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DRONES FOR
DISASTER
RELIEF

How Drones are Used for
Disaster Response

The ongoing pandemic (COVID-19) has taught us many things. Among those lessons is the realization that drones can be used for operations to save people's lives.

Even before the pandemic, at AirWorks 2019, DJI announced that drones saved the lives of 279 people around the world. The number probably represents a small fraction of documented cases where drones were used as a means for public safety. For example, during the lockdown that followed after the onset of COVID-19, drones helped Indian authorities to contain the spread of the virus by monitoring the streets for unlawful gathering. Read the full case study.

We have just scratched the surface when it comes to commercial drone usage – drones have tremendous potential in disaster management alone.

In a report from the United Nations, it has been stated that 1.2 million lives were lost, 1.7 trillion dollars of damage was done and 2.9 billion people were affected due to global disasters that occurred between 2002 and 2012. With economic and human losses of this magnitude, every new technology that promises to save lives has a huge potential, including drone technology.

What Problems do Drones Solve During a Disaster Response?

There are several pre-existing protocols that are supposed to be followed during disaster response. Most of them have been successful so far, but they create their own set of challenges. The main one is the response time, which is of great importance during disaster management. The second one is logistical support.

For example, in 2015, an earthquake of magnitude 7.8 devastated the Kathmandu region of Nepal, which claimed the lives of 9000 people. All means of transportation were destroyed which drastically affected the disaster response and relief work. Many people, trapped under the rubble, lost their lives since help didn't reach them on time.

When the Nepali government appealed for assistance to the international community, help arrived in the form of medical support, food, and relief equipment. Several international agencies came and deployed drones to help better assess the situation and to aid the search and rescue process.

Drones were also used during the 2013 typhoon Haiyan in the Philippines. They were mainly deployed to survey the impact of the storm on farmlands and ascertain future risks from similar storms.

Drones help improve the response time, since they can be deployed much faster, as compared to traditional vehicles like a helicopter. Vertical Takeoff and Landing (VTOL) drones can cover large distances and assess the situation in an event where all transportation routes have been destroyed or made inaccessible.

Drone Benefits During Disaster Response

The process of disaster management can be broken down into the following stages:

- Prevention
- Preparation
- Reponse
- Recovery

Using drones for disaster response can add value to all of the above-mentioned stages according to a study from Zurich North America. The study highlights the correlation between a short response during the early phase of disaster recovery with increased success in search and rescue operations.

To better appreciate the benefits of using drones, consider the following:

- Drones can ensure the safety of people. During the Fukushima Daiichi nuclear disaster 2011, drones were used to survey the extent of the disaster without risking the lives of the relief workers.
- Drones are quite effective as first responders since they can be deployed fast and easily, as compared to manned aerial vehicles.
- Drones are relatively inexpensive, and with the help of a drone fleet management system, can be deployed in large numbers as autonomous fleets.

Drone Applications for Supporting Disaster Response

The process of disaster management can be broken down into the following stages:

- Drones have long been in use for aerial mapping and surveys. The same application can be easily extended to disaster response. For example, drones were used during the landslide of Oso, Washington in 2014 to map the region after the incident.
- It often happens during an earthquake that a partially damaged building or a civic structure requires a thorough inspection before it can be deemed safe for humans to go there. Drones equipped with sensors like infrared (IR) cameras can do the job safely.
- Drones can be used for medical delivery. A US-based company called Matternet did its first field trial of medical delivery using drones to camps set up after the 2010 Haiti earthquake.

- Drones can be used for search and rescue operations. In 2005, fixed-wing drones were used to search for survivors after the devastation of Hurricane Katrina in Mississippi.

How FlytNow Enables Drones for Disaster Relief

Drones are not just a piece of hardware; they are usually paired with intelligent software to make them truly effective. In a disaster situation of a large magnitude, having multiple drones can be advantageous, but managing a swarm of drones is not easy. FlytNow, with its cloud-based software solution, solves the problem of simultaneously controlling and managing a large number of drones.

In brief, FlytNow works as a cloud application that provides a unified dashboard to manage drones connected to the system. When a request comes for deploying a drone, an emergency response operator can use the advanced mission planner to create a flight path for the drone and initiate the launch. Once in the air, the drone flies with full autonomy as per the mission plan. Below is an illustration of how a drone public safety operation might operate:

FlytNow is available in two versions, FlytNow Business and Enterprise; the latter offers a host of customization options.

FlytNow Business

This is a standard offering that provides usability out of the box. The offering comes with features specifically designed for disaster response and public safety operations. Here are some of those features and how they benefit disaster relief operations:

- **The ability to control drones over 4G/LTE/5G networks**. By combining this feature with VTOL drones, a disaster response team can fly drones for long distances, and conduct surveys and mapping of an affected area.
- **Role-based access to the system**. Disaster response teams are multi-faceted and not all require the same level of access to the drones. A relief worker on the ground might require only video access compared to someone who is required to assess the entire situation for planning logistics.
- **A mixed fleet of drones.** FlytNow is a hardware-agnostic platform i.e. it supports both off-the-shelf and custom drones based on PX4 and Ardupilot. In a disaster situation, different types of drones might be required. For example, delivery drones are heavy and can carry large packages. Whereas, drones meant for surveys are smaller in size and may even have fixed wings for long-distance flight.

