Linhai Song

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Research Interests

- Computer Science Education
- Performance Optimization & Tuning for Large Software
- Program Analysis and Software Testing

Employment

College of Information Sciences and Technology, PSU — Pennsylvania, USA
Assistant Professor — *2017.08 – Present*

FireEye Research Labs, FireEye, Inc. — California, USA
Staff Research Scientist — *2015.11 – 2017.07*

Education

University of Wisconsin-Madison — Wisconsin, USA
Ph.D. in Computer Science (M.S. along the way) — *2010.08 – 2015.10*
Advisor: Shan Lu
Thesis: Understanding, Detecting, and Diagnosing Real-World Performance Bugs

Institute of Computing Technology, Chinese Academy of Sciences — Beijing, China
M.S. in Computer Science — *2007.08 – 2010.06*
Advisor: Xueqi Cheng

Huazhong University of Science and Technology — Hubei, China
B.E. in Software Engineering — *2003.08 – 2007.06*

Academic Awards

MICRO Best Paper Runner Up, 2014

- "COMP: Compiler Optimizations for Manycore Processors" published in MICRO'2014
- One of five papers selected from 273 MICRO'2014 submissions

ACM SIGPLAN Research Highlights Award, 2011

- "Automated Atomicity-Violation Fixing" published in PLDI'2011
- One of eight papers selected from all papers published in 13 ACM SIGPLAN conferences in 2011

Publications [1]

Refereed Conference and Workshop Publications

1. Peng Peng, Limin Yang, **Linhai Song**, Gang Wang
   Opening the Blackbox of VirusTotal: Analyzing Online Phishing Scan Engines, **IMC'2019**.
2. Tengfei Tu[S], Xiaoyu Liu, **Linhai Song**, Yiying Zhang
   Understanding Real-World Concurrency Bugs in Go, **ASPLOS'2019**.
3. **Linhai Song**, Xinyu Xing
   Fine-Grained Library Customization, **SALAD'2018**.
4. **Linhai Song**, Shan Lu
   Program Analysis for Inefficient Loops, **ICSE'2017**.

[1] Students directly under my supervision are denoted by "S"

5. **Linhai Song**, Heqing Huang, Wu Zhou, Wenfei Wu, Yiying Zhang
   Learning from Big Malware, **APSys'2016**.
6. Rui Gu, Guoliang Jin, **Linhai Song**, Linjie Zhu, Shan Lu
   What Change History Tells Us About Thread Synchronization, **FSE'2015**.
7. **Linhai Song**, Min Feng, Nishkam Ravi, Yi Yang, Srimat Chakradhar
   COMP: Compiler Optimizations for Manycore Processors, **MICRO'2014**.
   Won MICRO'2014 Best Paper Runner Up
8. **Linhai Song**, Shan Lu
   Statistical Debugging for Real-World Performance Problems, **OOPSLA'2014**.
9. Adrian Nistor, **Linhai Song**, Darko Marinov, Shan Lu
   Toddler: Detecting Performance Problems via Similar Memory-Access Patterns, **ICSE'2013**.
10. Guoliang Jin*, **Linhai Song***, Xiaoming Shi, Joel Scherpelz, Shan Lu
    Understanding and Detecting Real-World Performance Bugs, **PLDI'2012**.
    (*: alphabetical order of surnames)
11. Guoliang Jin, **Linhai Song**, Wei Zhang, Shan Lu, Ben Liblit
    Automated Atomicity-Violation Fixing, **PLDI'2011**.
    Won ACM SIGPLAN Research Highlights Award

Other Publications

1. Zeming Yu^{S}, **Linhai Song**, Yiying Zhang
   Fearless Concurrency? Understanding Concurrent Programming Safety in Real-World Rust Software, **arXiv:1902.01906**.
2. **Linhai Song**, Xinyu Xing
   Fine-Grained Library Customization, **arXiv:1810.11128**.
3. Tengfei Tu^{S}, Xiaoyu Liu, **Linhai Song**, Yiying Zhang
   Understanding Real-World Concurrency Bugs in Go, **OSDI'2018 Poster**.
4. **Linhai Song**, Shan Lu
   Program Analysis for Inefficient Loops, UChicago CS **Technical Report TR-2016-06**.
5. Dongdong Deng, Guoliang Jin, Marc de Kruijf, Ang Li, Ben Liblit, Shan Lu, Shanxiang Qi, Jinglei Ren, Karthikeyan Sankaralingam, **Linhai Song**, Yongwei Wu, Mingxing Zhang, Wei Zhang, Weimin Zheng
   Fixing, Preventing, and Recovering from Concurrency Bugs, **Science China Information Sciences, April 2015**.
6. **Linhai Song**, Shan Lu
   Statistical Debugging for Real-World Performance Problems, **GCASR'2015 Poster**.
7. **Linhai Song**, Shan Lu
   Statistical Debugging for Real-World Performance Problems, UW-Madison CS **Technical Report 1803**.

