

# Yufeng Chi

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## Research Interest

**Computer architecture:** Domain-Specific Hardware, Accelerator for Physical AI, Design Methodology, FPGA Deployment

**Robotics:** Robot Learning, Reinforcement Learning, Whole-body Control, Robotic System Architecture

## Education

### University of California, Berkeley

Ph.D. Electrical Engineering and Computer Science

May 2023 – Present  
GPA: 3.937/4.0

Advisor: Yakun Sophia Shao, Borivoje Nikolic, Koushil Sreenath

Relevant Coursework:

**CS285** Deep Reinforcement Learning, **EE221A** Linear System Theory, **CS252A** Computer Architecture and Engineering,

**EECS251B** Advanced Digital Integrated Circuits and Systems

### University of California, Berkeley

B.S. Electrical Engineering and Computer Science

May 2019 – Dec 2022  
GPA: 3.783/4.0

Relevant Coursework:

**EE194/290C** IC Design Project: 16nm SoC for AI and IoT, **EECS151/EECS151LB** Digital Design and Integrated Circuits, **CS162**

Operating Systems, **EECSC106A** Robotics

## Publications

### 2025 Cygnus: A 1 GHz Heterogeneous Octa-Core RISC-V Vector Processor for DSP

V Jain, D Grubb, J Zhao, K Anderson, K Ho, Y Chi, E Schwarz, K Ansanovic, S Shao, B Nikolic  
Symposium on VLSI Technology and Circuits (VLSI Technology and Circuits)

### 2025 MAVERIC: A 16nm 72 FPS, 10 mJ/Frame Heterogeneous Robotics SoC with 4 Cores and 13 INT8/FP32 Accelerators

S Kim, J Zhao, R Hsiao, Y Chi, V Iyer, V Jain, X Huang, B Nikolic, S Shao  
Symposium on VLSI Technology and Circuits (VLSI Technology and Circuits)

### 2025 Demonstrating Berkeley Humanoid Lite: An Open-source, Accessible, and Customizable 3D-printed Humanoid Robot

Y Chi, Q Liao, J Long, X Huang, S Shao, B Nikolic, Z Li, K Sreenath  
Robotics: Science and Systems (RSS)  
[Paper][Website][Featured by FOX News, TechXplore, 量子位]

### 2025 LangWBC: Language-directed Humanoid Whole-Body Control via End-to-end Learning

Y Shao, X Huang, B Zhang, Q Liao, Y Gao, Y Chi, Z Li, S Shao, K Sreenath  
Robotics: Science and Systems (RSS)  
[Paper][Website]

### 2024 NeCTAr and RASoC: Tale of Two Class SoCs for Language Model Interference and Robotics in Intel 16

V Schmulbach, J Kim, E Gao, N Jha, E Wu, O Yu, B Oliveau, X Kong, B Roberts, C McMahon, L Yin, V Yang, B Brenner, G Moujaes, B Hao, L Revina, K Anderson, B Ngo, Y Chi, H Huang, R Sajadiany, R Gupta, E Schwarz, J Zhou, K Ho, J Zhao, A Flynn, B Nikolic  
IEEE Hot Chips 36 Symposium (HCS)

### 2024 DiffuseLoco: Real-Time Legged Locomotion Control with Diffusion from Offline Datasets

X Huang\*, Y Chi\*, R Wang\*, Z Li, XB Peng, S Shao, B Nikolic, K Sreenath  
Conference on Robot Learning (CoRL)  
[Paper][Website]

### 2023 Creating a Dynamic Quadrupedal Robotic Goalkeeper with Reinforcement Learning

X Huang, Z Li, Y Xiang, Y Ni, Y Chi, Y Li, L Yang, XB Peng, K Sreenath  
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)  
[Paper][Video][Featured by IEEE Spectrum, TechXplore, TechCrunch]

2022 **Collaborative Navigation and Manipulation of a Cable-towed Load by Multiple Quadrupedal Robots**  
C Yang, GN Sue, Z Li, L Yang, H Shen, Y Chi, A Rai, J Zeng, K Sreenath  
IEEE Robotics and Automation Letters 7 (4), 10041-10048 (RAL)  
[Paper][Video][Spotlighted by IEEE Spectrum]

