Yuanchao Xu

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Research Interests

Computer architecture, computer security, computer systems, software-hardware codesign, cloud computing, and memory systems.

Professional Appointments

Sept. 2023 - now	**University of California Santa Cruz** Tenure-track Assistant Professor in Computer Science

Education

Aug. 2018 - Dec. 2023	**North Carolina State University** Ph.D. in Computer Science Advisors: Dr. Xipeng Shen and Dr. Yan Solihin
Aug. 2015 - June 2018	**Tsinghua University** M.S. in Computer Science Advisor: Dr. Wei Xue
Aug. 2011 - June 2015	**Jilin University** B.S. in Software Engineering

Research Experience

May. 2021 - Dec. 2022	**Google, System Research@Google (SRG)** Research Intern & Student Researcher Mentors: Dr. David E. Culler, Dr. Kimberly Keeton, and Dr. Ravi Rajwar
May 2019 - Aug. 2019	**Oak Ridge National Laboratory** Research Intern Mentors: Dr. Mehmet E. Belviranli and Dr. Jeffrey S. Vetter
Aug. 2018 - Aug. 2023	**North Carolina State University** Research Assistant Advisors: Dr. Xipeng Shen and Dr. Yan Solihin
March 2017 - Sept. 2017	**ETH Zürich** Research Intern Mentors: Dr. Torsten Hoefler and Dr. Tobias Grosser

Peer-reviewed Conference Publications

HPDC 2024	Xinning Hui, **Yuanchao Xu**, Zhishan Guo, and Xipeng Shen, "ESG: Pipeline-Conscious Efficient Scheduling of DNN Workflows on Serverless Platforms with Shareable GPUs", the 33rd International Symposium on High-Performance Parallel and Distributed Computing, 2024. to appear
HPCA 2024	**Yuanchao Xu**, James Pangia, Chencheng Ye, Xipeng Shen and Yan Solihin, "Data Enclave: A Data-Centric Trusted Execution Environment", the 30th IEEE International Symposium on High-Performance Computer Architecture, 2024. **[Paper]**

