



DRONES FOR FOREST FIRE RESPONSE

How Drones are Useful in
Forest Fire Response



Unmanned Aerial Vehicles (UAVs) are already in use for controlling fires in urban areas and places where people reside. These UAVs are usually quadcopters that are quite effective in hovering in one place.

In the event of a fire, the primary objective of using drones is to gather situational awareness, which can be used to direct the efforts of the firefighters in locating and controlling hot spots.

Just like urban fires, forest fires to require monitoring so that firefighters know what they are dealing with.

Forest fires are different from urban fires; they are hard to control (sometimes cannot be controlled) and pose a greater threat to people and property. Here, drones can play a crucial role in detecting, containing, and extinguishing forest fires.

One example of drones being used to combat forest fires is that of California National Guards, who are using MQ-9 Reaper (military reconnaissance drones) to assist emergency responders in controlling forest fires. They have already provided crucial assistance in massive forest fires, which include Mendocino Complex Fire and Carr Fire.

Before we dive into how drones are used in this context, it is important to understand why they are used.

What is search and rescue?

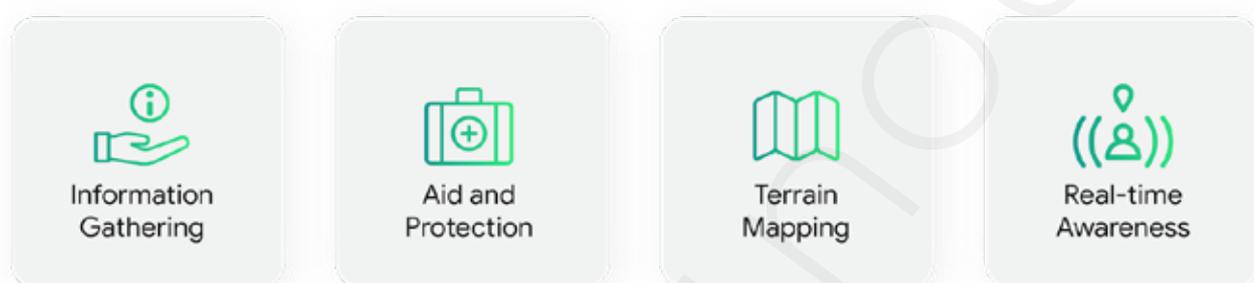
In the event of a forest fire, time is of the essence. This is why it makes sense to use a drone for two primary purposes: initial detection and initial rescue. Here is a further breakdown:

- Drones can quickly be airborne, fly to a location, map the area affected by the fire, and share the information to all relevant agencies within a couple of minutes.

- A drone can carry a whole range of sensors, including a thermal camera that supports multiple color palettes. The combination of all these sensors provides a better picture of the spread and speed of the fire, which can help civil authorities to come up with a relief plan.

How Are Drones Used in Forest Fires?

Drones are useful especially in forest fires that are difficult to control. They are primarily used for collecting information and during post-incident recovery. Their usage can be explained as follows:



Information gathering: During a forest fire it is important for firefighters to know whether they are hitting the hot spots, which is difficult and dangerous for the ground crew since such fires tend to spread over a large area.

Here drones carrying a thermal camera can do the job much more efficiently. A pilot flying a drone can cover a large area and identify hot spots using the thermal camera. Thermal cameras like DJI Zenmuse XT offer multiple color palettes that can precisely identify hot and cold zones giving a better idea of the kind of temperatures the responders are dealing with.

Aid and protection: Fighting any kind of fire is an occupational hazard for firefighters. But forest fires can move in any direction depending on the wind. This means a firefighter on the ground fighting a forest fire without the knowledge of the spread can easily get trapped.

The footage captured by a drone can provide insights about the spread and direction of the fire. This information can protect firefighters from going too close to the inferno.

