**Yi-Chia (Paul) Chen**

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**EDUCATION**

**University of Southern California (USC)** Los Angeles, CA

**Master of Science in Electrical and Computer Engineering Progressive degree (Computer Architecture/VLSI)** Aug 2023– May 2024

**Bachelor of Science in Electrical and Computer Engineering (W.V.T Rusch Honors Program)** Aug 2019– May 2023

* Current Coursework: Systems for Machine Learning, Computer Architecture
* Relevant Coursework: Machine Learning for Electrical Engineers (python), Network Processor Chip Design (C, Verilog, bash, python), Parallel and Distributed Computation (C), Digital System Design (Verilog/VHDL), Computer Systems Organization (Verilog), MOS VLSI Circuit Design (Cadence), Software Design (C++), Intro to Digital Circuits (Verilog, FPGA), Linear Circuits, Semiconductor Physics, Intro to Embedded Systems (C, Arduino), Distributed Systems for the IoT (Python, RPi), Linear Systems (Matlab), Electromagnetics (NanoVNA)

**SKILLS**

* C, C++, CUDA, OpenMP, Pthreads, Python, Pytorch,Verilog, VHDL, Vitis IDE, RTL, Vivado, Questa Sim, LTspice, KiCad, MATLAB, ROS, Ubuntu, GitHub, PCB layout, bash, Virtuoso, Machine Learning, assembly

**EXPERIENCE**

**Versum Materials, MilliporeSigma, Merck KGaA** Los Angeles, CA

Machine Learning/ Data Analytic Internship Jul 2023 – Present

* Development of scalable cloud-based data science and analytics workflows
* Implementation of Machine Learning pipelines on the Palantir Foundry stack
* Supporting customer-critical analytics applications with Software and ML Engineering Expertise

[**USC FPGA/PARALLEL Computing Lab**](https://sites.usc.edu/fpga/projects/) Los Angeles, CA

Conducted research on hardware accelerator on Heterogeneous platform (paper accepted at FPL 2023) Jun 2022 – Present

* Leverage Xilinx Adaptive Compute Acceleration Platform ([ACAP](https://www.xilinx.com/products/silicon-devices/acap/versal.html)) with multiple processors, FPGA, and AI Engine to

accelerate Graph Neural Networks (GNN) inference process in GCN, GraphSage, GIN, and SGC

* Optimized GEMM computation units using message passing paradigm on AI Engine and other computations on FPGA
* Evaluate the overall framework with PyTorch geometry on Python with Planetoid, Flicker, Nell, and Reddit datasets

**USC Viterbi School of Engineering** Los Angeles, CA

* Mentor students in EE354 (Intro to Digital Circuits, Verilog) Aug 2021 – May 2023
* Grade EE451 (Parallel and Distributed Computation, C++, CUDA, OpenMP) and EE155 (Intro to Programming, C++) assignments

[**USC Analog/RF Integrated Circuits, Microsystems, and Electromagnetics Lab**](https://sites.usc.edu/acmelab/) Los Angeles, CA

Human Motion Recognition Sensor Research Aug 2021 – Mar 2022

* Proposed a low-cost wearable induction-based sensor control circuit to detect human motion
* Verified circuit function via LTspice (simulator software)
* Layout Print Circuit Board circuit via KiCad EDA software

**USC Structural Health Monitoring Lab** Los Angeles, CA

Robot Operating System (ROS) Research Jul 2021 – Oct 2021

* Developed a multi-node simulation system in Python and C++ to collect image data via a Hexacopter model on ROS
* Created a growing crack simulator tool and implemented image quilting in MATLAB to synthesize data for simulation jobs

**The Group Strive Electronic Company** Hsinchu, Taiwan

Semiconductor Product Manufacturing MIS Internship Jun 2020 – Aug 2020

* Managed database, server, and label system and worked closely with the packaging and testing department
* Established a new request function on the company's operation website, replaced paper request forms

**COURSE PROJECTS**

**Semantic Deduplication with clustering techniques for Data-efficient Learning** April 2023–May 2023

* Optimized MNIST, FashionMNIST, and Cifar10 datasets using VGG16 and Kmeans, then trained with MLP and CNN models
* Propose a stratified sampling approach that balances the data samples, which improves the random setting by up to 3% acc.

**T.H.A.N.O.S ­– True Hardware Accelerated NIDS Offloading System** Jan 2023 – May 2023

* Designed a 5-staged dual-core multi-thread processor for hardware intrusion detection that is compatible with SNORT rules
* Constructed a RISC-V compiler in Python for compiling RISC-V assembly code
* Implemented Bloom filter and editing package header on FPGA using Verilog for memory-efficient matching

**Smart Bike Helmet** Jan 2023 – May 2023

* Invented a bike helmet with ATMega328p microcontroller with SOS signals, turn/brake signals, ultrasonic, and accelerometer
* Optimized and implemented modules such as GSM, Radio, Accelerometer, and GPS using UART, I2C, and SPI with C

[**Accelerated Visual Transform on GPU**](https://github.com/pacchen/accelerated_transformer) **(Achieved 223x speedup)** Nov 2022 – Dec 2022

* Optimized accelerated visual transform attention layer capable of making full batch inferences programmed in C with CUDA.
* Implemented shared memory and linear attention strategies and achieved 223x speedup

**Arbiter Unit Design**  Apr 2022 – Apr 2022

* Designed arbiter hardware on Cadence Virtuoso with a built-in finite state machine to perform a round-robin schedule of a multiplier and divider

**Flappy Bird Game with Nexys4 FPGA Board** Nov 2021 – Dec 2021

* Recreated Flappy Bird game on a VGA monitor with Verilog and Vivado

**UART and I2C Communication Protocol on DE10 Nano FPGA Board** Jul 2021 – Aug 2021

* Self-learned RTL design of UART and I2C protocols in Verilog
* Simulated the communication protocol using different modules in Verilog

[**ML (Machine Learning / Music Light) Therapy**](https://github.com/pacchen/MLTherapy) **-- 1st place in USC IEEE Product IoT Hackathon** Mar 2021 – Apr 2021

* Innovated an automatic light and music therapy IoT system on Raspberry Pi, Python, and MQTT
* Implemented facial emotion recognition using Microsoft Azure's Face API to generate corresponding light and music

**EXTRA CURRICULUMS**

**USC Taiwanese Student Association** Los Angeles, CA

**Current Senior Advisor and Past Event Planning Team Leader** Aug 2021 – Present

* Led the team to plan multiple large-scale (over five hundred people) events throughout the semester

**Racing SC (Formula SAE USC team)** - Electrical TeamAug 2019 – Mar 2021

* Assembled and bench-tested PCBs for Power Distribution Module (PDM), alternating switches, and relays
* Wired VDM sensors and wheel speed sensors onto the car for data collecting

**Winner's Robotics** - Teacher's Assistant Sep 2018 – Aug 2019

* Led a team of six to compete in the Robocup and won second place in the 2019 World Championship
* Taught students to program in C to control a robot in rescue missions in RoboCup Competition