## Experience

<b>Research Assistant</b>  Berkeley Wireless Research Center, UC Berkeley	Aug 2022 – May 2023 Advisor: Prof. Kristofer Pister, Prof. Borivoje Nikolic
Working with Prof. Kristofer Pister on bringing up the research chips OsciBear, BearlyML, and SCuM-V. - Experimented with JTAG, QSPI, and serialized-TileLink communication to the chip, and successfully established communication with OsciBear using an STM32 microcontroller running software emulated serialized-TileLink over UART interface - Wrote driver libraries and tested the on-chip RISC-V core, RF Baseband, Advanced Encryption Standard (AES) accelerator, and sparse-dense matrix multiplication accelerator - Designed the digital and RF layout of the 6-layer PCB for the chips in Intel BGA package	Working with Prof. Kristofer Pister on bringing up the research chips OsciBear, BearlyML, and SCuM-V. - Experimented with JTAG, QSPI, and serialized-TileLink communication to the chip, and successfully established communication with OsciBear using an STM32 microcontroller running software emulated serialized-TileLink over UART interface - Wrote driver libraries and tested the on-chip RISC-V core, RF Baseband, Advanced Encryption Standard (AES) accelerator, and sparse-dense matrix multiplication accelerator - Designed the digital and RF layout of the 6-layer PCB for the chips in Intel BGA package
Working with Prof. Borivoje Nikolic on improving the Chipyard System-on-Chip (SoC) framework. - Writing detailed documentation and tutorials for the generator components inside the testchipip and sifive-block repo - Working on automated C driver code generation from the source Chisel code - Porting Chipyard to Arty Cmod board to serve as a UART to serialized-TileLink adapter	Working with Prof. Borivoje Nikolic on improving the Chipyard System-on-Chip (SoC) framework. - Writing detailed documentation and tutorials for the generator components inside the testchipip and sifive-block repo - Working on automated C driver code generation from the source Chisel code - Porting Chipyard to Arty Cmod board to serve as a UART to serialized-TileLink adapter
<b>Bringup Engineer</b>  NeuralAccel Corporation – Internship	June 2022 – Aug 2022
Worked on designing a sparse-sparse matrix multiplication accelerator. - Implemented the serialized TileLink communication over UART for communication between host computer and the accelerator memory on Arty FPGA - Implemented a small single stage RISC-V core with MMIO devices as the controller of the accelerator - Worked on implementing an Ethernet controller supporting UDP protocol on Arty FPGA for streaming data between host computer and accelerator	Worked on designing a sparse-sparse matrix multiplication accelerator. - Implemented the serialized TileLink communication over UART for communication between host computer and the accelerator memory on Arty FPGA - Implemented a small single stage RISC-V core with MMIO devices as the controller of the accelerator - Worked on implementing an Ethernet controller supporting UDP protocol on Arty FPGA for streaming data between host computer and accelerator
<b>Independent Undergraduate Researcher</b>  Hybrid Robotics Lab, UC Berkeley	Jan 2022 – May 2023 Advisor: Prof. Koushil Sreenath
Working on developing a human-sized high degrees of freedom humanoid robot with 3D printed cycloidal gear actuator and proprioceptive motor driver from scratch. - Researched and designed a 15:1 proprioceptive cycloidal actuator with Autodesk Fusion 360 - Researched and designed the body of the robot with two 7 degrees of freedom legs and two 4 degrees of freedom arms. - Designed and manufactured a field-oriented control (FOC) motor controller which supports up to 90V and 50Amps driving capability - Designing Controller Area Network control system as the communication system on the robot	Working on developing a human-sized high degrees of freedom humanoid robot with 3D printed cycloidal gear actuator and proprioceptive motor driver from scratch. - Researched and designed a 15:1 proprioceptive cycloidal actuator with Autodesk Fusion 360 - Researched and designed the body of the robot with two 7 degrees of freedom legs and two 4 degrees of freedom arms. - Designed and manufactured a field-oriented control (FOC) motor controller which supports up to 90V and 50Amps driving capability - Designing Controller Area Network control system as the communication system on the robot
Participated in developing a model-based reinforcement learning control algorithm in Mujoco and OpenAI Gym environment for training the robot dog to learn a specific set of motions.	Participated in developing a model-based reinforcement learning control algorithm in Mujoco and OpenAI Gym environment for training the robot dog to learn a specific set of motions.
<b>Research Assistant</b>  Ma Lab, UC Berkeley	Sep 2021 – Jun 2022 Advisor: Prof. Eric Y. Ma
Assisted and worked with Prof. Eric Y. Ma in setting up the newly established Ma Lab. Built a real-time cloud-synced lab environment monitoring and inventory management system. - Implemented Bluetooth Low Energy (BLE) communication between sensor nodes and host computer - Designed and implemented QR Code-based inventory logging system - Integrated Python backend server to real-time updating PlotlyJS frontend data visualization	Assisted and worked with Prof. Eric Y. Ma in setting up the newly established Ma Lab. Built a real-time cloud-synced lab environment monitoring and inventory management system. - Implemented Bluetooth Low Energy (BLE) communication between sensor nodes and host computer - Designed and implemented QR Code-based inventory logging system - Integrated Python backend server to real-time updating PlotlyJS frontend data visualization
<b>System Engineer</b>  Formula Electric at Berkeley – Student Club	Jan 2021 – Dec 2023
In charge of the electrical control and communication system on the formula racing car. - Implemented firmware code for multiple modules on the car with GPIO, ADC, DAC, SPI, I2C, USB, and Ethernet functionalities - Designed and implemented the Controller Area Network Flexible Data-Rate (CAN-FD) communication system on the car - Designed and manufactured the steering wheel PCB and implemented the graphical display functionalities with Raspberry Pi Compute Module - Prototyped the data streaming system between car and pit station with WiFi and 900MHz XBee connectivity	In charge of the electrical control and communication system on the formula racing car. - Implemented firmware code for multiple modules on the car with GPIO, ADC, DAC, SPI, I2C, USB, and Ethernet functionalities - Designed and implemented the Controller Area Network Flexible Data-Rate (CAN-FD) communication system on the car - Designed and manufactured the steering wheel PCB and implemented the graphical display functionalities with Raspberry Pi Compute Module - Prototyped the data streaming system between car and pit station with WiFi and 900MHz XBee connectivity



