Tianyin Xu

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Research Interests

Computer systems, cloud computing, and software engineering

The goal of my research is to enable the design and implementation of reliable computer systems that empower the next-generation cloud and datacenter computing.

Employment

2018.8—	**University of Illinois at Urbana-Champaign** Assistant Professor, Department of Computer Science
2022.8—	**University of Illinois at Urbana-Champaign** Affiliate Assistant Professor, Department of Electrical and Computer Engineering
2023.1–2023.6	**Microsoft Research** Consultant Researcher
2018.8–2022.3	**Facebook Inc** Consultant Researcher
2017.12–2018.8	**University of Illinois at Urbana-Champaign** Adjunct Assistant Professor, Department of Computer Science
2017.10–2018.7	**Facebook Inc** Visiting Scientist
2010–2011	**Georg-August-Universität Göttingen, Germany** Technical Staff

Education

2011–2017	**University of California San Diego**, La Jolla, CA **Ph.D.** in Computer Science
2003–2010	**Nanjing University**, Nanjing, China M.Eng. and B.S. in Computer Science

Awards and Honors

2023	Gilles Muller Best Artifact Award at EuroSys'23
2023 Fall	UIUC List of Teachers Ranked as Excellent (for CS 591SN)
2023 Spring	UIUC List of Teachers Ranked as Excellent (for CS 523)
2022	Intel Rising Star Faculty Award
2022	NSF CAREER Award
2022	CACM Research Highlight (Cozart, Sigmetrics'20)
2021.5	Facebook Academic of the Month
2021 Fall	UIUC List of Teachers Ranked as Outstanding (CS 591DS)
2021	Best Student Paper Award at SIGCOMM'21
2021	SIGSOFT Distinguished Paper Award at FSE'21
2021	SIGSOFT Distinguished Paper Award at ISSTA'21
2021	Honorable Mention of IEEE Micro Top Picks (Elastic Cuckoo Page Table, ASPLOS'20)
2020	Facebook Distributed Systems Research Award
2020	Best Paper Award of ASPLOS'20

2020	Nominations for Best Paper and Best Student Paper at SC'20
2020 Fall	UIUC List of Teachers Ranked as Excellent (CS 523)
2019 Fall	UIUC List of Teachers Ranked as Excellent (CS 523)
2019	Best Demo Award at MobiCom'19
2019 Spring	UIUC List of Teachers Ranked as Excellent (CS 598TXU)
2018 Fall	UIUC List of Teachers Ranked as Excellent (CS 598TXU)
2017	Doctoral Research Award, Computer Science and Engineering, UCSD
2016	Jay Lepreau Best Paper Award at OSDI'16
2009	Best Paper Award at International Conference on Communications (ICC'09)

Publications

Conference and Workshop Papers

[ASPLOS'24] Jiyuan Zhang, Weiwei Jia, Siyuan Chai, Peizhe Liu, Jongyul Kim, and Tianyin Xu, **Direct Memory Translation for Virtualized Clouds**, In *Proceedings of the 29th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'24)*, San Diego, USA, Apr. 2024.

[SOSP'23] Jiawei Tyler Gu, Xudong Sun, Yuxuan Jiang, Chen Wang, Mandana Vaziri, Owolabi Legunsen, and Tianyin Xu, **Automatic Testing for Correct Operations of Cloud Systems**, In *Proceedings of the 29th ACM Symposium on Operating Systems Principles (SOSP'23)*, Koblenz, Germany, Oct. 2023.

[MICRO'23] Yan Sun, Yifan Yuan, Zeduo Yu, Chihun Song, Reese Kuper, Jinghan Huang, Houxiang Ji, Siddharth Agarwal, Jiaqi Lou, Ipoom Jeong, Ren Wang, Jung Ho Ahn, Tianyin Xu, and Nam Sung Kim, **Demystifying CXL Memory with Genuine CXL-Ready Systems and Devices**, In *Proceedings of the 56th IEEE/ACM International Symposium on Microarchitecture (MICRO-56)*, Toronto, Canada, Oct. 2023.

[MobiCom'23] Hao Lin, Jiaxing Qiu, Hongyi Wang, Zhenhua Li, Liangyi Gong, Di Gao, Yunhao Liu, Feng Qian, Zhao Zhang, Ping Yang, and Tianyin Xu, **Virtual Device Farms for Mobile App Testing at Scale: A Pursuit for Fidelity, Efficiency, and Accessibility**, In *Proceedings of the 29th Annual International Conference on Mobile Computing and Networking (MobiCom'23)*, Madrid, Spain, Oct. 2023.

[SoCC'23] Runxiang Cheng, Chris Cai, Selman Yilmaz, Rahul Mitra, Malay Bag, Mrinmoy Ghosh, and Tianyin Xu, **Towards GPU Memory Efficiency for Distributed Training at Scale**, In *Proceedings of the 14th ACM Symposium on Cloud Computing (SoCC'23)*, Santa Cruz, CA, Oct. 2023.

[PACT'23] Weiwei Jia, Jiyuan Zhang, Jianchen Shan, Yiming Du, Xiaoning Ding, and Tianyin Xu, **HugeGPT: Storing Guest Page Tables on Host Huge Pages to Accelerate Address Translation**, In *Proceedings of the 32nd International Conference on Parallel Architectures and Compilation Techniques (PACT'23)*, Vienna, Austria, Oct. 2023.

