Matthew Song

(408) 416-7630
Milpitas, CA
matthewsong@berkeley.edu

LinkedIn: matthew-c-song | Portfolio

EDUCATION

Electrical Engineering and Computer Science B.S., *University of California, Berkeley*   Expected graduation: 2025

RELEVANT COURSEWORK

Digital Design and ICs, Machine Learning, Signals and Systems, User Interfaces, Prototyping and Fabrication, Operating Systems, Machine Structures, Artificial Intelligence, Algorithms, Physics for Scientists and Engineers, Information Devices and Systems

WORK EXPERIENCE

SLAC National Accelerator Laboratory   **August 2024 — Present**
Electrical Engineering and Programming Intern

- Performed extensive fault analysis of SSI-protocol absolute encoders interfaced with a Galil motion controller
- Developed a test fixture and custom cable adapter to analyze control and data signals directly with an oscilloscope both in-system (mounted on robot) and in isolation (removed from robot).
- Advised SSRL staff on the next steps to take regarding the encoder and motion controllers
- Initiated extensive conversations with the manufacturers of the components tested to gain insight
- Analyzed schematics of existing PCBs with Altium to determine their capability to drive a detector trigger
- Designed and programmed an FPGA-based waveform generator to perform diagnostics and test edge conditions for the encoder

UAVs@Berkeley   **Summer 2024 - Present**
President - previous Lead Electrical Engineer

- Led a multidisciplinary team to advance UAV design, including electronics, mechanical design, and control systems
- Designed and validated a custom PCB for a delayed-release payload controller
- Developed, debugged, and deployed firmware for the payload controller, ensuring robust performance during field testing
- Configured and debugged communication protocols including CAN, I2C, and UART for seamless on-board and off-board component interaction

PROJECTS

FPGA Computer Vision Accelerator   **March — April 2024**

- Designed, routed, and brought up a Zynq-7000 SoC PCB to accelerate the ORB computer vision algorithm for a UAV system
- Integrated DDR3, gigabit ethernet, and USB 2.0 interfaces, ensuring signal integrity with trace optimization and simulation
- Engineered the system for mechanical compatibility with the UAVs@Berkeley competition hexacopter

GPS-Denied UAV Navigation   **November — December 2024**

- Developed a computer-vision-based geolocation system enabling UAV navigation in GPS-denied environments
- Set up and troubleshoot RTSP video streams from the onboard camera system to the flight computer
- Evaluated and optimized image processing pipelines to enhance geolocation accuracy
- Conducted full-system test flights with in-field debugging and performance validation
- Designed and 3D printed customized mounts for critical hardware components

Fully Custom 3D Printer   **June 2024**

- Self-sourced and built a modified Voron 2.4 3D printer
- Designed and programmed an autonomous, reliable, dockable bed probe for consistent leveling
- Configured and compiled custom firmware on Raspberry Pi and STM32 platforms
- Tuned resonance and backlash compensation to achieve high-speed, precision prints

FPGA RISC-V CPU   **November — December 2024**

- Designed and implemented a 3-stage pipelined RISC-V CPU in Verilog on a Xilinx PYNQ-Z1 board
- Implemented synchronization, signal smoothing, and button parsing modules to allow interfacing with the real world
- Designed a UART communication module for streamlined communication between the CPU and external systems

SKILLS

Altium, Xilinx Vivado, Python, Java, C/C++, Drones, Ardupilot, oscilloscope and multimeter usage, RISC-V, Git, Solidworks, 3D printing, SMD soldering