Pengyu Zeng

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EDUCATION

Wuhan University **Wuhan, China**

Bachelor of Science in Electronic Information Engineering *Sept. 2019 – June 2023*

- **GPA & Honors:** 3.94/4.00 (92/100); Beacon-fire Scholarship (2%), The First-class Scholarship of Wuhan University (5%), Merit Student of Wuhan University (5%), Excellence Award of National Integrated Circuits Contest
- **Relevant Coursework:** Analogue Circuit, Communication Electronic Circuit, Integrated Circuit Design, Digital System Design, Microcomputer System Design, Signals and Systems, Electromagnetic Field Theory, Stochastic Mathematics

RESEARCH INTERESTS

- Mixed-signal In-memory Computing, Analog and Mixed-signal Circuits, Radio Frequency Circuits

RESEARCH EXPERIENCE

Fudan University, Advisor: Prof. Zhangwen Tang **Shanghai, China**

Research Assistant, **The Error Correction Analysis and Model design of the Pipelined ADC** *Sept. 2021 – Jan. 2022*

- Made systematic analysis in the digital error correction algorithm of the pipelined ADC, which inspires a new structure made up with stages of different bit-widths (conventional structure is combined with stages of the same bit-width)
  - Established the function and the transfer waveform of the input signal and residue signal
  - Used the function to analyze the digital output error and prove that the error correction algorithm is valid because the ratio of two adjacent stage's output is inherently opposite to the ratio of output errors caused by comparators mismatch
  - Explained the non-integer bits and the operation of overlap-add between two adjacent outputs by establishing the function of the input signal and quantized signal
  - Made a comparison among three kinds of structures with different transfer characteristics in the ability of noise tolerance, error correction range and output offset
- Built a behavioral model of the pipelined ADC with MATLAB to accelerate the design process
  - Designed a model with variable parameters in Op-amps and MDACs to verify the structure of ADC
  - Added changeable noise (kT/C noise, amplifier noise, etc.) and mismatch (capacitor mismatch, comparator offset, etc.) to analyze the impact of different nonideal factors
  - Proposed Monte Carlo Simulation to get more comprehensive simulation results of ENOB, SNR, SFDR, etc.

Tsinghua University, Advisor: Prof. Ziqiang Wang **Beijing, China**

Summer Research Intern, **A 40Gb/s CTLE for a PAM4 Wireline Receiver** *June 2021 – July 2021*

- Adopted variable-controlling method to improve the performance of the CTLE and keep the balance among peaking gain, DC gain and power dissipation
- Used MATLAB to verify the nonideal characteristic of the bode diagram when zeros and poles change
- Drew the layout and finished DRC/LVS check, parasitic extraction and post-simulaion on Cadence Virtuoso

National College Student Research Training Program **Wuhan, China**

Team Leader, **A Hardware-Accelerated SoC for Dehaze Based on Cortex-M3** *Mar. 2021 – Sept. 2022*

- Designed a SoC for real time image dehaze which is realized on Xilinx FPGA and using ARM Cortex-M3 as CPU
- Implemented the dehaze algorithm (Dark Channel Prior) on the hardware and packaged it into an IP core
- The algorithm was improved in:
  - Simplified the sorting operation into threshold-comparison operation
  - Divided the algorithm into six steps and applied two 3-stage pipelines to accelerate the algorithm
  - Proposed parallel filtering to make full use of hardware resource and speed up the operation

PUBLICATIONS

- **Conference Publications**
  - F. Shao and P. Zeng, "Urban Waterlogging Monitoring System Based on LoRa Technology," to appear at *International Conference on Computer, Communication, Control, Automation and Robotics (CCCAR)*, Mar. 2022.
- **Patents**
  - P. Zeng, Z. Zhang, "Control System for Transport Robot Based on Raspberry Pi," China Patent ZL202120792700.4, Nov. 2, 2021.
  - P. Zeng, Y. Qin, Fei. Shao, Z. Zhang, "Urban Waterlogging Monitoring System Based on STM32," China Patent ZL202120796204.6, Nov. 2, 2021.
  - P. Zeng, Y. Guo, Z. Wang, Z. Zhang, "Access Control System with Body Temperature Detection Function Based on Arduino," China Patent ZL202021248838.X, Jan. 19, 2021.

TECHNICAL SKILLS

- **EDA Tools:** Cadence Virtuoso, ADS, HFSS, Altium Designer
- **FPGA & Embedded Development IDE:** Quartus, Vivado, Keil, CCS
- **Programming Languages:** Verilog, MATLAB, C, C++, C#, Python, Java