

Tongping Liu

CONTACT INFORMATION

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Dept. Electrical and Computer Engineering
University of Massachusetts Amherst
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RESEARCH INTERESTS

Improving security, reliability, and performance of sequential, parallel and distributed software systems.

EDUCATION BACKGROUND

Ph.D., Computer Science, University of Massachusetts Amherst, May 2014.

Thesis: Safe and Efficient Multithreading

Advisor: Emery D. Berger

M.S., Computer Science, University of Massachusetts Amherst, May 2010.

M.E., Electrical Engineering, Huazhong Univ. of Science and Technology, July 2002.

B.A., Electrical Engineering, Harbin Institute of Technology, July 1999.

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Electrical and Computer Engineering, Univ. of Massachusetts Amherst, August 2014 - August 2019.

Assistant Professor, Department of Computer Science, Univ. of Texas at San Antonio, August 2014 - August 2019.

Research Intern, Computing Systems Architecture Group, NEC Labs, Summer 2014.

Research Intern, Compiler Group, Huawei US R&D Center, Summer 2013

Research Intern, Distributed System and Resource Management Group, IBM T.J.Watson Research Center, Summer 2012

Research Intern, Computer Science Lab, Samsung Electronics, Summer 2011

Intern, VMKernel Group, VMware, Summer 2009

Senior Software Engineer, Linux Department, COSMOBIC, March 2004 - June 2007

Software Engineer, R&D Center, Hualong Technology, June 2002 - March 2004

REPRESENTATIVE PUBLICATIONS (E.G. SOSP, PLDI, SECURITY, CCS, MICRO, ICSE...)

Underlined names are students supervised by me.

1. *Sampler: PMU-based Sampling to Detect Memory Errors Latent in Production Software*
Sam Silvestro, Hongyu Liu, Tong Zhang, Changhee Jung, Dongyoon Lee, Tongping Liu.
To appear in Proceedings of The 51th International Symposium on Microarchitecture (Micro'18).
2. *Guarder: A Tunable Secure Allocator*
Sam Silvestro, Hongyu Liu, Tianyi Liu, Zhiqiang Lin, Tongping Liu.

- Proceedings of The 27th USENIX Security Symposium (**Security'18**). Acceptance Rate: 19.1% (100/524).
3. *iReplyer: In-situ and Identical Record-and-Replay for Multithreaded Applications*
Hongyu Liu, Sam Silvestro, Wei Wang, Chen Tian, Tongping Liu.
Proceedings of The 37th annual ACM SIGPLAN conference on Programming Language Design and Implementation (**PLDI'18**). Acceptance Rate: 19.8% (55/277).
 4. *FreeGuard: A Faster Secure Heap Allocator*
Sam Silvestro, Hongyu Liu, Corey Crosser, Zhiqiang Lin, Tongping Liu.
ACM Conference on Computer and Communications Security (**CCS'17**). Acceptance Rate: 18% (151/836).
 5. *UnDead: Defeating Deadlocks of Production Software*
Jinpeng Zhou, Sam Silvestro, Hongyu Liu, Yan Cai, and Tongping Liu. The 32nd IEEE/ACM International Conference on Automated Software Engineering (**ASE 2017**). Acceptance Rate: 21% (65/314).
 6. *SyncPerf: Categorizing, Detecting, and Diagnosing Synchronization Performance Bugs*
Mejbah ul Alam*, Tongping Liu*, Guangming Zeng, Abdullah Muzahid. Note: Alam and Liu are equally contributed.
The 2017 European Conference on Computer Systems (**EuroSys'17**). Acceptance Rate: 20.5% (41/200).
 7. *DoubleTake: Fast and Precise Error Detection via Evidence-Based Dynamic Analysis*
Tongping Liu, Charlie Curtsinger, Emery D. Berger.
The 38th International Conference on Software Engineering (**ICSE'16**). Acceptance Rate: 19% (101/530).
 8. *Predator: Predictive False Sharing Detection (Citation: 18)*
Tongping Liu, Chen Tian, Ziang Hu, Emery D. Berger.
Proceedings of the 19th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (**PPoPP 2014**). Acceptance Rate: 16% (28/179).
 9. *Dthreads: Efficient Deterministic Multithreading (Citation: 233)*
Tongping Liu, Charlie Curtsinger, Emery D. Berger.
Proceedings of the 23rd ACM Symposium on Operating Systems Principles (**SOSP 2011**). Acceptance rate:18% (28/153).
 10. *Sheriff: Precise Detection and Automatic Mitigation of False Sharing (Citation: 63)*
Tongping Liu, Emery D. Berger.
Proceedings of the 26th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications (**OOPSLA 2011**). Acceptance rate: 37% (61/166).
 11. *Grace: Safe Multithreaded Programming for C/C++ (Citation: 301)*
Emery D. Berger, Ting Yang, Tongping Liu, Gene Novark.
Proceedings of the 24th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications (**OOPSLA 2009**). Acceptance rate: 17% (25/144).
 12. *Redline: First Class Support for Interactivity in Commodity Operating Systems (Citation: 81)*
Ting Yang, Tongping Liu, Emery D. Berger, Scott F. Kaplan, J.Eloit B.Moss.

