Yen-An Lu

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Education

- **National Taiwan University (NTU)** Taipei, Taiwan
  B.Sc. in Electrical Engineering; GPA: 3.70/4.0 Sept. 2018 - June. 2022
  Courses: Computer Architecture, Computer-Aided VLSI System Design,Integrated Circuit Design, Machine Learning, Electronics, Switching Circuit Design, Electrical Engineering Lab (Digital Circuitry)

Research Interest

My research interests involve the design of **ultra-low-power circuits** and **energy-efficient ML algorithms and architectures for AI.**

Research Experience

- **Academia Sinica, Taiwan**
  Advisor: Prof. Cheng, Hsiang-Yun April. 2022 - Sept. 2022
  Position: Research Assistant
  - **Training Personalized Recommendations in heterogeneous memory devices**:
    - Investigated different systems' impacts on training recommender system.
    - Applied process-in-memory architecture and heterogeneous memory(HBM and DIMM) to accelerate the training time of the recommender system.
    - **Skills**: Ramulator, Compute-in-memory, Recommender system

- **Energy-Efficient Circuits and Systems Lab, NTU**
  Advisor: Prof. Tsung-Te Liu Mar. 2021 - Present
  Position: Research Student
  - **Energy-efficient keyword spotting accelerator**:
    - Designed a low-power circuit that can identify ten keywords from one-second long utterances.
    - Sent our design to Taiwan Semiconductor Research Institute and taped out a depthwise separable convolution neural network (DSCNN) keyword spotting accelerator.
    - **Skills**: Machine learning, DSCNN, Fold batch-norm, Post-sim & Verification
  - **Optimizing keyword spotting accelerator by applying quantization-aware training**:
    - Utilize quantization-aware training on keyword spotting to minimize model weights.
    - Test different weight bitwidths to ensure the accuracy.
    - **Skills**: Tensorflow, Quantization-Aware Training
  - **MFCC feature extraction circuit**:
    - Designed a low-power circuit that can extract MFCC features from one-second long utterances.
    - The extracted MFCC features can be utilized to recognize keywords.
    - **Skills**: Frame blocking, Hamming Window, Fast Fourier Transform, Triangular Bandpass Filters, Discrete Cosine Transform, Log Energy, Delta Cepstrum

- **Nanoelectronics Research Lab, NTU**
  Advisor: Prof. Vita Pi-Ho Hu Mar. 2021 - Sept. 2021
  Position: Research Student
  - **Investigating Ferroelectric Minor Loop Dynamics and History Effect**:
    - Constructed multiple phase-field models based on the time-dependent Landau–Ginzburg framework to simulate phase-field multidomain switching model.
    - Researched the correlation between ferroelectric material domain size and the coercive field.
    - **Skills**: TCAD, Preisach Model, Landau–Ginzburg framework, History Effect

Course Projects

- **FPGA Voice Recorder**:
  - **Course**: Electrical Engineering Lab (Digital Circuit)
  - **Skills**: FPGA, WM8731, I^2C & I^2S interface, On-board SRAM, PLL
  - Implemented I2C to initialize the WM8731 chip.
  - Controlled the DAT/CLK signals of the WM8731 chip to make a recorder.
- **Gauss-Seidel Iteration Machine**:
  - **Course**: Computer-Aided VLSI System Design(graduate level course)
  - **Skills**: Gauss-Seidel Method, Clocking Gating
  - Designed a low power, low latency, and low area circuit to solve a linear equation with sixteen unknown.
  - Utilized the Gauss–Seidel method iterated 16 times to acquire the final answer.
- **Image Processing Filter**:
  - **Course**: Integrated Circuit Design
  - **Skills**: Pipeline, Synthesis, Auto Place & Route
  - Designed an Image Processing Filter that can process data with three different operations.
  - Ranked third among 26 groups.

Extracurricular Activities

- **Calligraphy Club**: Coordinator & Treasurer
  - **The 26th Nine Schools of North District**: Hosted an inter-school calligraphy exhibition, attracting students from nine schools in attendance.
  - **The 12th Jinshi Group Exhibition**: Invited famous calligraphers to attend Jinshi Group Exhibition; my calligraphic works were exhibited in the exhibition.

Teaching & Volunteer experience

- **Taiwan Fund for Children and Families' volunteer**:
  - **Volunteer experience**: Organized three-hour tutorials on school subjects every two weeks for rural children.
- **Student-Faculty Tea Party & Ancestral Thanksgiving Celebration**:
  - **Number of participants**: 720 participants including the principal.
  - **Teaching experience**: Taught overseas Chinese students, international students, and students from China how to write Spring Festival couplets to celebrate the end of the semester while giving thanks to our ancestors.

Skills Summary

- **Programming Languages**: Python, C++, Java, MATLAB, Verilog, SystemVerilog
- **Simulation Tools**: Innovus, Quartus, EPS, Lint, Primetime, TCAD
- **Framework**: Pytorch, Tensorflow
- **Operating System**: Linux, Windows
- **Languages**: English, Mandarin Chinese