Sydney Emery
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UAS Research Paper

UAS's Aiding First Responders

Over the past decade, first responders have begun integrating small unmanned aerial systems (UAS) as a resource for a variety of operational needs. UAS, often referred to as "drones," are used by first responders in support of public safety activities such as search and rescue, firefighting, and post incident reconstruction. UAS provide first responders with an aerial view of their environment and can be outfitted with various sensors tailored to different applications. The publication of the "Blue UAS Cleared List" or "Blue List" by the Department of Defense (DoD) may aid responder agencies with their acquisition processes.

Drone as a First Responder (or DFR) programs are initiatives in which police departments use a drone to respond to an emergency call right when it happens, deploying the drone to the scene of the call. When the drone arrives, it livestreams video from the location of the call, giving officers in route the advantage of having aerial intelligence to prepare them for what they might encounter at the scene. In a DFR program, drones are stationed at strategic locations throughout a city, ready to be dispatched immediately when an emergency call comes in. A team monitoring the drone's live feed (as shown above) can provide tactical information to officers on the way to the scene. This real-time intelligence can help officers avoid an ambush, know the direction in which a fleeing suspect ran, or add nuance to their understanding of the situation to help them decide whether an officer is needed at all.

Here's how it works: As soon as an incident is reported to 911, a remote operator deploys a drone directly to the scene. (A remote operator is a drone pilot who flies without being physically present where the drone is flying.) The drone arrives faster than the first responders sent to the scene (typically, sometimes it gets there later). While officers are traveling to the

scene, the drone's live feed is watched by incident command officers located in a control center, providing crucial situational awareness to inform the response. For this idea to work, the drones have to be deployed very fast. That's why the DFR model typically requires drones to be placed at key strategic locations throughout a city. And it works, in over 4,000 calls in the Chula Vista Police Department's DFR program the first DFR program in the U.S. drones arrived on the scene in less than 2.5 minutes. Another key data point from the Chula Vista P.D.: in over 1,000 drone deployments, the live feed from the drone helped avoid the need to dispatch a patrol unit. That means the drone footage showed that there was not a need for police to show up physically over 1,000 times, which is a big number that's 1,000 times where an officer didn't have to put themselves in potential danger, and in which any possibility of escalation was completely avoided.

Drone as First Responder programs are still relatively new. While the idea is fairly straightforward, the regulatory hurdles required to start a DFR program are significant, and it can take considerable time and resources to get the approvals needed to start one. The reason for this is because, in a true Drone as First Responder program, the drones dispatched to the scene of unfolding events will be flown Beyond Visual Line of Sight (BVLOS) as well as over people, both operations that are prohibited by the FAA's drone rules (called the Part 107 rules). Because of these prohibitions, police departments which constitute the vast majority of public safety agencies creating DFR programs have to go through a lengthy, complicated process to be able to fly as needed for DFR operations. (You can also get permission to fly in these prohibited manners by securing a COA for your public safety drone program instead of going the Part 107 route.) That being said, DFR programs are growing throughout the U.S. And companies

like SkyFire Consulting and Axon Air are leading the way, providing end-to-end partnerships

that help police departments make the Drone as First Responder vision a reality in their

communities.

In New Mexico, the City of Clovis has used drones not only for criminal pursuits but also

for fire emergencies. Their DFR program provides real-time video feeds to dispatchers, offering

a bird's-eye view of incidents. In one notable incident, drones were instrumental in tracking a

suspect who fled a scene, leading to a swift arrest. In another instance, drones provided crucial

insight into a warehouse fire, helping firefighters identify the most affected areas and strategizing

their response. This real-time data has reduced response times and improved the safety and

efficiency of emergency personnel. In Florida, the Daytona Beach Police Department has

integrated drones into their daily operations. While the Department uses drones in several ways

to support its work, its DFR initiative has been particularly impactful. In events like the Daytona

500, drones have been used for crowd surveillance and management. On regular days, they assist

in search-and-rescue operations, crime scene documentation, and active shooter situations. By

providing a real-time aerial perspective, the drones have enhanced situational awareness, leading

to better decision-making and heightened public safety.

The best first responder drones of 2023 include: BRINC Lemur 2, DJI's Matrice 30, and

Skydio X2. The BRINC Lemur 2 is primarily a public safety drone, crafted explicitly for roles

in public safety, emphasizing law enforcement and handling situations like hostage crises and

active shootings. Equipped with specialized features, the Lemur 2 can maneuver in confined

indoor areas, has bidirectional communication, and can break through glass windows for entry

into structures (it's the only drone that does this). DJI's Matrice series is a favorite choice for law

enforcement and other public safety departments. The Matrice 30 is the most compact model in the series. It can be fitted with an optional thermal camera and is a durable, mobile drone designed for on-site tasks, including first responder and public safety operations. The Skydio X2 is a compact, durable drone designed to support both daytime and nighttime first responder operations. Skydio's drones are known for their autonomy, which allows the drone to fly largely on its own. The autonomy on the X2 gives first responders the freedom to act on the ground while still collecting aerial data, allowing them to chase an individual on foot or search for a victim of a car crash as the drone flies overhead. Here's what to look for in first responder drones: High-resolution camera(s), real-time video streaming, extended flight time, safety features, two-way communication, rugged build, extended transmission range, data encryption, and automation.

There are many reported benefits to these programs, from reduced response time to improved safety for both police and the community. But there are also various challenges, not the least of which is societal acceptance. As more and more police departments in the United States and the world consider implementing DFR programs, we need to take an informed look at their benefits, barriers to success, lessons learned, best practices, and coming changes in the technology, plans for its use, and its potential impact on the public.

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