ASPLOS 2023	Chencheng Ye, **Yuanchao Xu**, Xipeng Shen, Yan Sha, Xiaofei Liao, Hai Jin, and Yan Solihin, “SpecPMT: Speculative Logging for Resolving Crash Consistency Overhead of Persistent Memory”, the 28th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, 2023. **[Paper]**
HPCA 2023	Chencheng Ye,**Yuanchao Xu**, Xipeng Shen, Yan Sha, Xiaofei Liao, Hai Jin, and Yan Solihin, “Reconciling Selective Logging and Hardware Persistent Memory Transaction”, the 29th IEEE International Symposium on High-Performance Computer Architecture, 2023. **[Paper]**
ISCA 2022	**Yuanchao Xu**, Chencheng Ye, Yan Solihin, Xipeng Shen, “FFCCD: Fence-Free Crash-Consistent Concurrent Defragmentation for Persistent Memory”, the 49th ACM/IEEE International Symposium on Computer Architecture, 2022. **[Paper][Slides]**
HPCA 2022	**Yuanchao Xu**, Chencheng Ye, Xipeng Shen, and Yan Solihin, “Temporal Exposure Reduction Protection for Persistent Memory”, the 28th IEEE International Symposium on High-Performance Computer Architecture, 2022. **[Paper][Slides]**
RTAS 2022	Hsin-Hsuan Sung, **Yuanchao Xu**, Jiexiong Guan, Wei Niu, Bin Ren, Yanzhi Wang, Shaoshan Liu, Xipeng Shen, “Brief industry paper: Enabling level-4 autonomous driving on a single $1 k off-the-shelf card.”, the 28th Real-Time and Embedded Technology and Applications Symposium, 2022. **[Paper]**
MICRO 2021	**Yuanchao Xu**, Mehmet Esat Belviranili, Xipeng Shen and Jeffrey Vetter, “PCCS: Processor-Centric Contention Slowdown Model for Heterogeneous System-on-chips”, the 54th IEEE/ACM International Symposium on Microarchitecture, 2021. **[Paper][Slides]**
ICDM 2021	Hui Guan, Umang Chaudhary, **Yuanchao Xu**, Lin Ning, Lijun Zhang, and Xipeng Shen, “Recurrent Neural Networks Meet Context-Free Grammar: Two Birds with One Stone”, the IEEE International Conference on Data Mining, 2021. **[Paper]**
OOPSLA 2021	Guoqiang Zhang, **Yuanchao Xu**, Xipeng Shen, and Işil Dillig, “UDF to SQL Translation through Compositional Lazy Inductive Synthesis”, the ACM SIGPLAN Object Oriented Programming Languages, Systems and Applications, 2021. **[Paper]**
ISCA 2021	Chencheng Ye, **Yuanchao Xu**, Xipeng Shen, Xiaofei Liao, Hai Jin and Yan Solihin, “Supporting Legacy Libraries on Non-Volatile Memory: A User-Transparent Approach”, the 48th ACM/IEEE International Symposium on Computer Architecture, Online, June 2021. **[Paper]**
HPCA 2021	Chencheng Ye, **Yuanchao Xu**, Xipeng Shen, Xiaofei Liao, Hai Jin and Yan Solihin, “Hardware-Based Address-Centric Acceleration of Key-Value Store”, the 27th IEEE International Symposium on High-Performance Computer Architecture, Seoul, February 2021. **[Paper]**
ISCA 2020	**Yuanchao Xu**, Chencheng Ye, Yan Solihin, Xipeng Shen, “Hardware-Based Domain Virtualization for Intra-Process Isolation of Persistent Memory Objects”, the 47th ACM/IEEE International Symposium on Computer Architecture, Online, June 2020. **[Paper][Slides]**
ASPLOS 2020	**Yuanchao Xu**, Yan Solihin, Xipeng Shen, “MERR: Improving Security of Persistent Memory Objects via Efficient Memory Exposure Reduction and Randomization”, the 25th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Lausanne, Switzerland, March 2020. **[Paper][Slides]**
IPDPS 2018	Shizhen Xu, **Yuanchao Xu**, Wei Xue, Xipeng Shen, Xiaomeng Huang, Guangwen Yang, “Taming the “Monster”: Overcoming Program Optimization Challenges on SW26010 Through Precise Performance Modeling”, the 32nd IEEE International Parallel and Distributed Processing Symposium, Vancouver, Canada, May 2018. **[Paper]**

SC 2016	Haohuan Fu, Junfeng Liao, Wei Xue, Lanning Wang, Dexun Chen, Long Gu, Jinxiu Xu, Nan Ding, Xinliang Wang, Conghui He, Shizhen Xu, Yishuang Liang, Jiarui Fang, **Yuanchao Xu**, et al, "Refactoring and optimizing the community atmosphere model (CAM) on the sunway taihulight supercomputer", the International Conference for High Performance Computing, Networking, Storage and Analysis, Salt Lake City, UT, USA, Nov. 2016. **[Paper]**

Peer-reviewed Journal Publications

TACO 2022	Chencheng Ye, **Yuanchao Xu**, Xipeng Shen, Hai Jin, Xiaofei Liao, Yan Solihin, Chencheng Ye, Yan Solihin, Xipeng Shen, Preserving Addressability Upon GC-Triggered Data Movements on Non-Volatile Memory, the ACM Transactions on Architecture and Code Optimization (TACO). **[Paper]**

Peer-reviewed Conference Abstract

SEED 2021	Naveed Ul Mustafa,**Yuanchao Xu**, Xipeng Shen, Yan Solihin, "New Security Challenges for Persistent Memory", the 1st International Symposium on Secure and Private Execution Environment Design, 2021.