[OSDI'23] Xiang (Jenny) Ren, Sitao Wang, Zhuqi Jin, David Lion, Adrian Chiu, Tianyin Xu, and Ding Yuan, **Relational Debugging – Pinpointing Root Causes of Performance Problems**, In *Proceedings of the 17th USENIX Symposium on Operating Systems Design and Implementation (OSDI'23)*, Boston, MA, July 2023.

[HotOS'23] Jinghao Jia, Raj Sahu, Adam Oswald, Dan Williams, Michael V. Le, and Tianyin Xu, **Kernel extension verification is untenable**, In *Proceedings of the 19th Workshop on Hot Topics in Operating Systems (HotOS-XIX)*, Providence, RI, June 2023.

[ISCA'23] Jovan Stojkovic, Tianyin Xu, Hubertus Franke, and Josep Torrellas, **MXFaaS: Resource Sharing in Serverless Environments for Parallelism and Efficiency**, In *Proceedings of the 50th Annual International Symposium on Computer Architecture (ISCA'23)*, Orlando, FL, June 2023.

[EuroSys'23] Lilia Tang, Chaitanya Bhandari, Yongle Zhang, Anna Karanika, Shuyang Ji, Indranil Gupta, and Tianyin Xu, **Fail through the Cracks: Cross-System Interaction Failures in Modern Cloud Systems**, In *Proceedings of the 18th European Conference on Computer Systems (EuroSys'23)*, Rome, Italy, May 2023. **Gilles Muller Best Artifact Award**

[ICSE'23] Shuai Wang, Xinyu Lian, Darko Marinov, and Tianyin Xu, **Test Selection for Unified Regression Testing**, In *Proceedings of the 45th IEEE/ACM International Conference on Software Engineering (ICSE'23)*, Melbourne, Australia, May 2023.

[NSDI'23] Yinfang Chen, Xudong Sun, Suman Nath, Ze Yang, and Tianyin Xu, **Push-Button Reliability Testing for Cloud-Backed Applications with Rainmaker**, In *Proceedings of the 20th USENIX Symposium on Networked Systems Design and Implementation (NSDI'23)*, Boston, MA, April 2023.

[WWW'23] Xinlei Yang, Wei Liu, Hao Lin, Zhenhua Li, Feng Qian, Xianlong Wang, Yunhao Liu, and Tianyin Xu, **Visual-Aware Testing and Debugging for Web Performance Optimization**, In *Proceedings of the 32th ACM Web Conference (WWW'23)*, Austin, Texas, Apr. 2023.

[HPCA'23] Jovan Stojkovic, Tianyin Xu, Hubertus Franke, and Josep Torrellas, **SpecFaaS: Accelerating Serverless Applications with Speculative Function Execution**, In *Proceedings of the 29th IEEE International Symposium on High-Performance Computer Architecture (HPCA-29)*, Montreal, QC, Canada, Feb 2023.

[HPCA'23] Jovan Stojkovic, Namrata Mantri, Dimitrios Skarlatos, Tianyin Xu, and Josep Torrellas, **Memory-Efficient Hashed Page Tables**, In *Proceedings of the 29th IEEE International Symposium on High-Performance Computer Architecture (HPCA-29)*, Montreal, QC, Canada, Feb 2023.

[Sigcomm'22] Xinlei Yang, Hao Lin, Zhenhua Li, Feng Qian, Xingyao Li, Zhiming He, Xudong Wu, Xianlong Wang, Yunhao Liu, Zhi Liao, Daqiang Hu, and Tianyin Xu, **Mobile Access Bandwidth in Practice: Measurement, Analysis, and Implications**, In *Proceedings of the 2022 Annual Conference of the ACM Special Interest Group on Data Communication (Sigcomm'22)*, Amsterdam, Netherlands, August 2022.

[OSDI'22] Xudong Sun, Wenqing Luo, Jiawei Tyler Gu, Aishwarya Ganesan, Ramnatthan Alagappan, Michael Gasch, Lalith Suresh, and Tianyin Xu, **Automatic Reliability Testing For Cluster Management Controllers**, In *Proceedings of the 16th USENIX Symposium on Operating Systems Design and Implementation (OSDI'22)*, Carlsbad, CA, Jul. 2022.

[OSDI'22] Di Gao, Hao Lin, Zhenhua Li, Chengen Huang, Yunhao Liu, Feng Qian, Liangyi Gong, and Tianyin Xu, **Trinity: High-Performance Mobile Emulation through Graphics Projection**, In *Proceedings of the 16th USENIX Symposium on Operating Systems Design and Implementation (OSDI'22)*, Carlsbad, CA, Jul. 2022.

[USENIX ATC'22] Xuhao Luo, Weihai Shen, Shuai Mu, and Tianyin Xu, **DepFast: Orchestrating Code of Quorum Systems**, In *Proceedings of the 2022 USENIX Annual Technical Conference (USENIX ATC'22)*, Carlsbad, CA, Jul. 2022.

[EuroSys'22] Hsuan-Chi Kuo, Kai-Hsun Chen, Yicheng Lu, Dan Williams, Sibin Mohan, and Tianyin Xu, **Verified Programs Can Party: Optimizing Kernel Extensions via Post-Verification In-Kernel Merging**, In *Proceedings of the 17th European Conference on Computer Systems (EuroSys'22)*, Rennes, France, Apr. 2022.

[ASPLOS'22] Jovan Stojkovic, Dimitrios Skarlatos, Apostolos Kokolis, Tianyin Xu, and Josep Torrellas, **Parallel Virtualized Memory Translation**, In *Proceedings of the 27th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'22)*, Lausanne, Switzerland, Feb. 2022.

