

# Charlie Chen

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## EDUCATION

Harvard University

Cambridge, MA

**Bachelor of Science in Electrical Engineering**, Minor in Computer Science | GPA: 3.97/4.0

May 2027

- Relevant Courses: Semiconductor Electronic Circuits (MIT), Computing Hardware, Circuits Devices & Transduction, Signals & Communications, Systems & Control, Physics E&M, Systems Programming, Data Structures & Algorithms

## TECHNICAL SKILLS

**Digital & Embedded:** FPGA Programming, SystemVerilog, Vivado, Digital Circuit Design, Arduino, GPIO, Linux

**Hardware & Circuits:** PCB Design, Schematic Capture, KiCad, LTSpice, Analog Circuit Design, Op-Amps, Soldering, Board Bring-Up, Oscilloscopes, Multimeters, Function Generators, Power Supplies

**Programming:** Python, C, MATLAB, Git

## ENGINEERING PROJECTS

**NAND-Only Logic Gate Demo PCB** | PCB Design & Bring-Up, Power & Signal Integrity, KiCad

- Designed & assembled 2-layer PCB implementing all six Boolean functions using only NAND-gates with user inputs
- Added **per-IC decoupling capacitors** to suppress noise & prevent transient VDD droop on input transitions
- Reduced ground bounce & improved signal integrity using **solid ground plane** to minimize return path impedance
- Performed **hardware validation** & debugging across all input combinations during **board bring-up** using LEDs & **DMM**

**MIPS Multicycle Processor & Assembler** | SystemVerilog, RTL Design, FPGA, FSM Control, Testbenches

- Architected multicycle CPU to reuse shared datapath resources, trading control complexity for hardware efficiency
- Implemented **FSM control path** to correctly sequence register, ALU, memory, & PC operations across instruction types
- Developed MIPS assembler & **self-written testbenches**, verifying cycle-accurate CPU behavior via **waveform analysis**

**Reverb Karaoke Machine** | Analog Signal Conditioning, Op-Amps, Filters, ADC/DAC

- Engineered **op-amp signal conditioning** of audio input for unipolar ADC, preserving vocal dynamics without clipping
- Applied **band-limiting & reconstruction filtering** to suppress quantization artifacts across ADC/DAC boundaries
- Characterized **frequency response** & end-to-end signal quality with **oscilloscope** during prototyping to diagnose noise

**Mask Detector** | Embedded Systems, Arduino, Real-Time IO, Serial Communication

- Built real-time embedded system that live detected & sprayed water at unmasked faces with 91% accuracy
- Integrated **low-latency serial communication** between inference pipeline & **Arduino-driven relay circuit**

## EXPERIENCE

Harvard Ability Lab | Cambridge, MA

June – Nov 2025

Undergraduate Researcher

- Enabled human-in-the-loop experiments by prototyping **stable wearable mounting system** for supernumerary arm
- Designed task protocols varying complexity & motion to evaluate system behavior under **realistic human movement**
- Collected **10,000+ frames** of egocentric video & actuator states to support VLA training & **control analysis**

## ADDITIONAL SKILLS & INTERESTS

**Fluent Languages:** English, Mandarin

**Interests:** Hiking, Cooking, Running, Speedcubing