Akash Poptani

Third Year Student at Indian Institute of Technology (IIT) Dharwad
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Education

IIT Dharwad- B.Tech in Electrical Engineering 2020-2024

Relevant Courses:
Computer Architecture, Microprocessors and Microcontrollers, Digital Systems, VLSI Design, Discrete Structures, Analog Circuits and Introduction to Computer Programming

Publications

SANNA: Secure Acceleration of Neural Network Applications

Accepted at International Conference on VLSI Design (VLSID'23), Hyderabad, India, 2023.

TFCM: Transformer-Focused Cache Management with Broad

Submitted at International Symposium on High-Performance Computer Architecture (HPCA), 2024.

CASH: Criticality-Aware Split Hybrid L1 Data Cache

Submitted at International Symposium on High-Performance Computer Architecture (HPCA), 2024.

Projects and Internship

Current Projects

Design and Development of Runtime monitor processors July 2022

– Understanding the concepts of Runtime Verification and Monitorability.Implementing Temporal-Logic Based Runtime Observer Pairs for System Health Management of Real-Time Systems. Implementation of FSM models(monitor processor) using Haskell on CLASH compiler

Extending the Tejas architectural simulator with power (McPAT) and temperature (Hotspot) modeling capabilities Jan 2023

– Understanding how Tejas and McPat works. Integrating Tejas and McPat to enable power calculations. Extend this work to enable temperature calculations and enable tracing of power and temperature during the execution of a program.

Using Cordic Algorithm to improve performance of DSP/NN based applications Nov 2022

– Understanding how CORDIC (Coordinate Rotation Digital Computer) algorithms are used to evaluate mathematical functions using rotation as the basic operation. Different versions are implemented and compared in terms of performance, area and power consumption. operation.

Research Internships

Hong Kong University of Science and Technology (HKUST) Jun 2023 - Aug 2023

– Hardware implementation of prefetcher architecture for multi-AI core architecture using verilog. I learnt using SMAUG and gem5-aladdin tools. Optimised performance by addition of prefetcher and dead-block predictor.

– Under the guidance of Prof. Wei Zhang.

Arizona State University Jun 2023 - Aug 2023

– Machine Learning (ML) Applications in Electronic Design Automation (EDA): Prediction of static IR drop using Machine Learning based on distributions of all voltage sources, distribution of current sources, topology of the PDN and resistance values of each resistor.

– Under the guidance of Prof. Vidya A. Chhabria.

Tata Consultancy services (TCS) Banglore May 2023 - Jun 2023

– Extending the support of operators from TensorFlow to TensorflowLite for Tiny ML based applications. Developed an understanding of TinyMl and it's applications.

IIT Dharwad Apr 2022 - Jul 2022

– Designing and evaluating Task Scheduling Algorithms for Heterogeneous Secure Systems (HSS) which dealt with secure acceleration of neural network applications against Hardware Trojans through assisted parallelism. I had come up with Heuristic Layer Scheduling algorithms and implemented them using C++ to optimize the output time.

– Under the guidance of Prof. Rajshekar K.

IIT Ropar April 2022 - July 2022

– Understanding the advancements in Replacement Policies and cache partitioning. Implementing UCP and Hawkeye Predictor on ChampSim.

– Under the guidance of Prof. Shirshendu Das.

Other Projects

Breadboard implementation of Calculator Design

Digital Design was created using different gates. (Also, designed these gates using CMOS)

Understanding modern aspects of processors using simulators

Learning Sniper(changing existing system models), HotSpot(monitoring on chip temperature for different parameters) and 3D-ICE(3D-Interlayer Cooling Emulator with inter-tier Microchannel Liquid Cooling) simulators.

Implementation of MIPS using Verilog

Understanding digital circuits, implementing Combinational and sequential circuits on xilinx, writing assembly code and integrating the whole system.

Skills

Programming	VHDL, Verilog, Haskell, CLASH C,C++,Python, Java, MATLAB
Technical	Computer Architecture, Formal Verification, Hardware Security, Digital Design, Arduino, Linux Basics, Data Analysis, Version Controlling
Documentation	LaTeX
Management	Good communication and efficient planning
Tools	Tejas, McPat, Hotspot, SMAUG, gem5-aladdin, ChampSim