[NDSS'22] Muhammad Adil Inam, Wajih Ul Hassan, Ali Ahad, Adam Bates, Rashid Tahir, Tianyin Xu, and Fareed Zaffar, **Forensic Analysis of Configuration-based Attacks**, In *Proceedings of the 29th Network and Distributed System Security Symposium (NDSS'22)*, SD, CA, Feb. 2022.

[OOPSLA'21] Jialu Zhang, Ruzica Piskac, Ennan Zhai, and Tianyin Xu, **Static Detection of Silent Misconfigurations with Deep Interaction Analysis**, In *Proceedings of the 36th ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'21)*, Chicago, IL, October 2021.

[FSE'21] Wenyu Wang, Wei Yang, Tianyin Xu, and Tao Xie, **Vet: Identifying and Avoiding UI Exploration Tarpits**, In *Proceedings of the 2021 ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'21)*, Virtual Event, August 2021. **SIGSOFT Distinguished Paper Award**

[Sigcomm'21] Yang Li, Hao Lin, Zhenhua Li, Liangyi Gong, Feng Qian, Yunhao Liu, Xianlong Xin, and Tianyin Xu, **A Nationwide Study on Cellular Reliability: Measurement, Analysis, and Enhancements**, In *Proceedings of the 2020 Annual Conference of the ACM Special Interest Group on Data Communication (Sigcomm'21)*, Virtual Event, August 2021. **Best Student Paper Award**

[ISSTA'21] Runxiang Cheng, Lingming Zhang, Darko Marinov, and Tianyin Xu, **Test-Case Prioritization for Configuration Testing**, In *Proceedings of the 30th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA'21)*, Virtual Event, July 2021. **SIGSOFT Distinguished Paper Award**

[HotOS'21] Xudong Sun, Lalith Suresh, Aishwarya Ganesan, Ramnatthan Alagappan, Michael Gasch, Lilia Tang, and Tianyin Xu, **Reasoning about modern datacenter infrastructures using partial histories**, In *Proceedings of the 18th Workshop on Hot Topics in Operating Systems (HotOS-XVIII)*, Virtual Event, May 2021.

[HotOS'21] Andrew Yoo, Yuanli Wang, Ritesh Sinha, Shuai Mu, and Tianyin Xu, **Fail-slow fault tolerance needs programming support**, In *Proceedings of the 18th Workshop on Hot Topics in Operating Systems (HotOS-XVIII)*, Virtual Event, May 2021.

[ISSTA'21] Runxiang Cheng, Lingming Zhang, Darko Marinov, and Tianyin Xu, **Test-Case Prioritization for Configuration Testing**, In *Proceedings of the 30th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA'21)*, Virtual Event, Jul. 2021.

[ICSE'21] Yuanliang Zhang, Haochen He, Owolabi Legunsen, Shanshan Li, Wei Dong, and Tianyin Xu, **An Evolutionary Study of Configuration Design and Implementation in Cloud Systems**, In *Proceedings of the 43rd International Conference on Software Engineering (ICSE'21)*, Virtual Event, May 2021.

[NSDI'21] Xinlei Yang, Xianlong Wang, Zhenhua Li, Feng Qian, Liangyi Gong, Rui Miao, Yunhao Liu, and Tianyin Xu, **Fast and Light Bandwidth Testing for Internet Users**, In *Proceedings of the 18th USENIX Symposium on Networked Systems Design and Implementation (NSDI'21)*, Virtual Event, Apr. 2021.

[OSDI'20] Xudong Sun, Runxiang Cheng, Jianyan Chen, Elaine Ang, Owolabi Legunsen, and Tianyin Xu, **Testing Configuration Changes in Context to Prevent Production Failures**, In *Proceedings of the 14th USENIX Symposium on Operating Systems Design and Implementation (OSDI'20)*, Virtual Event, Nov. 2020.

[FSE'20] Qingrong Chen, Teng Wang, Owolabi Legunsen, Shanshan Li, and Tianyin Xu, **Understanding and Discovering Software Configuration Dependencies in Cloud and Datacenter Systems**, In *Proceedings of the 2020 ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'20)*, Virtual Event, Nov. 2020.

[SC'20] Saurabh Jha, Shengkun Cui, Subho Banerjee, Tianyin Xu, Jeremy Enos, Mike Showerman, Zbigniew T. Kalbarczyk, and Ravishankar K. Iyer, **Understanding, Detecting, and Localizing Failures in High-Performance Storage Systems**, In *Proceedings of the International Conference for High-Performance Computing, Networking, Storage and Analysis (SC'20)*, Virtual Event, Nov. 2020. **Nominated for both Best Paper and Best Student Paper**

[MICRO'20] Dimitrios Skarlatos, Qingrong Chen, Jianyan Chen, Tianyin Xu, and Josep Torrellas, **Draco: Architectural and Operating System Support for System Call Security**, In *Proceedings of the 53rd IEEE/ACM International Symposium on Microarchitecture (MICRO-53)*, Virtual Event, Oct. 2020.

[MobiCom'20] Mingliang Li, Hao Lin, Cai Liu, Zhenhua Li, Feng Qian, Yunhao Liu, Nian Sun, Tianyin Xu, **Aging or Glitching? Why Does Android Stop Responding and What Can We Do About It?** In *Proceedings of the 26th Annual International Conference on Mobile Computing and Networking (MobiCom'20)*, Virtual Event, Sep. 2020.

[Sigmetrics'20] Hsuan-Chi Kuo, Jianyan Chen, Sibin Mohan, and Tianyin Xu, **Set the Configuration for the Heart of the OS: On the Practicality of Operating System Kernel Debloating**, In *Proceedings of the 2020 ACM SIGMETRICS Conference (Sigmetrics'20)*, Virtual Event, Jun. 2020.

