member International Conference on Software Testing, Verification and Validation (ICST), Industry Track, 2020
- Student Volunteer Chair International Conference on Automated Software Engineering (ASE), 2017

PC Member	International Symposium on Software Testing and Analysis (ISSTA), Artifact Evaluation Committee, 2017
Co-Reviewer	ICSE 2020, ICST 2020, RV 2019, DATE 2019, ISSTA 2018, FM 2018, (Programming) 2017, ASE 2016, ICST 2016, TACAS 2016, ASE 2015, RV 2015, HVC 2014, ICSE 2014, ASE 2013
Student Volunteer	ESEC/FSE 2015, Bergamo, Italy, September 2015
Student Member	CS Department Graduate Student Admissions Application Review Committee, UIUC, Fall/Summer 2016
CS Ambassador	CS Department Graduate Student Ambassador for 2 incoming Ph.D. students at UIUC in Fall 2016
Mentor	Mentored 5 new Ph.D. Students to help them transition to life in CS Department at UIUC
Co-organizer	Brett Daniel Software Engineering Seminar for Fall 2015 at UIUC
Co-teacher	Taught one class on “Software Testing for Fun, Fame and maybe even Profit” to 19 high school students, UIUC, Spring 2015
Volunteer	ASPIRE UIUC Campus Visit Program for Underrepresented Minorities. Met 2 candidates, UIUC, Fall 2014

Presentations

Guest Lecture	<i>Regression Testing</i> , CSMORE, Cornell University, Summer 2020
Guest Lecture	<i>Combining Runtime Verification and Software Testing</i> , CS 427 (Software Engineering I), UIUC, Fall 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , Cornell University, April 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , U. of Southern California, April 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , Michigan State University, April 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , Oregon State University, April 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , Texas A&M University, April 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , U. of Maryland College Park, April 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , U. of Nebraska at Lincoln, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , University of Minnesota, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , UMass Amherst, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , UC Santa Cruz, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , UC San Diego, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , University of Rochester, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , U. of Illinois at Chicago, March 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , UT Austin, February 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , UC Santa Barbara, February 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , George Mason University, February 2019
Invited Talk	<i>Evolution-Aware Runtime Verification</i> , Drexel University, February 2019
Seminar	<i>Evolution-Aware Runtime Verification</i> , University of Michigan, Fall 2018
Seminar	<i>Evolution-Aware Runtime Verification</i> , George Mason University, Fall 2018
Seminar	<i>Evolution-Aware Runtime Verification</i> , Georgia Institute of Technology, Fall 2018
Guest Lecture	<i>Regression Testing: Challenges and Advances</i> , CS 598 (Reliability of Cloud-Scale Systems), UIUC, Fall 2018

- Conference Talk and Tool Demo *STARTS: STatic Regression Test Selection*, ASE 2017, November 2017, Urbana-Champaign, IL
- Poster *STARTS: STatic Regression Test Selection*, Huawei, October 2017, Urbana-Champaign, IL
- Guest Lecture *An Extensive Study of Static Regression Test Selection in Modern Software Evolution*, CS 527 (Topics in Software Engineering), UIUC, Fall 2017
- Guest Lecture *An Extensive Study of Static Regression Test Selection in Modern Software Evolution*, CS 498ST (Software Testing), UIUC, Fall 2017
- Guest Lecture *An Extensive Study of Static Regression Test Selection in Modern Software Evolution*, CS 427 (Software Engineering I), UIUC, Fall 2017
- Guest Lecture *An Extensive Study of Static Regression Test Selection in Modern Software Evolution*, CS 427 (Software Engineering I), UIUC, Fall 2016
- Conference Talk *An Extensive Study of Static Regression Test Selection in Modern Software Evolution*, FSE 2016, Seattle, November 2016
- Poster and Tool Demo *NonDex: A Tool for Detecting and Debugging Wrong Assumptions on Java API Specifications*, FSE 2016, Seattle, November 2016
- Conference Talk *How Good Are the Specs? A Study of the Bug-Finding Effectiveness of Existing Java API Specifications*, ASE 2016, Singapore, September 2016
- Seminar Talk *How Good Are the Specs? A Study of the Bug-Finding Effectiveness of Existing Java API Specifications*, Brett Daniel Software Engineering Seminar, UIUC, September 2016
- Guest Lecture *How Good Are the Specs? A Study of the Bug-Finding Effectiveness of Existing Java API Specifications*, CS 527 (Topics in Software Engineering), UIUC, Fall 2016
- Seminar Talk *Evolution-Aware Monitoring-Oriented Programming*, Brett Daniel Software Engineering Seminar, UIUC, September 2015
- Seminar Talk *Evolution-Aware Monitoring-Oriented Programming*, Postgraduate Seminar, CSE Department OAU, March 2015
- Guest Lecture *An Empirical Evaluation and Comparison of Manual and Automated Test Selection*, CS 527 (Topics in Software Engineering), UIUC, Fall 2014

Industry Experience

- 2009 – 2010 Software Developer, Digital Jewels Limited, Lagos, Nigeria
- 2008 Software Developer, Resourcery PLC, Lagos, Nigeria