

Project Abstract

The *Harm Drone* project presents a low-cost, modular embedded system for UAVs to log high-fidelity sensor data without relying on wireless telemetry or proprietary interfaces. Developed as a senior capstone at the University of Nebraska, the system emphasizes affordability, platform independence, and safety compliance.

The team designed a custom PCB featuring an STM32 microcontroller, USB hub, EEPROM, and dual storage via onboard flash and SD card, enabling reliable data logging across Windows, macOS, and Linux systems. Compliance with IEEE 1789-2015 lighting standards ensures safe operation in public environments.

The project encompassed the full engineering lifecycle from prototyping and PCB design to firmware development and testing. The system supports four USB sensors, provides persistent storage, and boots in under five seconds.

Though not flown on a UAV, the system is fully prepared for integration. Future improvements include support for more advanced sensors and environmental hardening. The *Harm Drone* proves that robust, research-grade systems can be built affordably.