Sizhe Zhang

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Education

- **Villanova University** — Villanova, PA
  Ph.D. Student in Computer Engineering Advised by Prof. Xun Jiao — *2021-Present*
- **Cornell University** — Ithaca, NY
  Master of Engineering in Electrical Computer Engineering — *2019-2020*
- **University at Buffalo** — Buffalo, NY
  Bachelor of Science in Electrical Engineering ***Magna Cum Laude*** — *2014-2019*

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*