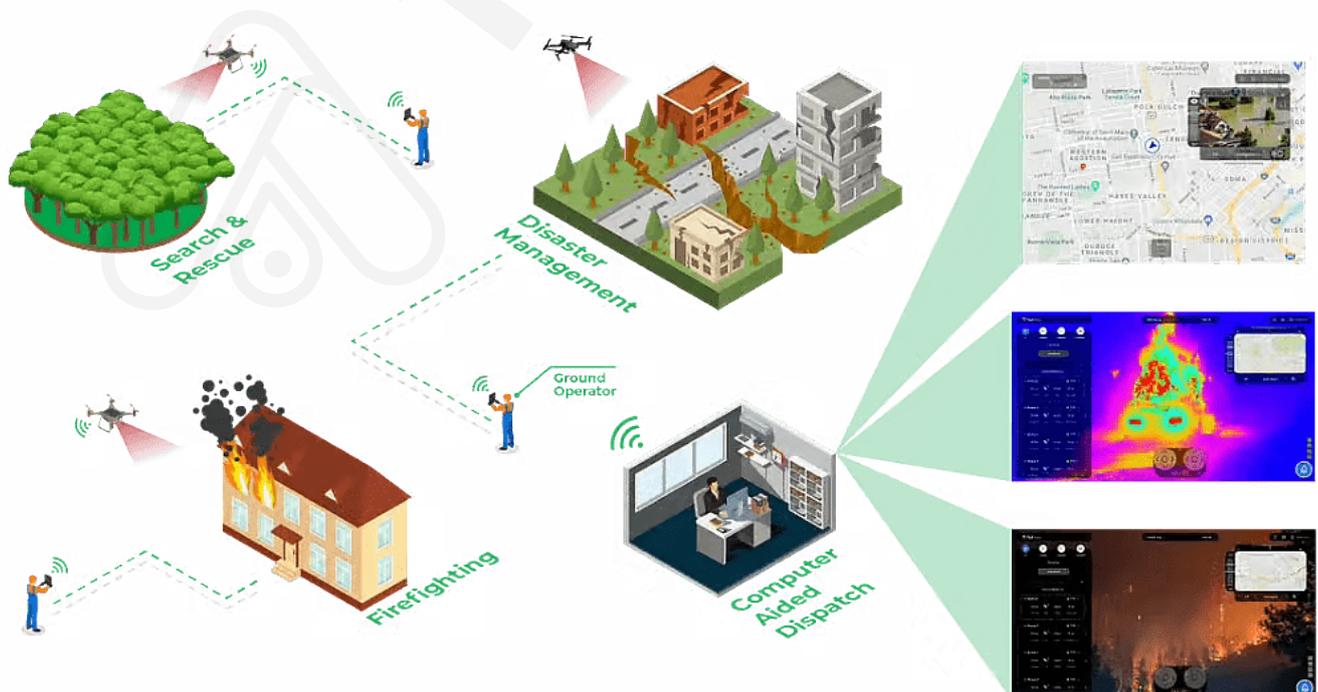
Terrain Mapping: Footage captured from a drone can be converted into a 3D map allowing civil authorities to ascertain the extent of the damage. This information is useful during post-incident relief work and for insurance companies to verify damage claims.

Real-time Awareness: Any kind of relief work requires resources, and for that situational awareness is required for planning. In 2018, wildfire threatened the town of Hechingen, Germany, which was facing severe drought and the water level dropped below 50%.

The fire department of Hechingen was called in to control the blaze. The fire was close to a remote country road far away from water sources and covered an area close to 5000 square meters. DJI M210 drones, with Zenmuse XT and X4S cameras, were put to the test and flown over the area to gather intelligence. Aerial imagery showed the firefighters the hot spots and the spread of the fire; accordingly, they planned to carry water, in fire engines, to the spot and control the blaze.

Thus, drones played an important role in providing intelligence for decision making.

