

# HEMING CUI

362 Riverside Drive, Room 9B-8, New York, NY 10025

917-208-5612; [heming@cs.columbia.edu](mailto:heming@cs.columbia.edu)

## Education

- PhD, Computer Science, **Columbia University**, expected May 2014
- Master, Computer Science, **Tsinghua University**, Beijing, China, July 2008
- Bachelor, Computer Science, **Tsinghua University**, Beijing, China, July 2005

## Research Interest

- Operating Systems, Programming Languages, Distributed Systems, and Security

## Research Experience

- Reliable multithreading: [TERN OSDI '10], [PEREGRINE SOSP '11], [PARROT SOSP '13]
- Security rule violation detection: [WOODPECKER ASPLOS '13]
- Precise static data race detection: [Wu PLDI '12]
- Dynamic instrumentation for bypassing concurrency errors: [LOOM OSDI '10]

## Selected Publication

- **Heming Cui**, Jiri Simsa, Yi-Hong Lin, Hao Li, Ben Blum, Xinan Xu, Junfeng Yang, Garth Gibson, and Randy Bryant. "Parrot: a Practical Runtime for Deterministic, Stable, and Reliable Threads". Proceedings of the 24th ACM Symposium on Operating Systems Principles (**SOSP '13**).
- **Heming Cui**, Gang Hu, Jingyue Wu, and Junfeng Yang. "Verifying Systems Rules Using Rule-Directed Symbolic Execution". Proceedings of the 18th International Conference on Architecture Support for Programming Languages and Operating Systems (**ASPLOS '13**).
- **Heming Cui**, Jingyue Wu, John Gallagher, Huayang Guo, and Junfeng Yang. "Efficient Deterministic Multithreading through Schedule Relaxation". Proceedings of the 23rd ACM Symposium on Operating Systems Principles (**SOSP '11**).
- **Heming Cui**, Jingyue Wu, Chia-che Tsai, and Junfeng Yang. "Stable Deterministic Multithreading through Schedule Memoization". Proceedings of the Ninth Symposium on Operating Systems Design and Implementation (**OSDI '10**).
- Junfeng Yang, **Heming Cui**, Jingyue Wu, Yang Tang, and Gang Hu. "Determinism Is Not Enough: Making Parallel Programs Reliable with Stable Multithreading". Communications of the ACM 2014 (**CACM '14**).
- Jingyue Wu, Yang Tang, Gang Hu, **Heming Cui**, Junfeng Yang. "Sound and Precise Analysis of Parallel Programs through Schedule Specialization". Proceedings of the 33rd ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI '12**).
- Jingyue Wu, **Heming Cui**, and Junfeng Yang. "Bypassing Races in Live Applications with Execution Filters". Proceedings of the Ninth Symposium on Operating Systems Design and Implementation (**OSDI '10**).

## Impact

- Since our idea of Stable Multithreading (StableMT) was initially proposed in TERN in 2010, this idea has attracted the research community's interest, and most subsequent relevant systems are also StableMT. Our systems on realizing this idea have been featured in in media such as ACM Tech News, TG Daily, and Phys.org. Google "Heming Cui Phys.org".
- WOODPECKER has found ten serious security and reliability violation bugs in widely used programs such as git, CVS, and useradd. Eight of these bugs have been quickly confirmed or fixed by the corresponding developers.

## Patent

- Junfeng Yang, **Heming Cui**, and Jingyue Wu. "Methods, Systems, and Media for Providing Determinism in Multithreaded Programs". Published 2012-4-26. Patent application number: 20120102470.
- Junfeng Yang, **Heming Cui**, and Jingyue Wu. "Methods, Systems, and Media for Protecting Applications from Races". Published 2012-4-19. Patent application number: 20120096449.

## Teaching

- TA, Reliable Software, Fall 2009, Columbia University
- TA, Operating Systems, Spring 2009, Columbia University
- TA, Operating Systems, Spring 2007, Tsinghua University

## Talk

- **PARROT: A Practical Runtime for Deterministic, Stable, and Reliable Threads**
  - DARPA PI meeting, January 2014
  - Tsinghua University in Beijing, China, December 2013
  - Institute of Software Chinese Academy of Science (ISCAS), December 2013  
[http://www.iscas.ac.cn/xwzx/xshd/201311/t20131125\\_3985178.html](http://www.iscas.ac.cn/xwzx/xshd/201311/t20131125_3985178.html)
  - SOSP, November 2013
  - Carnegie Mellon University, October 2013  
<http://www.pdl.cmu.edu/SDI/2013/103113-b.html>
  - Columbia University W4118 Operating Systems Course, October 2013
  - Columbia University Computer Systems Seminar, September 2013
- **Verifying Systems Rules Using Rule-Directed Symbolic Execution**
  - ASPLOS, March 2013
  - Columbia University Computer Systems Seminar, March 2013
  - DARPA site visit, September 2012
- **Efficient Deterministic Multithreading through Schedule Relaxation**
  - DARPA site visit, September 2012
  - SOSP, October 2011
  - Columbia University Computer Systems Seminar, October 2011
  - Columbia University E6121 Reliable Software Course, September 2011

- **Stable Deterministic Multithreading through Schedule Memoization**
  - OSDI, October 2010
  - Columbia University Computer Systems Seminar, September 2010
  - Columbia University E6998-1 Reliable Software Course, September 2010

## Reference

- **Prof. Junfeng Yang** (my advisor)  
Associate Professor, Computer Science, Columbia University  
<http://www.cs.columbia.edu/~junfeng>  
Email: [junfeng@cs.columbia.edu](mailto:junfeng@cs.columbia.edu)
- **Prof. Garth Gibson**  
Professor, Computer Science, Carnegie Mellon University  
<http://www.cs.cmu.edu/~garth>  
Email: [garth@cs.cmu.edu](mailto:garth@cs.cmu.edu)
- **Prof. Roxana Geambasu**  
Assistant Professor, Computer Science, Columbia University  
<http://www.cs.columbia.edu/~roxana>  
Email: [roxana@cs.columbia.edu](mailto:roxana@cs.columbia.edu)