

Ryan (Peng) Huang

Computer Science and Engineering
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RESEARCH INTERESTS

Computer systems, cloud and mobile computing, reliability, programming languages

EDUCATION

University of California San Diego 2010–2016
Ph.D. in Computer Science
Advisor: Prof. Yuanyuan Zhou
Thesis: Toward Understanding and Dealing with Failures in Cloud-Scale Systems

Peking University 2006–2010
B.S. in Computer Science, B.A. in Economics
Graduate with honor
Thesis: Design and Implementation of a Decentralized Social Network (*Outstanding Bachelor's Thesis*)

EMPLOYMENT

Associate Professor Jan 2023–
University of Michigan - Ann Arbor, MI

Assistant Professor Aug 2017–Dec 2022
Johns Hopkins University - Baltimore, MD

Postdoctoral Researcher Aug 2016–July 2017
Microsoft Research - Redmond, WA

PhD Intern June 2015–Sept 2015
Facebook - Menlo Park, CA

Research Intern June 2014–Sept 2014
Microsoft Research - Redmond, WA

Research Intern June 2013–Sept 2013
Microsoft Research - Redmond, WA

Research Intern Nov 2011–Dec 2012
Teradata - San Diego, CA

Software Engineer Intern Mar 2010–June 2010
NetEase - Beijing, China

HONORS AND AWARDS

USENIX ATC 2021 Best Paper Award 2021

NSF CAREER Award 2020

NSDI 2020 Best Paper Award 2020

Professor Joel Dean Excellence in Teaching Award at JHU 2019

ASPLOS 2019 Best Paper Award 2019

MICRO 2018 Best Paper Candidate	2018
NSF CRII Award	2018
OSDI 2016 Best Paper Award	2016
Outstanding Graduate in Beijing	2010
Outstanding Bachelor's Thesis, Peking University	2010
Founder Scholarship, Peking University	2009
China National Scholarship, Ministry of Education of China	2008
Wusi Scholarship, Peking University	2007

PUBLICATIONS

Conference Paper

- [1] Yuzhuo Jing and **Peng Huang**. Operating system support for safe and efficient auxiliary execution. In *Proceedings of the 16th USENIX Symposium on Operating Systems Design and Implementation*, July 2022, **USENIX OSDI '22**.
- [2] Chang Lou, Yuzhuo Jing, and **Peng Huang**. Demystifying and checking silent semantic violations in large distributed systems. In *Proceedings of the 16th USENIX Symposium on Operating Systems Design and Implementation*, July 2022, **USENIX OSDI '22**.
- [3] Chang Lou, Cong Chen, **Peng Huang**, Yingnong Dang, Si Qin, Xinsheng Yang, Xukun Li, Qingwei Lin, and Murali Chintalapati. RESIN: A holistic service for dealing with memory leaks in production cloud infrastructure. In *Proceedings of the 16th USENIX Symposium on Operating Systems Design and Implementation*, July 2022, **USENIX OSDI '22**.
- [4] Lingmei Weng, **Peng Huang**, Jason Nieh, and Junfeng Yang. Argus: Debugging performance issues in modern desktop applications with annotated causal tracing. In *Proceedings of the 2021 USENIX Annual Technical Conference*, July 2021, **USENIX ATC '21**. **Best Paper Award**.
- [5] Brian Choi, Randal Burns, and **Peng Huang**. Understanding and dealing with hard faults in persistent memory systems. In *Proceedings of the 16th European Conference on Computer Systems*, April 2021, **EuroSys '21**.
- [6] Yigong Hu, Gongqi Huang, and **Peng Huang**. Automated reasoning and detection of specious configuration in large systems with symbolic execution. In *Proceedings of the 14th USENIX Symposium on Operating Systems Design and Implementation*, Banff, Alberta, Canada, November 2020. **OSDI '20**.
- [7] Sebastien Levy, Randolph Yao, Youjiang Wu, Yingnong Dang, **Peng Huang**, Zheng Mu, Pu Zhao, Tarun Ramani, Naga Govindraju, Xukun Li, Qingwei Lin, Gil Lapid Shafirri, and Murali Chintalapati. Predictive and adaptive failure mitigation to avert production cloud VM interruptions. In *Proceedings of the 14th USENIX Symposium on Operating Systems Design and Implementation*. November 2020, **OSDI '20**.
- [8] Chang Lou, **Peng Huang**, and Scott Smith. Understanding, detecting and localizing partial failures in large system software. In *Proceedings of the 17th USENIX Symposium on Networked Systems Design and Implementation*, Santa Clara, CA, February 2020. **NSDI '20**. **Best Paper Award**.
- [9] Ze Li, Qian Cheng, Ken Hsieh, Yingnong Dang, **Peng Huang**, Pankaj Singh, Xinsheng Yang, Qingwei Lin, Youjiang Wu, Sebastien Levy, and Murali Chintalapati. Gandalf: An intelligent, end-to-end analytics service for safe deployment in large-scale cloud infrastructure. In *The 17th USENIX Symposium on Networked Systems Design and Implementation*, February 2020, **NSDI '20**.
- [10] Huiba Li, Yiming Zhang, Zhiming Zhang, Shengyun Liu, **Peng Huang**, Dongsheng Li, Zheng Qin, Kai Chen, and Yongqiang Xiong. Ursa: Hybrid block storage for cloud-scale virtual disks. In *Proceedings of the 14th ACM European Conference on Computer Systems*, Dresden, Germany, March 2019. **EuroSys '19**.
- [11] Yigong Hu, Suyi Liu, and **Peng Huang**. A case for lease-based, utilitarian resource management on mobile devices. In *Proceedings of the 24th ACM International Conference on Architectural Support for Programming Languages and Operating Systems*, Providence, RI, April 2019. **ASPLOS '19**. **Best Paper Award**.
- [12] **Peng Huang**, Chuanxiong Guo, Jacob R. Lorch, Lidong Zhou, and Yingnong Dang. Capturing and enhancing in situ system observability for failure detection. In *Proceedings of the 13th USENIX Symposium on Operating Systems Design and Implementation*, Carlsbad, CA, October 2018. **OSDI '18**.

