

Cao Gao

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Research Interests

I am interested in computer architecture, performance analysis, mobile systems and machine learning. Currently working on designing mobile architecture for future machine learning algorithms.

Education

- **University of Michigan, Ann Arbor, MI** 2014.1 – 2017.5 (*expected*)
Ph.D., Computer Science and Engineering
Area of Specialization: Computer Engineering --- Hardware
Advisor: Prof. Trevor Mudge
- **University of Michigan, Ann Arbor, MI** 2012.9 – 2013.12
M.S., Computer Science and Engineering
Overall GPA: 4.0/4.0
- **Zhejiang University, Hangzhou, Zhejiang, China** 2008.9 – 2012.6
B.Eng., Major: Electronic and Information Engineering Minor: English
Member of Chu Kochen Honors College Overall GPA: 3.91/4.0
- **National Cheng Kung University, Tainan, Taiwan, R.O.C** 2010.9 – 2011.1
Exchange student in Electrical Engineering and Computer Science Overall GPA: 93.7/100

Professional Experience

- **ARM Ltd., Austin, TX** 2014.6 – 2014.8
R&D Intern at the Mobile System Group. Work on Android workload characterization.

Major Projects

- An ultra-low power non-uniform memory accelerator for wearable devices
Design an ultra-low power accelerator for wearable device applications such as keyword spotting
Develop the overall architecture, ISA, and compiler for the accelerator, participate in chip fabrication
- Graph analytics processing accelerator
Design an accelerator architecture for billion-edge scale graph applications
Lead four grad students to characterize applications, explore algorithm and architecture choices
- Accelerating deep learning algorithms on mobile platforms
Analyze the characteristics of *Deep Neural Network* workloads on mobile / server GPUs
Participate in designing an offloading scheme from mobile to server that achieves optimal trade-off
- User quality-of-experience metrics for android applications
Develop a set of user responsiveness and experience metrics for a set of Android applications
Implement a framework to automate workload execution and metrics collection
- A study of mobile device utilization
Analyze the CPU and GPU utilization of a wide range of commonly used mobile applications
Demonstrate the diminishing returns of increasing core counts and suggest a more flexible system

Publications

- Suyoung Bang, Jingcheng Wang, Ziyun Li, Cao Gao, Yejoong Kim, Qing Dong, Yen-Po Chen, et.al . A 288 μ W Programmable Deep Learning Processor with 270kB On-chip Weight Storage Using Non-uniform Memory Hierarchy for Mobile Intelligence. 2017 IEEE international Solid-State Circuits Conference (ISSCC), February 2017.
- Qi Zheng, Cao Gao, Trevor Mudge, and Ronald G. Dreslinski. Leveraging Mobile GPUs for Flexible High-speed Wireless Communication. The 3rd International Workshop on Parallelism in Mobile Platforms (PRISM-3), June 2016.
- Cao Gao, Anthony Gutierrez, Madhav Rajan, Ronald G. Dreslinski, Trevor Mudge, and Carole-Jean Wu. A Study of Mobile Device Utilization. 2015 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), March 2015.
- Cao Gao, Anthony Gutierrez, Ronald G. Dreslinski, Trevor Mudge, Kristian Flautner, and Geoffery Blake. A Study of Thread Level Parallelism on Mobile Devices. 2014 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), March 2014.
- Yong Ding, Xiaohua Luo, Cao Gao. Pseudo Transistor Matrix for Defect Density Extraction of Gate Oxide Shorts. International Conference on Applied Materials and Electronics Engineering, January 2012

Skills

Programming: experienced in C/C++, Python, CUDA, familiar with Verilog, Matlab, Java

Environments: Linux, Android, shell scripting, git, ARM streamline, Keil uVision, nvprof, Caffe

Languages: Fluent in English, native Mandarin speaker

Related Courses

EECS 583 -- Advanced Compilers	Grade: A	Fall 2013
Project: Design a loop-distribution compiler optimization technique in LLVM		
EECS 570 -- Parallel Computer Architecture	Grade: A	Winter 2013
Project: Fine-grain reconfigurable energy-efficient Network-on-Chip router architecture		
EECS 578 -- Computer-Aided Design Verification of Digital Systems	Grade: A+	Fall 2012
Project: BugCalc: a quantitative evaluation of bug effects and characteristics		
EECS 470 -- Computer Architecture	Grade: A	Fall 2012
Project: 2-way superscalar out-of-order processor. Ranked 2 nd overall, 1 st in clock frequency.		

Awards

University of Michigan EECS Departmental Fellowship	2012-2013
ISCA conference travel grant	2015
Rackham travel grant	2014, 2015