How FlytNow Enhances the Capabilities of Drones Fighting Forest Fires



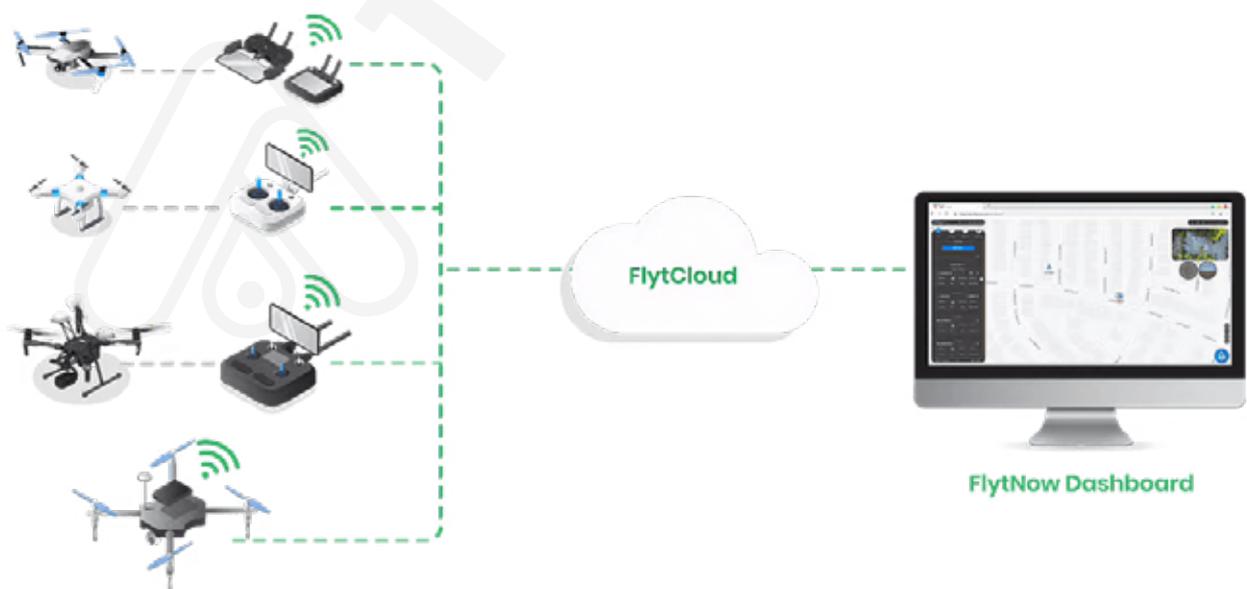
FlytNow is a cloud-based fleet management solution that provides a unified dashboard for managing a fleet of drones. The dashboard provides access to drone-mission planning, live telemetry, and video streams from all connected drones over a 4G/LTE/5G network. Below is an illustration of how the solution works.

How Drones are Connected to FlytNow?

FlytNow supports a wide variety of drones including the popular DJI Mavic and Matrice series of drones.

Connecting a DJI drone is extremely simple; download and install the FlytOS mobile app and connect the mobile with the RC of the drone. The mobile application acts as a relay between the drone and the cloud application. Live telemetry and the video feed are sent to the FlytNow cloud server over the mobile network.

Custom drones also work with FlytNow by leveraging a single board computer (SBC). An SBC with the operating system is connected to the flight controller of the drone, which communicates with FlytNow either through Wifi or a GSM module.

