ALI AQDAS

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RESEARCH INTERESTS

Domain-Specific Accelerators, Computer Architecture, Machine Learning, Data-Center Networks, Embedded Systems, Neuromorphic Computing

EDUCATION

Purdue University *August 2024 - Present*
Doctorate in Computer Science
Advisor: Dr. Muhammad Shahbaz

National University of Sciences and Technology, Islamabad *Sept 2019 - Jun 2023*
B.E. in Electrical Engineering CGPA: **3.93/4**
Thesis: SoC Implementation of RISC-V Vector Processor
Advisor: Dr. Muhammad Imran
Co-advisor: Dr. Rehan Ahmed

RESEARCH EXPERIENCE

System-on-Chip(SoC) Design Lab Jan 2024 - July 2024
Research Assistant *Islamabad,Pakistan*

Advisors: Dr. Muhammad Imran (NUST)
Project Title: "Design for Testability (DFT)"

· Surveyed Design for Testability Techniques such as SSN, Determinsitic Scan, and Multi-Cycle Tests

Integrated Circuits Design Lab Jan 2023 - Jun 2023
Junior Research Assistant *Islamabad,Pakistan*

Advisors: Dr. Muhammad Imran (NUST) and Dr. Rehan Ahmed (NUST)
Project Title: "SoC Implementation of RISC-V Vector Processor"

· Developed a chaining mechanism for parallel operation of functional units.
· Implemented parameteric microarchitectural components enabling scalability.
· Worked on physical mapping of microarchitecture on TSMC 65 nm.

System-on-Chip(SoC) Design Lab Jun 2022 - Dec 2022
Hardware Design Intern *Islamabad,Pakistan*

Advisors: Dr. Muhammad Imran (NUST) and Dr. Rehan Ahmed (NUST)
Project Title: "SoC Implementation of RISC-V Vector Processor"

· Developed and integrated a vector extension with a scalar core.
· Developed a neural network and benchmark kernels using intrinsic instructions.

AI Lounge Jul 2021 - Jul 2024
Teaching Assistant *Islamabad, Pakistan*

Advisors: Dr. Syed Ali Raza Zaidi (Leeds) and Dr. Hassan Aqeel (Aston)
Project Title: "TinyML and its Applications" | GitHub

· Implemented a Fall Detection System to reduce fatality risk in elderly people through appropriate alerting system.
· Developed content for Workshop/MOOC

Signal Processing and Machine Learning Lab (SIGMA) Jul 2020 - Oct 2020
Summer Intern *Islamabad, Pakistan*

Advisors: Dr. Hassan Aqeel (Aston)
Project Title: "Keratin Pearl Localization in Whole Slide Images" | GitHub

- Designed a tool to localize anomalies in whole slide images to reduce doctors' effort in diagnosing tumors.
- Performed tiling of ultra high resolution images using OpenSlide
- Binary Mask generation for image segmentation using GeoJSON and SciKit Image

TEACHING EXPERIENCE

Purdue University Aug 2024 - Present
Graduate Teaching Assistant *West Lafayette, IN*

Course List
- CS-250 Computer Architecture

NUST Chip Design Center May 2024 - July 2024
Instructor *Islamabad,Pakistan*

- Designing and Conducting Hands-on Labs with Dr. Muhammad Imran

TECHNICAL STRENGTHS

Hardware Descriptive Langauges	SystemVerilog, Verilog HDL
Programming Languages	C, C++, Python, MATLAB, Embedded-C, RISC-V Assembly
Deep Learning Frameworks	Tensorflow 2, Tensorflow for Microcontrollers, PyTorch, FAST.AI
Tools	Vivado, Quartus Prime, QuestaSim, Verilator, Linux, LaTeX

NOTABLE PROJECTS

XOR-Memory Generator | GitHub

XOR-Memory is a high-bandwidth memory designed by LaForest, et al. It uses BRAMs to make multi-ported memories in FPGAs. XOR-Memory Generator is a software tool that can be used to generate Verilog files for variable sized memory with different number of read and write ports. The word size is also adjustable. The design can also be verified through script generated testbench.

FPGA Implementation of Bresenham Circle Drawing Algorithm | GitHub

Bresenham Circle Drawing algorithm is a lightweight algorithm to draw circles on computer that only computes points for an octant of circle, and uses eight way symmetry to draw a full circle.
- Implemented Bresenham's Circle Drawing Algorithm in Verilog to draw circles with variable radii.
- Utilized University of Toronto's VGA Adapter to display the output on LCD using DE1-SoC. https://www.eecg.utoronto.ca/ jayar/ece241$_0$7F/vga/

Angle of Arrival Estimation in 4-6 GHz Range | GitHub

- Literature Survey for Angle of Arrival Estimation Algorithms
- MATLAB Simulations of Multiple Signal Classification (MUSIC) Algorithm in Uniform Circular Array (UCA)

Further Projects available on LinkedIn and GitHub