

FLARE

Fire Localization and Aerial Research Ecosystem



The primary transition from the prototype to the ideal target architecture involves scaling from a single-node Firebase system to a robust multi-node network, adding a SQL-based cloud database, and upgrading the drone with a live thermal camera feed.

The Problem

- In remote areas monitoring is:
- limited,
 - delayed,
 - too expensive.

Our Solution

- Uses existing sensor + drone tech (no reinvention)
- Low-power communication (LoRa + LTE)
- Event-triggered drone deployment
- Scalable via existing infrastructure

1st Fire Detection (Node Level)
 The solar-powered sensor (Node 1) continuously monitors environmental conditions, when **temperatures exceed 50°C and smoke is detected** it activates a fire signal (**trigger mechanism**); after that trigger a Fire detection signal is sent to the central hub using a **long range LoRa connection** (Alert transmission)

2nd Data Gateway & Transmission
Node 0 (LoRa Gateway) receives the alert and processes the incoming signal from Node 1, then it **transmits** the drone dispatch signal and the precise sensor GPS coordinates via a **WiFi/4G/LTE tower**.

3° Cloud Processing & Visualization
 The **Google Firebase** acts as the central **cloud database**, receiving and storing the sensor information and GPS coordinates routed **via the Internet**, this data is **sent to the web dashboard in real-time**, displaying critical sensor insights and dispatch alerts for operators.

4° Emergency Response & Deployment
The authorities receive the dispatch signal, GPS coordinates, and real-time sensor information directly from the dashboard, a drone, equipped with a thermal camera, is immediately **deployed** to the exact GPS coordinates to **verify, monitor, and assess** the fire situation.

