# Ron(Haoqin) Deng

Phone: (+1)3107436278(US); (+86)13861785871(China) | Email: haoqinde@usc.edu

## Education

- University of Southern California, Viterbi School of Engineering
- Major: Electrical and Computer Engineering
- Minor: Computer Science & Physics
- GPA: 3.7/4.0

**Relevant skills:**

- **Courses**: Data Structure, Algorithms, Machine Learning, Software Engineering, Digital Circuits, FPGA programming, Internetworking, Cellular Biology, Quantum Mechanics, Open Quantum System, Semiconductor Devices, Non-linear Circuits, Electromagnetism, VLSI, Neuromorphic computing
- **Programming**: C/C++, Python, Java, Verilog
- **Tools & Software**: Pytorch, Qiskit, Cadence, ModelSim, Comsol

## Experience

**Research Assistant, Khajavikhan Optics and Photonics Group** Feb 2021 - Current

- Explored various architectures of Optical Neural Network (ONN)
- Simulated onchip-training of ONN made of cascading Mach-Zehnder interferometers
- Simulated onchip-training of ONN made of parity-time symmetric directional couplers
- Simulated the parity-time symmetric directional coupler in Comsol

**Research Assistant, USC Laboratory for Photons, Electrons and Materials** Jun 2020 – Dec 2020

- Studied principles of materials growth technique, including evaporation, TLP, LP-TLP, MOCVD; learned to operate machines to grow materials using these techniques.
- Studied the computational model of neurons and its hardware emulation with semiconductor devices such as memristors and MOSFETS
- Explored various architectures of mapping Artificial Neural Networks and Spiking Neural Networks onto available hardware synapse/neuron devices
- Simulated DCSNN(Deep Convolutional Spiking Neural Network) that incorporates hardware parameters, using spyketorch libraries; achieved 91% best training accuracy.
- Designed hardware implementation of a neural network using crossbars of floating-gate MOSFET devices

**Research Assistant, USC ALCHEM Lab** May 2019 – Aug 2020

- Studied mechanism of quantum computing and various quantum algorithms; learned to use quantum libraries such as qiskit and pyqpanda
- Developed accQOC, a comprehensive compilation methodology that accelerates pulse generation by 9x.
- Implemented simultaneous-measurement methodology for mutually commuting Hamiltonians to reduce measurement overhead in Variational Eigen-Solver algorithm
- Coauthor of the paper "*Accelerating Quantum Optimal Control Based Pulse Generation*", ISCA2020

**Research Assistant, USC IMEDE Lab** Mar 2019 – Mar 2020

- Assisted in designing a neural-signal sampling device
- Used Opal-Kelly's API to realize data transfer between FPGA and PC; implemented SPI protocol to transfer data between FPGAs; visualized data on PC end

**Summer Internship, Shanghai AIKE Measurement Co.** July 2018 – August 2018

- Learned to use LabView to sample data and control hardware
- Assisted in designing the structure of a dispenser for lab usage
- kept track of daily tasks and progress for the team

## Projects

**EE582: Neuromorphic computing** 2021 Spring

- Implemented a dendritic spiking circuit; incorporated synapse circuit, voltage adder, spiking circuit
- Presented Indiveri's "*A VLSI neuromorphic device for implementing spike-based neural networks*"

**LAHACK 2020 Mobile App: Go Eat**

- Developed a cross-platform app that recommends restaurants based on user preferences
- Created KNN and genetic models to recommend restaurants given user and restaurant features
- Utilized Firebase to store and fetch data

**LAHACK 2019 Game: Mind Palace**

- Developed a game that trains players' mnemonic technique
- Designed game stages and implemented them with SDL library
- Utilized Google Cloud API to extract key information from sentences

**Arcade Game "SPLATOON"**

- Designed a 2D-board Splatoon game that runs on a Xilinx FPGA Spartan 6, implemented with Verilog
- Integrated joystick module for user control and VGA module for image display

**Home Light System IoT Project**

- Developed a remote light control system running on Raspberry Pi
- Fetched data from light sensor and transmit it through OpenMote
- Utilized MQTT library to transmit data and control illumination

**Web Game "Mission Universe"**

- Created a web-based, multiplayer jet-fighting game, using HTML, JavaScript, Java
- Utilized Phaser API to construct game elements and WebSocket to transmit data in multiplayer mode

**Code Compiler**

- Implemented a compiler that parses a realistic program into tree structure, with Bison and C++
- Generated assembly language and computed values of variables and memories

**Accelerometer**

- Developed an accelerometer running on Arduino
- Integrated a rotary encoder to set threshold and a buzzer to present speed, controlled by interrupt