

# Erk Sampat

University of California, Santa Barbara – B.S., Electrical Engineering (June 2026)

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## SKILLS

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- Analog integrated circuit design
- Power electronics; DC-DC converter design
- Embedded systems (register-level STM32)
- Digital logic design
- Circuit simulation (LTSpice)
- Hardware and software debugging
- Transmission line and antenna theory
- C and C++; MATLAB; `git`
- Data structures and algorithms
- Object-oriented programming
- Technical documentation;  $\text{\LaTeX}$
- High-density PCB design (KiCAD, Altium)
- Electronics lab instrumentation
- SMD rework

## PROJECTS

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### [SinESC](#)

Highly efficient brushless motor controller for drones. Supports sensorless field-oriented control for maximal power efficiency, resulting in increased flight time and smoother operation.

### **Delta-Sigma Audio Amplifier**

Circuit-level implementation of a delta-sigma data converter and full-bridge GaN output stage. Provides 20 W of output power with efficiency over 90%.

### **RC Drones and Planes**

Built and flew remote-controlled drones and planes – primarily first-person-view drones, glider-style airplanes, and nitromethane-powered airplanes. Set up autopilot and Iridium satellite communications for an airplane designed to detect forest fires. Won [first place](#) in tinyML Vision Challenge.

### [Universal Laser Driver](#)

Low-power laser driver with ultra-wide input and output voltage range. Also built laser pointers of various wavelengths using the Universal Laser Driver.

### **Solid-State Tesla Coil**

Converts line voltage to several hundred kilovolts, generating foot-long electrical arcs. Used to demonstrate high voltage and electromagnetic induction.

## EXPERIENCE

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### **Undergraduate Researcher – Biomimetic Circuits and Nanosystems Group (July 2025–present)**

Designing a metalens (composed of  $\text{TiO}_2$  nanofins) to be fabricated on top of a CMOS SPAD sensor. Applications include probabilistic computing and biosensors. Advised by Prof. Luke Theogarajan; intend to publish in 2026.

### **Power Electronics Intern – Astranis Space Technologies (June–September 2024)**

- Designed, tested, and documented a radiation testing board for 16 different high-voltage diodes. Implemented high-voltage biasing, clamping, and transient fault-detection circuitry. Hardware architecture to be reused for future radiation tests.
- Designed a four-channel 80 V/60 A high-side GaN load stepping board for testing flight hardware. Implemented power stage, including linear current ramp soft-starting regime. Also realized under-voltage lockout, over-current protection, and over-voltage protection. Voltage/current telemetry made accessible to the user.
- Wrote a script using Google's `openhftf` to automate radiation tests for op-amps.
- Assisted in debugging a faulty flyback converter in battery management system.

### **Student Worker – UCSB Department of Physics (April 2023–June 2024)**

- Set up labs for all undergraduate physics courses
- Documented lab procedures
- Managed inventory; repaired broken test equipment
- Designed electronics projects for lab curriculum