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⚙ GitHub Profile

EDUCATION

- **National Taiwan University** *Sep. 2021 - Jun. 2025*
  Department of Electrical Engineering
  - **Courses:** Quantum Information and Computation, Special Topics on Quantum Design Automation, Machine Learning, Deep Learning for Computer Vision, Algorithm, Data Structure, Computer Architecture
  - **Overall GPA:** 4.15/4.3

COLLABORATIVE RESEARCH EXPERIENCE

- **Quantum Circuit Synthesis** *Jan. 2023 - Present*

  Qsyn: A Developer-Friendly Quantum Circuit Synthesis Framework link
  - Investigate optimization algorithms in the full quantum circuit synthesis process and implement them into an end-to-end tool in C++.
  - Implement the functions between tensor and quantum circuit.
  - Efficiently decompose an Unitary matrix into basic gate sets.

- **Quantum Machine Learning** *Feb. 2024 - Present*

  Exploring Algorithms, Circuits, and Models for Quantum Machine Learning Applications
  - Conduct research on leveraging quantum entanglement to optimize quantum federated learning performance and enhance security through quantum channel implementation.
  - Investigating novel approaches for efficient gradient estimation in quantum machine learning (QML), with a focus on improving algorithmic and measurement efficiency.

- **Human Computer Interaction** *Jan. 2023 - Jun. 2023*

  CrossHaptics: Enabling Real-time Haptic Feedback for VR Games via Vibration Pattern Analysis
  - Explore how VR controller vibration patterns designed by game developers can be used to enable support for addition haptic devices for all VR games.
  - Conduct data processing for user studies.
  - Code with OpenVR API for vibration patterns capturing.

SELECTED PROJECTS

- **Quantum Information and Computation: Course Project** *Apr. 2024 - Jun. 2024*

  Comprehensive framework of T-Count Optimization Techniques for Clifford+T Quantum Circuits link
  - Integrated various T-count reduction techniques, including TMerge, Internal-H-OPT, and H-gadget, into a unified optimization flow.
  - Consolidated advanced phase polynomial optimization methods, such as TODD and Reed-Muller Codes, for more efficient T-gate minimization.
  - Combined Gray synthesis (GraySyn) and T-parallelism (T-Par) strategies to enhance overall circuit efficiency.

- **Special Topics on Quantum Design Automation: Course Project** *Dec. 2023 - Jan. 2024*

  Decomposing a Unitary Matrix into Basic Gate Set link
  - Read in a valid unitary matrix, converting the tensor into several 2-level matrices.
  - Use gray-code synthesis to map the matrices into quantum gates, decomposing and optimizing to get the final quantum circuit with the given basic gate sets.

- **Introduction to Electronic Design Automation: Course Project** *Apr. 2024 - Jun. 2024*

  Reinforcement Logic Optimization for a General Cost Function link
  - Implemented and compared a Reinforcement Learning algorithm against baseline methods like Greedy and Simulated Annealing to minimize costs.
  - Developed a program to optimize digital circuits based on a black-box cost estimator, addressing complex optimization beyond traditional PPA metrics.
  - Parsed a cell library and generated a netlist, then converted it into an AIG file for circuit optimization using Yosys and Yosys-ABC commands.

TECHNICAL SKILLS AND INTERESTS

Languages: C/C++/Arduino, Python, JavaScript/CSS/HTML, Go, Rust, System Verilog
Developer Tools: vim, git, VSCode, MBed OS, STM32CubeIDE, RPi