Yuanchao Xu

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Research Interests

Computer security, computer architecture, memory security, computer systems, trusted execution environments, and software-hardware codesign.

Education

Aug. 2018 - now	**North Carolina State University** Ph.D. Candidate 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

Aug. 2021 - now	**Google, System Research@Google (SRG)** Research Intern & Student Researcher Mentors: Dr. David E. Culler and Dr. Kimberly Keeton
May 2021 - Aug. 2021	**Google** Research Intern Mentors: Dr. David E. Culler and Dr. Ravi Rajwar
May 2019 - Aug. 2019	**Oak Ridge National Laboratory** Research Intern Mentors: Dr. Mehmet E. Belviranli and Dr. Jeffrey S. Vetter
March 2017 - Sept. 2017	**ETH Zürich** Research Intern Mentors: Dr. Torsten Hoefler and Dr. Tobias Grosser

Conference Publications

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. **Accepted, to appear**
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. **Accepted, to appear**
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]**

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, 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, 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, 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]**

Journal

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]**

Workshop

NVMW 2022	**Yuanchao Xu**, Wei Xu, Kimberly Keeton, David E. Culler, “SoftPM: Software Persistent Memory”, the 13th Non-Volatile Memories Workshop, 2022.
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.

Work under Submission

Under review	**Yuanchao Xu**, Chencheng Ye, Yan Solihin, Xipeng Shen, “Data Enclave: A Decoupled Trusted Execution Environment”, 2023.
Under review	**Yuanchao Xu**, Wei Xu, Kimberly Keeton, David E. Culler, “SoftPM: Software Persistent Memory”. 2023.

Honors & Awards

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

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

Student Reviewer	IEEE/ACM International Symposium on Microarchitecture (MICRO 2022)
Artifact Evaluation Committee Member	ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPOPP 2021, PPOPP 2022, PPOPP 2023)
Journal Reviewer	IEEE Computer Architecture Letters (CAL 2022) ACM Transactions on Architecture and Code Optimization (TACO 2021) IEEE Transactions on Dependable and Secure Computing (TDSC 2020)
Volunteer	IEEE International Symposium on Secure and Private Execution Environment Design (SEED 2021) IEEE International Symposium on High Performance Computer Architecture (HPCA 2020)

Teaching Experience

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

Fall 2022	**James Pangia (North Carolina State University, Ph.D. student)** Trusted execution environment for persistent memory
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	**Hsin-Hsuan Sung (North Carolina State University, Ph.D. student)** Autonomous driving scheduling, published a paper at RTAS 2022
Spring 2019	**Maryam Babaie (University of Central Florida, Master student)** SW/HW codesign for reducing memory exposure, started her Ph.D. at UC Davis

Reference

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Dr. David E. Culler
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Dr. Josep Torrellas
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