Proceedings of the 8th USENIX Symposium on Operating Systems Design and Implementation (**OSDI 2008**).
Acceptance rate: 13% (26/193).

OTHER PUBLICATIONS

1. *CSOD: Context-sensitive Overflow Detection*.
Hongyu Liu, Sam Silvestro, Xiaoyin Wang, Lide Duan, Tongping Liu,
Proceedings of the 2019 IEEE/ACM International Symposium on Code Generation and Optimization ((**CGO 2019**)).
2. *Cheetah: Detecting False Sharing Efficiently and Effectively*.
Tongping Liu*, Xu Liu*. Note: Tongping and Xu are equally contributed.
International Symposium on Code Generation and Optimization (**CGO 2016**). Acceptance Rate: 23% (25/108).
3. *A User Space-based Project for Practicing Core Memory Management Concepts*
Sam Silvestro, Timothy T. Yuen, Corey Crosser, Dakai Zhu, Turgay Korkmaz, Tongping Liu.
Proceedings of The 49th ACM Technical Symposium on Computer Science Education (**SIGCSE'18**).
4. *Foreseer: Workload-aware Data Storage for MapReduce*
Jia Zou, Juwei Shi, Tongping Liu, Zhao Cao, WangLiu Chen.
Proceedings of 35th International Conference on Distributed Computing Systems (**ICDCS 2015**), poster.
5. *Dynamic Detection of Stack Overflow*
Tongping Liu.
Journal of Computer Science(China). No.9, 2007.

RESEARCH SUPPORT (TOTAL: \$1,300,042, MY SHARE: \$800,131)

1. NSF CCF Proposal: *SPX: Pinpointing and Resolving Scalability Culprits Hidden in Different Components of the Whole System Stack*, **Lead PI**, CCF-1823004, Total \$999,883, UTSA Share: \$499,992, 10/01/2018-9/30/2022
2. Mozilla Faculty Research Grant: *Guarder: Defending Heap Vulnerabilities with Flexible Guarantee and Better Performance*, **Sole PI**, Amount \$51,073, 12/2017-unlimited.
3. Google Faculty Award: *Efficient, Effective, and Intelligent False Sharing Detection*, **Sole PI**, Amount \$42,355, 08/2015-unlimited.
4. NSF CCF Proposal: *CRII: Evidence-Assisted Detection and Elimination of Memory Errors*, **Sole PI**, CCF-1566154, \$206,731, 03/01/2016-02/28/2019

TEACHING RELATED EXPERIENCE

Operated Systems (graduate): Spring 2015, Fall 2015, Fall 2017, Fall 2018.
Operated Systems (undergraduate): Fall 2016, Spring 2017, Spring 2018, Fall 2018.
Kernel Programming: Spring 2017, Spring 2018.
Parallel and Distributed Software Systems: Spring 2016.
Systems Programming: Fall 2014.

Research Methods: Spring 2019.

STUDENTS SUPERVISION

Current Students:

Hongyu Liu (PhD candidate, 08/2015–12/2019)

Alumni:

Sam Silvestro (Ph.D., 01/2016–08/2019)

Jinpeng Zhou (Master thesis, 08/2015–06/2017)

Corey Crosser (Master Project, graduated in 05/2018)

Kyle Haley (B.S., 2018)

PATENTS

1. A Precise and Fully-Automatic On-Site Failure Diagnosis Method. Tongping Liu, Hongyu Liu, Sam Silvestro. Application 62/685,853.
2. Low-Overhead Detection Techniques for Synchronization Problems in Parallel and Concurrent Software. Tongping Liu, Mohammad Mejbah ul Alam, Abdullah Muzahid. Application 62/658,784.
3. FreeGuard: A Faster Secure Heap Allocator. Tongping Liu, Sam Silvestro, Hongyu Liu. Application 62/577,636.
4. Defeating Deadlocks in Production Software. Tongping Liu, Jinpeng Zhou, Sam Silvestro, Hongyu Liu. Application 62/571,436.
5. System and Method for Detecting False Sharing. Tongping Liu, Chen Tian, Ziang Hu. US Patent 9,678,883.
6. System and Method for Predicting False Sharing. Chen Tian, Tongping Liu, Ziang Hu. US Patent 9,547,599.
7. Prevention of race conditions in library code through memory page-fault handling mechanisms. Daniel G. Waddington, Chen Tian, Tongping Liu. US20130042080, A1.
8. Coupled Lock Allocation and Lookup for Shared Data Synchronization in Symmetric Multithreading Environments. Daniel G. Waddington, Tongping Liu, Chen Tian. US Patent 8,868,849.
9. Mapping Guest Pages to Disk Blocks to Improve Virtual Machine Management Process. Kiran Tati, Rajesh Venkatasubramanian, Carl A. Waldspurger, Alexander Thomas Garthwaite, Tongping Liu. US20130205106.