[ASPLOS'20] Dimitrios Skarlatos, Apostolos Kokolis, Tianyin Xu, and Josep Torrellas, **Elastic Cuckoo Page Tables: Rethinking Virtual Memory Translation for Parallelism**, In *Proceedings of the 25th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'20)*, Virtual Event, Mar. 2020. **Best Paper Award**.

[FAST'20] Jian Chen, Minghao Zhao, Zhenhua Li, Ennan Zhai, Feng Qian, Hongyi Chen, and Yunhao Liu, and Tianyin Xu, **Lock-Free Collaboration Support for Cloud Storage Services with Operation Inference and Transformation**, In *Proceedings of the 18th USENIX Conference on File and Storage Technologies (FAST'20)*, Santa Clara, CA, Feb. 24-27, 2020.

[CCS'19] Chengcheng Xiang, Yudong Wu, Bingyu Shen, Mingyao Shen, Haochen Huang, Tianyin Xu, Yuanyuan Zhou, Cindy Moore, Xinxin Jin, and Tianwei Sheng, **Towards Continuous Access Control Validation and Forensics**, In *Proceedings of the 26th ACM Conference on Computer and Communications Security (CCS'19)*, London, UK, Nov. 11-15, 2019.

[SOSP'19] David Chou, Tianyin Xu, Kaushik Veeraraghavan, Andy Newell, Sonia Margulis, Lin Xiao, Pol Mauri Ruiz, Justin Meza, Kiryong Ha, Shruti Padmanabha, Kevin Cole, and Dmitri Perelman, **Taiji: Managing Global User Traffic for Large-Scale Heterogenous Internet Services at the Edge**, In *Proceedings of the 27th ACM Symposium on Operating Systems Principles (SOSP'19)*, Oct. 27-30, 2019, Huntsville, Ontario, Canada.

[MobiCom'19] Qifan Yang, Zhenhua Li, Yunhao Liu, Hai Long, Yuanchao Huang, Jiaming He, Tianyin Xu, and Ennan Zhai. **Mobile Gaming on Personal Computers with Direct Android Emulation**, In *Proceedings of the 25th Annual International Conference on Mobile Computing and Networking (MobiCom'19)*, Oct. 21-25, 2019, Los Cabos, Mexico. **Best Demo Award**.

[MobiSys'19] Ao Xiao, Yunhao Liu, Yang Li, Feng Qian, Zhenhua Li, Sen Bai, Yao Liu, Tianyin Xu, and Xianlong Xin. **An In-depth Study of Commercial MVNO: Measurement and Optimization**, In *Proceedings of the 17th Annual International Conference on Mobile Systems, Applications, and Services (MobiSys'19)*, June 17-21, 2019, Seoul, Republic of Korea.

[MobiSys'19] Yuxuan Yan, Zhenhua Li, Qi Alfred Chen, Christo Wilson, Tianyin Xu, Ennan Zhai, Yong Li, and Yunhao Liu. **Understanding and Detecting Overlay-based Android Malware at Market Scales**, In *Proceedings of the 17th Annual International Conference on Mobile Systems, Applications, and Services (MobiSys'19)*, June 17-21, 2019, Seoul, Republic of Korea.

[MobiSys'19] Fan Dang, Zhenhua Li, Yunhao Liu, Ennan Zhai, Qi Alfred Chen, Tianyin Xu, Yan Chen, and Jingyu Yang. **Understanding Fileless Attacks on Linux-based IoT Devices with HoneyCloud**, In *Proceedings of the 17th Annual International Conference on Mobile Systems, Applications, and Services (MobiSys'19)*, June 17-21, 2019, Seoul, Republic of Korea.

[IMC'18] Justin Meza, Tianyin Xu, Kaushik Veeraraghavan, and Onur Mutlu, **A Large-Scale Study of Data Center Network Reliability**, In *Proceedings of the 2018 Internet Measurement Conference (IMC'18)*, Oct. 31-Nov. 2, 2018, Boston, MA.

[OSDI'18] Kaushik Veeraraghavan, Justin Meza, Scott Michelson, Sankaralingam Panneerselvam, Alex Gyori, David Chou, Sonia Margulis, Daniel Obenshain, Shruti Padmanabha, Ashish Shah, Yee Jiun Song, and Tianyin Xu, **Maelstrom: Mitigating Datacenter-level Disasters by Draining Interdependent Traffic Safely and Efficiently**, In *Proceedings of the 13th USENIX Symposium on Operating Systems Design and Implementation (OSDI'18)*, Oct. 8-10, 2018, Carlsbad, CA.

[ICSE'18 NIER] Tianyin Xu and Darko Marinov, **Mining Container Image Repositories for Software Configurations and Beyond**, In *Proceedings of the 40th International Conference on Software Engineering, New Ideas and Emerging Results (ICSE'18, NIER)*, May 27-Jun. 3, 2018, Gothenburg, Sweden.

[FAST'18] He Xiao, Zhenhua Li, Ennan Zhai, Tianyin Xu, Yang Li, Yonghe Wang, Quanlu Zhang, and Yao Liu, **Towards Web-based Delta Synchronization for Cloud Storage Services**, In *Proceedings of the 16th USENIX Conference on File and Storage Technologies (FAST'18)*, Feb. 12-15, 2018, Oakland, CA.

