Felipe R. Monteiro

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Personal

Felipe R. Monteiro is an Applied Scientist with the Automated Reasoning Group at Amazon Web Services. His main experiences are in static analysis, model checking, and software verification and his most recent work combines proof decomposition with model checking to verify complex software systems.

Education

M.Sc. Computer Science, Federal University of Amazonas, 2018 – 2020.

B.Eng. Computer Engineering, Federal University of Amazonas, 2011 – 2018.

Exchange Program in Computer Science, Goldsmiths University of London, 2013 – 2014.

Professional Experience

1. **Applied Scientist II** at Amazon Web Services, 10/2021 – *present*

   – Research on compositional techniques and model checking;

   – Proving memory safety and functional correctness of system-level code;

   – Build tools capable of providing a high assurance for Amazon computing foundations;

   – Automated Reasoning Group

2. **SDE-II** at Amazon Web Services, 01/2020 – 09/2021

   – Research on continuous software verification, static analysis, and model checking;

   – Proving memory safety and functional correctness of system-level code;

   – Automated Reasoning Group

3. **SDE-I Intern** at Amazon Web Services, 01/2019 – 07/2019

   – Research on software verification and model checking;

   – Development of a set of proof harnesses for a core c99 package, which includes cross-platform primitives, configuration, data structures, and error handling;

   – Programming tasks including development, maintenance, and testing open source ANSI-C projects.

   – Automated Reasoning Group

4. **Software Engineer** at Eldorado Institute, 01/2018 – 01/2019

   – Research on battery management for Android-based smartphones;

– Development of an Android application to perform stress test hardware components and measure current drain;

– Programming tasks including enhancements, maintenance, and testing in Android applications.

– Eldorado Institute

5. **Undergraduate Research Fellow and Developer** at Electronic and Information Research Center, 10/2011 – 10/2017

   – Research on formal verification of digital systems (DSVerifier);

   – Research on model checking of C++ programs based on the Qt framework (QtOM);

   – Research on model checking of CUDA-based applications (ESBMC-GPU);

   – Programming tasks including enhancements, maintenance, and testing (C/C++).

   – Systems & Software Verification Laboratory

6. **Google Summer of Code Intern** at University of Washington, 06/2017 – 08/2017 (*sponsored by Google*)

   – Research on whole-program inference (Checker Framework);

   – Programming tasks including enhancements, maintenance, and testing (Java);

   – Google Summer of Code 2017

7. **Undergraduate Research Fellow** at Samsung Electronics, 04/2015 – 01/2016

   – Mobile application development (Android);

   – Programming tasks including enhancements, maintenance, and testing (Java);

   – Led, architected and participated in the design, testing, and deployment of an Android application and related components. Also participated as Scrum Master.

8. **Undergraduate Research Fellow** at Institute of Technology Development (INdT), 11/2011 – 04/2013

   – Research on formal verification of C++ programs using SMT-based BMC (ESBMC++);

   – Programming tasks including enhancements, maintenance, and testing (C/C++).

   – Systems & Software Verification Laboratory

9. **Undergraduate Research Fellow** at Institute of Computing, 04/2011 – 12/2011

   – Research on assistive technology for autistic children;

   – Usability and semiotic engineering of human-computer interaction;

   – Laboratory of Intelligent Systems.

Publications

21 revised publications and h-index 10. Full list available at Google Scholar and DBLP.

Journal Articles

Monteiro, F. R., Gadelha, M. R., and Cordeiro, L. C. **Model Checking C++ Programs**, Softw Test Verif Reliab.2022;32:e1793.

Chong, N., Cook, B., Kallas, K., Khazem, K., **Monteiro, F. R.**, Schwartz-Narbonne, D., Tasiran, S., Tautschnig, M., Tuttle, M. R. **Code-Level Model Checking in the Software Development Workflow at Amazon Web Services**, Softw: Pract Exper. 2021;51:772–797.

F. R Monteiro, E. H. da S. Alves, I. S. da Silva, H. I. Ismail, L. C. Cordeiro, E. B. de Lima Filho. **ESBMC-GPU A Context-Bounded Model Checking Tool to Verify CUDA Programs**, Science of Computer Programming (2018). doi:10.1016/*j.scico*.2017.09.005.

F. R. Monteiro, F. A. P. Januário, L. C. Cordeiro, E. B. de Lima Filho. **BMCLua: A Translator for Model Checking Lua Programs**, ACM SIGSOFT Software Engineering Notes. 42 (2017) 1 – 10. doi:10.1145/3127360.3127367.

F. R. Monteiro, M. A. P. Garcia, L. C. Cordeiro, E. B. de Lima Filho. **Bounded Model Checking of C++ programs based on the Qt cross-platform framework**, Journal of Software Testing, Verification and Reliability. 27 (2017) e1632 – n/a. doi:10.1002/*stvr*.1632.

P. Pereira, H. Albuquerque, I. da Silva, H. Marques, **F. R. Monteiro**, R. Ferreira, L. C. Cordeiro. **SMT-based Context-Bounded Model Checking for CUDA Programs**, Journal of Concurrency and Computation: Practice and Experience (2016) doi:10.1002/*cpe*.3934.

Proceedings

F. R. Monteiro, M. R. Gadelha, and L. C. Cordeiro. **Summary of Model Checking C++ Programs**, 15^{th} IEEE International Conference on Software Testing, Verification and Validation (ICST), 2022.

