ZHIHAN XU

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EDUCATION

University of Southern Califronia (USC) *Aug. 2023 - Now*
Ph.D. in Computer Engineering GPA: 3.85/4.0
- Working in FPGA/Parallel Computing Lab, advised by Professor Viktor K. Prasanna

University of Pennsylvania (UPenn) *May 2023*
M.S. in Electrical Engineering GPA: 3.84/4.0
- Outstanding Teaching Assistant (Penn Engineering, SEAS)

University of Glasgow (UoG) *May 2020*
B.Eng. in Electronics and Electrical Engineering GPA: 18.78/22
- Honours of the First-Class

University of Electronic Science and Technology of China (UESTC) *May 2020*
B.Eng. in Electrical Engineering GPA: 3.7/4.0
- Outstanding Graduate Student (University-level Distinction)

RESEARCH STATEMENT

I design practical computing systems for Privacy-Preserving Machine Learning (PPML), aiming for high performance, efficiency, and flexibility. Specifically, I leverage reconfigurable computing technology (i.e., FPGAs) to accelerate homomorphic encryption and its applications in PPML.

EMPLOYMENT EXPERIENCE

Research Assistant, USC *Aug. 2023 - Now*
Supervisor: Prof. Viktor K. Prasanna

· Contribute to two NSF-funded Projects: (i) Portable Library for Homomorphic Encrypted Machine Learning on FPGA Accelerated Cloud Cyberinfrastructure; (ii) Accelerating Privacy Preserving Deep Learning for Real-time Secure Applications
· Research outcomes published at FCCM '24, FPGA '25, FPL '25, HPEC '25

GPU Design Verfication Intern, Nvidia Corporation (US) *May 2022 - Aug. 2022*
Manager: Matt Brockmeyer

· Internship at Streaming Multiprocessor (SM) Design Verification Team focusing on testlist optimization
· Designed and deployed Baysiain Optimization flow on testlists to improve test coverage. The algorithm explores the knob space and tunes knob values with a test result feedback loop to improve the hit rate
· Implemented NNs trained with random tests, accelerating the BayOpt flow for optimized testlists

Research Assistant, Shanghai Jiao Tong University *Sep. 2020 - Jul. 2021*
Supervisors: Prof. Li Jiang, Prof. Zhezhi He

· Neural network compression and design space exploration for the FPGA-based CNN accelerator
· FPGA acceleration of CNN with heterogeneous cores, coupled with mixed-precision quantization
· Research outcome published at FPGA '22

MENTORING AND TEACHING

Research Mentor, IUSSTF-Viterbi Program   *May 2025 - Jul. 2025*
Supervisor: Prof. Viktor K. Prasanna

· Mentored undergraduate Ashwajit Singh for FPGA acceleration of the number theoretic transform
· Research outcome accepted by HPEC '25

Teaching Assistant, USC   *Jan. 2024 - May 2024*
Lecturer: Gandhi Puvvada

· EE354L Introduction to Digital Circuits

Teaching Assistant, UPenn   *Jan. 2023 - May 2023*
Lecturer: Dr. Tania Khanna

· ESE5310 Digital Signal Processing

Teaching Assistant, UESTC   *Aug. 2019 - Dec. 2019*
Lecturer: Prof. Rami Ghannam

· UESTC3002 Electronic Devices

PROFESSIONAL SERVICES

Journal/Conference Peer Review

· International Workshop on Heterogeneous High-performance Reconfigurable Computing (H^{2}RC '23)
· IEEE Transactions on Emerging Topics in Computing (TETC '24, '25)
· IEEE Transactions on Computers (TC '24)
· IEEE High Performance Extrem Computing Conference (HPEC '24)
· IEEE Transactions on Very Large Scale Integration Systems (TVLSI '24)
· IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD '25)
· IEEE Access (Access '25)

Conference Organization

· Proceedings Chair of IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC '24, '25)

ACHIEVEMENTS

Outstanding Teaching Award, awarded by Penn Engineering	*May 2023*
Outstanding Graduate Student (Distinction), awarded by UESTC	*Dec. 2019*
Outstanding Student Leadership Scholarship, awarded by UESTC	*Dec. 2019*
Outstanding Student Scholarship (top 10%) , awarded by UESTC	*2017, 2018, 2019*
Honorable Mention of Mathematical Contest in Modeling (MCM)	*2019*

PUBLICATIONS

[1] Singh A*, <u>Xu Z</u>*, Prasanna VK. NTT-SAA: Exploring NTT Acceleration with 2-D Systolic Array Architecture on FPGAs. In 2025 IEEE High Performance Extreme Computing Conference (HPEC '25) (* equal contribution)

[2] <u>Xu Z</u>, Kannan R, Prasanna VK. FAME: FPGA Acceleration of Secure Matrix Multiplication with Homomorphic Encryption. In 2025 35th IEEE International Conference on Field-Programmable Logic and Applications (FPL '25) (to be published)

[3] <u>Xu Z</u>, Ye T, Kannan R, Prasanna VK. FAST: FPGA Acceleration of Fully Homomorphic Encryption with Efficient Bootstrapping. In Proceedings of the 2025 ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA '25)

[4] <u>Xu Z</u>, Yang Y, Kannan R, Prasanna VK. Bandwidth Efficient Homomorphic Encrypted Discrete Fourier Transform Acceleration on FPGA. In 2024 IEEE 32nd Annual International Symposium on Field-Programmable Custom Computing Machines (FCCM '24)

[5] Gong Y*, <u>Xu Z*</u>, He Z, Zhang W, Tu X, Liang X, Jiang L. N3h-core: Neuron-designed neural network accelerator via fpga-based heterogeneous computing cores. In Proceedings of the 2022 ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA '22) (* equal contribution)

[6] <u>Xu Z</u>, Ansari S, Abdulghani AM, Imran MA, Abbasi QH. IoT enabled smart security framework for 3D printed smart home. In 2020 IEEE International Conference on Smart Internet of Things (SmartIoT '20)

[7] Wang H, Wang G, <u>Xu Z</u>, Lei W, Zhang S. High-and low-level feature enhancement for medical image segmentation. Cham: Springer International Publishing. In 2019 International Workshop on Machine Learning in Medical Imaging (MLMI '19)

OTHER PUBLICATIONS (EXTENDED ABSTRACTS AND POSTERS)

[1] <u>Xu, Zhihan</u>; Yang, Yang; Prasanna, Viktor (2025). Portable Library for Homomorphic Encrypted Machine Learning on FPGA Accelerated Cloud Cyberinfrastructure. figshare. Poster. `https://doi.org/10.6084/m9.figshare.29648843.v1`

[2] <u>Xu, Zhihan</u>; Yang, Yang; Prasanna, Viktor (2024). Portable Library for Homomorphic Encrypted Machine Learning on FPGA Accelerated Cloud Cyberinfrastructure. figshare. Poster. `https://doi.org/10.6084/m9.figshare.26540695.v1`

[3] <u>Xu, Zhihan</u>; Yang, Yang; Prasanna, Viktor (2023). Portable Library for Homomorphic Encrypted Machine Learning on FPGA Accelerated Cloud Cyberinfrastructure. figshare. Poster. `https://doi.org/10.6084/m9.figshare.24201921.v3`