Akash Poptani

Fourth Year Student at Indian Institute of Technology (IIT) Dharwad
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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 Compatibility for Multi-Core AI Accelerators

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

Research Internships

Hong Kong University of Science and Technology (HKUST) Jun-Aug 2023
Developed a 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 to predict static IR drop in Electronic Design Automation.
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.

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.

IIT Ropar Apr-Jul 2022
Explored Replacement Policies and Cache Partitioning techniques. Implemented UCP and Hawkeye Predictor on ChampSim simulator.
Mentor: Prof. Shirshendu Das.

Current Projects

Runtime Monitor Processors July 2022
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.

Criticality Aware Cache Design Dec 2022
Assisted in implementing a Criticality Aware Tiered Cache Hierarchy. Integrated various Memory Technologies. Conducted experiments on Branch predictors for efficiency tuning.

Drought Prediction with ML/DL Dec 2022
Led research using ML/DL for improved drought prediction. Investigated various algorithms and enhanced prototypes with innovative simulations. Addressed economic, environmental, and societal aspects for practical application. Potential impact on water resource management.

Other Projects

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

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.

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.

Freelance Tutor, Raipur Developed custom materials, assessed progress, and maintained communication with parents.

Subject Matter Expert at Embibe Contributed to content development, categorized questions, and ensured alignment with learning objectives.

Volunteering

I actively contributed to various extracurricular activities during my academic journey. In the Public Relations role, I facilitated outreach between companies and our institute and coordinated HR conclave activities. As a Council Member in the Eunoia Literary Club, I influenced club decisions and organized engaging competitions. In the Department Academic Mentorship Programme (DAMP), I mentored junior peers and conducted sessions for personal and academic growth. Additionally, I coordinated soft skills development activities in the Rational Eloquence Unit (REU-CDC) and provided one-on-one mentoring in the Student Mentorship Programme (SMP). Within the Event Management Team (Career Development Cell), I organized and anchored talks, webinars, and sessions to ensure high-quality events.

Club Membership

Active participation in Robotics Club, Hardly Human (AI Club), Code Geass (Coding Club), Fierce Gallants (Chess Club), Udghosh (Dramatics Club), and Sapphire (Dance Club).
Hosted and managed various club events, contests, and sessions. Participated in **IIT Tech Meet 2023 (Student's Academic Conclave) and 2022 Bosch Age and Gender Detection event.**