- **Live video streaming and sharing**. Video feeds from a swarm of drones flying over a disaster affected area can be streamed onto a single unified dashboard, which is ideal for command center operations.

FlytNow Business

The Enterprise version includes FlytNow Business as well as customization and add-ons, for operations that need scalability and a high degree of automation. This edition includes an operating system, which is installed on a single-board computer (SBC) – the SBC is then attached to the flight controller of a drone. This configuration allows for add-ons and integration, some of them are as follows:

FlytCAS
(Collision Avoidance System)

FlytDock
(Autonomous Precision Landing)
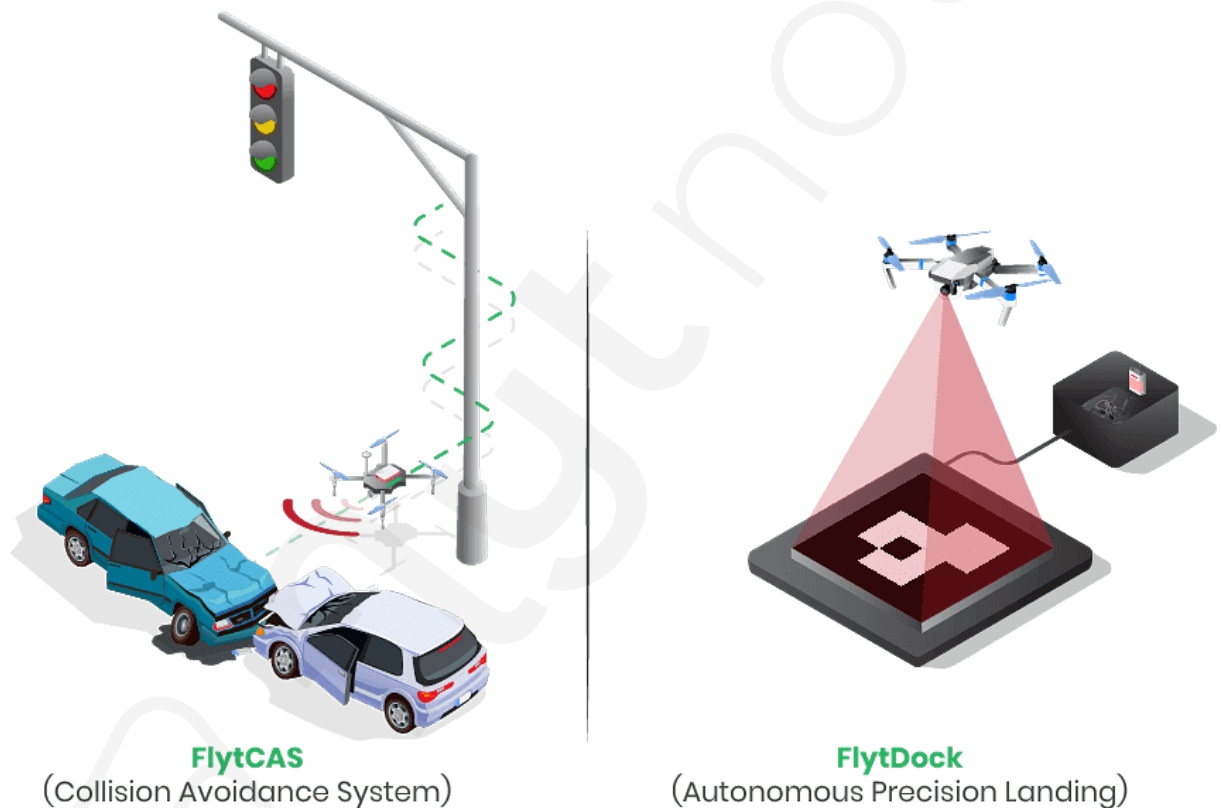
- Obstacle avoidance, also known as FlytCAS, allows a drone to fly over a complex environment. This feature is useful when a drone is flying over or near ruins which can throw unexpected obstacles.
- Precision landing, also known as FlytDock, allows a drone to land precisely on a machine-generated visual tag. This feature can be used when a drone has to land on a specific location to make a delivery.
- Object detection, also known as FlytAI, allows a drone to detect objects from its video feed. This feature can be used to detect moving objects or humans on the ground during a search and resume operation.
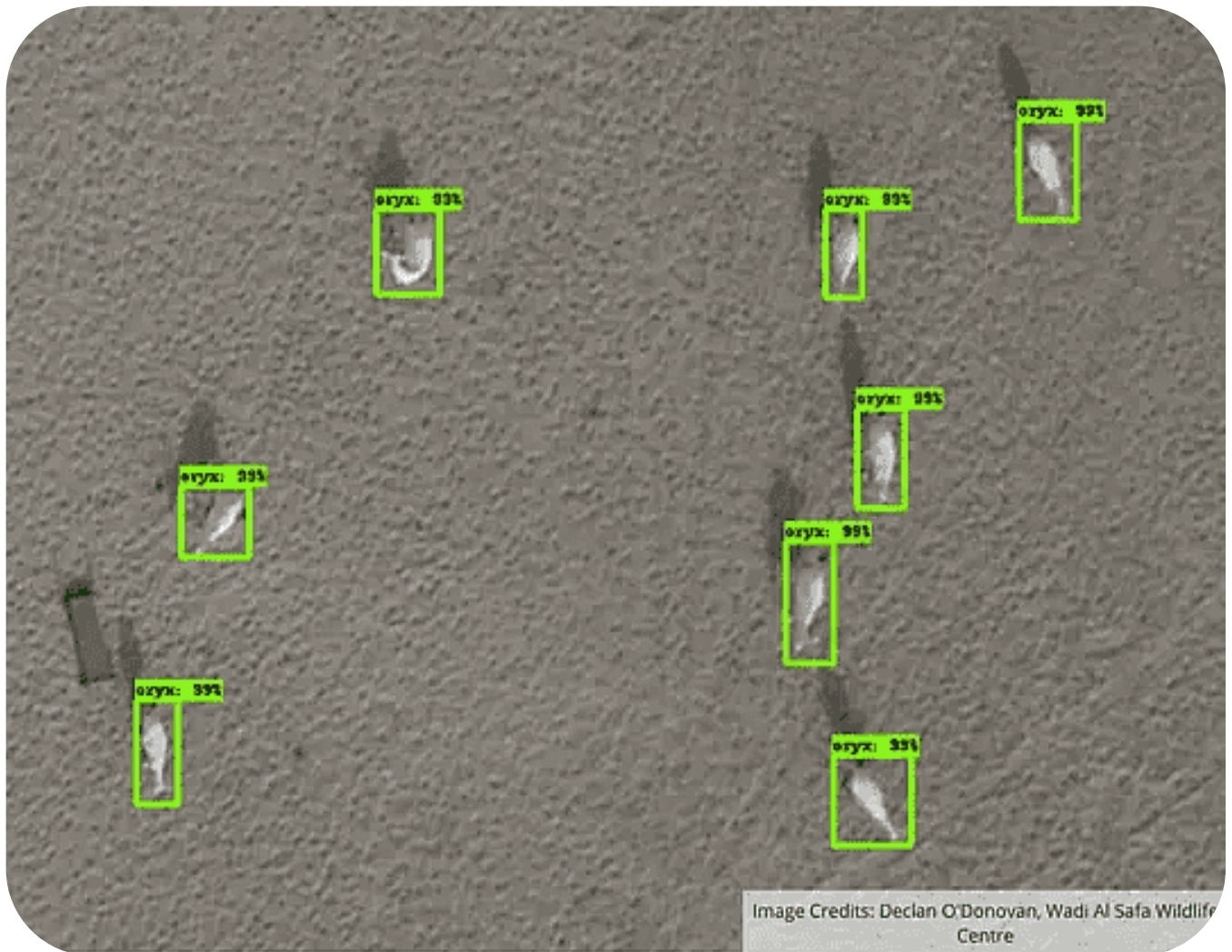
Support for third-party integrations: The FlytNow application supports integration with third-party applications. During a disaster scenario, it is important to accurately log the drone flights and to make sure the drones don't interfere with other aircraft. There are service providers like DronelogBook for flight data recording and Airdata for airspace intelligence, which can be integrated with FlytNow easily.

Advanced geofence: For the safety of the drones and compliance with airspace norms, it is necessary to restrict the area of operation during any relief work. FlytNow supports polygon geofences for operators to work on complex geography.

Integration with ground-based hardware: FlytNow has native support for ground-based hardware like charging pads and Drone-in-a-Box systems. By using such hardware, a first-responder system can be set up where the launch and docking of a drone are fully automated. When disaster strikes, such systems can be activated for faster response and expedite the overall relief process.

FlytNow Business

During the recent lockdown for COVID-19, India's first drone command center was established in Ahmedabad, by Dronelab, using FlytNow, which allowed local drone pilots to launch coordinated operations to monitor the streets for unlawful gathering.

One of our partners in Belgium, DR ONE, is using FlytNow for airport asset monitoring.

History was created in the city of Lillestrøm, Norway, when Droneverkstedet, one of our partners, conducted the very first remote drone construction site inspection using FlytNow over a 5G network.

Summary

In this blog, we discussed the usability of drones in disaster response and the problems they help solve. Then we reviewed the benefits of using drones for use cases in disaster situations. Finally, we ended on the note of how the FlytNow drone fleet management system enables disaster management teams to quickly deploy and manage drones for disaster relief.

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