- [13] Rui Zhang, Calvin Deutschbein, **Peng Huang**, and Cynthia Sturton. End-to-end automated exploit generation for validating the security of processor designs. In *Proceedings of the 51st Annual IEEE/ACM International Symposium on Microarchitecture*, Fukuoka City, Japan, October 2018. **MICRO 51. Best Paper Candidate.**
- [14] Gennady Pekhimenko, Chuanxiong Guo, Myeongjae Jeon, **Peng Huang**, and Lidong Zhou. TerseCades: Efficient data compression in stream processing. In *Proceedings of the 2018 USENIX Annual Technical Conference*, Boston, MA, July 2018. **USENIX ATC '18.**
- [15] Tianyin Xu, Xinxin Jin, **Peng Huang**, Yuanyuan Zhou, Shan Lu, Long Jin, and Shankar Pasupathy. Early detection of configuration errors to reduce failure damage. In *Proceedings of the 12th USENIX Symposium on Operating Systems Design and Implementation*, Savannah, GA, November 2016. **OSDI '16. Best Paper Award.**
- [16] **Peng Huang**, Tianyin Xu, Xinxin Jin, and Yuanyuan Zhou. DefDroid: Towards a more defensive mobile os against disruptive app behavior. In *Proceedings of the 14th Annual International Conference on Mobile Systems, Applications, and Services*, Singapore, Singapore, 2016. **MobiSys '16.**
- [17] Xinxin Jin, **Peng Huang**, Tianyin Xu, and Yuanyuan Zhou. NChecker: Saving mobile app developers from network disruptions. In *Proceedings of the 11th European Conference on Computer Systems*, London, United Kingdom, 2016. **EuroSys '16.**
- [18] **Peng Huang**, William J. Bolosky, Abhishek Singh, and Yuanyuan Zhou. ConfValley: A systematic configuration validation framework for cloud services. In *Proceedings of the 10th European Conference on Computer Systems*, Bordeaux, France, April 2015. **EuroSys '15.**
- [19] **Peng Huang**, Xinxin Jin, William J. Bolosky, and Yuanyuan Zhou. Why does a cloud-scale service fail despite fault-tolerance? In *The 11th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, Broomfield, CO, October 2014. **Note: accepted with high-score reviews but withdrawn from publication per request by Microsoft.**
- [20] **Peng Huang**, Xiao Ma, Dongcai Shen, and Yuanyuan Zhou. Performance regression testing target prioritization via performance risk analysis. In *Proceedings of the 36th International Conference on Software Engineering*, Hyderabad, India, May 2014. **ICSE '14.**
- [21] Tianyin Xu, Jiaqi Zhang, **Peng Huang**, Jing Zheng, Tianwei Sheng, Ding Yuan, Yuanyuan Zhou, and Shankar Pasupathy. Do not blame users for misconfigurations. In *Proceedings of the 24th ACM Symposium on Operating Systems Principles*, Farmington, Pennsylvania, November 2013. **SOSP '13.**
- [22] Xiao Ma, **Peng Huang**, Xinxin Jin, Pei Wang, Soyeon Park, Dongcai Shen, Yuanyuan Zhou, Lawrence K. Saul, and Geoffrey M. Voelker. eDoctor: Automatically diagnosing abnormal battery drain issues on smartphones. In *Proceedings of the 10th USENIX Conference on Networked Systems Design and Implementation*, Lombard, IL, April 2013. **NSDI '13.**
- [23] Ding Yuan, Soyeon Park, **Peng Huang**, Yang Liu, Michael M. Lee, Xiaoming Tang, Yuanyuan Zhou, and Stefan Savage. Be conservative: Enhancing failure diagnosis with proactive logging. In *Proceedings of the 10th USENIX Conference on Operating Systems Design and Implementation*, Hollywood, CA, October 2012. **OSDI '12.**
- [24] Jing Jiang, Christo Wilson, Xiao Wang, **Peng Huang**, Wenpeng Sha, Yafei Dai, and Ben Y. Zhao. Understanding latent interactions in online social networks. In *Proceedings of the 10th ACM SIGCOMM Conference on Internet Measurement*, Melbourne, Australia, November 2010. **IMC '10.**

