Liu ShaoKun

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Education

South China University of Technology (SCUT) (985) GuangZhou
- **Major：BS in Information Engineering** *Sep.2020-Jun.2024*
- **GPA：3.47/4.00;**
- **Skills and tools：**

Skilled in programming with C++, C, Python, Verilog, SystemVerilog, and MATLAB;

Proficient in using professional software such as PyCharm, VSCode, Vivado, Quartus, and Multisim for development and simulation tasks;

Experienced in utilizing Origin, ChemDraw, Gauss View, and EndNote to process experimental data and compose scientific research papers.

Patent

- **Wiring Assembly and Bidirectional Output Rectification Three-MOS Switch**

Patent Number: CN219203671U
- **ESP32-Based Autonomous Nucleic Acid Testing Control System**

Patent Number: CN219202165U

Research

FPGA-Accelerated LSTM Data Optimization Research *Dec 2023 – Jun 2024*
- Utilized TOP-K pruning to reduce LSTM model density and applied linear and logarithmic quantization for parameter optimization, ensuring FPGA compatibility while maintaining model accuracy and efficiency.
- Developed an FPGA-based heterogeneous acceleration framework, incorporating loop convolution, partitioned storage, and parallel processing to enhance LSTM model performance through pipelining, loop unrolling, and a bespoke nonlinear activation module.
- Orchestrated PS-PL cooperation, executing control logic on ARM Cortex-A9, managing parameter loading from SD card to PL via AXI bus, and routing computation results back to DDR3 and serial output.
- Evaluated the impact of pruning, quantization, and FPGA acceleration on LSTM performance on Zedboard, assessing metrics such as inference latency, accuracy, power usage, and resource allocation.
- The heterogeneous acceleration platform designed in this experiment achieves an acceleration ratio of $405.00 \times$ and an energy efficiency ratio of $639.97 \times$ compared to the Intel Core i7-7700HQ processor.

Automatic multifunctional nucleic acid detection system *Sep 2022 – Nov 2022*
- Engineered a compact CNN model based on MobileNet for edge deployment on K210 and Raspberry Pi, facilitating automated swab sampling and real-time facial recognition.
- Deployed a ROS1-integrated LiDAR for environmental perception, employing Cartographer SLAM and AMCL for accurate mapping and localization, complemented by costmap and Move_base for navigation and obstacle avoidance.
- Utilized ROS1 and MoveIt for robotic arm motion planning, integrating KDL for kinematics and implementing PID control for precise six-axis arm manipulation in sampling tasks.
- Set up ESP32 as a server in STA mode for local data storage and networked file sharing via WiFi, enhancing module integration and data management.

Implementation of FPGA-Based Machine Vision Defect Detection   *Apr 2023 – Jul 2023*

- Leveraged the PaddlePaddle framework to develop a lightweight SSD-MobileNetV1 model, optimized for deployment on the Intel FPGA Cyclone V platform.
- Employed techniques such as image rotation, scaling, translation, and noise addition to boost the model's generalization and prevent overfitting, effectively expanding the dataset.
- Implemented network pruning and quantization to minimize model parameters and computational load, ensuring high inference accuracy on resource-constrained hardware.
- Utilized the GHRD framework to design a vhdmi IP core for VGA to HDMI conversion, integrating a vcam module for image stream processing from DDR3 to DVP format on the development board.
- The realized inference time is about 1.5 fps, HDMI refresh rate reaches 15 fps, and the mAP of model inference is 95.74%.

Low-Cost Self-Powered System Based on Novel Topology and   *May 2023 – May 2024*
Adaptive Tracking for Triboelectric Nanogenerator (TENG)

2023 National Innovation and Entrepreneurship Training Program for College Students

- Derived the first voltage characteristics at the Maximum Capacitance Point (MCP), addressing a theoretical gap in TENGs, and designed an adaptive MCP tracking switch to enhance energy transfer efficiency.
- Leveraged the V-Q-x relationship and V-Q curve of TENG to determine output impedance and theoretical energy limits, establishing a foundational theoretical framework for power management circuit design.
- Developed an MCP adaptive tracking system using an L-shaped stroke switch, coupled with a BUCK energy storage unit, to enable efficient energy storage and voltage regulation.
- Created a novel MOSFET-BJT combination maximum value tracking switch, demonstrating its applicability across multiple TENG modes and superior energy transfer efficiency, as validated through simulations.

Internship

Digital Backend Engineer, Shenzhen Joulwatt Microelectronics Co.,   *Feb 2024 – Jul 2024*
Ltd. (Supervisor Company)

- ADC Chip Verification Leadership: Directed the digital functional verification for ADC chip Y, crafting the verification strategy and managing the process. Authored SystemVerilog test scripts and executed verification on Verdi and VCS platforms, culminating in a successful tape-out and functional verification, with market launch imminent.
- FPGA-Based Sampling Platform Development: Engineered a digital sampling platform for ADC chip X, autonomously establishing the verification framework per technical specs. The platform is operational for verification, with an anticipated tape-out in the forthcoming year.
- STM32 Verification Platform for Clock Chip: Constructed an STM32-based verification platform for clock chip Z, overseeing platform functionality, timing design for chip I/O, client liaison, and post-deployment support to guarantee reliable operation and client approval.

Student Leadership & Activities

Class Works   *Sep.2020–Mar.2024*

- Served as Science and Innovation Officer, responsible for organizing various innovation activities to stimulate creative thinking and practical skills within the class.
- Served as Quality Development Officer, organizing and planning diverse team-building activities that contributed to the class winning the "Outstanding Class" award from the School of Electronic Information.

Captain, College Debate Team *Sep.2020–Mar.2021*

- Developed a structured training program covering debate techniques, logical reasoning, and presentation skills.
- Organized regular training sessions, mock debates, and case analyses, providing targeted guidance to enhance the team's overall proficiency.
- Awarded "Best Debater" in the internal college debate competition.

Lead, Winter Recruitment Team in Huizhou *Jul.2021*

- Led planning and coordination for promotional outreach to high school students, working closely with high school leadership to achieve recruitment goals.
- Trained team members on communication techniques and strategies, ensuring effective and professional interactions.

Honors and Awards

- National Inspirational Scholarship 2023
- Second Prize, National College Electrical and Electronic Engineering Innovation Competition 2023
- National College Micro-Entrepreneurship Silver Award 2021
- National College Student Innovation and Entrepreneurship Training Program 2021
- First Prize, Guangdong Province University Electronic Design Competition ("AI-Topic") 2022
- Special Prize, "Challenge Cup" Guangdong University Student Extracurricular Academic and Technological Competition 2022
- Second Prize, National College Student Mathematics Competition (Non-Math Category) 2022
- First Prize, College Electrical and Electronic Engineering Innovation Competition (Guangdong, Hong Kong,Macao, and Taiwan Region) 2023
- Second Prize, Guangdong Province Energy Conservation and Emission Reduction Competition 2022