Allison Sullivan

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RESEARCH INTEREST

Automated Software Engineering: Test/Oracle Generation, Automated Bug Localization and Repair, Regression Testing, and Mutation Testing

Formal Methods and Programming Languages: Model Based Testing, Formal Specification Languages, Program Synthesis, Model Checking and Symbolic Execution

ACADEMIC EMPLOYMENT HISTORY

2020 – PRESENT **Assistant Professor,** The University of Texas at Arlington **Arlington, TX**

2018 – 2020 **Assistant Professor,** North Carolina A&T State University **Greensboro, NC**

EDUCATION

2014-2017 **Ph.D. in Software Engineering,** The University of Texas at Austin **Austin, TX**

2012-2014 **M.S. in Software Engineering,** The University of Texas at Austin **Austin, TX**

2008-2012 **B.S. in Software Engineering,** The University of Texas at Dallas **Richardson, TX**

INDUSTRY EMPLOYMENT HISTORY

June – July 2019 **Google, Inc,** Faculty in Residence (FIR) **Mountain View, CA**
FIR is an immersive program that trained me to: design and implement classroom experiments related to project-based learning, conduct resume workshops, and give mock interviews.

2015 – 2016 **Naval Research Laboratory,** Intern in the Center for High Assurance Computer Systems **Washington, D.C**
I extended the SCR toolset to automatically generate test cases that incorporate assumptions. This included updating the automated translations of SCR models into SPIN, NuSMV, and PVS.

May – Aug. 2013 **IBM Research ,** Intern in the Test Suite Automation Team **Austin, TX**
I built a test automation toolset to ensue test suites automatically feed their output into RQM, IBM's project management tool. This toolset bridges existing automation scripts with the RQM and is in place at IBM today.

RESEARCH FUNDING

7 grants | **Total amount:** $9,669,000 | **My share:** $1,909,000

Grants Obtained at UTA

[1] CAREER: Live Programming for Finite Model Finders
National Science Foundation, solo PI, $525k, June 2024 - May 2029

[2] SHF: Small: INCA: Incremental Analysis of Software Specification for Evolving Systems
National Science Foundation – CISE Core, solo PI, $490k, Oct 2022 - Sept 2025

[3] KeenEye: Enhancing Scenario Enumeration
National Science Foundation – Formal Methods in the Field, solo PI, $99k, Oct 2021 - Mar 2023

[TRANSFER] Alloy Analyzer Plus: An Integrated Development Environment for Alloy
National Science Foundation – Formal Methods in the Field, solo PI, $67k, July 2020 – Jan 2022

Grants Obtained at NC A&T

[4] MRI: Acquisition of a Testbed of Connected Autonomous MicroTransit Vehicles
National Science Foundation Major Research Instrumentation, Co-PI, $550k (My Share: $55k), July 2020 - June 2022

[5] Secure and Safe Assured Autonomy (S^2A^2)
NASA University Leadership Initiative, Co-PI, $7.9M (My Share: $635k), Aug 2020 - Aug 2024

[6] Alloy Analyzer Plus: An Integrated Development Environment for Alloy
National Science Foundation – Formal Methods in the Field, solo PI, $100k, Transferred to UTA July 2020

[7] Project Based Learning in the Teaching of Analysis of Algorithms
National Science Foundation – HBCU-UP ACE Implementation Project, solo PI, $5k, June 2019 - August 2021

REFEREED CONFERENCE PUBLICATIONS

(C22) Adam Emerson, Allison Sullivan. Crucible: Graphical Test Cases for Alloy Models. In *Proceedings of the 34th International Symposium on Software Reliability Engineering* (ISSRE 2023), to appear, Oct. 2023. (Acceptance: 29.5%)

(C21) Ana Jovanovic, Allison Sullivan. Mutation Testing for Temporal Alloy Models. In *Proceedings of the ACM/IEEE 26th International Conference on Model-Driven Engineering Languages and Systems* (MODELS 2023), to appear, Oct. 2023. (Acceptance: 24.6%)

