Hanqing Zhu

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Education

Shanghai Jiao Tong University(SJTU)　　　　　　　　　　　　　　**Shanghai, China**
B.E. in Microelectronics science and technology　　　　　*Sept 2016- Jun 2020(expected)*
Major GPA: **89.27**/100(**3.80**/4.0), Advanced GPA:**91.71**/100 (for Sophomore(90.73), junior(92.45) years)
Rank: **2**/53 (Sophomore, junior GPA Rank **1**/53)
- **Core Courses(Selected):** Probability and Statistics (100, rank 1st), Signals and Systems (95, rank 1st), Design of Digital Integration Circuits (94, rank 1st), Advanced VLSI chip design (91, rank 1st), Digital Signal Processing (98,rank 1st), Operation System(97, rank 2nd), Computer Processors and System(89,rank 3rd)

University of Texas at Austin　　　　　　　　　　　　　　　　　**Austin,USA**
Summer Research Intern in Department of Electric and Computer Engineering　*July 2019- Sept 2019*
- Research on Fundamental Graph Partition Problem in Physical Design and Robust Optical Neural Network
- Advisor: Prof. David. Z. Pan, IEEE fellow & SPIE fellow

Peter the Great St. Petersburg Polytechnic University(SPbPU)　　**Saint Petersburg, Russia**
Summer School of Information Technology Module(Full Scholarship funded by SPbPU)　*Aug 2018- Sept 2018*
- Modern SAP Technologies and Russian Course (Grade:95/100)

Honors and Awards(Selected)

- **Hongyi Scholarship**(¥25,000, awarded to 10 students of the year in SJTU)　　　　　2019
- **Outstanding Undergraduate Scholarship** (¥30,000, awarded to 5 undergraduates in SJTU)　2019
- **Excellent Overseas Research Sponsorship**(Best 20 overseas internship students in SJTU)　2019
- **The Samsung Scholarship**(top2%, only one in our department)　　　　　　　　　2018
- **Zhiyuan College Honors Scholarship** (Top 10% students of SJTU)　　　　　　　　2017
- **Academic Excellence Scholarship of Shanghai Jiao Tong University**　　2017&2018&2019
- **Excellent League Cadre** of Shanghai Jiao Tong University　　　　　　　　　　　2019
- **First Prize** in China Undergraduate Mathematical Contest in Modeling, Shanghai Division　2018
- **"Color for love" Bronze Prize of Chinese College Students' Rural Supporting Education**　2017

Research Experiences

HLS-level Accurate Results Estimation for FPGA Electromagnetic Transient Emulation System
Research Assistant, supervised by assoc.Prof. Guanghui He, Shanghai, China　*Nov 2019 - Present*
- Started to work on fast and accurate estimation of the quality of results in HLS-level aided by Machine learning without finishing time-consuming downstream implementation process in our specific domain

A New GPU-Friendly and Parallel Heuristic Solver for Graph Partitioning(Independent Work)
Research Intern, supervised by Prof. David.Z.Pan, Austin, USA　*July 2019 - Oct 2019*
- Designed a **heuristic** solver for graph partitioning problem based on the **modified load-balancing mechanism** to introduce "Distance" into the graph and a **K-means-like algorithm**
- Modified the initialization scheme to choose initial centroids dispersedly through Breadth-First-Search method to take graph structure into consideration
- Transformed the whole program to run in parallel to accelerate and wrote a CUDA version to accelerate the linear equation solver
- Outperformed state-of-art tool(**Metis**) and got ∼ 5% performance improvement on edge-cut while still maintained an acceptable run-time in current implementation (with acceleration)

A Noise-Aware Quantization Scheme Towards Robust ONN with low-bit[C1](Cooperative Work)

Research Intern, supervised by Prof. David.Z.Pan, Austin, USA *July 2019 - Sept 2019*
- Proposed a quantization scheme that adapts a full-precision optical neural network(ONN) to low-resolution voltage controls and adopted a protective Group Lasso regularization technique to boost its noise-robustness
- Mainly worked on experiment part and realized iterative quantization methods in ONNs as the baseline

Low Complexity Message Passing Detection(MPD) Algorithm Optimization in MIMO System
Research Assistant, supervised by assoc.Prof. Guanghui He, Shanghai, China *Nov 2018 - July 2019*
- Implemented a low complexity MPD algorithm in order to reduce computation cost(more suitable for efficient hardware implementation)
- Adopted a simplified probability updating scheme by sorting the maximum element in each symbol's LLR vector to update necessary messages as well as to omit some operations
- Decreased complexity with a small degradation in bit error rate performance proven by simulation results

Wireless Near-Field Thin-Film Integrated Antenna Design[J1]
Research Assistant, supervised by assoc.Prof. Li Duan, Shanghai, China *Sept 2017 - Oct 2018*
- Designed and fabricated integrated antennas with a maximum size of 22mm and lowest echo loss of -21.93dB
- Found the interactive superposition effect between multiple integrated antennas with common ground based on analysis of the relationship between basic parameters and performance characteristics

Selected Projects

A Python-based HSPICE-like simulator
- Developed an HSPICE-like tool capable of simulating AD/DC/TRAN analysis and supporting linear and nonlinear elements based on Modified Nodal Analysis method
- Extended functions to own three different dynamic approximation methods and dynamic time step control

CNN-Classification on FPGA Platform
- Reproduced a rapid FPGA prototyping framework for CNN classification deployment on PYNQ platform and performed classification on MINIST and Cifar-10 dataset aided by caffe to train models
- Transplanted PYNQ kernel to ZYNQ and successfully tested an adder IP through Jupyter on ZYNQ-7000

High Performance VLSI Architecture for HEVC Motion Estimation
- Designed an efficient VLSI architecture compatible for HEVC ME full search algorithm targeting processing 1920×1080p video @30fps
- Synthesized the proposed architecture in SMIC 0.18um technology with the maximum work frequency of 74MHz and power of 845.18mW and finished chip by using digital VLSI CAD tools

Convolutional Layer Hardware Design for CNN
- Proposed hardware structures of the 2nd convolutional layer in VGGNet(partly referred to Eyersis)
- Implemented RTL-level design; verified the convolutional operation's function compared to MATLAB program

Publications

[C1] ROQ: A Noise-Aware Quantization Scheme Towards Robust Optical Neural Networks with Low-bit Controls
- Jiaqi Gu, Zheng Zhao, Chenghao Feng,**Hanqing Zhu**, Ray T. Chen, David Z. Pan
- Accepted by *the Design, Automation and Test in Europe Conference*. DATE 2020.

[J1] Design and Manufacturing of Near-Field Thin-Film Integrated Antenna for Wireless Remote Sensing on Turbine Blade Surface by MEMS technology
- In submission to *the Journal of Shanghai Jiao Tong University* as a co-author, 2019

Leadership and Activities

Volunteer Teacher in Eryuan No.2 High School, Yunnan Province *Aug 2017- Sept 2017*
- Gave 40 students one-to-one catch-up tuition, helped 27 students enter college, received national bronze prize

Director of College Students' Teaching Volunteer Program in Siyuan Commonweal Organization
- Managed this Program for two years, recruited over 110 volunteers, offered summer courses for 700+ students

Skills

- **Programming Languages:** python, C++, MATLAB, Verilog, CUDA
- **IC Design:** Digital RTL Design & Cadence tools & FPGA development tools & HSPICE
- **Additional:** Latex & Git & Linux