M. R. Gadelha, R. Menezes, **F. R. Monteiro**, L. C. Cordeiro, and D. A. Nicole. **ESBMC: Scalable and Precise Test Generation based on the Floating-Point Theory (Competition Contribution)**, 23^{rd} International Conference on Fundamental Approaches to Software Engineering (FASE), 2020.

Chong, N., Cook, B., Kallas, K., Khazem, K., **Monteiro, F. R.**, Schwartz-Narbonne, D., Tasiran, S., Tautschnig, M., Tuttle, M. R. **Code-Level Model Checking in the Software Development Workflow**, 42^{rd} International Conference on Software Engineering (ICSE), 2020.

F. R. Monteiro, M. R. Gadelha, and L. C. Cordeiro. **Boost the Impact of Continuous Formal Verification in Industry**, 10^{th} Workshop on Tools for Automatic Program Analysis (TAPAS), 2019.

M. R. Gadelha, **F. R. Monteiro**, L. C. Cordeiro, D. A. Nicole. **ESBMC v6.0: Verifying C Programs Using *k*-Induction and Invariant Inference**, 25^{th} International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2019.

M. R. Gadelha, **F. R. Monteiro**, L. C. Cordeiro, D. A. Nicole. **Towards Counterexample-guided *k*-Induction for Fast Bug Detection**, ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), 2018.

M. R. Gadelha, **F. R. Monteiro**, J. Morse, L. C. Cordeiro, B. Fisher, D. A. Nicole. **ESBMC v5.0 - An Industrial-Strength C Model Checker**, 33^{rd} IEEE/ACM International Conference on Automated Software Engineering, 2018.

F. R. Monteiro, M. A. P. Garcia, L. C. Cordeiro, E. B. de Lima Filho. **Bounded Model Checking of C++ Programs, based on the Qt Cross-Platform Framework: Journal-First Abstract**, 33^{rd} IEEE/ACM International Conference on Automated Software Engineering, 2018.

F. R. Monteiro. **Bounded model checking of state-space digital systems: the impact of finite word-length effects on the implementation of fixed-point digital controllers based on state-space modeling**, 24^{th} ACM SIGSOFT International Symposium on Foundations of Software Engineering, 2016.

M. Garcia, **F. R. Monteiro**, L. C. Cordeiro, E. B. de Lima Filho. **ESBMC^{QtOM}: A Bounded Model Checking Tool to Verify Qt Applications**, Model Checking Software. SPIN 2016. Lecture Notes in Computer Science, vol 9641. Springer, 2016.

F. R. Monteiro, P. A. Pereira, L. C. Cordeiro, C. F. F. Costa Filho, M. G. F. Costa. **Complementary training programme for electrical and computer engineering students through an industrial-academic collaboration**, IEEE Frontiers in Education Conference, 2016.

F. R. Monteiro, L. C. Cordeiro, E. B. de Lima Filho. **Bounded model checking of C++ programs based on the Qt framework**, IEEE 4^{th} Global Conference on Consumer Electronics, 2015.

M. Ramalho, M. Freitas, **F. R. Monteiro**, H. Marques, L. C. Cordeiro, B. Fischer. **SMT-based bounded model checking of C++ programs**, 20^{th} IEEE International Conference and Workshops on the Engineering of Computer Based Systems, 2013.

F. R. Monteiro, E. A. B. Costa, T. H. C. de Castro. **WorldTour: Software para Suporte no Ensino de Crianças Autistas**, XXIII Brazilian Symposium on Computers in Education, 2012.

F. R. Monteiro, T. H. C. de Castro. **WorldTour: Towards an Adaptive Software to Support Children with Autism in Tour Planning**, IEEE 36^{th} Annual Computer Software and Applications Conference, 2012.

Services

External Reviewer of the VIII Brazilian Symposium on Computing Systems Engineering (SBESC), 2018.

Program committee member of the 7th International Competition on Software Verification (SV-COMP), 2018.

Artifact evaluation committee member of the 13th International Conference on Tests and Proofs (TAP), 2019.

Reviewer of the journal IEEE Access, 2019.

Program committee member of the 9th International Competition on Software Verification (SV-COMP), 2020.

Program committee member of the 10th International Competition on Software Verification (SV-COMP), 2021.

Artifact evaluation committee member of the Object Oriented Programming Languages, Systems and Applications (OOPSLA), 2021.

Artifact evaluation committee member of the 34th International Conference on Computer Aided Verification (CAV), 2022.

Awards

Silver Medal at the International ACM Student Research Competition, Association for Computing Machines, 2016.

Best Mobile Application Award of the 3^{rd} Technological Innovation Summit, Samsung Electronics of Amazonia Ltda., 2016.

Woody Bledsoe Award at the 9^{th} International Joint Conference on Automated Reasoning, 2018.

Technology Summary

Agile Methodologies (e.g., SCRUM, Kanban, XP);

Version Control (e.g., Git and Github/Gerrit);

Issue tracker (e.g., Jira);

Programming (e.g., ANSI-C, C++, Java, Python);

APIs (e.g., UIAutomator);

Building Tools (e.g. cmake, ant, and Autotools);

IDE (e.g., Eclipse and Android Studio);

Continuous Integration (e.g., Travis CI and GitHub Actions);

MATLAB, Simulink, LabView;

Embedded Systems, UML, LaTeX;

Additional Skills

Proficient in English.

Last updated: June 14, 2022

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