Publications before Ph.D

1. Yan Guo, Huifeng Tang, **Linhai Song**, Yu Wang, Guodong Ding
   ECON: An Approach to Extract Content from Web News Page, **APWeb'2010**.
2. **Linhai Song**, Xueqi Cheng, Yan Guo, Bo Wu, Yu Wang
   Blog Post Extraction Using Title Finding, **CCIR'2009**.
3. Yu Wang, Bingxing Fang, Bo Wu, **Linhai Song**, Yan Guo
   Schema Matching Incorporating with Attribute Distribution Features, **CCIR'2009**.
4. Feng Guan, Xiaoming Yu, Zeying Peng, Hongbo Xu, Yue Liu, **Linhai Song**, Xueqi Cheng
   ICTNET at Web Track 2009 Ad-hoc Task, **TREC'2009**.
5. Xueke Xu, Yue Liu, Hongbo Xu, Xiaoming Yu, **Linhai Song**, Feng Guan, Zeying Peng, Xueqi Cheng
   ICTNET at Blog Track TREC 2009, **TREC'2009**.
6. Bo Wu, Xueqi Cheng, Yu Wang, Yan Guo, **Linhai Song**
   Simultaneous Product Attribute Name and Value Extraction from Web Pages, **WI'2009 workshop**.
7. **Linhai Song**, Xueqi Cheng, Yan Guo, Yue Liu, Guodong Ding
   ContentEx: A framework for automatic content extraction programs, **ISI'2009 short**.

Patents

1. Min Feng, Srimat Chakradhar, **Linhai Song**
   Compiler Optimization for Many Integrated Core Processors, U.S. Patent No. 20150277877, Oct 1st, 2015.

Research Grants

Benchmarking Generic Functions in Rust

- Role: Sole PI;
- Total: $25,000; Personal Share: $25,000 (100%);
- Mozilla Research Grants
- 09/01/2019 to 09/01/2020

Benchmarking, Detecting, and Diagnosing Real-World Performance Problems

- Role: Sole PI;
- Total: $85,500; Personal Share: $85,500 (100%);
- IST@PSU Seed Grants
- 09/01/2018 to 09/01/2019

Professional Services

- PC member of Poster session at ICSE'2020
- Reviewer of IEEE Computer Architecture Letters in 2019
- PC member of APSys'2019
- PC co-chair of Student Research Competition (SRC) at ASPLOS'2019
- Reviewer of ASPLOS'2019
- Reviewer of CCS'2018
- PC member of APSys'2018
- PC member of Student Research Competition (SRC) at FSE'2018
- Reviewer of ISSTA'2018
- NSF Panelist 2018
- PC member of Student Research Competition (SRC) at ASPLOS'2018
- Reviewer of CCS'2017
- Reviewer of Transactions on Software Engineering in 2017
- Reviewer of Usenix ATC'2017
- Reviewer of Journal of Computer Science and Technology in 2017
- PC member of Artifact Evaluation session at PLDI'2015
- PC member of Artifact Evaluation session at ISSTA'2014

Talks

1. Understanding Real-World Concurrency Bugs in Go
   Conference Presentation at ASPLOS'2019, April 2018
2. Understanding and Detecting Real-World Concurrency Bugs in New Programming Languages
   Research Seminar, ByteDance, December 2018
3. Understanding and Detecting Real-World Concurrency Bugs in New Programming Languages
   Research Seminar, Baidu X-lab, December 2018
4. Fine-grained Library Customization
   Conference Presentation at Salad'2018, July 2018
5. Protocol Subsetting and Dialect Generation
   Research Seminar, Baidu X-lab, December 2017
6. Performance Diagnosis for Inefficient Loops
   Conference Presentation at ICSE'2017, May 2016
7. Improve Software Security and Performance through Data Analytics

Research Seminar, the Pennsylvania State University, March 2016

8. Learning from Big Malware
   Conference Presentation at APSys'2016, August 2016
9. Understanding, Detecting, and Diagnosing Real-World Performance Bugs
   Research Seminar, National University of Singapore, March 2016
10. Understanding, Detecting, and Diagnosing Real-World Performance Bugs
    Research Seminar, Microsoft Research Asia, December 2015
11. Understanding, Detecting, and Diagnosing Real-World Performance Bugs
    Research Seminar, Peking University, June 2015
12. Understanding, Detecting, and Diagnosing Real-World Performance Bugs
    Research Seminar, Pivotal Labs, May 2015
13. Statistical Debugging for Real-World Performance Problems
    Conference Presentation at OOPSLA'2014, October 2014
14. Statistical Debugging for Real-World Performance Problems
    WISDOM Workshop II, May 2014
15. Optimizing Memory Performance on Many Integrated Core Coprocessors
    Research Seminar, NEC Labs America, August 2013
16. Understanding and Detecting Real-World Performance Bugs
    Conference Presentation at PLDI'2012, June 2012
17. Understanding and Detecting Real-World Performance Bugs
    Programming Languages Seminar, University of Wisconsin-Madison, May 2012

Skills

- **Languages:** C/C++, C#, Java, Python, PHP, SQL, HTML, JavaScript, Bash
- **Instrumentation & Analysis:** LLVM, PIN, GCC, GDB
- **Tools & Libraries:** Pthread, OMP, STL, SVN, GIT, MySQL, SQLite
- **Platforms:** Linux, Windows, Intel MIC