Workshop Paper

- [25] Yigong Hu, **Peng Huang**, Ze Li, Suhas Pinnamaneni, Francis David, Yingnong Dang, and Murali Chintalapati. Scaling performance issue detection and diagnosis in cloud infrastructures. In *AAAI-20 Workshop on Cloud Intelligence*, 2020.
- [26] Chang Lou, **Peng Huang**, and Scott Smith. Comprehensive and efficient runtime checking in system software through watchdogs. In *Proceedings of the 17th Workshop on Hot Topics in Operating Systems*, New York, NY, USA, May 2019. **HotOS '19.**
- [27] **Peng Huang**, Chuanxiong Guo, Lidong Zhou, Jacob R. Lorch, Yingnong Dang, Murali Chintalapati, and Randolph Yao. Gray failure: The Achilles' heel of cloud-scale systems. In *Proceedings of the 16th Workshop on Hot Topics in Operating Systems*, Whistler, British Columbia, Canada, May 2017. **HotOS '17.**

Journal Article

- [28] Jing Jiang, Christo Wilson, Xiao Wang, Wenpeng Sha, **Peng Huang**, Yafei Dai, and Ben Y. Zhao. Understanding latent interactions in online social networks. *ACM Trans. Web*, 7(4):18:1–18:39, November 2013.
- [29] Jing Jiang, Yongjun Li, Qinyuan Feng, **Peng Huang**, and Yafei Dai. A multiple user sharing behaviors based approach for fake file detection in P2P environments. *Science China Information Sciences*, 53(11):2169–2184, November 2010.

Technical Report

- [30] **Peng Huang**, Craig Schechter, Vincent Chen, Steven Hill, Dongcai Shen, Yuanyuan Zhou, and Lawrence K. Saul. Experience in building a comparative performance analysis engine for a commercial system. Technical Report CS2015-1014, University of California, San Diego, September 2015.

