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 • Cum. GPA: 4.2 / 4.3 • Major GPA: 4.1 / 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 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 connunications 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 • Control theory

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
GaNFET 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, pipelined CPU design project
Advanced Analog Circuit Design: Transistor level analog and mixed signal circuit design, analog 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)