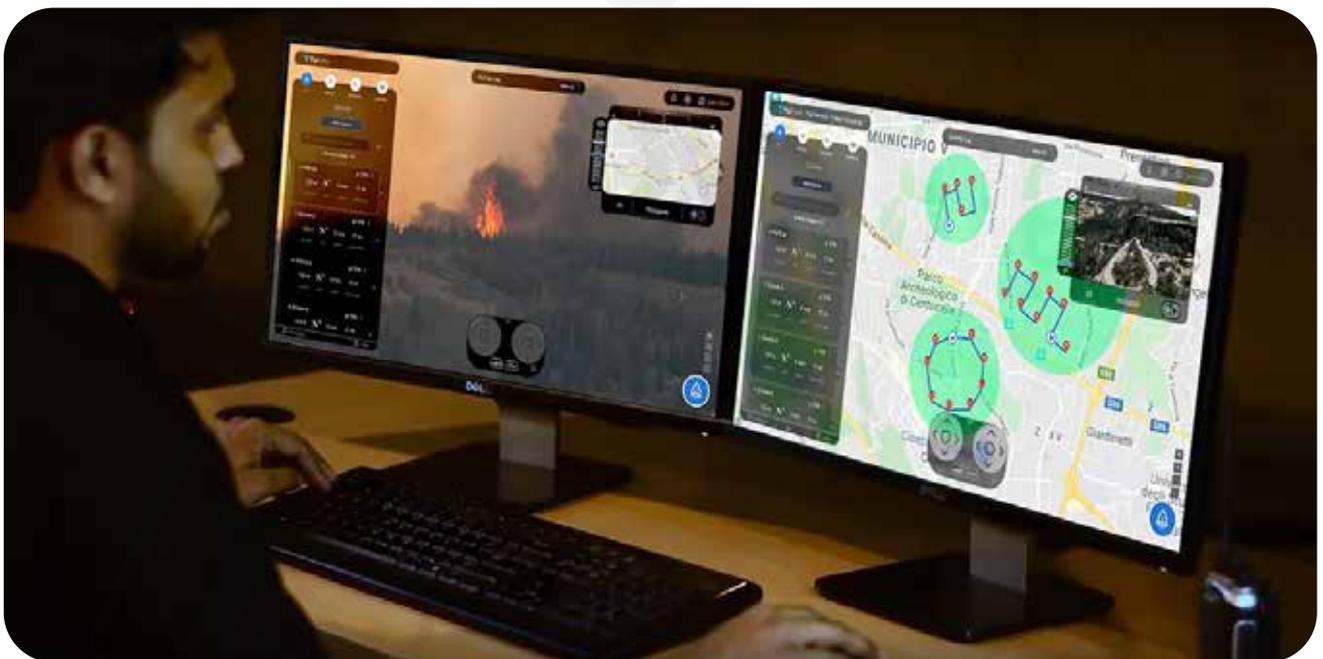


Establishing a Localized Command Center Using FlytNow Business

FlytNow Business is a standard offering that comes with out of the box features. This solution is ideal for setting up a localized command center to manage drones working to bring a forest fire under control.

A forest fire can burn for days before it's brought under control, so it becomes important for fire officials to stay close to the situation and monitor it. Following are the features that would allow firefighters to set up a command center and some ways they can be used:

- FlytNow Business can be accessed from a web browser. A firefighter with a laptop or a tablet can log in to the FlytNow dashboard and see the statuses of all connected drones. Like a command center, he/she can manage and control all drones from a single dashboard.



- FlytNow Business comes with an advanced mission planner that allows for setting up a flight path for a drone. Using the mission planner, a fire official can program a drone to fly over a defined perimeter and map it in order to understand the spread of the fire.

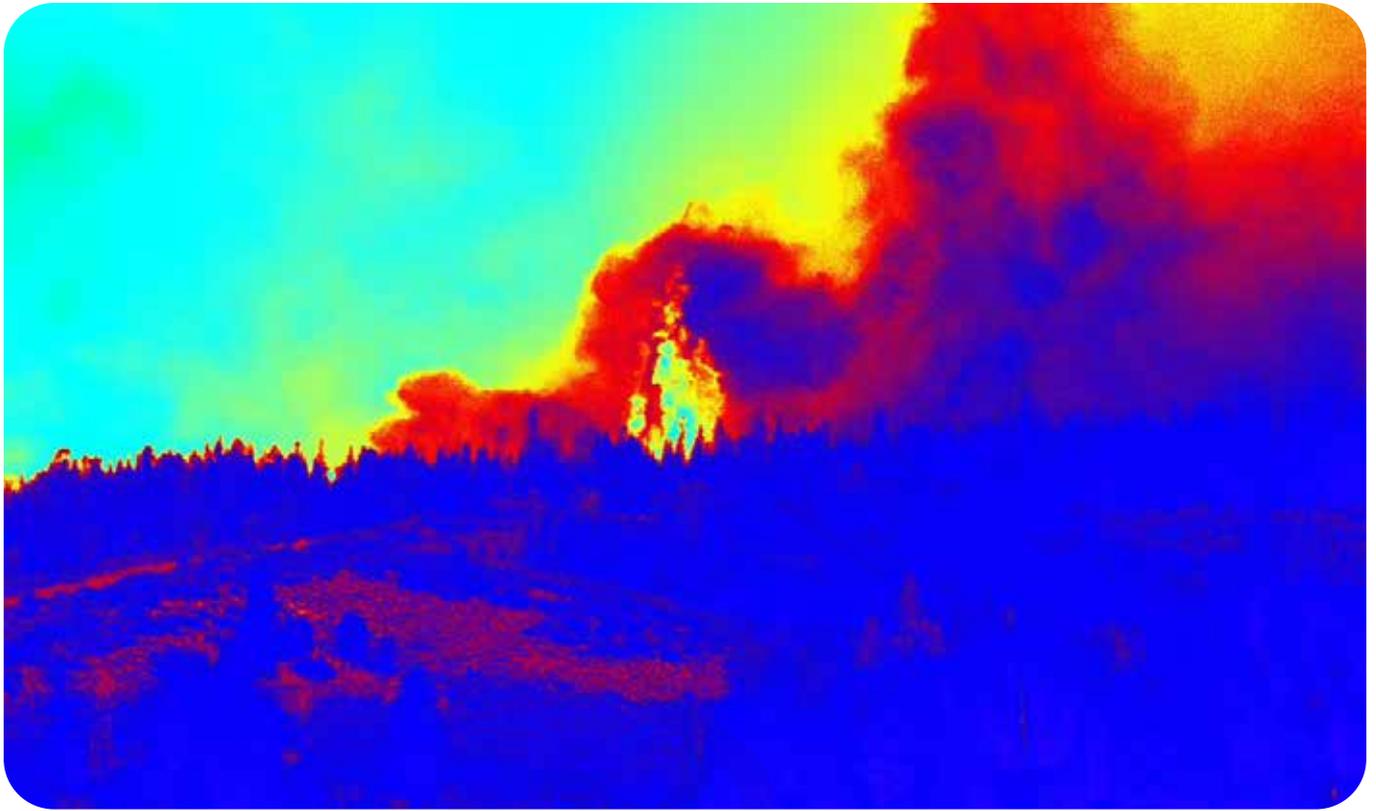
- It can stream live video and telemetry from all connected drones. Using this feature, a fire official can see the video feeds (at ultra-low latency) from all connected drones on the dashboard and even share them with various agencies either via email or using the built-in team management. This would allow for better coordination among different agencies.