TEACHING EXPERIENCE

CS 624: Reliable Software Systems , JHU <i>Instructor</i>	Spring 2021
CS 318: Principles of Operating Systems , JHU <i>Instructor</i>	Fall 2020
CS 718: Advanced Operating Systems , JHU <i>Instructor</i>	Spring 2020
CS 318: Principles of Operating Systems , JHU <i>Instructor</i> , course evaluation rating: 4.38/5	Fall 2019
CS 817: Selected Topics in Systems Research , JHU <i>Instructor</i>	Spring 2019
CS 318: Principles of Operating Systems , JHU <i>Instructor</i> , course evaluation rating: 4.56/5	Fall 2018
CS 817: Selected Topics in Systems Research , JHU <i>Instructor</i>	Fall 2018
CS 718: Advanced Operating Systems , JHU <i>Instructor</i> , course evaluation rating: 4.86/5	Spring 2018
CS 318: Principles of Operating Systems , JHU <i>Instructor</i> , course evaluation rating: 4.5/5	Fall 2017
CSE 120: Principles of Operating Systems , UCSD <i>Teaching Assistant</i>	Fall 2014
CSE 221: Advanced Operating Systems , UCSD <i>Teaching Assistant</i>	Winter 2014
CSE 120: Principles of Operating Systems , UCSD <i>Teaching Assistant</i>	Spring 2013
Introduction to Computation , Peking University <i>Teaching Assistant</i>	Fall 2009

PROFESSIONAL SERVICE

Workshop Organizer

Co-chair for [the 1st Workshop on High Availability and Observability of Cloud Systems](#) (at EuroSys '21) 2021

Program Committee

Program Committee Member for ASPLOS '22, ApSys '21	2021
Program Committee Member for OSDI '21, NSDI '21, OSDI '20, ApSys '20, RTAS '20, ICDCS '20	2020
Journal Reviewer for ACM Transactions on Storage	2020
Program Committee Member for SOSP '19, HotOS '19, ApSys '19, ASPLOS '19 SRC	2019
External Reviewer for NSDI '19	2018
Program Committee Member for USENIX ATC '18	2018
Program Committee Member for USENIX ATC '17, SOSP SRC, SIGCOMM HotConNet	2017
Shadow Program Committee Member for EuroSys '17	2017
Program Committee Member for MobiSys PhD '16 forum	2016
Journal Reviewer for IEEE TPDS 2016	2016
Assistant for ASPLOS '16 PC chair	2016

Panelist

NSF Panelist	2016, 2018, 2019, 2020, 2021
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DEPARTMENT SERVICE

PhD Admission Committee	2020–Present
Curriculum Committee	June 2018–June 2019
Faculty Search Committee	2017

GRANTS

Principal Investigator, <i>NSF CSR SMALL</i> (rated Highly Competitive), CNS-2149664, \$500,000	Dec 2021–Nov 2024
Principal Investigator, <i>Facebook Research Award</i> , \$50,000	Aug 2021
Principal Investigator, <i>NSF CAREER</i> (rated Highly Competitive), CNS-1942794, \$609,497	Jul 2020–Jun 2025
Principal Investigator, <i>NSF CSR SMALL</i> , CNS-1910133, \$500,000	Oct 2019–Sep 2022
Principal Investigator (transferred), <i>NSF SPX</i> , CCF-1918757, \$399,999	Oct 2019 –Sep 2023
Principal Investigator, <i>Amazon AWS Cloud Credits for Research</i> , \$20,000	Nov 2018–Nov 2019
Principal Investigator, <i>NSF CRII Award</i> , CNS-1755737, \$174,955	Aug 2018–Jul 2020
Principal Investigator, <i>Google Cloud Platform Research Credits</i> , \$14,000	Aug 2018–Feb 2019
Principal Investigator, <i>Microsoft Azure for Research Grant</i> , \$20,000	Aug 2017–Aug 2018

