

# YUJIA YUAN

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Stanford EE PhD candidate and **Shoucheng Zhang Fellow** building physical-AI hardware end-to-end — from sensing materials and PCBs through embedded firmware to the data pipelines that turn raw signals into clean, machine-readable input. Seeking R&D, hardware, or founding-engineer roles in robotics, sensor fusion, wearables, and physical AI.

## EDUCATION

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**Stanford University** — PhD, Electrical Engineering · Prof. Zhenan Bao Group 2022 – Present

Coursework: Analog Circuits, RF Circuits, Sensors, Device Physics, Deep Learning, Patent Law.

**University of Waterloo** — BAsC, Electrical Engineering, Minor in Physics · GPA 3.93 / 4.00 2017 – 2022

Coursework: PCB, Quantum Physics, Signal Processing, Control Theory, Algorithms & Data Structures, OOP, Digital Circuits.

**Honors:** Shoucheng Zhang Fellowship (\$360K, 6 fellows, 2022) · Gerry Heckman Scholarship (2022) · Waterloo President's Research Award (2021, 2022) · NSERC Undergraduate Research Award (2021) · Waterloo President's Scholarship of Distinction (2018).

## SELECTED PROJECTS

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**Robotic Skin That Feels Touch — High-Density Tactile Sensor Array** Stanford · Bao Lab · 2024 – Present

Robotic Tactile · Physical Intelligence · Soft Sensing

- Designed a stretchable high-density tactile array sensing pressure, slip, and texture in real time.
- Built device, analog front-end, and readout pipeline turning each pixel into control-ready data.
- Enables fine manipulation for teleoperation, dexterous prosthetics, surgical robotics, and AR/VR haptics.

**Wearable Health Patch That Doesn't Drift — Cortisol & Glucose Biosensor** Stanford · Bao Lab · 2023 – 2024

Wearable Bioelectronics · Health AI · Sensor Fusion

- Co-developed a body-worn biosensor with a matched reference channel that cancels sweat, motion, and thermal noise.
- Integrated flexible PCB, wireless link, and smartphone readout for continuous on-body operation.
- Cut signal drift **100x**, unlocking continuous metabolic monitoring; published in *Nature Electronics* (2025).

**Soft Electronics on a Wafer — Stretchable Integrated Circuits** Stanford · Bao Lab · 2023 – Present

Stretchable Electronics · Physical AI Hardware · On-Device Compute

- Built one of the first wafer-scale platforms for circuits that bend and stretch like skin.
- Owned simulation, layout, cleanroom fabrication, and electrical test; hit **55,000 transistors / cm<sup>2</sup>** and **50x speed** of prior SOTA.
- Puts signal-conditioning compute on robot fingertips and patches; *Nature* (2024), follow-up under review at *Cell Device*.

**Underground-Miner Safety Monitor — End-to-End Embedded Product** Jannatech Technologies · 2017 – 2018

Embedded Systems · Industrial Safety · Real-Time Sensing

- Shipped a rugged distance-warning system: dual ultrasonic sensors, custom PCB, and TI-microcontroller firmware.
- Delivered hardware, firmware, and Python operator UI as one product deployed in active mines.

**Lab Automation Toolkit — Three Closed-Loop Optical Instruments** Waterloo · Bajcsy Lab · 2018 – 2022

Optoelectronics · Lab Automation · Mechatronics

- Designed a self-aligning laser-coupling rig, phone-readable melamine scanner, and broadband polarization station.
- Combined CAD, motor control, optics, and Python pipelines; polarization work presented at *CLEO 2022*.

## SELECTED PUBLICATIONS

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Y. Yuan†, C. Zhao†, Z. Bao\*, et al. "Monolithic fabrication of high-density stretchable complementary circuits." *Cell Device*, under review (2025)

C. Zhao, J. Park, D. Maula, Y. Yuan, Z. Bao\*, et al. "Skin-like drift-free wearable biosensors using stretchable transistors." *Nature Electronics* (2025)

D. Zhong, C. Wu, Y. Jiang, Y. Yuan, Z. Bao\*, et al. "High-speed, large-scale intrinsically stretchable integrated circuits." *Nature* (2024)

Y. Yuan, S. Venuturumilli, M. Bajcsy\*, et al. "A compact setup for broadband polarization tomography." *CLEO* (2022)

## SKILLS

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**Hardware:** PCB, analog & RF circuits, sensors, embedded systems, optomechanics. **Software:** Python, C++, Cadence, MATLAB, Lumerical, COMSOL, deep-learning toolchains. **Fabrication:** photolithography, deposition, etching, 3D printing, machining, SEM/AFM, cleanroom; liquid metal, organic semiconductors, elastomers.