[CHI'17] Tianyin Xu, Han Min Naing, Le Lu, and Yuanyuan Zhou, **How Do System Administrators Resolve Access-Denied Issues in the Real World?** In *Proceedings of the 35th Annual CHI Conference on Human Factors in Computing Systems (CHI'17)*, May 6-11, 2017, Denver, CO.

[OSDI'16] 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 (OSDI'16)*, Nov. 2-4, 2016, Savannah, GA. **Jay Lepreau Best Paper Award**.

[MobiSys'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 International Conference on Mobile Systems, Applications, and Services (MobiSys'16)*, Jun. 26-30, 2016, Singapore, Singapore.

[EuroSys'16] Xinxin Jin, Peng Huang, Tianyin Xu, and Yuanyuan Zhou, **NChecker: Saving Mobile App Developers from Network Disruptions**, In *Proceedings of the 11th ACM European Conference on Computer Systems (EuroSys'16)*, Apr. 18-21, 2016, London, UK.

[NSDI'16] Zhenhua Li, Weiwei Wang, Tianyin Xu, Xin Zhong, Xiang-Yang Li, Yunhao Liu, Christo Wilson, and Ben Y. Zhao, **Exploring Cross-Application Cellular Traffic Optimization with Baidu TrafficGuard**, In *Proceedings of the 13th USENIX Symposium on Networked Systems Design and Implementation (NSDI'16)*, Mar. 16-18, 2016, Santa Clara, CA.

[ESEC/FSE'15] Tianyin Xu, Long Jin, Xuepeng Fan, Yuanyuan Zhou, Shankar Pasupathy, and Rukma Talwadker, **Hey, You Have Given Me Too Many Knobs! Understanding and Dealing with Over-Designed Configuration in System Software**, In *Proceedings of the 10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE'15)*, Aug. 31-Sep. 4, 2015, Bergamo, Italy.

[IMC'15] Zhenhua Li, Christo Wilson, Tianyin Xu, Yao Liu, Zhen Lu, and Yinlong Wang, **Offline Downloading in China: A Comparative Study**, In *Proceedings of the 15th ACM Internet Measurement Conference (IMC'15)*, Oct. 28-30, 2015, Tokyo, Japan.

[IMC'14] Zhenhua Li, Cheng Jin, Tianyin Xu, Christo Wilson, Yao Liu, Linsong Cheng, Yunhao Liu, Yafei Dai, and Zhi-Li Zhang, **Towards Network-level Efficiency for Cloud Storage Services**, In *Proceedings of the 14th ACM Internet Measurement Conference (IMC'14)*, Nov. 5-7, 2014, Vancouver, Canada.

[ASPLOS'14] Jiaqi Zhang, Lakshminarayanan Renganarayana, Xiaolan Zhang, Niyu Ge, Vasanth Bala, Tianyin Xu, and Yuanyuan Zhou, **EnCore: Exploiting System Environment and Correlation Information for Misconfiguration Detection**, In *Proceedings of the 19th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'14)*, Mar. 1-5, 2014, Salt Lake City, UT.

[SOSP'13] 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 (SOSP'13)*, Nov. 3-6, 2013, Farmington, PA.

Journal Articles

[TOCS'24] Hao Lin, Zhenhua Li, Di Gao, Yunhao Liu, Feng Qian, and Tianyin Xu, **Trinity: High-Performance and Reliable Mobile Emulation through Graphics Projection**, *ACM Transactions on Computer Systems*, Accepted on January 2024.

[CACM'20] Hsuan-Chi Kuo, Jianyan Chen, Sibin Mohan, and Tianyin Xu, **Set the Configuration for the Heart of the OS: On the Practicality of Operating System Kernel Debloating,**, Communications of the ACM, Vol. 65, No. 5, pp. 101–109, May 2022.

[TOMPECS'19] Zhenhua Li, Yongfeng Zhang, Yunhao Liu, Tianyin Xu, Ennan Zhai, Yao Liu, Xiaobo Ma, Zhenyu Li, **A Quantitative and Comparative Study of Network-Level Efficiency for Cloud Storage Services**, *ACM Transactions on Modeling and Performance Evaluation of Computing Systems*, 4(1): 3:1-3:32, 2019.

[TON'16] Lei Jiao, Jun Li, Tianyin Xu, Wei Du, and Xiaoming Fu, **Optimizing Cost for Online Social Networks on Geo-Distributed Clouds**, *IEEE/ACM Transactions on Networking*, 24(1): 99-112, 2016.

[CSUR'15] Tianyin Xu and Yuanyuan Zhou, **Systems Approaches to Tackling Configuration Errors: A Survey**, *ACM Computing Surveys*, Volume 47, Number 4, Article 70, Jul. 2015.

ePrint Archive

[arXiv'23] Jinghao Jia, YiFei Zhu, Dan Williams, Andrea Arcangeli, Claudio Canella, Hubertus Franke, Tobin Feldman-Fitzthum, Dimitrios Skarlatos, Daniel Gruss, and Tianyin Xu, **Programmable System Call Security with eBPF**, *arXiv:2302.10366 [cs.OS]*, Feb. 2023.

[arXiv'21] Wenyu Wang, Wei Yang, Tianyin Xu and Tao Xie, **Speculating Ineffective UI Exploration via Trace Analysis**, *arXiv:2102.06377 [cs.SE]*, Feb. 2021.

[arXiv'19] Tianyin Xu and Owolabi Legunsen, **Configuration Testing: Testing Configuration Values as Code and with Code**, *arXiv:1905.12195 [cs.SE]*, Jul. 2019.

