**(Tris) Jiayi Tian**

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**Education**

**Nanjing University Nanjing, China**

School of Electronic Science and Engineering Sept. 2019- Jul. 2023

* B.Eng., Major in VLSI Design & System Integration
* **Cumulative GPA: 4.51/5.0; Major GPA: 4.49/5.0 (Top 10% in the grade)**

**Preprints**

* **Jiayi Tian**, Chao Fang, Haonan Wang and Zhongfeng Wang. "BEBERT: Efficient and robust binary ensemble BERT." *IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP). 2023* [[submitted](http://arxiv.org/abs/2210.15976)]

**Research Experience**

**Low-bit Quantization for BERT Accelerator Design**  Apr. 2021- Oct. 2022

*Independent project, ICAIS Lab, Nanjing University.*

* Investigated literature on Transformer-based models and various model compression methods.
* Used Python and Pytorch to perform low-bit quantization with ensemble methods in BERT models.
* Proposed Binary Ensemble BERT (BEBERT), a novel compression scheme to boost the efficiency and robustness of binary BERT. Our BEBERT outperforms the existing binary models by **2%~4%** in accuracy, reducing variance by around **60%**, and achieves **2x** acceleration in the training process.
* Participated in manuscripts reviewing work for TCAS-II.

**INT8 Quantization for BERT Accelerator Design with Hardware Deployment** Sept. 2021- Apr. 2023

*Member, ICAIS Lab, Nanjing University.*

* Used Python and Pytorch to perform INT8 quantization in BERT models.
* Used Matlab to achieve critical operations (Attention, Softmax. etc.) for further hardware coding.
* Planning to use Verilog to deploy INT8 BERT in FPGA for text classification.

**Optimization for Phase Solution in Lensless Imaging** Sept. 2022- Mar. 2023

*Independent project, Vision Lab, Nanjing University.*

* Used Python and Pytorch to improve the accuracy of neural networks solving equations.
* Optimized the forward propagation process by providing additional equations.
* Planning to optimize the parameter gradient and objective functions in the backward propagation process to deal with the double solution problem during image reconstruction.
* Planning to optimize phase solution in the diffractive neural field for lensless imaging using the methods above.

**Binary Quantization for Transformer-based Models Accelerator Design with Hardware Deployment**

*Member, ICAIS Lab, Nanjing University.*Nov. 2022- June. 2023

* Investigated literature on state-of-the-art binarization neural networks.
* Planning to use Python and Pytorch to perform full binarization in BERT and ViT with accuracy improvement.
* Planning to use Matlab to achieve important operations in binary BERTs for further hardware coding.
* Planning to use Verilog to devise binary BERT operations in FPGA for efficient inference.

**Course projects**

**Verilog Design Experiment** Mar. 2021- Jun. 2021

*Member, A+*

* Used Quartus and Intel Cyclone5 Series' FPGA to complete a VGA display clock on the monitor.
* Used RAM and temporal logic analysis for VGA to design the hands of the VGA clock.
* Wrote a report in 17 pages by Latex and got an A+ score.

**VLSI Design Experiment** Mar. 2022- Jun. 2022

*Individual assignment, A (top 5%)*

* Used Vivado and Cadence to devise efficient coding for computing one-dimension convolution.
* Proposed three optimization methods based on basic VLSI techniques, including pipeline, parallel, and transpose.
* Wrote a report in 11 pages by Latex and got an A score (top 5%).

**Technical Skills**

* Programming and HDL:

Advanced in C/Matlab, Proficient in Verilog, Python/Pytorch, Familiar with C++

* Hardware design and simulation skills:

Advanced in Vivado/Quartus/Modelsim, Altium Designer, and Multisim, Familiar with SPICE

* Languages: TOEFL 102; GRE V153+Q170+3.5

**Honors and Awards**

* National Undergraduate Electronic Design Contest, The 2nd Prize in Jiangsu Province, Nov. 2021 (30%)
* National Undergraduate Electronic Design Contest, The 2nd Prize in Jiangsu Province, Oct. 2020 (30%)
* People's Scholarship, The 2nd Prize in NJU, Nov. 2020 (10%)
* Jinxiao Company Scholarship, Nov. 2021 (5%)
* People's Scholarship, The Academic Competition Award, Nov. 2021 (5%)
* Excellent Organization Award, Student Union in Sch of Elec Sci and Eng., NJU, Sept. 2020 (20%)
* Excellent Department Director, Student Union in Sch of Elec Sci and Eng., NJU, Oct. 2021 (15%)
* Excellent Volunteer Prize, NJU, Dec. 2021 (<1%)
* Excellent Volunteer Prize on the school's 120th anniversary, Sept. 2022 (<1%)

**Extra-Curricular Experience**

**Department Director** Sept. 2020- Sept. 2021

*Organization Department, Student Union in Sch of Elec Sci and Eng.*

* Organized school social practice, volunteer work, and extracurricular activities.

**Vice-chairman** Sept. 2021-Sept. 2022

*School Badminton Association, Nanjing University.*

* Organized large-scale sports events and contests in NJU; the number of participants is up to hundreds.

**Captain** Sept.2021-Sept. 2022

*Women's Volleyball Team, Sch of Elec Sci and Eng.*

* Won the 4th prize in the 2019-2020 departmental contest and the 3rd prize in the 2020-2021 departmental contest.