Joint Quantum Sciences Seminar

Wednesday, November 16, 2022
Pierce Hall 301
4:00 PM

Dr. Jason Cong

UCLA, Computer Science Department

"FPGAs, Real-Time Processing, and Quantum Computing"

An Field Programmable Gate Array (FPGA) is a programmable integrated circuits that one can customize in his/her office/lab to get a dedicated application-specific circuit for his/her own applications with much reduced processing latency and power consumption compared to general-purpose CPUs. In this talk, I shall start with a quick tutorial of the FPGA technology, including its architecture and design flow. Then, I shall give examples how FPGAs are used for real-time processing and control, including recent works on FPGA-based in-vivo calcium image processing and decoding and high-throughput real-time processing for Compact Muon Solenoid (CMS) detector in the Large Hadron Collider at CERN. Next, I shall discuss how FPGAs can be used in quantum computing, such as closed-loop feedback for stabilizing frequency fluctuations and state initialization for the superconducting qubits. Finally, I shall present our latest progress on high-level synthesis (HLS) that supports dataflow programming and latency-insensitive designs. Our goal is to facilitate researchers (e.g. everyone in the HQI community) to efficiently design FPGAs with no or little prior circuit design experience.

Student presentation will begin at 400:PM
Refreshments will begin at 4:15 PM
Guest Presentation will begin at 4:30 PM

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