Zeren Li

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Education

Purdue University – West Lafayette, IN

Ph.D. in Electrical and Computer Engineering	Aug 2022 – May 2028
Master of Science in Electrical and Computer Engineering	Aug 2022 – Dec 2024
Bachelor of Science in Computer Engineering	Aug 2018 – May 2022

Experience

Microprocessor Systems and Interfacing Teaching Assistant, Purdue University   Jan 2023 – Current

- Oversaw lab sessions for a Microprocessor Systems and Interfacing course, guiding 60+ students each semester.
- Guided students on **ARM/RISC-V** assembly programming, **STM32/Raspberry Pi Pico** microcontroller interfacing, and digital system design.
- Collaborated with course instructors to grade assignments and provide feedback on lab projects.

Publications

Can SOLARBURST go silicon? A systematic analysis on software supply chain attacks for Open Source VLSI design   Unpublished Manuscript

Fabiha Hashmat, *Zeren Li*, Santiago Torres-Arias

Projects

Source-to-Binary Comparative Analysis Tool

- Built a static analysis framework bridging C/C++ source code and decompiled binaries using **Clang libtooling AST** and **Ghidra**.
- Developed a Python/Tkinter GUI for function attributes comparative visualization.
- Engineered a parallel C++ symbol demangler, reducing processing time on a large VLSI codebase from 20 mins to 1 min (**20× speedup**).

Multicore Processor Design and Prototyping

- Designed and implemented a **single-cycle** CPU that supports the MIPS instruction set and operates at **35 MHz** on an FPGA board.
- Designed and implemented a **60 MHz dual-core** MIPS CPU with a five-stage pipeline on an FPGA board. Features include hazard handling, L1 instruction and L1 data caches, **MSI-based cache coherence**, LL/SC instructions for synchronization, and **branch prediction** (2-bit predictor with branch target buffer), reducing control hazards by **15%**.

ASIC Design

- Designed RTL diagrams for UART Receiver and APB-Slave interface modules; implemented and integrated both modules.
- Designed RTL diagrams for USB receiver, transmitter, and AHB-Lite module. Implemented USB receiver with AHB-Lite module in SystemVerilog.
- Developed verification test benches for all modules, ensuring functionality and integration.

Gimbal Vehicle

- Utilized STM32F091 and STM32F446 microcontrollers to design and build a wireless controller and a gimbal-mounted vehicle.
- Extracted data from four Mecanum wheel hall sensors to devise algorithms enabling **omnidirectional movement**.
- Combined MPU6050 Accelerometer/Gyroscope data with a Kalman filter to stabilize the gimbal's orientation with error margins of **less than 3°** regardless of chassis movement.