CONTRIBUTIONS ON OPEN-SOURCE-PROJECTS

1. FreeGuard: A Faster Secure Heap Allocator.
<https://github.com/UTSASRG/FreeGuard>.
2. UnDead: Detecting and Tolerating Deadlocks in Production Software.
<https://github.com/UTSASRG/UnDead>.
3. SyncPerf: Categorizing, Detecting, and Diagnosing Synchronization Performance Bugs.
<https://github.com/UTSASRG/SyncPerf>.

4. DOUBLETAKE: Fast and Precise Error Detection via Evidence-Based Dynamic Analysis. <https://github.com/plasma-umass/predator>.
5. PREDATOR: Predictive False Sharing Detection: main contributor. <https://github.com/plasma-umass/predator>.
6. Sheriff: Precise Detection and Automatic Mitigation of False Sharing, main contributor. <https://github.com/plasma-umass/sheriff>.
7. DTHREADS project (A robust deterministic multithreading): main contributor. <https://github.com/plasma-umass/dthreads>.
8. SANPPLE project: one of main contributors. <http://en.sourceforge.jp/projects/sfnet.snapple/releases/>.

INVITED TALKS

1. *iReplayer: In-situ Replaying Errors of Multithreaded Programs*. Texas State University, September 2017.
2. *SyncPerf: Categorizing, Detecting, and Diagnosing Synchronization Performance Bugs*. Shenzhen Institutes of Advanced Technology, June 2017.
3. *SyncPerf: Categorizing, Detecting, and Diagnosing Synchronization Performance Bugs*. Xiamen University, June 2017.
4. *iReplayer: Identical and Efficient Record-And-Replay*. Harbin Institute of Technology, May 2017.
5. *SyncPerf: Categorizing, Detecting, and Diagnosing Synchronization Performance Bugs*. Harbin Engineering University, May 2017.
6. *iReplayer: Identical and Efficient Record-And-Replay*. George Mason University, October 2016.
7. *iReplayer: Identical and Efficient Record-And-Replay*. George Washington University, October 2016.
8. *Deterministic Systems to Defeat Reliability Problems*. South China University of Technology, December 2015.
9. *Deterministic Systems to Defeat Reliability Problems*. Guangdong University of Technology, December 2015.
10. *Deterministic Systems to Defeat Reliability Problems*. University of Science and Technology Beijing, December 2015.
11. *Improving the Performance of Parallel Applications*. Beijing University of Posts and Telecommunications, December 2015.
12. *Improving the Performance of Parallel Applications*. Institute of Computing Technology, December 2015.
13. *Improving the Performance of Parallel Applications*. Chinese Academy of Science (ICT), December 2015.
14. DOUBLETAKE: *Efficiently Detecting Memory Errors*. Huawei US R&D Center, February 2015.
15. *Performance Improvement for Parallel Applications*. Washington State University
16. *Performance Improvement for Parallel Applications*. HP Labs, April 2014.

17. *Performance Improvement for Parallel Applications*. NEC Labs America, March 2014.
18. *Performance Improvement for Parallel Applications*. North Carolina State University, March 2014.
19. *Performance Improvement for Parallel Applications*. College of William and Mary, March 2014.
20. *Performance Improvement for Parallel Applications*. University of Texas at San Antonio, February 2014.
21. *Performance Improvement for Parallel Applications*. Florida International University, February 2014.
22. PREDATOR: *Predictive False Sharing Detection*. Huawei US R&D Center, August 2013.
23. *Safe and Efficient Multithreading*. Huawei US R&D Center, June 2013.
24. DTHREADS: *Efficient Deterministic Multithreading*. IBM T.J.Watson Lab, August 2012.
25. SHERIFF: *Precise Detection and Automatic Mitigation of False Sharing*. IBM T.J.Watson Lab, August 2012.
26. SHERIFF: *Precise Detection and Automatic Mitigation of False Sharing*. University of Texas at Austin, January 2011.

SERVICE

Program Committee: ICCCN 2015, ICCCN 2016, ICPADS 2016, ICSDE2017, COMPSAC 2018, TrustCom 2018, SETTA 2018

External Review Committee: PPOPP 2015, PLDI 2019

Reviewer: Journal of Systems and Software, Journal of Computational Science, NCS17, CCGrid 2017, TDSC, TPDS, IJICT, TCC, TC, ICDCS 2013, Middleware 2013, ICDCS 2014