- The dashboard supports multiple views for different kinds of operations. For example, in a UAV search and rescue operation, an operator can switch to the IR view to detect the heat signature of people trapped by the fire.



In the case of DJI Mavic 2 Enterprise Dual and Matrice 210 V2 Dual, the dashboard supports MSX, which generates high contrast thermal images with lines and edges, and multiple color palettes including isotherms. Using the color palettes, a firefighter can identify hot and cold regions, which can aid in the identification of hot spots.



- FlytNow Business can be integrated with cloud servers like AWS S3 for the storage of video captured during firefighting operations. These videos can later be used for training purposes.

Establishing a Localized Command Center Using FlytNow Business

FlytNow Enterprise is a customizable offering that includes all the features of the Business version plus additional features. It can be used to set up a fully automated response system that can be integrated with ground-based hardware (Drone-in-a-Box and charging pads) and computer-aided dispatch systems like 911. A system like this would function in the following way.



- An emergency operator receives a forest fire alert through the computer-aided dispatch system.
- The alert is routed to the nearby fire stations. A fire official logs in to the FlytNow dashboard and selects the alert, which pinpoints the fire's location.
- The firefighter requests a drone recon over the area. The response system (powered by FlytNow Enterprise) automatically creates a mission and selects a nearby drone station (Drone-in-a-Box hardware). FlytNow Enterprise supports all popular Drone-in-a-Box hardware.
- The drone receives the command and flies off autonomously. FlytNow Enterprise supports integration with UTM service providers like Airmap for airspace intelligence to support BVLOS flights.
- On reaching the location, the drone starts recording and sends out a live video feed for the firefighter to see.

- A firefighter has the option to use AI features like object detection to identify certain ground objects, for example, a hotspot.
- The drone continues the mission until its battery becomes low. It goes back to the station and lands on the DiaB hardware using the precision landing feature by FlytNow Enterprise. The solution makes it safe for the drone to fly autonomously with advanced failsafe that allows a drone to do an emergency landing in case of a hardware failure.

Summary

In this blog, we understood the importance of drones and how they are used in controlling forest fires. We discussed in detail the challenges that drones allow firefighters to overcome, and how FlytNow as a solution enhances the capabilities of drones.

You can implement FlytNow today with our 28 days free trial and see yourself how FlytNow can enhance your workflow with drones. Making the justification of using drones even stronger.

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