(C20) Allison Sullivan. Integrating Testing into the Alloy Model Development Workflow. In *Proceedings of the ACM/IEEE 26th International Conference on Model-Driven Engineering Languages and Systems* (MODELS 2023), to appear, Oct. 2023. (Acceptance: 24.6%)

(C19) Allison Sullivan. Live Programming for Finite Model Finders. In *Proceedings of the 38th IEEE/ACM International Conference on Automated Software Engineering - New Ideas and Emerging Results* (ASE-NIER 2023), to appear, Sept. 2023. (Acceptance: 36%)

(C18) Jan Oliver Ringert, Allison Sullivan. Abstract Alloy Instances. In *Proceedings of the 25th International Symposium on Formal Methods* (FM 2023), pages 364-382, Mar. 2023.

(C17) Ana Jovanovic, Allison Sullivan. REACH: Refining Alloy Scenarios by Size. In *Proceedings of the 33rd International Symposium on Software Reliability Engineering* (ISSRE 2022), pages 229–238, Oct. 2022. (Acceptance: 29%)

(C16) Ana Jovanovic, Allison Sullivan. Towards Automated Input Generation for Sketching Alloy Models. In *Proceedings of the 10th International Conference on Formal Methods in Software Engineering* (FormaliSE 2022), pages 58–68, May 2022.

(C15) Allison Sullivan. Hawkeye: User-Guided Enumeration of Scenarios. In *Proceedings of the 32nd International Symposium on Software Reliability Engineering* (ISSRE 2021), pages 569–578, Oct. 2021. (Acceptance: 27.5%)

(C14) Tanvir Ahmed Khan, Allison Sullivan, Kaiyuan Wang. AlloyFL: A fault localization framework for Alloy. In *Proceedings of the 2021 ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering Demonstration Track* (FSE DEMO 2021), pages 1535–1539, Aug. 2021. (Acceptance: 62.5%)

(C13) Kaiyuan Wang, Allison Sullivan, Darko Marinov, Sarfraz Khurshid. Fault Localization for Declarative Models in Alloy. In *Proceedings of the 331st International Symposium on Software Reliability Engineering* (ISSRE 2020), pages 391–402, Oct. 2020. (Acceptance: 26%)

(C12) George Thompson, Allison Sullivan. ProFL: A Fault Localization Framework for Prolog. In *Proceedings of the 29th ACM SIGSOFT International Symposium on Software Testing and Analysis Demonstration Track* (ISSTA DEMO 2021), pages 561–564, July. 2020. (Acceptance: 33%)

(C11) Allison Sullivan, Darko Marinov, Sarfraz Khurshid. Solution Enumeration Abstraction - A Modeling Idiom to Enhance a Lightweight Formal Method. In *Proceedings of the 21st International Conference on Formal Engineering Methods* (ICFEM 2019), pages 336–352, Nov. 2019. (Acceptance: 30%)

(C10) Kaiyuan Wang, Allison Sullivan, Sarfraz Khurshid. ARepair: A Repair Framework for Alloy. In *Proceedings of the 41st IEEE/ACM International Conference on Software Engineering* (ICSE Demo 2019), pages 103–106, May. 2019. (Acceptance: 47%)

(C9) Kaiyuan Wang, Allison Sullivan, Darko Marinov, Sarfraz Khurshid. ASketch: A Sketching Framework for Alloy. In *Proceedings of the 2018 ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering* (FSE Demo 2018), pages 916–919, Nov. 2018. (Acceptance: 45%)

(C8) Kaiyuan Wang, Allison Sullivan, Sarfraz Khurshid. Automated Model Repair for Alloy. In *Proceedings of the 33rd International Conference on Automated Software Engineering* (ASE 2018), pages 577–588, Sept. 2018. (Acceptance: 20%)