[arXiv'16] Tianyin Xu, Vineet Pandey, and Scott Klemmer, **An HCI View of Configuration Problems**, *arXiv:1601.01747 [cs.HC]*, Jan. 2016.

Funding

Selected Tech Transfer, Software Release, and Press Coverage

Tech transfer & software release	Draco [MICRO'20] is upstreamed into the Linux kernel v5.11
	◇ `https://github.com/torvalds/linux/search?p=1&q=yifei+seccomp&type=commits`

Acto [SOSP'23] received an IBM grant to open-source it to the broader community.

⋄ `https://github.com/xlab-uiuc/acto`

Sieve [OSDI'22] has received 290+ stars and 20 forks on GitHub.

⋄ `https://github.com/sieve-project/sieve`

Ctest [OSDI'20] is used by several research projects and used in a programming lab of CS 527.

⋄ `https://github.com/xlab-uiuc/openctest`

Impact   Acto [SOSP'23] and Sieve [OSDI'22] uncovered 100+ critical defects in popular Kubernetes controllers (the majority of them have been fixed).

Rainmaker [NSDI'23] uncovered 70+ critical error-handling bugs in Azure and AWS based cloud applications (the majority of them have been fixed)

Ctest [OSDI'20], PCheck [OSDI'16], and Spex [SOSP'13] led to more than a hundred code improvements—benefiting thousands of configuration parameters—in both commercial and open-source systems including NetApp Data ONTAP products, Apache HTTP server, Hadoop, HBase, Squid, MySQL, PostgreSQL, VSFTP, ZooKeeper, Alluxio, Accumulo, and Redis.

Spex [SOSP'13] influenced the Squid web proxy to improve its configuration library.

Coverage   Acto [SOSP'23] is selected as a solution showcase by KubeCon+CloudNativeCon Europe.

Rex [HotOS'23] is covered and actively discussed by Hacker News.

Cross-system failure analysis [EuroSys'23] is invited for presentation by SREcon24 Americas.

Relational Debugging [OSDI'23] is featured by SIGOPS Blog.

Rainmaker [NSDI'23] is covered by The Weekend Read.

Seccomp-eBPF is covered by LWN.net and is selected by Linux Plumbers Conference.

The CXL.mem analysis [MICRO'23] is covered by Semiconductor Engineering, Intel Community Blog, Hacker News, and The New Stack.

Sieve [OSDI'22] is covered by VMware Office of the CTO Blog, Hacker News, KBE Insider, IllinoisCS News, Micah Lerner's Paper Review, etc., and is selected for presentation at Kube-Con+CloudNativeCon North America.

Draco [MICRO'20] and its Linux adoption is covered by LWN.net, Phoronix, IllinoisCS News, C3SR News, and CSL News.

Taiji [SOSP'19] is covered by The Morning Paper.

Maelstrom [OSDI'18] is covered by The Morning Paper.

WebRSync [FAST'18] is covered by The Morning Paper.

Access-control misconfiguration study [CHI'17] is included in W3C Authentication Reference.

PCheck [OSDI'16] is covered by The Morning Paper and is referenced by configuration libraries like PurConfig and Cirix.

The configuration design analysis [FSE'15] is covered by It Will Never Work in Theory.

Service

External Service

2020—	ACM SIGOPS Blog (Editor)
2020—	Journal of Systems Research (Area chair)
2024	EuroSys, USENIX ATC (Program committee)
2023	OSDI, NSDI, DSN, SIGMETRICS (Program committee)
2022	SIGMETRICS, SYSTOR, EdgeSys (Program committee)
2021	SOSP (Virtual platform chair)
	EuroSys (Sponsorship chair)
	HotOS, ICSE, Sigmetrics SRC (Program committee)
2020	OSDI, MobiSys, FSE Tool/Demo (Program committee)

2019	SOSP, APSys, SEConfig, EdgeSys (Program committee)
2018	ICDCS, EuroSys Doctoral Workshop, EdgeSys (Program committee)
2017	SOSP SRC (Program committee)
2016	ASPLOS (PC assistant)
2015	USENIX LISA (Academic review committee)
2014	ICNP PhD Forum (Program committee)
2013	ICNP PhD Forum (Program committee)
2010	SIGCOMM (Scribe)

Journal reviewer	IEEE Transactions on Cloud Computing
	IEEE Transactions on Computers
	IEEE Transactions on Reliability
	IEEE Transactions on Parallel and Distributed Systems
	IEEE Transactions on Software Engineering
	IEEE Transactions on Network and Service Management
	IEEE Transactions on Mobile Computing
	Elsevier Journal of Reliability Engineering and System Safety
	Springer Journal of Cloud Computing
	Springer Journal of Empirical Software Engineering
	Springer Journal of Computer Science and Technology

Departmental Service

2021.9–2024.6	Faculty Recruiting Committee
2020.9–2023.6	CS CARES Committee
2020.9–2024.6	CS Advisory Committee
2019.9–2020.6	Faculty Recruiting Committee
2018.9-2019.6	Undergraduate Study Committee

Educational Service

2023.11	Panelist, "A day in the life of a CS researcher", CRA UR2PhD Undergraduate Research Methods Course
2023.7	Panelist, "How to Do Research (Part 1): Coming up to Speed", Illinois CS REU Seminar Series
2022.5	Panelist, "A view from the trenches", ICSE New Faculty Symposium
2020.7	Panelist, "Networking", Illinois CS REU Seminar Series
2020.11	Mentor, EECS Rising Star Workshop, 2020
2019.7	Panelist, "Presentation and Other Verbal Communication Skills", Illinois CS REU Seminar Series
2019.7	Panelist, "Career paths with a PhD in CS", Illinois CS REU Seminar Series

Talks

⬦ **Cross-System Interaction Failures: Don't Fail through the Cracks**
- ○ SREcon24 Americas, Mar. 2024.

