Peizun Liu

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Highlights

* A motivated researcher, engineer, problem solver, and deep thinker with an interdisciplinary mindset

* Established expertise in programming languages, program analysis and formal verification

* Extensive communication and leadership skills: work as a head TA for three semesters to coordinate all aspects of courses and to lead a group of TAs and graders.

Education

* Ph.D.	Computer Science, Northeastern University		09/2012 – *present*
	Thesis: *Resource-Parameterized Program Analysis using Observation Sequences*		
	Advisor: Thomas Wahl		
* M.E.	Software Engineering, Tsinghua University		09/2009 – 07/2012
	Thesis: *Study and Application of Reverse Modeling and Checking PLC System*		
	Advisor: Guiming Luo		
* B.M.	Info. Mgmt. & Info. Syst., Chengdu University of Technology		09/2003 – 06/2006

Technical Skills

* **Programming Languages:** C++ (*proficient*), Java, Python, Shell, OCaml, C, C#, SQL

* **Operating Systems & Tools:** Unix / Linux, Mac OS, Windows; Eclipse, NetBeans, Git, Emacs, GDB; MySQL; etc.

* **Others:** Multi-threaded programming; knowledge of distributed systems; knowledge of *static analysis*; knowledge of *software formal verification*; knowledge of software testing, verification and analysis; experience on system architecture and algorithms; SMT / SAT solving techniques, solvers and APIs (e.g., Z3, miniSAT); experience on performance and scalability analysis.

Work Experience

* Research Intern	MathWorks	Natick, MA	May. 2018 – Aug. 2018
* Software Engineer	Tsinghua Tongfang	Beijing, China	Aug. 2006 – Oct. 2008

Selected Projects

* ***Resource-Parameterized Program Analysis using Observation Sequences.*** We introduce a broad verification methodology for resource-parameterized programs that observes how changes to the resource parameter affect the behavior of the multithreaded or distributed program.

  • *Recognitions:* Peer-reviewed publications in top conferences (CAV, PLDI)

  • *Tools:* We delivered an automatic verifier written in C++. The tool is available online and ACM Digital Library. *Website:* www.khoury.northeastern.edu/home/lpzun/cuba/

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∗ ***Parameterized Verification.*** We proposed a series of techniques for the notoriously hard problem of parameterized verification using concrete or symbolic techniques.

- *Recognitions:* Peer-reviewed publications in premier conferences (SEFM, IJCAR, ICFEM, FM-CAD)
- *Tools:* We delivered several automatic verifiers written in C++. The tools are all available online.
  Website: www.khoury.northeastern.edu/home/lpzun/cutr, www.khoury.northeastern.edu/home/lpzun/tse

∗ ***Simulink Model Analysis.*** Analyze & verify Simulink models using various SMT solving techniques.

- Translate Simulink models to constrained Horn clauses and verify them in SMT solvers;
- Cluster proof objectives of a Simulink model to improve the verification performance.

Research Experience

My research interests are **programming language**, **program analysis** and **formal verification**. The goal of my research is to improve the **quality** and **reliability** of various types of software, especially the critical system software. I am also interested in **program synthesis** and **concurrency bug** analysis.

Selected Publications

[1] **Peizun Liu**, Thomas Wahl and Akash Lal. *Verifying Asynchronous Event-Driven Programs Using Partial Abstract Transformers*. In 31st International Conference on Computer-Aided Verification (CAV), pp.386-404, 2019.

[2] **Peizun Liu** and Thomas Wahl. *CUBA: Interprocedural Context-Unbounded Analysis of Concurrent Programs*. In 39th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), pp.105-119, 2018.

[3] **Peizun Liu** and Thomas Wahl. *IJIT: An API for Boolean Program Analysis with Just-in-Time Translation*. In 15th International Conference on Software Engineering and Formal Methods (SEFM), pp.316-331, 2017.

[4] **Peizun Liu** and Thomas Wahl. *Concolic Unbounded-Thread Reachability via Loop Summaries*. In 18th International Conference on Formal Engineering Methods (ICFEM), pp.346-362, 2016.

[5] Konstantinos Athanasiou, **Peizun Liu** and Thomas Wahl. *Unbounded-Thread Program Verification using Thread-State Equations*. In 8th International Joint Conference on Automated Reasoning (IJCAR), pp.516-531, 2016.

[6] **Peizun Liu** and Thomas Wahl, *Infinite-State Backward Exploration of Boolean Broadcast Programs*. In 14th International Conference on Formal Methods in Computer-Aided Design (FMCAD), pp. 155-162, 2014.

Professional Service

∗ *Conference program committee member*: **ICSEA 2018**, ICSEA 2017

∗ *Conference and workshop reviewing*: **CAV 2018**, **VMCAI 2018**, CAV 2017, FMCAD 2017, CAV 2015, CAV 2014, FMCAD 2014, DATE 2014, CAV 2013, FMCAD 2013, DATE 2013

Graduate Courses

Advanced Algorithms, Intensive Computer Systems, Theory of Computation, Principles of Programming Languages, Engineering Reliable Software, Special Topics on Formal Methods, Software Verification, Machine Learning, Data Mining

Honors and Awards

∗ SAT/SMT Summer School Grant *(value. $1550)*   National Science Foundation   2014

∗ FMCAD Student Forum Grant *(value. $600)*   FMCAD Inc.   2013