(C7) Kaiyuan Wang, Allison Sullivan, Darko Marinov, Sarfraz Khurshid. Solver-based Sketching of Alloy Models using Test Valuations. In *Proceedings of the 6th International Conference on Abstract State Machines, Alloy, B, TLA, VDM, and Z* (ABZ 2018), pages 121–136, June 2018. (Acceptance: 39%)

(C6) Kaiyuan Wang, Allison Sullivan, Manos Koukoutos, Darko Marinov, Sarfraz Khurshid. Systematic Generation of Non-equivalent Expressions for Relational Algebra. In *Proceedings of the 6th International Conference on Abstract State Machines, Alloy, B, TLA, VDM, and Z* (ABZ 2018), pages 105–120, June 2018. (Acceptance: 39%)

(C5) Kaiyuan Wang, Allison Sullivan, Sarfraz Khurshid. MuAlloy: A Mutation Testing Framework for Alloy. In *Proceedings of the 40th International Conference on Software Engineering Demonstration Track* (ICSE Demo 2018), pages 29–32, May 2018. (Acceptance: 42%)

(C4) Allison Sullivan, Kaiyuan Wang, Sarfraz Khurshid. AUnit: A Test Automation Tool for Alloy. In *Proceedings of the 11th IEEE International Conference on Software Testing, Verification and Validation Demonstration Track* (ICST Demo 2018), pages 398–403, Apr. 2018.

(C3) Allison Sullivan, Kaiyuan Wang, Razieh Nokhbeh Zaeem, Sarfraz Khurshid. Automated Test Generation and Mutation Testing for Alloy. In *Proceedings of the 10th IEEE International Conference on Software Testing, Verification and Validation* (ICST 2017), pages 264–275, Mar. 2017. (Acceptance: 27%)

(C2) Nima Dini, Allison Sullivan, Milos Gligoric, Gregg Rothermel. The Effect of Test Suite Type on Regression Test Selection. In *Proceedings of the 27th IEEE International Symposium on Software Reliability Engineering* (ISSRE 2016), pages 47–58, Oct. 2016. (Acceptance: 35%)

(C1) Allison Sullivan, Razieh Nokhbeh Zaeem, Sarfraz Khurshid, Darko Marinov. Towards a Test Automation Framework for Alloy. In *Proceedings of the 2014 International Symposium on Model Checking of Software* (SPIN 2014), pages 113–116, July. 2014. (Acceptance: 63%)

REFEREED WORKSHOP PUBLICATIONS

(W2) Sanyogita Piya and Allison Sullivan. LLM4TDD: Best Practices for Test Driven Development Using Large Language Models. In *The First International Workshop on Large Language Models for Code* (LLMCODE@ICSE 2024), To Appear.

(W1) Allison Sullivan, Kaiyuan Wang, Sarfraz Khurshid, Darko Marinov. Evaluating state modeling techniques in Alloy. In *Proceedings of the 6th Workshop on Software Quality Analysis, Monitoring, Improvement, and Applications* (SQAMIA 2017), pages 16:1–16:9, Sept. 2017.

THESIS AND DISSERTATION

(T2) Allison Sullivan. Automated testing and sketching of Alloy models. In *Texas ScholarWorks - UT Electronic Theses and Dissertations*, May 2017.

(T1) Allison Sullivan. AUnit: A testing framework for Alloy. In *Texas ScholarWorks - UT Electronic Theses and Dissertations*, May 2014.

UNIVERSITY SERVICE

Faculty Supervisor

4 Ph.D. students, **1** undergraduate student

Passed comp	**Ana Jovanovic**, Focus: Software Engineering & Formal Methods
Passed comp	**Anahita Samadi**, Focus: Software Engineering & Machine Learning
Diagnostic	**Guanxuan Wu**, Focus: Software Engineering, Formal Methods & Machine Learning
New	**Mohammad Patwary**, Focus: Software Engineering, Formal Methods & Human Computer Interaction
Undergrad	**Sanyogita Piya**, Focus: Software Engineering & Machine Learning

