Xuan Wang

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Education

University of California, San Diego	GPA: 3.83 / 4.0
Ph.D. in Computer Science and Engineering (Advisor: Prof. Tajana Rosing)	*Expected 2027*

University of California, San Diego (Double Major) (Cum Laude)	GPA: 3.86 / 4.0
B.S in Computer Engineering (Major GPA: 3.89 / 4.0)	*Jun. 2023*
B.S in Applied Mathematics (Major GPA: 3.98 / 4.0)	*Jun. 2023*

Publications

- Minxuan Zhou, Yujin Nam, **Xuan Wang**, Youhak Lee, Chris Wilkerson, Rahavan Kumar, Sachin Taneja, Sanu Mathew, Rosario Cammarota, and Tajana Rosing, "**UFC: A Unified Accelerator for Fully Homomorphic Encryption**", *to be appeared, MICRO'2024.*

- Yujin Nam, Xiaofan Yu, **Xuan Wang**, Minxuan Zhou, Yeshwanth Venkatesha, Abhishek Moitra, Gabrielle De Micheli, Augusto Vega, Priyadarshini Panda, Tajana Rosing, "**Rhychee-FL: Robust and Efficient Hyperdimensional Federated Learning with Homomorphic Encryption**", *in submission.*

- Behnam Khaleghi, Xiaofan Yu, Jaeyoung Kang, **Xuan Wang**, Tajana Rosing, "**Private and Efficient Learning at the Edge with Hyperdimensional Computing**", *to be appeared*, IEEE TCASAI'2024.

- **Xuan Wang***, Minxuan Zhou*, Tajana Rosing, "**Fast-OverlaPIM: A Fast Overlap-driven Mapping Framework for Processing In-Memory Neural Network Acceleration**", *IEEE TCAD'2024.*

- Xuan Wang, Minxuan Zhou, Tajana Rosing, "**Overlap Optimization for Processing In-Memory Neural Network Acceleration**", *SRC TEHCON, 2023.*

- Minxuan Zhou*, **Xuan Wang***, Tajana Rosing, "**OverlaPIM: Overlap Optimization for Processing In-Memory Neural Network Acceleration**", *Design, Automation, and Test in Europe (DATE'2023). * Co-first authors.*

Work Experience

Graduate Student Researcher, SEE Lab	*UC San Diego, La Jolla, CA, 2023.9 – present*

- Advisor: Prof. Tajana Simunic Rosing

Deep Learning Architecture Intern	*Nvidia Corporation, Santa Clara, CA, 2024.6 – 2024.9*

- Project: Architectural simulation optimization for deep learning workloads and ingenious GPU.
- Achieved high performance with returning internship offer.

Research Projects

Fully Homomorphic Encryption Acceleration *(Advised by Prof.Tajana Rosing)*	*2023.10 - Present*

- Investigating fully homomorphic encryption and hardware simulators for domain-specific acceleration.
- Developed a unified FHE accelerator (UFC) for both SIMD and Logic scheme with scheme switching.
- Co-designing between architecture, system, and FHE algorithm for applicable FHE program development and acceleration.

Private Hyperdimensional Computing for ML Classification *(Advised by Prof.Tajana Rosing)*	*2023.5 - Present*

- Benchmarked non-private and private training and inference for HD computing on MINIST, CIFAR10 and CIFAR100.
- Evaluated the per-stage decoding time and evaluated the per epoch training time on CPU and GPU.

OverlaPIM: Overlap Optimization for PIM NN Acceleration *(Advised by Prof.Tajana Rosing)*	*2021.4 - 2023.10*

- Developed **OverlaPIM**, a hardware-software co-design DNN mapping framework on PIM, produced **2.10x to 4.11x** faster mappings through input-output computational overlap and transformation in C++ with baseline Timeloop.
- Optimized framework to evaluate whole DNN model in design space instead of a single layer.
- Co-designed between architecture constrains and framework to generate better mapping in **(Fast-)OverlaPIM.**

Genomics Pairwise Sequence Alignment Acceleration *(Advised by Prof.Yatish Turakhia)*   *2022.4 - 2022.9*
- Implemented PEs and SRAMs ASIC design for genomics pairwise sequence alignment acceleration in System Verilog.
- Collected ALUTs resources, registers, and Fmax data by synthesizing on Vivado.

BASEDNet: Baseline Detection for Historical Documents *(Advised by Prof.Taylor Berg-Kirkpatrick) 2020.10 –2021.6*
- 1 of 49 students chosen for CSE Early Research Scholars.
- Implemented BASEDNet, a DNN model in Tensorflow and evaluated using the IoU formula.

Technical Skills/Selected Coursework

- **Technical Language**: **C++**, **Python**, **C**, **System Verilog**, Java, **Julia**, SageMath, Markdown, ARM assembly, HTML.
- **Tools and Skills**: **OpenGL**, **CUDA**, **PyTorch**, **MATLAB**, Vivado, LTspice, LaTeX, Unix/Linux, Docker, Git, OpenMP, TensorFlow.
- **CS Coursework**: **Computer Architecture**, **Parallel Computing**, **Operating System**, **Fully Homormophic Encryption, Digital System Design**, Natural Language Processing, Circuit Design, Artificial Intelligence, Data Mining, Data Structure, Algorithm, Prob & Stats, Signal & System.
- **Mathematics Coursework**: **Linear & Nonlinear Optimization**, **Graph Theory**, **Combinatorics**, Geometric Computer Graphics, Real Analysis, Advanced Linear Algebra, Calculus.

Honors and Awards

- **TRELS** (Triton Research & Experimental Learning Scholars) Quarterly Awards (WI23)
- **Tau Beta Pi** Engineering Honor Society (2021-present)
- Thurgood Marshall College Honor Program (2021-2023)
- **Provost Honors:** FA19, WI20, SP20, WI21, SP21, FA21, WI22, SP22.
- Provincial Second Prize in National Chemistry Olympiad (2018).