ANANTH KRISHNA PRASAD

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EDUCATION

Doctor of Philosophy, Computer Science — August 2018 - *Present*
University of Utah GPA 3.904

Bachelors in Technology, Electronics and Communication Engineering — August 2013 - May 2017
Birla Institute of Technology and Science, Pilani (Hyderabad Campus), India
GPA - 8.35 out of 10

RESEARCH INTERESTS

- Processing-in-Memory / Near-Data Processing for Bandwidth-Limited Applications
- Hardware/Software Co-Design
- Emerging Memory Technologies

ACADEMIC EXPERIENCE

Selected Projects:

Graduate Research Assistant — August 2018 - *Present*
School of Computing, University of Utah, UT
Advisors: Prof. Rajeev Balasubramonian & Dr. Mahdi Nazm Bojnordi

- **Billion-Scale Approximate Nearest Neighbor** - Currently working on enabling capability of distance-based indexing of data in-memory for large scale Approximate Nearest Neighbor search through bitwise search space pruning.
- **LNS for DNN inference** - Developed and evaluated a logarithm-based number system for end-to-end deep neural network execution. Real-domain additions and subtractions are approximate through the use of LUTs and bit-shifts to eliminate the requirement of multipliers. Achieved competing accuracy to crossbar accelerators on VGG-16 without requirement for multiplications.
- **High Bandwidth Cross Caching** - Developed a novel reconfigurable memristor based memory with high bandwidth efficiency, with capability of large scale parallel search. Demonstrated cache/scratchpad reconfigurability and achieved 50% and 12x improvement over state-of-the-art High Bandwidth memory, over Cache and Hash Table/Stringmatch applications respectively.
- **Memristive Ranking In Memory** - Identified bandwidth bottleneck issues with sorting kernels, and proposed propose a viable hardware/software mechanism for performing large-scale data ranking in ReRAM based memory with a bandwidth complexity of O(1), by reformulating sorting operations as bit-level in-situ operations. Achieved 12.4 - 50.7x throughput gains for high-performance parallel sorting kernels and 2.3 - 43.6x improvements in a set of database applications, with 90% energy reduction.

Research Assistant
Indian Institute of Science, Bangalore, India — July 2017 - June 2018
Advisor: Prof. S.K Nandy

- Implemented and validated Worst Case Execution Time (WCET) analysis over REDEFINE hardware for validation of safety-critical application execution.

Publications:

- **Memristive Data Ranking**, Ananth Krishna Prasad, Morteza Rezaalipour, Masoud Dehyadegari, Mahdi Nazm Bojnordi, International Symposium on *High Performance Computer Architecture* (**HPCA**), 2021 - click here
- **Monarch: A Durable Polymorphic Memory For Data Intensive Applications**, Ananth Krishna Prsad, Mahdi Nazm Bojnordi, Arxiv Pre-print (Submitted to IEEE-TC) click here

Technical Blogposts:

- **A Case for the Scope of Reconfigurable Transistors in Computer Architecture**, Ananth Krishna Prasad, Pierre-Emmanuel Gaillardon, Mahdi Nazm Bojnordi - click here
- **A Case for Optical Deep Neural Networks**, Ananth Krishna Prasad and Mahdi Nazm Bojnordi - click here

Posters:

- High Bandwidth Cross Caching, presented at DAC 2020

Teaching Assistanceships

- CS 5460/6460 Operating Systems, under Prof. Ryan Stutsman
- CS/ECE 3810 Computer Organization, under Prof. Mahdi Nazm Bojnordi

INDUSTRY EXPERIENCE

Intern Jan 2017 - Jun 2017
Analog Devices India, Bangalore
Manager: Raka Singh

- Trained multiple Deep-Neural Networks for above 96% accuracy across different types of neural networks for different energy and processing constrains (variations of VGG-16, Alexnet and XNOR-net)

TECHNICAL SKILLS

- **Programming Languages:** C, C++, Python, Verilog
- **Frameworks:** Tensorflow, Caffe, ESESC, Cacti, Cadence Spectre/RTL Compiler, Innovus, Virtuoso

HONORS

- Departmental Fellowship, School of Computing, University of Utah