Akash Poptani

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akashpoptani | Blogs

Education

Indian Institute of Technology (IIT) Dharwad, Karnataka Nov 2020 - Apr 2024
B.Tech in Electronics, Electrical and Communication Engineering (EECE) CPI: 9.05/10
Relevant Courses - Computer Architecture, Advanced Computer Architecture, Runtime Verification, VLSI Design, Microprocessors and Microcontrollers, Digital Systems, Discrete Structure and Introduction to Computer Programming

Publications

SANNA: Secure Acceleration of Neural Network Applications code poster overview

International Conference on VLSI Design (VLSID'23)

LCM: LLM-focused Hybrid SPM-cache Architecture with Cache Management for Multi-Core AI Accelerators

ACM International Conference on Supercomputing (ICS'24)

CASH: Criticality-Aware Split Hybrid L1 Data Cache

ACM Great Lakes Symposium on VLSI (GLSVLSI'24)

Decoding Drought: Embracing Simplicity in Effective Predictive Models code presentation video overview

IEEE Asia-Pacific Conference on Geoscience, Electronics and Remote Sensing Technology (AGERS'23) - **Best Student Presenter**

Precision Balancing: Machine Learning Models and Selective Strategies for Intraday Trading Success code

IEEE International Conference on Innovative Practices in Technology and Management (ICIPTM'24) - **Single Author paper**

Enhancing Intraday Trading through Machine Learning: A NSE Nifty 50 Analysis

IEEE International Conference on Innovative Trends in Information Technology (ICITIIT'24) - **Single Author paper**

Unlocking Intraday Gains: A Study of OPEN-Side Strategies with Linear Regression

Submitted at International Symposium On Forecasting (ISF'24)

Experience

Research Assistant

ARCO (Architectures and Compilers) Group led by Prof. Antonio Gonzalez
Polytechnic University of Catalonia (UPC), Barcelona Dec 2023 - Mar 2024
Proposing enhancements to Ray Tracing (RT) units within GPUs, tailored to Ray Tracing-based workloads. Utilizing the Vulkan-Sim simulator to conduct basic characterization experiments for evaluating gains in terms of performance and energy.

Research Internships

Hong Kong University of Science and Technology (HKUST) Jun - Oct 2023
Hardware implementation of prefetcher architecture for multi-AI core systems using Verilog. Optimized performance by integrating a prefetcher and dead-block predictor using SMAUG and gem5-aladdin tools. Mentor: Prof. Wei Zhang.

Arizona State University Jun-Aug 2023
Applied Machine Learning in Electronic Design Automation to predict static IR drop based on distributions of voltage sources, current sources, topology of the PDN and resistance values of each resistor. Mentor: Prof. Vidya A. Chhabria.

Tata Consultancy Services (TCS) Bangalore May-Jun 2023
Enhanced TensorFlow to TensorFlow Lite compatibility for TinyML applications. Gained expertise in TinyML.

Indian Institute of Technology (IIT) Dharwad Apr-Jul 2022
Designed and evaluated Task Scheduling Algorithms for Heterogeneous Secure Systems (HSS) with a focus on securing neural network applications against Hardware Trojans through assisted parallelism. Mentor: Prof. Rajshekar K.

Current Projects

CASH: Criticality-Aware Split Hybrid Cache Dec 2022
Assisted in implementing a Criticality Aware Tiered Cache Hierarchy, encorporating SRAM and STTRAM Technologies. Specialized in optimizing the placement of write-intensive lines to minimize write energy while enhancing performance. Conducted experiments on Branch predictors to fine-tune efficiency.

Design and Development of Runtime Monitor Processors Jul 2022
Understanding the concepts of Runtime Verification and Monitorability. Implemented Temporal-Logic Based Runtime Observer Pairs for System Health Management. Developed FSM models using Haskell on the CLASH compiler.

Tejas Architectural Simulator Extension (McPat and Hotspot) Jan 2023
Enhanced Tejas with power and temperature modeling capabilities. Enabled accurate power and temperature tracking during program execution.

Other Projects

Breadboard Calculator Design Digital design implementation of a calculator on a breadboard using RTL model and CMOS logic gates.

Replacement & Partitioning techniques Explored Replacement Policies and Cache Partitioning techniques. Implemented UCP and Hawkeye Predictor on ChampSim simulator.

Processor Simulators Study Comparative study of passive cooling techniques and familiarity with Sniper, HotSpot, and 3D-ICE simulators.

MIPS Implementation in Verilog Proficiency in digital circuit design, including combinational and sequential circuits using Xilinx tools and assembly code.

Treasure Hunt & Snakes and Ladders Developed Minesweeper and Snakes and Ladders games in C, utilizing binary files and library functions for interactive gaming.

Portfolio Website Implementing HTML, CSS and Javascipt to create a static website.

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

Teaching

Teaching Assistant (TA) - CS103 Evaluated student coding proficiency, facilitated group discussions, and conducted code reviews to enhance skills. Oversaw a cohort of 20+ students. (Aug-Nov 2023)

Freelance Tutor, Raipur Tailored curricula, assessed academic progress, maintained effective communication with parents, and instilled a growth mindset in students through mentoring.

Subject Matter Expert at Embibe Executed an 8-month tenure actively contributing to content development by proficiently solving mathematics and science questions, crafting detailed answers, categorizing questions, and ensuring alignment with learning objectives.

Contests and Competitions

AI-Based Mental Health Monitoring and Feedback System Sep 2023
Selected for **VLSID Design Contest** at International Conference on VLSI Design, 2024.

Contributed to **Inter IIT Tech Meet 2023 (Student's Academic Conclave)** with a presentation on Task Scheduling algorithms for secure neural network acceleration. Previously involved in **Inter IIT Tech Meet 2022 (Bosch Age and Gender Detection event)** focusing on ML models for Face recognition.

Extracurriculars

Demonstrating versatile engagement and leadership, I coordinated outreach efforts and facilitated company-institute outreach and coordinating HR conclave activities in Public Relations (PR - Career Development Cell), influenced decisions and judged competitions as a Council Member in Eunoia - Literary Club of IITDh, and guided peers through the Department Academic Mentorship Programme (DAMP). As a subhead of Rational Eloquence Unit (REU- Career Development Cell), I coordinated with speakers, organized soft skills events, and conducted competitions to enhance communication and management skills. As part of the Student Mentorship Programme (SMP), I provided one-on-one mentoring, exposing my mentees to diverse academic paths. In the Event Management Team (Career Development Cell), I organized high-quality talks, webinars, and sessions. Concurrently, my active participation in Robotics Club, Hardly Human (AI Club), Code Geass (Coding Club), Fierce Gallants (Chess Club), Udghosh (Dramatics Club), and Sapphire (Dance Club) involved managing various club events and sessions.