

Ray Sun

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EDUCATION

UNIVERSITY OF SOUTHERN CALIFORNIA | M.S. / PH.D. IN ELECTRICAL ENGINEERING

M.S. expected May 2022 | Los Angeles, CA

CALTECH | B.S. IN ELECTRICAL ENGINEERING

June 2020 | Pasadena, CA • GPA: 4.2 / 4.3

EXPERIENCE

MICRO-VU CORP. | ELECTRICAL ENGINEERING INTERN

Summer 2019 | Windsor, CA

- Supported hardware and FPGA (Xilinx, Verilog) development for non-contact and multi-sensor metrology machines.
- Designed and prototyped low-latency, fault-robust Bluetooth machine remote with STM32 and SiLabs Blue Gecko.

AMPAIRE INC. | POWERTRAIN INTERN

Summer 2018 | Los Angeles, CA

- Assembled and validated high voltage electric powertrain modules for ground testbed and flight aircraft.
- Designed and tested 15 Mbps isolated dual-channel CAN transceiver.
- Developed Simulink model of powertrain system.

RESEARCH

USC ANALOG/RF IC, MICROSYSTEMS, AND ELECTROMAGNETICS LAB

GRADUATE RESEARCHER

August 2020 – Present | Los Angeles, CA

- Designing novel 65 nm CMOS sensor to enable next-generation spectroscopy for biomedical and point-of-care applications

CALTECH MISSION OPERATIONS CENTER

STUDENT TEAM MEMBER

April 2019 – June 2020 | Pasadena, CA

- Collaborated with JPL and University of Michigan on uplink/downlink operations and data analysis of CubeSat missions.
- Designed VHF/UHF groundstation for small satellite communications and ops center on campus.

CALTECH AEROSPACE ROBOTICS AND CONTROL LAB

UNDERGRADUATE RESEARCHER

June 2017 – March 2018 | Pasadena, CA

- Assisted development of 6-DOF spacecraft simulator robots for formation flight and docking experimentation.
- Designed STM32-based second-generation thruster controller PCB.
- Assisted setup and conduct of spacecraft simulator and UAV experiments and demonstrations.

SKILLS

HARDWARE & FIRMWARE

Design:

STM32 / TI SimpleLink / ARM • Xilinx / Intel FPGA •
Arduino / AVR • Embedded wireless • Raspberry Pi

Tools:

Altium Designer • KiCad • Cadence Virtuoso • LTSpice •
Autodesk Inventor • SolidWorks

Fabrication:

3D printing • Laser cutting

PROGRAMMING

C/C++ • Python • VHDL • Verilog • Linux • Assembly
(AVR, ARM, x86) • MATLAB/Simulink

LANGUAGES

Elementary: Chinese, German, Japanese

OTHER

General class amateur radio license

PROJECTS

Bifrost: Arduino Nano-based open source RGB LED controller with music visualization capabilities and Bluetooth.

Triumph: Accurate and robust analog function generator with sine, square, and triangle output

GaN FET Motor Controller: 5kW 3-phase brushless motor controller based on STM32F4 with GaNFETs.

Digital Watch: STM32F0-based digital watch with seven-segment display

High Altitude Balloon: Stratosphere characterization with Arduino Due and sub-RF communications

Wearable Computer: Raspberry Pi-based wearable computer with custom transparent display

Binario: AVR assembly program for game board with quad encoders, LED matrix, SPI EEPROM

ACTIVITIES AND ORGANIZATIONS

Caltech Formula SAE Team : Designed, verified, and integrated 2 generations of STM32F4-based electric vehicle pedals interface PCB. Designed temperature sense and high voltage sense circuit for 2nd generation battery management system.

Hacktech : Former organizer of intercollegiate hackathon; 3 years of involvement.

IEEE: Former chair of the Caltech IEEE student branch, organized events for networking, outreach, and education.

Tau Beta Pi : Member of engineering honor society.

COURSEWORK

USC

Advanced VLSI: Timing analysis, memory design, SRAM with in-memory-compute logic design project

Advanced Analog Circuit Design: Transistor level analog circuit design, OTA design project

CALTECH

Advanced Embedded Systems (Teaching Assistant): Wireless real time embedded PCB project with TI SimpleLink ARM MCU

Intro Embedded Systems (Teaching Assistant): Designed 8-bit CPU; implemented AVR assembly code for embedded game

Analog Electronics Lab (Teaching Assistant): Designed accurate, high-current analog function generator

Experimental Circuits Lab: Designed 5kW GaNFET-based STM32 brushless motor driver

Advanced Digital Systems Design: VHDL logic circuit implementation on resource-constrained Lattice / Xilinx FPGAs

FPGAs with VHDL: VHDL circuit projects on Intel / Altera Cyclone V, Snake game project with VGA driver

Experimental Robotics: Designed obstacle course navigating robot with team of 5; Arduino and Raspberry Pi

Autonomy: Designed 6-DOF robot arm card playing robot with team of 4; mechanical design, ROS

Aerospace Electronics: Built high-altitude weather balloon payload for characterization of upper atmosphere

Mechatronics (Teaching Assistant) • Algorithms (C++) • Machine Learning (Python) • Computing Systems (C, x86 assembly)