Workshop

NVMW 2024	Chencheng Ye, **Yuanchao Xu**, Xipeng Shen, Yan Sha, Xiaofei Liao, Hai Jin, Yan Solihin, "SpecPMT: Speculative Logging for Resolving Crash Consistency Overhead of Persistent Memory", the 15th Non-Volatile Memories Workshop, 2024
NVMW 2022	**Yuanchao Xu**, Wei Xu, Kimberly Keeton, David E. Culler, "SoftPM: Software Persistent Memory", the 13th Non-Volatile Memories Workshop, 2022.

Honors & Awards

2024	Outstanding Dissertation Award, NCSU
2022	Student Travel Grant, ISCA
2021	NCSU Computer Science Outstanding Research Award
2020	Student Travel Grant, ASPLOS
2014	National Scholarships of China (highest scholarship for Chinese undergraduate
2013	Silver Medal, ACM-International Collegiate Programming Contest, Asia Regional

Research Talks

2023	**Data-Centric Architecture Support for Security** at University of Maryland, College Park, MD at University of California Santa Cruz, Virtual at National University of Singapore, Virtual at University of Waterloo, Waterloo, Ontario

2022	**Understanding and Strengthening Persistent Memory Security** at University of Chicago, Chicago, IL at Tsinghua University, Virtual
2022	**FFCCD: Fence-Free Crash-Consistent Concurrent Defragmentation for Persistent Memory** at ISCA 2022, New York, NY
2022	**SoftPM: Software Persistent Memory** at NVMW 2022, San Deigo, CA
2022	**Temporal Exposure Reduction Protection for Persistent Memory** at HPCA 2022, Virtual
2021	**PCCS: Processor-Centric Contention Slowdown Model for Heterogeneous System-on-chips** at MICRO 2021, Virtual
2020	**Hardware-Based Domain Virtualization for Intra-Process Isolation of Persistent Memory Objects** at ISCA 2020, Virtual
2020	**MERR: Improving Security of Persistent Memory Objects via Efficient Memory Exposure Reduction and Randomization** at ASPLOS 2020, Virtual at Institute of Computation Technology at Chinese Academy of Science, Virtual

Academic Services

Organization Committee	IEEE/ACM The International Symposium on Computer Architecture (ISCA 2023) IEEE International Symposium on High-Performance Computer Architecture (HPCA 2025)
Program Committee	IEEE International Symposium on High-Performance Computer Architecture (HPCA 2025) ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2025) IEEE/ACM International Symposium on Microarchitecture (MICRO 2024) ACM ASIA Conference on Computer and Communications Security (ASIACCS 2024) IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2024)
Journal Reviewer	ACM Transactions on Architecture and Code Optimization (TACO) 2021, 2022, 2023, 2024 IEEE Transactions on Parallel and Distributed Systems (TPDS 2024) IEEE Computer Architecture Letters (CAL 2022) IEEE Transactions on Dependable and Secure Computing (TDSC 2020)

Teaching Experience

Winter 2024	Instructor for Computer Architecture, CSE 120, UCSC
Fall 2022	Guest Lecturer for Architecture of Parallel Computers, CSC 506, NCSU
Fall 2021	Guest Lecturer for Compiler Construction, CSC 512, NCSU
Spring 2019	Teaching Assistant for Concepts and Facilities of Operating Systems, CSC 246, NCSU
Fall 2018	Teaching Assistant for Computer Organization and Assembly Language, CSC 236, NCSU

Mentoring Experience

Summer 2024 - now	Qizhong Wang (University of California Santa Cruz, advised Ph.D. student) GPU side-channel attack
Fall 2023 - now	Yinzhe Zhang (University of California Santa Cruz, advised Ph.D. student) ML systems for large language models
Summer 2022	Arnav Sareen (North Carolina School of Science and Mathematics, high school student) Key-value store acceleration with learned index
Spring 2022	Khan Shaikhul Hadi (University of Central Florida, Ph.D. student) Durable atomic instruction for persistent memory
Spring 2021 - Summer 2022	Hsin-Hsuan Sung (North Carolina State University, Ph.D. student) Autonomous driving scheduling, **published a paper at RTAS 2022**