TALKS

- Cloud Systems to the Next Level: From High Availability to Observability
- Keynote: Sixth Workshop on Hot Topics on Data Centers (HotDC 2021), *Dec 2021, Virtual*
- Towards Grey Fault Tolerant Cloud Systems
- Invited Talk: University of Cambridge Systems Seminar, *Apr 2021, Virtual*
- Gray Failure: The Achilles' Heel of Cloud-Scale Systems
- Invited Talk: Lyft, *Aug 2019, Virtual*
- Harnessing System Observability for Modeling and Detecting Gray Failures
- Invited Talk: NC State Systems Seminar, *Feb 2019, Raleigh, NC*
- Capturing and Enhancing In Situ System Observability for Failure Detection
- OSDI 2018, *Oct 2018, Carlsbad, CA*
 - Microsoft Azure, *Aug 2018, Redmond, WA*
- Gray Failure: The Achilles' Heel of Cloud-Scale Systems
- HotOS XVI, *May 2017, Whistler, Canada*
- CloudBrain: Toward Real-Time Intelligence for Highly-Available Cloud Systems

- Technical Briefing to Microsoft CVP and EVP, *March 2017, Redmond, WA*
- Technical Briefing to Azure CTO, *March 2017, Redmond, WA*

DefDroid: towards a more defensive mobile OS

- MobiSys 2016, *June 2016, Singapore*
- UCSD CNS Review, *Oct 2015, San Diego, CA*

Systematic configuration validation in cloud services

- Facebook, *June 2015, Menlo Park, CA*
- EuroSys 2015, *April 2015, Bordeaux, France*
- UCSD CNS Review, *Oct 2014, San Diego, CA*
- Microsoft Research, *Sept 2014, Redmond, WA*

Failures and misconfigurations in cloud – analysis, implications and practices

- Microsoft, *Sept 2013, Redmond, WA*

Performance regression testing target prioritization via performance risk analysis

- ICSE 2014, *June 2014, Hyderabad, India*

GRADUATE STUDENTS

Chang Lou, PhD, Johns Hopkins University	Fall 2017–Present
Yigong Hu, PhD, Johns Hopkins University	Fall 2017–Present
Brian Choi, PhD, Johns Hopkins University (co-advised with Randal Burns)	Fall 2018–Present
Haoze Wu, PhD, Johns Hopkins University	Fall 2019–Present
Yuzhuo Jing, PhD, Johns Hopkins University	Fall 2020–Present
Senapati S. Diwangkara, PhD, Johns Hopkins University (co-advised with Soudeh Ghorbani)	Fall 2021–Present
Parv Saxena, Masters, Johns Hopkins University	Spring 2019–Fall 2019
Ziyang Wang, Masters, Johns Hopkins University	Fall 2018–Spring 2019
Justin Shafer, Masters, Johns Hopkins University	Fall 2018–Spring 2019
Shreyas Aiyar, Masters, Johns Hopkins University	Spring 2021–Summer 2021

MASTER THESIS ADVISING

<i>Analysis of Memory Leaks in Linux Kernel</i> , Amitoj Chawla, Masters, JHU	Fall 2018
<i>Learning from Imbalanced Data</i> , Vincent Chen, Masters, UC San Diego	Fall 2013

UNDERGRADUATE STUDENTS

Tony Pan	Spring '22–Present
Emily Zhai	Summer '21–Present
Gongqi Huang (<i>honorable mention for 2021 CRA Outstanding Undergrad Researcher Award</i>)	Spring '20–Present
Ding Ding	Summer '19–Fall '19
Varun Radhakrishnan	Spring '19–Fall '19
Xu Meng	Fall '17–Spring '18
Suyi Liu	Fall '17–Spring '18
Zach Silver	Spring '18–Summer '18

OPEN-SOURCE SOFTWARE

- OathKeeper: <https://github.com/OrderLab/OathKeeper>
- Orbit: <https://github.com/OrderLab/orbit>
- Arthas: <https://github.com/OrderLab/Arthas>
- Violet: <https://github.com/OrderLab/violet>
- LeaseOS: <https://orderlab.io/LeaseOS>
- Panorama: <https://github.com/ryanphuang/panorama>
- DefDroid: <https://defdroid.github.io>
- liballuxio: <https://github.com/ryanphuang/liballuxio>
- imembench: <https://github.com/ryanphuang/imembench>
- PerfScope: <https://github.com/ryanphuang/perfscope>