Sizhe Zhang

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Education

- **Villanova University** — Villanova, PA
  Ph.D. Student in Computer Engineering Advised by Prof. Xun Jiao GPA:3.78/4.00 — *2021-Present*
- **Cornell University** — Ithaca, NY
  Master of Engineering in Electrical Computer Engineering GPA:3.49/4.00 — *2019-2020*
- **University at Buffalo** — Buffalo, NY
  Bachelor of Science in Electrical Engineering ***Magna Cum Laude*** *GPA:3.74/4.00* — *2014-2019*
- **Relevant Coursework**: Embedded Operating Systems, Computer System Programming, Fundamentals Machine Learning, Intro to Pattern Recognition, Big Data Analytics, Computer Architecture, HDL Based Digital Design with Programmable Logic, Intro VLSI Electronics, Intro to Parallel computing.

Research Interest

- **1**: Electronic design automation, Approximate Computing
- **2**: Machine Learning, Federated Learning
- **3**: Neuromorphic computing, Hyperdimensional Computing, Vector Symbolic Architectures

Projects

- **Hyperdimensional Computing system robustness assessment and enhancement**: Accessing hyperdimensional computing system robustness and explored several approaches to enhance the robustness of hyperdimensional computing. Simulated energy saving though memory voltage scaling.
- **Federated Hyperdimensional Computing**: Explore the different aspects of federated learning based on hyperdimensional computing and deep learning.
- **Vending Machine System Based on Object Detection Neural Networks** : Designed and implemented an embedded system (based on Raspberry Pi 4) to upgrade a basic cooler into a vending machine system. Built a data collection platform to collect goods imagines and automate label and box the object. Training an object detection neural network by using red cloud services. Combined a custom-trained object detection model with a pre-trained model (running on Google Coral TPU accelerator) and improved the detection accuracy and system performance.
- **Quad-Core RISC-V Processor Design**: Designed and implemented a five-stage quad-core RISC-V processor.By using special python library Pymtl tested and benchmarked with sorting algorithm based on C.
- **Neural Network Parallel Computing by CUDA**: Design and implemented a basic neural network for handwritten classification by using CUDA for GPU parallel computing both for inference and training.
- **Transistor Level Application of Mars Rover Inquire Finite State Machine**: Design and implemented a mars rover control chip on the schematic and gate level by using Cadence Virtuoso. Successfully passed all the test and embedded into a pad frame.

Publications

- **1**: **Sizhe Zhang**, Ruixuan Wang, Dongning Ma, Jeff Jun Zhang, Xunzhao Yin, Xun Jiao, "Energy-Efficient Brain-Inspired Hyperdimensional Computing Using Voltage Scaling". 2022 Design, Automation and Test in Europe Conference (**DATE**), Antwerp, Belgium, 2022
- **2**: **Sizhe Zhang**, Ruixuan Wang, Jeff (Jun) Zhang, Abbas Rahimi, Xun Jiao, "Assessing Robustness of Hyperdimensional Computing Against Errors in Associative Memory". The 32nd IEEE International Conference on Application-specific Systems, Architectures and Processors (**ASAP**), Virtual, 2021.
- **3**: Depeng Wang, Huijuan Zhang, Tri Vu, Ye Zhan, Akash Malhotra, Pei Wang, Upendra Chitgupi, Aliza Rai, **Sizhe Zhang**, Lidai Wang, Jan D Huizinga, Jonathan F Lovell, Jun Xia. "Trans-illumination intestine projection imaging of intestinal motility in mice". **Nature Communications**, 2021.

Honors and Awards

- DAC 2021 Young Fellow Program
- University at Buffalo Dean's List: Spring 2015, Spring 2018, Fall 2018

Research & Teaching Experience

- **Graduate Assistant** — Villanova University
  Dependable, Efficient, and Intelligent Computing Lab (DETAIL) — *2021*
- **Student Assistant** — University at Buffalo
  Assistant EE202 Circuit Analysis,EE305 Applied Probability and EE Study lounge — *2018*
- **Research Assistant** — University at Buffalo
  University at Buffalo Optical & Ultrasonic Imaging Laboratory — *2017-2018*

Skills

- C, C++, MATLAB, VHDL, Multisim, Sketch up, Cadence Virtuoso, Verilog, Python, CUDA, MPI, OPENMP, OpenCV, Tensorflow, Pytorch