⬦ **Designing an Inclusive OS Interface for Virtual Memory Translation**
- ○ Intel ArchFest, Sep. 2023.

⬦ **Correctness and Fault Tolerance of Kubernetes Controllers**
- ○ MPI-SWS Systems Seminar, Oct. 2023.
- ○ Dagstuhl Seminar 23082 (Resilient Software Configuration and Infrastructure Code Analysis), Feb. 2023.

⬦ **Configuration Validation and Testing for Cloud Systems: Research and Practice**
- ○ Dagstuhl Seminar 23082 (Resilient Software Configuration and Infrastructure Code Analysis), Feb. 2023.

⬦ **Continuous configuration testing**

- ○ Peking University, 12/12/2021, Online
- ○ CONFLANG, 10/18/2021, Online
- ○ Facebook Core Systems Faculty Speaker Series, 9/29/2021, Online
- ◇ **Hardening cloud and datacenter systems against configuration errors**
  - ○ Salesforce Inc., 5/9/2018, San Francisco, CA
  - ○ University of California Los Angeles, 4/25/2017, Los Angeles, CA
  - ○ Max Planck Institute for Software Systems, 3/24/2017, Kaiserslautern, Germany
  - ○ University of Waterloo, 3/16/2017, ON, Canada
  - ○ University of Illinois at Urbana–Champaign, 3/13/2017, Urbana, IL
  - ○ Georgia Institute of Technology, 2017/3/8, Atlanta, GA
  - ○ University of California Santa Barbara, 3/2/2017, Santa Barbara, CA
  - ○ Pennsylvania State University, 2/24/2017, State College, PA
  - ○ New York University, 2/22/2017, New York, NY
  - ○ University of California Santa Cruz, 2/17/2017, Santa Cruz, CA
- ◇ **Early detection of configuration errors to reduce failure damage**
  - ○ OSDI, 11/4/2016, Savannah, GA
  - ○ CNS Review 4/20/2016, San Diego, CA
  - ○ NetApp Inc., 3/1/2016, Sunnyvale, CA
- ◇ **Exploring cross-app cellular traffic optimization w/ Baidu TrafficGuard**
  - ○ NSDI, 3/18/2016, Santa Clara, CA
- ◇ **Proactive methods in dealing with datacenter misconfigurations**
  - ○ Microsoft Research, 3/4/2016, Redmond, WA
  - ○ CNS Review, 8/8/2013, San Diego, CA
- ◇ **Hey, you have given me too many knobs!**
  - ○ ESEC/FSE, 9/3/2015, Bergamo, Italy
- ◇ **Do not blame users for misconfigurations**
  - ○ SOSP, 11/5/2013, Farmington, PA
  - ○ NetApp Inc., 9/6/2012, Sunnyvale, CA

Teaching

2024 Spring	UIUC CS 523: Advanced Operating Systems
2024 Spring	UIUC CS 591SN: Systems Reading Group
2023 Fall	UIUC CS 423: Operating System Design
2023 Fall	UIUC CS 591SN: Systems Reading Group
2023 Spring	UIUC CS 523: Advanced Operating Systems
2023 Spring	UIUC CS 591SN: Systems Reading Group
2022 Fall	UIUC CS 423: Operating System Design
2022 Fall	UIUC CS 591SN: Systems Reading Group
2022 Fall	UIUC CS 591SE: Software Engineering Seminar
2022 Spring	UIUC CS 598XU: Reliability of Cloud-Scale Systems
2022 Spring	UIUC CS 591SN: Systems Reading Group
2022 Spring	UIUC CS 591SE: Software Engineering Seminar
2021 Fall	UIUC CS 523: Advanced Operating Systems
2021 Fall	UIUC CS 591DS: Systems Reading Group
2021 Fall	UIUC CS 591SE: Software Engineering Seminar
2021 Spring	UIUC CS 591IG: Systems Reading Group
2021 Spring	UIUC CS 591SE: Software Engineering Seminar
2020 Fall	UIUC CS 523: Advanced Operating Systems
2020 Fall	UIUC CS 591IG: Systems Reading Group
2020 Fall	UIUC CS 591SE: Software Engineering Seminar
2020 Spring	UIUC CS 423: Operating System Design

2020 Spring	UIUC CS 591IG: Systems Reading Group
2020 Spring	UIUC CS 591SE: Software Engineering Seminar
2019 Fall	UIUC CS 523: Advanced Operating Systems
2019 Fall	UIUC CS 591SN: Systems Reading Group
2019 Fall	UIUC CS 591SE: Software Engineering Seminar
2019 Spring	UIUC CS 598TXU: Reliable Software Systems
2019 Spring	UIUC CS 591SN: System and Networking Seminar
2018 Fall	UIUC CS 598TXU: Reliability of Cloud-Scale Systems

Students

PhD Students

2025 (expected)	Xudong Sun, UIUC CS (**Yunni & Maxine Pao Memorial Fellowship**)
2025 (expected)	Jinghao Jia, UIUC CS (**Richard T. Cheng Fellowship**, **Outstanding TA Award**)
2026 (expected)	Jiawei (Tyler) Gu, UIUC CS (**Gene Golub Fellowship)**)
2026 (expected)	Shuai Wang, UIUC CS (co-advised by Darko Marinov)
2026 (expected)	Siyuan Chai, UIUC CS
2026 (expected)	Yinfang Chen, UIUC CS
2022.6	Wenyu Wang (co-advised by Tao Xie), UIUC CS (**3M Foundation Fellowship**), First job: Meta

