


I'm a 2nd year Ph.D. student at the University of Michigan (advised by Prof. Satish Narayanasamy), working on confidential computing and trusted hardware, with a strong background in GPU architecture, memory systems and Out-of-Order CPU architecture. I'm looking for a research or engineering internship position during the summer of 2024.

My research seeks to advance confidential computing solutions for enabling privacy-preserving data analytics solutions ranging from population-scale genomic analysis to generative AI. My approach is to develop trustworthy hardware, and use it to efficiently guarantee privacy from the rest of system components, including the operating system and system administrators.

Please see next page for my CV and detailed background.

– Joy

# JUECHU DONG

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## SUMMARY

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Juechu (Joy) Dong is a 2nd year Ph.D. student with the Computer Engineering Lab at the University of Michigan, advised by Prof. Satish Narayanasamy. Her research seeks to advance confidential computing solutions for enabling privacy-preserving data analytics solutions ranging from population scale genomic analysis to generative AI. Her current work focuses on scaling trusted memory capacity from hundreds of MB to tens of TB and developing privacy-preserving genome-wide association study platform on Azure's confidential computing platform.

## EDUCATION

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- University of Michigan - Ann Arbor** (exp.) 2027  
*Computer Science and Engineering, PhD*  
**Topics:** Computer System & Architecture, Trusted Hardware / Confidential Computing  
**Advisor:** Prof. Satish Narayanasamy
- University of Michigan-Shanghai Jiao Tong University Joint Institute** Aug 2022  
*Computer Engineering, Bachelor of Science*
- University of Michigan - Ann Arbor** Apr 2022  
*Computer Engineering, Bachelor of Science in Engineering, Summa Cum Laude*  
**Selected Coursework:** Comp. Architecture A, Compiler A+, Operating System A  
**GPA:** 3.99/4.00

## PUBLICATION (under submission)

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- Toleo: Scaling Freshness to Tera-scale Memory Using CXL and PIM** ASPLOS'24  
*J. Dong, J. Rosenblum, S. Narayanasamy* under submission
- Scale trusted memory size from hundreds of MB to tens of TB by expanding the span of trusted from a single trusted processor to an entire platform including intelligent memories.
  - Design a new scheme of freshness protection that reduces the space requirement by 50x.
  - Reduce deployment cost by spacing sharing one intelligent memory device among multiple CPUs.
- mm2-long: Accelerating Accurate Ultra Long Genome Sequence Mapping on AMD GPU**  
*J. Dong, X. Liu, H. Sadasivan, G. Sitaraman, S. Narayanasamy* on-going
- Accelerate computational intensive chaining step in the state-of-art long sequence mapping tool minimap2 using AMD GPU by 5x.
  - Optimize towards ultra long reads of 100k+ to accommodate genome sequencing technology trend.
  - Develop adaptive GPU scheduling algorithm to balance highly heterogeneous workload.
- SECRET-GWAS: Confidential Computing for Population-Scale GWAS** RECOMB'24  
*J. Rosenblum, J. Dong, S. Narayanasamy* under submission
- Develop a thousand-core platform on Azure Confidential Computing to conduct multi-institutional GWAS on millions of patients in less than a minute.
  - Adapt Spark-based Hail genomic analysis framework to run on TEE under obliviousness requirement.
  - Parallelize GWAS computation on 1k cores to achieve near linear speedup.

## INDUSTRY EXPERIENCE

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- NVIDIA** May 2022 - Aug. 2022  
*GPU Deep Learning Architect Intern*
- Model and analyze new memory features on next-gen GPUs such as distributed shared memory, asynchronous transaction barrier, etc.
  - Analyze and optimize multi-GPU data movement for deep learning workloads using Tensor Memory Accelerator (TMA).

## TEACHING

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### Instructional Aide

2021FA, 2022WN

*EECS470 Computer Architecture*

### Graduate Student Instructor

2023FA

*EECS471 Applied Parallel Programming with GPUs*

### Graduate Student Instructor

2024WN

*EECS570 Parallel Computer Architecture*

## SERVICE

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### Computer Engineering Lab Reading Group

2022 - present

*Coordinator*

- Organize weekly paper reading presentations and discussions.
- Host talks from visiting researchers and professors.

### UM-SJTU Joint Institute Alumni Association

2022 - present

*Founder & Vice President*

- **Alumni Engagement:** Organize alumni and student gatherings.
- **Relationship Building:** Involve in expanding SJTU - UM collaborations, connecting to JI sponsors, and building industry relationships.
- **Career Advising:** Organize students career development workshops.
- **Welcoming:** Host new student orientation events, organize airport pickups, and offer settle down help.
- **Student Support:** Support students during the stressful transition to start in a new university in a new country, and during urgent crisis.

## SKILLS

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**Programming Languages:** C/C++, CUDA, HIP, SIMD, (system) verilog, bash, Makefile

**Technologies/Frameworks:**

*GPU Tuning:* nsight-compute/nsight-sys, omniperf/omnitrace/rocprof

*Formal Verification:* Murphi,

*SIMD:* avx512, avx2 on Xeon Phi

*Simulation:* SniperSim, DRAMSim, pinplay

*Confidential Computing:* Open Enclave SDK, Intel SGX

**Architectures:** AMD CDNA2 Instinct GPU, NVIDIA Hopper GPU, Intel Xeon Phi, Out-of-order CPU

## SELECTED HONORS

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### Rackham International Student Fellowship

2023-2024

*Awarded to 25 outstanding students among all international PhD and MS students in the university*

### James B. Angell Scholar

2020-2023

*Achieving "A Record" for 6 consecutive terms*

### John Wu & Jane Sun Outstanding Scholarship

2018-2022

*Awarded to 13 outstanding students among ~ 300 freshmen in SJTU-UM Joint Institute for half tuition waiver*

### Outstanding Academic Performance Scholarship

2018-2020

*Awarded to undergraduate students at SJTU with outstanding academic performance*