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The Use of Drones in Firefighting

The service of firefighting has been around for as long as people have needed to put out fires, which is to say, a long time. Homes and habitats can be utterly destroyed if fires are left uncontrolled. Certain places, like California, have to prepare to stop massive wildfires that come every year. This year alone, the US has had more than 46,000 wildfires that destroyed around six million acres of land. This has led fire departments to look for better solutions to prevent and control them.

Luckily, drones have advanced rapidly in the last decade and can carry a heavier payload further than before while remaining financially viable. Fire departments have been developing specialized drones to fit their needs, as well as creating new fleets of them to assist every part of the team.

Lightweight drones with strong airframes are essential to the task. The winds encountered during a severe wildfire can be sudden and extreme. For a drone to stay not only airborne but stable, it has to have advanced stabilization systems that can counter the turbulent air. The issue this creates is that heavy frames and advanced systems add a lot of weight to a drone, which makes them less effective as a mobile platform for teams on the ground. Because ofthis, it has taken several years of engineering to find the right balance between the two.

The new series of drones allow firefighters to be safer and more effective at their job. They can monitor vulnerable areas before a fire breaks out, plant seeds, set small fires to stop

the spread of larger ones, keep aviation crews out of harm's way and communicate with teamson the ground.

"Knowing is half the battle" isn't just a catchphrase used to inspire children to learn. Having information about an area before there is a fire can be extremely useful to fire departments. Since they only have limited resources, setting up in high-risk areas allows them to concentrate their effort on the places that require the most attention. Drones can be used to map out these vulnerable areas far before a fire begins. This map allows firefighters to predict the path of the wildfire so that they can formulate a plan to stop it. It also lets them know which people are in the most danger and which homes need to be evacuated.

Since wildfires often occur in the same areas year after year, there is a lot a fire department can do between fires to make them less severe. One of these things is to plant seeds for new trees. This may sound like adding fuel to the next fire, but having fresh trees in an area that was just burned helps keep it moist, as well as preventing erosion. Planting seeds used to be done by hand: a time-consuming process that took a considerable amount of effort put into it to see any meaningful results. Drones have increased the ability to plant seeds dramatically, with up to six times as many being planted by airdrop than by hand in the same amount of time! It has been so effective that in 2016, a company called DroneSeed was granted FAA approval to fly drones weighing over the critical 55 pounds beyond line-of-sight to do the job. Flying beyond line-of-sight is usually an issue for drone companies. It's the reason that Amazon and others can't deliver packages with drones yet. The FAA approving this company for flying BLOSshows how much they believe delivering seeds by air is important to prevent fires.

Small drones can also do something that sounds counterintuitive: they can start fires. This isn't a feature used by arsonists to start these large wildfires; it's used by the fire departments to stop them. Arming drones with firebombs that combust upon impact with the ground allows for small, containable fires to be set ahead of the larger ones. This was a tactic used by fire departments for a long time, but they have only recently been able to incorporate drones into it. This is thanks to a company from Lincoln, NE, who developed a system called INGIS that can be installed on drones that enables them to drop little flammable balls. Each drone can carry up to 400 balls in its bomb bay that can be released at a rate of 120 per minute. The estimated five-minute reload time enables operators to cover up to 4,300 acres of ground in eight hours. There are already about one hundred of these systems in use against wildfires all around the country.

Incorporating drones into fire departments has helped in a lot of ways, but one of the most important is that they improve the safety of the firefighters. They allow teams to gain a better understanding of what is going on. Wildfires can change rapidly with the wind, which makes fighting them extremely hazardous. Giving crew live information about how a fire is changing can be life-saving, as well as allowing them to move in a new direction to stop it. During a fire, there is a lot of smoke in the area and the personnel on the ground are in a very stressful situation. Drones equipped with thermal cameras can guide them through that smoke toward wherever they need to go. They also improve the safety of the aircrews. A helicopter flying in low visibility over a fire is in a dangerous state that requires a lot of situational awareness that can quickly wear down a pilot. Sending in drones to dangerous areas where larger

aircraft aren't needed allows for those larger platforms to fulfill other tasks and reduces the effect of fatigue on the pilots.

Overall, drones provide several services for fire departments that assist them in fighting fires. They are better suited for doing these jobs than a lot of aircraft because they are lighter, easier to maintain, require less downtime in between missions, and cost much less than larger aircraft. With their introduction to more and more departments, those departments will be able to use their limited resources more efficiently to prevent and stop fires.

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