Master's Students

2024 (expected)	Xinyu (Alex) Lian, MS, UIUC CS (co-advised by Darko Marinov)
2024 (expected)	Anna Mazhar, MS, UIUC CS
2024 (expected)	Pratik Rajesh Sampat, MS, UIUC CS (co-advised by Saugata Ghose)
2024 (expected)	Jiyuan Zhang, MS, UIUC CS
2023.12	Ruowen Qin, MCS, UIUC CS, First job: Red Hat
2023.6	Wenqing Luo, MS, UIUC CS (co-advised by Aishwarya Ganesan and Ramnatthan Alagappan), First job: Apple (Cloud Infra)
2023.6	Parth Thakkar, MS, UIUC CS, First job: Meta (Dev Infra)
2022.12	Kai-Hsun (Kevin) Chen, M.Eng., UIUC ECE, First job: Anyscale
2022.6	Wentao Zhang, MS, SJTU, First job: UIUC (PhD program)
2021.9	Jianyan Chen, MS, UIUC CS, First job: Trend Micro
2021.6	Andrew Yoo, MS, UIUC CS (co-advised by Shuai Mu) **(Siebel Scholar)**, First-job: Whova (Infra)
2021.6	Kele Huang, MS, CAS, First job: Columbia University (PhD program)
2020.12	Zhanghao Chen, MCS, UIUC CS, First job: ByteDance (Stream Computing Infra)
2020.6	Qingrong Chen, MS, UIUC CS **(Siebel Scholar)**, First job: Facebook (AI Infra)
2020.6	Kaiyuan Zhang, MS, UTD/UIUC, First job: Purdue University (PhD program)
2019.12	Ran (Elaine) Ang, MS, UIUC CS, First job: Google (Spanner)

Undergraduate Students

2025 (expected)	William Zheng, UIUC CS
2025 (expected)	Mark Zhang, UIUC CS
2024 (expected)	Zicheng Ma, UIUC ECE
2024 (expected)	Fan Chung, UIUC/NYCU
2024 (expected)	Cheng Ding, USTC (co-advised by Owolabi Legunsen)
2024 (expected)	Saad Sher Alam, LUMS
2023.12	Peizhe Liu, UIUC ECE, First job: UIUC (MS program)

2023.6	Yuxuan (Matt) Jiang, UIUC ECE, First job: University of Michigan (PhD program)
2023.6	Feiran (Alex) Qin, ShanghaiTech/UIUC, First job: North Carolina State University (PhD program)
2023.6	Muhammad Taha, LUMS, First job: Purdue University (MS program)
2023.6	Kunle Li, UIUC ECE, First job: Carnegie Mellon University (MS program)
2022.6	Xinyu Lian, UIUC ECE, First job: UIUC (MS program)
2022.6	Yicheng Lu, UIUC ECE, First job: UIUC (MS program)
2022.6	Fan Wen, USTC, First job: Purdue University (PhD program)
2021.6	YiFei Zhu, BE, UIUC ECE **(Highest Honor, University Honor)**, First job: Google (Kernel)

Postdoc and Visitors

2023.9-2025.6	Jongyul Kim, Postdoc Research Fellow, UIUC CS
2023.9-2024.6	Wenjie Ma, Research Scholar, UIUC CS
2023.10-2024.4	Hao Lin, Visiting PhD Student (Tsinghua University), UIUC CS
2021.9-2022.6	Chaitanya B. Bhandari, Research Scholar, UIUC CS, First job: UIUC (MS program)
2019.10-2020.4	Yuanliang Zhang, Visiting PhD Student (NUDT), UIUC CS, First job: Assistant Professor at NUDT

Thesis Committee

2024 (expected)	Tzu-Bin Yan (advisor: Kirill Levchenko), UIUC
2024 (expected)	Jie Huang (advisor: Kevin Chen-Chuan Chang), UIUC
2024 (expected)	Hongpeng Guo (advisor: Klara Nahrstedt), UIUC
2023.11	Bingzhe Liu (advisor: Brighten Godfrey), UIUC
2023.8	Dan Plyukhin (advisor: Gul Agha), UIUC
2022.9	Zhe Yang (advisor: Klara Nahrstedt), UIUC
2022.4	Hsuan-Chi Kuo (advisor: Sibin Mohan), UIUC
2022.4	Apostolos Kokolis (advisor: Josep Torrellas), UIUC, **David J. Kuck Outstanding PhD Thesis Award**
2022.1	Atul Sandur (advisor: Gul Agha), UIUC
2021.10	Saurabh Jha (advisor: Ravishankar K. Iyer), UIUC
2021.7	Ali Kheradmand (advisors: Brighten Godfrey and Grigore Roşu), UIUC
2021.6	Wing Lam (advisors: Tao Xie and Darko Marinov), UIUC, **ACM SIGSOFT Outstanding Doctoral Dissertation Award**
2020.8	Dimitrios Skarlatos (advisor: Josep Torrellas), UIUC, **ACM SIGARCH - IEEE-CS TCCA Outstanding Dissertation Award, David J. Kuck Outstanding PhD Thesis Award**
2020.7	Faria Kalim (advisor: Indranil Gupta), UIUC
2020.5	Tarek Elgamal (advisor: Klara Nahrstedt), UIUC
2020.3	Santhosh Prabhu (advisor: Matthew Caesar), UIUC