Graduated Students

3 M.S. students, **1** undergraduate student

BS. 2023	**Adam Emerson**, REU Summer 2022 - Spring 2023 – ISSRE 2023 first author paper First job: Incoming Ph.D. student
MS 2020	**Jasmine Mabrey**, Thesis: Automated Defect Classification using Machine Learning First Job: Sandia National Laboratory
MS 2020	**George Thompson**, Thesis: Towards Automated Fault Localization for Prolog Models First Job: Sandia National Laboratory
MS. 2018	**Regina Bunch**, Project: Improving GUIs for the Autistic Community, First Job: Cigna

Former REU Students

Fall 2022	**Cristian Munoz**, Project: Generating Core Software Model from Scenarios
Fall 2021	**Resha Adhikari**, Project: Empirical Study of Program Repair Techniques for Java
Fall 2020	**Joelle Banks**, Project: Empirical Study of Program Repair Techniques for C
Spring 2020	**William Dunston**, Project: Fault Classification for CodeHints

Student Committee Member

I have had the honor of serving on the following student committees:

Ph.D.	Shovon Pereira (UTA), Qiping Wei (UTA), Fadul Sikder (UTA), Krishna Khadka (UTA), Shreyosi Endow (UTA), Sabrina Haque (UTA), Cristian Garces (UTA - Former), Hanan Alshahr (Fall 2019, NC A&T)
M.S. Thesis	Derrick Leflore (Fall 2019, NC A&T), Shannon Wiggins Brown (Spring 2020, NC A&T), Yuanrui Ren (Fall 2018, The University of Texas at Austin).

Outreach Activities

Ongoing	Faculty advisor for UTA's Society of Women Engineers since Aug. 2020
Ongoing	UTA CSE Broadening Participation in Computing Committee Member since Aug. 2020
2023	Panelist for "Blazing Bright: Faculty Impact To The Computing" at UTA's CSE's 50th anniversary event.
2023	Invited speaker at "Never Work in Theory" industry conference
2022	Escorted a cohort of UTA students to the Grace Hopper Celebration.
2022	Hosted a workshop on Z3 at OurCS@DFW by UTA.

2022	Moderator for the "Career Paths in Computing" panel at SCRF.
2022	Panelist for "The Graduate School Experience" panel at OurCS@DFW.
2022	Hosted a workshop on STEM majors at Digital Divas
2021	Hosted a workshop on Z3 at OurCS@DFW by UTA.
2021	Panelist for the "Career Paths in Computing" panel at SCRF.
2021	Hosted a workshop on STEM majors at Digital Divas
2021	Staffed UTA's virtual booths at TAPIA and CMD-IT Graduate Fair.
2020	Organizer for the Triad Programming Contest
2020	Faculty Mentor for NC A&T's SAE International AutoDrive Challenge Student Team (Functional Safety Group)
2020	Coach for NC A&T's Advancing Minorities' Interest in Engineering (AMIE) Design Challenge team
2019	Organizer for the Triad Programming Contest
2019	Coach for NC A&T's 2019 Black Enterprise 2019 BE SMART Hackathon team. **Placed 1st**
2019	Coach for NC A&T's Advancing Minorities' Interest in Engineering (AMIE) Design Challenge team

Professional Membership

Ongoing	Society of Women Engineers
Ongoing	Association for Computing Machinery
2018 – 2020	NC A&T's Center of Excellence in Cybersecurity Research, Education and Outreach

Professional Development

2020	Attended "Engaging Students in Online Synchronous Class Meetings"
2020	Reviewer for Google's "Technical Writing One/Two" courses.
2019	Member of the NC A&T team to recruit Facebook's Engineer in Residence Program.
2019	NC A&T's CS Representative to Intel's HBCU Consortium and Intel's HBCU Beyond 2020 grant.
2018	NC A&T Representative to Facebook T3 "Train the Trainer" summit on Data Structures and Algorithms.

