

Hui Guo

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Areas of Specialization

Programming Languages • Software Reliability • Compilers

Education

2015 – 2020 **Ph.D., Computer Science**, *University of California, Davis, CA, USA.*

Advisor: Prof. Cindy Rubio-González

Dissertation : Analysis of Floating-Point Programs for Numerical Accuracy and Efficiency

2010 – 2013 **Master, Computer Science**, *Institute of Computing Technology, University of Chinese Academy of Sciences, Beijing, China.*

Advisor: Prof. Chenggang Wu

Thesis : Automated Test for Optimization Algorithms in Binary Translation

2006 – 2010 **Bachelor (with honors), Computer Science**, *Hebei University of Technology, Tianjin, China.*

Professional Experience

11/2020 – **Research Scientist**, *Facebook, Menlo Park, CA, USA.*

07/2019 – **Grad Student R&D**, *Lawrence Livermore National Laboratory, Livermore, CA, USA.*

09/2019 The o3 compiler optimizations are known to be unsafe for floating-point arithmetic. I designed and implemented a clang tool that analyzes and transforms the floating-point code to isolate the code areas, which will generate errors when compiled with o3 optimization.

09/2015 – **Research Assistant**, *UC Davis, Davis, CA, USA.*

09/2020 My research focuses on program analysis and synthesis in consideration of numerical uncertainties. Specifically, I analyze, transform and optimize numerical software for reliability and efficiency with compiler frameworks such as LLVM and clang. Generally, I am broadly interested in programming languages, compilers, software reliability and testing.

07/2013 – **Software Engineer**, *Sugon Information Industry Co., Ltd., Beijing, China.*

12/2013 I worked in the Cloud Storage Department. My primary task was to enhance the performance of storage systems by incorporating efficient cache management for RAIDs.

07/2010 – **Research Assistant**, *ICT, University of Chinese Academy of Sciences, Beijing, China.*

07/2013 Binary translation provides a fast, inexpensive way to migrate software from one instruction set architecture to another without the need for source code. My work focused on translation optimizations and automatic testing for binary translators.

Honors

2015 **Graduate Fellowship**, *UC Davis.*

2011 **Merit Student**, *University of Chinese Academy of Sciences.*

2010 **Outstanding Graduate Award**, *Hebei Province.*

2006 - 2009 **Scholarships**, *Hebei University of Technology.*

Professional Talks

07/2020 **Efficient Generation of Error-Inducing Floating-Point Inputs via Symbolic Execution**, Virtual ICSE'20.

11/2019 **Precimonious & HiFPTuner: Mixed-Precision Tuning**, *Tutorial on Floating-Point Analysis and Reproducibility Tools for Scientific Software, SC'19, Denver, Colorado, USA.*

11/2017 **A Comprehensive Study of Real-World Numerical Bug Characteristics**, ASE'17, Urbana-Champaign, Illinois, USA.

08/2017 **Hierarchical Search in Floating-Point Precision Tuning**, Dagstuhl Seminar on Analysis and Synthesis of Floating-Point Programs, Dagstuhl, Germany.

Publications

- 2020 **Hui Guo**, Ignacio Laguna, Cindy Rubio-González: "pLiner: Isolating Lines of Floating-Point Code for Compiler Induced Variability", *IEEE/ACM International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, 2020.
- 2020 **Hui Guo**, Cindy Rubio-González: "Efficient Generation of Error-Inducing Floating-Point Inputs via Symbolic Execution", *Proceedings of 42nd International Conference on Software Engineering (ICSE)*, 2020.
- 2018 **Hui Guo**, Cindy Rubio-González: "Exploiting Community Structure for Floating-Point Precision Tuning", *Proceedings of 27th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*, 2018, pp.333-343.
- 2017 Anthony Di Franco*, **Hui Guo***, Cindy Rubio-González: "A Comprehensive Study of Real-World Numerical Bug Characteristics", *Proceedings of 32nd IEEE/ACM International Conference on Automated Software Engineering (ASE)*, 2017, pp.509-519. (* indicates co-first authorship.)
- 2014 **Hui Guo**, Zhenjiang Wang, Chenggang Wu, Ruining He: "EATBit: Effective Automated Test for Binary Translation with High Code Coverage", *Proceedings of the Conference on Design, Automation & Test in Europe (DATE)*, 2014, pp.1-6.

Teaching

- 2018 **Teaching Assistant**, ECS 260 Software Engineering (Graduate Level), UC Davis

Skills

- 8+ years of experience on C/C++ programming under Linux, proficient in LLVM, clang, Python
- Good understanding of data structures, algorithms, computer architecture, compilers and operating systems