## Ecosystem Technical Supporting

Intel Corporation – Internship

Jun 2020 - Dec 2020

Worked as technical consultant to analyze strength and weakness of Intel's potential technical partners.  
Contributed to designing the Intel Nanjing Smart Technology Business Park.

## Selected Projects

### Designing and manufacturing a 3-phase field-oriented control brushless DC motor controller

Aug 2022 – Feb 2024

Independent project

- STM32 controller with 1Mbps Controller Area Network (CAN) 2.0 bus communication
- 3-phase shunt current sampling with IIR filter
- Absolute magnetic encoder for position feedback with All-digital Phase Locked Loop (ADPLL) filter
- Coordinate Rotation Digital Computer (CORDIC) processor for Field-Oriented Control (FOC) computation
- 10 kHz current and position loop control with configurable operation modes
- PCB design and assembling

[\[Assembly Video\]](#)[\[Testing Video\]](#)

### Designing and building a 1/2 scale humanoid robot to play xylophone

Aug 2021 – Nov 2021

Group project for EECS 106A

Designed the mechanical structure and actuator integration of the robot.

Implemented the control system first on Arduino, and then ported to the RISC-V Red-V development board.

Integrated inverse kinematics and animation control of the robot with Blender.

Awarded as Showcase Winner in the class final presentation.

### Educational RISC-V Processor Video Series

Apr 2020 – June 2020

Independent personal project

Published a series of videos introducing RISC-V processor ISA and logic design to viewers on Bilibili and YouTube.

Gained 800k views on both video platforms and inspired many to start learning RISC-V ISA.

[\[Project Video\]](#)[\[Education Video \(Chinese\)\]](#)

## Skills

**Programming / Scripting (ordered by proficiency):** Python, JavaScript, C, RISC-V ASM, Verilog, Scala/Chisel, C++

**Robotics:** Isaac Lab and MuJoCo simulation, Sim2Real transfer, Onshape mechanical design, PCB design

**Prototyping:** STM32 Programming, Embedded system protocols (UART, SPI, I2C, CAN, EtherCAT), 3D printing, FPGA prototyping

**Multimedia:** Audio/Video Editing, 3D Modeling and Production with Blender and Unreal Engine

## Honors and Awards

2022 UC Berkeley Dean's List of College of Engineering

2021 UC Berkeley EECS C106A Final Project Showcase Winner

2021 "Hack To The Moon" Winner at CalHacks hello:world (CalHacks 8.0)

2019 UC Berkeley Honors to Date

## Teaching

### 2022 ELENG 194 Bringup Class: Test Integrated Circuit Chips Designed in Previous Tapeout Classes

Teaching Assistant, UC Berkeley