

# Owolabi Legunse

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## Research Interests

My research interests are in Software Engineering and Applied Formal Methods, with a focus on Software Testing and Runtime Verification

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## Education

- 2013 – now **Ph.D. Computer Science**, *University of Illinois at Urbana-Champaign (UIUC)*.  
(Expected July'19) 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*.

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## 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
- 2000 Best Result in all Nigerian Public Secondary Schools for the West African Senior Certificate Examination
- 1997 National Mathematical Center Scholarship for Excellence in the Nigerian National Mathematics Olympiad

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## Publications

*14 conference papers (11 research track, 1 new idea track, 2 tool demonstration track) and 2 invited journal papers. Papers are grouped by topics. Papers that begin with ★ are under submission/review.*

- Runtime Verification during Regression Testing
- ★[1] **Owolabi Legunse**, 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)*, 2019. 10-page research paper
  - ★[2] **Owolabi Legunse**, Nader Al Awar, Xinyue Xu, Wajih Ul Hassan, Grigore Roşu, and Darko Marinov. How Good are the Specs? A Study of the Bug-Finding Effectiveness of Existing Java API Specifications. *Automated Software Engineering Journal (ASEJ)*, 2019. Journal extension of ASE 2016 paper
  - [3] **Owolabi Legunse**, 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**

- [4] **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)
- Regression Test Selection ★[5] **Owolabi Legunsen**, August Shi, Milica Hadzi-Tanovic, Lingming Zhang, and Darko Marinov. Reflection-Aware Static Regression Test Selection. *41st IEEE/ACM International Conference on Software Engineering (ICSE 2019)*, 2019. 10-page research paper
- [6] 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)
- [7] **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)
- [8] **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)
- [9] 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)
- Flaky Test Detection [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)
- [11] Alex Gyori, Ben Lambeth, August Shi, **Owolabi Legunsen**, and Darko Marinov. Non-Dex: 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)
- [12] 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)
- Testing in Emerging Domains ★[13] 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)*, 2019. 10-page research paper
- [14] 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)

- [15] 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)
- Software Architecture [16] Lawrence Chung, Tom Hill, **Owolabi Legunsen**<sup>†</sup>, 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. <sup>†</sup>Corresponding Author

## 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. Co-authored [1] and [5]. Siebel Scholar '18. Next: Ph.D., TU Munich)
- Xinyue Xu (MS, UIUC. Co-authored [2] and [3]. First job: Google)
- Tiffany Yung (MCS, UIUC. Co-authored [10]. First job: Groupon)
- Felicia Chandra (MCS, UIUC. Built prototype for [7]. ASE 2017 Web Chair. First job: NextCapital)
- Benjamin Lambert (BS, UIUC. Co-authored [11]. Current: undergrad at UIUC)
- Nader Al Awar (Summer REU at UIUC. Co-authored [2]. Current: BS, American University of Beirut)
- Karl Hajal (Summer REU at UIUC. Helped with [2]. Current: 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 450+ bugs in 90+ open-source projects Bugs reported under the following GitHub pseudonyms for double-blind review: **emopers**, **flakycov**, **lazypanda1**, and **testingsavvy**. My research helped discover over 450 bugs in more than 90 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 (papers [1], [5], [6], [7], [8], [13]). STARTS can be found at <https://github.com/TestingResearchIllinois/start>

- 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 (papers [1], [2], [3], and [4]). JavaMOP can be found at <https://github.com/runtimeverification/javamop>
- NonDex NonDex detects flaky tests caused by developers' wrong assumptions about under-determined specification (papers [11] and [12]). 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 (paper [10]). 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 (paper [14]). ProbFuzz can be found at <https://www.probfuzz.com>

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## Experience with Research Grants

*Assisted in the preparation of proposals for the following research grants/gift:*

- 2018 – 2022 *SHF: Medium: Collaborative Research: Enhancing Continuous Integration Testing for the Open-Source Ecosystem*, National Science Foundation. Funded amount: \$1.2M, UIUC amount: \$437,000
- 2014 – 2017 *SHF: Small: Revisiting Assumptions of Regression Testing*, National Science Foundation. Funded amount: \$462,000
- 2016 *Improving Regression Testing Efficiency*, Qualcomm. Funded amount: \$50,000

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## Service to Professional Community

- 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 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

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## Presentations

- Invited Talk *Evolution-Aware Runtime Verification*, George Mason University, Fall 2018
- Invited Talk *Evolution-Aware Runtime Verification*, Georgia Institute of Technology, Fall 2018
- Guest Lecture *Regression Testing: Challenges and Advances*, 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 \_\_\_\_\_, 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 \_\_\_\_\_, CS 498ST (Software Testing), UIUC, Fall 2017
- Guest Lecture \_\_\_\_\_, CS 427 (Software Engineering I), UIUC, Fall 2017
- Guest Lecture \_\_\_\_\_, CS 427 (Software Engineering I), UIUC, Fall 2016
- Conference Talk \_\_\_\_\_, 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 \_\_\_\_\_, Brett Daniel Software Engineering Seminar, UIUC, September 2016
- Guest Lecture \_\_\_\_\_, 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 \_\_\_\_\_, 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

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## Industry Experience

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

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## References

### **Darko Marinov** (*advisor*)

Professor  
Dept. of Computer Science  
University of Illinois at Urbana-Champaign  
marinov@illinois.edu  
<http://mir.cs.illinois.edu/marinov>

### **Grigore Roşu** (*advisor*)

Professor  
Dept. of Computer Science  
University of Illinois at Urbana-Champaign  
grosu@illinois.edu  
[http://fsl.cs.illinois.edu/index.php/Grigore\\_Rosu](http://fsl.cs.illinois.edu/index.php/Grigore_Rosu)

### **Sarfraz Khurshid**

Professor  
Dept. of Electrical & Computer Engineering  
University of Texas at Austin  
khurshid@ece.utexas.edu  
<https://users.ece.utexas.edu/khurshid>

### **Sasa Misailovic**

Assistant Professor  
Dept. of Computer Science  
University of Illinois at Urbana-Champaign  
misailo@illinois.edu  
<http://misailo.cs.illinois.edu>