Liu Liu

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Education

2016-Present	**University of California at Santa Barbara** Ph.D. student in Computer Science Advisor: Professor Yuan Xie	**Santa Barbara, CA**
2015	**University of California at Santa Barbara** M.S. in Computer Engineering	**Santa Barbara, CA** GPA: 3.82/4.00
2013	**University of Electronic Science and Technology of China** B.Eng. in Information Display and Optoelectronic Technology	**Chengdu, P.R. China** GPA: 3.80/4.00

Research Experience

09/2016-Now	**University of California at Santa Barbara** Graduate Student Researcher in the Department of Computer Science	**Santa Barbara, CA**
06/2016-09/2016	**PerceptIn Inc.** Research Internship	**Santa Clara, CA**
03/2015-06/2016	**University of California at Santa Barbara** Research Associate in the Department of Electrical and Computer Engineering	**Santa Barbara, CA**

Research Summary

Liu Liu is currently a Ph.D. student working under the supervision of Professor Yuan Xie. His research interests include hardware specialization for deep learning, heterogeneous computer architecture, emerging non-volatile memory architecture design. The research projects are listed as follows,

Hardware Acceleration for Sparse Neural Networks. With the increasing demand on advanced deep learning models, training deep neural networks on large-scale datasets is computationally expensive. However, there exists redundancy in neural network processing. This project aims at exploring efficient methods to select critical neurons which participate in learning the model. Therefore, it could save unnecessary computations as well as intermediate data during training. With hardware support for regular sparsity, this approach could accelerate DNN inference and training significantly.

Heterogeneous Architecture for Robotics. Emerging robotic applications pose challenges to current computing platforms with stringent real-time requirements and limited energy budget. This project explores a heterogeneous SoC architecture by integrating GPU, DSP, and FPGA.

Publications

[1]. **Liu Liu**, Shaoshan Liu, Zhe Zhang, Jie Tang, Yuan Xie. "HEMERA:Heterogeneous Architecture for Emerging Robotic Applications", accept as poster in *the 54th Design Automation Conference (DAC),* June 2017, Austin, TX.

[2]. **Liu Liu**, Ping Chi, Shuangchen Li, Yuanqing Cheng, Yuan Xie. "Building Energy-Efficient Multi-Level Cell STT-RAM Caches with Data Compression", in Proc. *the 22nd Asia and South Pacific Design Automation Conference (ASP-DAC),* Jan. 2017, Chiba/Tokyo, Japan.

[3]. Shuangchen Li, **Liu Liu**, Peng Gu, Cong Xu, and Yuan Xie. "NVSim-CAM: A Circuit-Level Simulator for Emerging Nonvolatile Memory based Content-Addressable Memory", in Proc. *the 35rd International Comference on Computer-Aided Design (ICCAD),* Nov. 2016, Austin, TX.

[4]. Peng Gu, Shuangchen Li, Dylan Stow, Russell Barnes, **Liu Liu**, Eren Kursun, Yuan Xie. "Leveraging 3D Technologies for Hardware Security: Opportunities and Challenges", in Proc. *the 26th Great Lakes Symposium on VLSI (GLSVLSI),* May 2016, Boston, MA.

Skills and Expertise

Programming:	Python, C/C++, CUDA/OpenCL, Verilog/SystemVerilog
Tools:	PyTorch, TensorFlow, Vivado, ModelSim, VCS, HSPICE, gem5, NVSim
Certificate:	Coursera Deep Learning Specialization by Andrew Ng.