PROFESSIONAL SERVICE

Conferences

PC Member	The 47th International Conference on Software Engineering (ICSE 2025)
PC Member	The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering Tools and Demonstration Track (FSE Demo 2024)
PC Member	The 12th International Conference on Formal Methods in Software Engineering (FormaliSE 2024)
PC Member	The 34th IEEE International Symposium on Software Reliability Engineering (ISSRE 2023) - Fast Abstracts
PC Member	The 23rd IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM 2023)
PC Member	The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering Tools and Demonstration Track (FSE Demo 2023)
PC Member	The 34th IEEE International Symposium on Software Reliability Engineering (ISSRE 2023)
PC Member	16th IEEE International Conference on Software Testing, Verification and Validation Testing Tool Track (ICST 2023)
Session Chair	The 30th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER)– Program Analysis I Session
PC Member	The 30th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2023)
PC Member	The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering Tools and Demonstration Track (FSE Demo 2022)
PC Member	The 33rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2022)
Session Chair	The 44th International Conference on Software Engineering (ICSE) – Validation and Verification Session
PC Member	The 44th International Conference on Software Engineering Tools and Demonstration Track (ICSE Demo 2022)
PC Member	The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering Tools and Demonstration Track (FSE Demo 2020)
PC Member	The 27th International SPIN Symposium on Model Checking of Software (SPIN 2020)
PC Member	The Special Interest Group on Computer Science Education Technical Symposium (SIGCSE 2020)
PC Member	The 5th International Conference on Research in Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT 2020)

Journals

Reviewer	IEEE Transactions on Software Engineering (Impact Factor: 3.33)
Reviewer	ACM Transactions on Software Engineering and Methodology (Impact Factor: 2.674)
Reviewer	Software and Systems Modeling (Impact Factor: 1.910)
Reviewer	Software Tools for Technology Transfer (Impact Factor: 1.09)

Grant Panels

Panelist	2 panel at the National Science Foundation (NSF), Virtual in 2023
Panelist	1 panel for the Department of Energy in 2022

Panelist	1 panel at the National Science Foundation (NSF), Virtual in 2022
Panelist	1 panel for the Department of Energy in 2021
Panelist	2 panels at the National Science Foundation (NSF), Alexandria, VA in 2020

Other

Speaker	Never Work in Theory - A Bridge Between Researchers and Practitioners.
Co-Reviewer	The 27th International Symposium on Software Testing and Analysis (ISSTA 2018)
Co-Reviewer	The 11th International Conference on Software Testing, Verification and Validation (ICST 2018)
Co-Reviewer	The 25th International Symposium on the Foundations of Software Engineering (FSE 2017)
Co-Reviewer	The 10th International Conference on Software Testing, Verification and Validation (ICST 2017)
Co-Reviewer	The 31st IEEE/ACM International Conference on Automated Software Engineering (ASE 2016)

CLASSROOM TEACHING

The University of Texas at Arlington

Spring 2024	CSE 4321: Software Testing & Maintenance, Undergraduate
Fall 2023	CSE 4321: Software Testing & Maintenance, Undergraduate
Fall 2022	CSE 4321: Software Testing & Maintenance, Undergraduate
Spring 2022	CSE 5320/6392: Computer-Aided Verification for Systems, Graduate
Fall 2021	CSE 4321: Software Testing & Maintenance, Undergraduate
Spring 2021	CSE 5320/6392: Computer-Aided Verification for Systems, Graduate
Fall 2020	CSE 5311: Design and Analysis of Algorithms, Graduate

North Carolina A&T State University

Spring 2020	COMP 496: Senior Design, Undergraduate
Spring 2020	COMP 681: Formal Methods, Graduate
Fall 2019	COMP 285: Analysis of Algorithms, Undergraduate
Fall 2019	COMP 611: System Testing and Evaluation, Graduate
Spring 2019	COMP 496: Senior Design, Undergraduate
Spring 2019	COMP 681: Formal Methods, Graduate
Fall 2008	COMP 285: Analysis of Algorithms, Undergraduate