

Fire Fighter Drone

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1. Abstract

In a world where fire accidents are increasingly common and the brave first responders always risk their lives to save the lives of others. Unfortunately, history tells that these brave first responders do not survive most of the time. To save as many lives as possible, it is important to leave dangerous tasks to machines. One such device is a drone; it provides great maneuverability and doesn't risk any personnel. Drones can also gather in formation at greater speed, reliability and are also able to drop items. Thus, the solution mentioned below will help us solve this problem along with the functionalities mentioned below.

The drones are most commonly used in other countries like the USA, China, UAE, etc, for safety and cleaning purposes. Nowadays UAV or drones are mainly used in Defence, automatic delivery systems by Amazon, air ambulance, and other uses. So I have made the project which has the manual firefighting system, and it can automatically land and take off from any way. Have a GPS Tracking system that gives the location every second on time. Which will reduce the time of the firefighter and increase the efficiency of the system. It will reduce the time to take action

2. Introduction

The advancement of unmanned aerial vehicle (UAV) technology has opened new frontiers in

emergency response and disaster mitigation. In modern firefighting, the "golden hour" the initial moments of an outbreak is often lost to logistical delays and geographical barriers. This project will reduce the gap between the firefighting truck and the fire detection technique, and its heavy system will also reduce the time and save many lives

In this new generation, drones are playing an important role. When the system get feedback from the system, a drone pilot will launch the system, and then it will find that the other person has the location coordinate of it, so he can track it easily.

- **Advanced GPS Integration:** In the modern era, drones play an important role; they are the backbone of the Defence and firefighters are used to this. This Drone has advanced GPS Integration, which helps the drone to auto-land and automatically find the smallest part. It will utilise high accuracy by using satellite linking. At the same time, it can link or pair with 15 to 16 satellites.
- **Real-Time Location Tracking** In a real-time location tracking system, there is a GPS module that we use for location tracking. Using a GPS tracking system, there is communication between the controller and the drone. The GPS module, which is in the drone, sends the second location to the drone operator.

- **Autonomous Landing System:** Safety and recovery are the most important things that a drone must have. In this firefighting drone, we have used the Ultrasonic sensors, which will detect a safe location or a safe place for landing. It has the automatic landing system, which will be used for auto land in any case, there is no connection between the Drone pilot and Drone.

The main Aim of this project is to use for fire safety. This Drone will be used as a Normal drone and as a firefighting drone. We have

4.OBJECTIVE AND SCOPE

The Primary Objective of the project is to design and implement a drone which will have both the function it will use like a Normal drone and like a Fire Extinguisher drone. Real time GPS tracking and give every second of information to the control system. Our main objective of the system is that we are making this system for both the purpose for civilians and the fire fighter system. There is a simple box which is made of the a plastic and having a two servo motor which will open the box and then the fire ball will fall on the specific location

High-Rise Building Firefighting

Nowadays, the firefighting drones are most commonly used for buildings like 15 to 20 floors. There is a high risk due to the high. Here, the drone plays an important role. It can go up to 40 floors and increase this. Rescue Assistance: Drones use speakers to give instructions to trapped victims and searchlights to illuminate escape routes through thick smoke.

made a kite or firefighting system which will use a fireball which has a gas like Dry Chemical Powder which is ammonium phosphate-based, which we used in it.

3.BACKGROUND

Nowadays, drones play an important and key role. The main aim of the project is to make a fire extinguisher system. The evolution of the fire system is increasing day by day. In history, we used a manual system. In this system, there were a lot of risks and human hazards, so nowadays we use drones and robots for firefighting.

5.UAV Making

Technical Implementation: UAV Construction and Component Integration

In UAV Making, we divided our drone into two parts. First, a normal drone, and second, is a fire fighting system where both systems come together and form a firefighter drone. The main hardware of the system is a heavy duty f450 quadcopter frame . There is a fiber platform used for fireball. The ball we used in this project has a weight of around 300gm and at a single time we used only 1 ball. It will drone the ball to that location and return to the home for the other. The hardware we used for it is

- **Hardware**

1. F450 Drone Frame (Plastic)
2. DJI Propellers x2sets
3. APM 2.8 Flight Controller
4. Battery 5300m Ah

5. Imax B6AC Charger
6. M8N GPS Module
7. FSI6 Transmitter and Receiver
8. Shock Absorber
9. Telemetry Module Ground and Air Module

- **Software**

1. Mission Planner

6. Fire Extinguisher System

This system is used to design and to detect fires. It is precise and has low risk. It does not have the complex system used; it will manually detect the fire. Rather than using a complex system, we used a simple and manual system for it. In the fire extrication system, we used a box with a fireball. There are two servo motors used to drop that ball at the location.

Mechanism and Operation

The delivery system consists of a lightweight housing unit mounted to the underside of the drone. The operation of this unit is governed by dual high-torque servo motors which act as the primary release actuators.

The deployment sequence follows a strategic protocol:

1. **Positioning:** Once the drone reaches the target coordinates via the M8N GPS system, it hovers at a safe altitude directly above the heat source.
2. **Activation:** The operator (via the FSI6 transmitter) or the autonomous flight controller triggers the dual servo mechanism.

3. **Release:** The servos rotate to swing the bay doors open, allowing gravity to deploy the suppressant ball.
4. **Suppression:** Upon falling into the fire, the ball's casing activates, dispersing extinguishing dry powder across the affected area to stifle the combustion process.

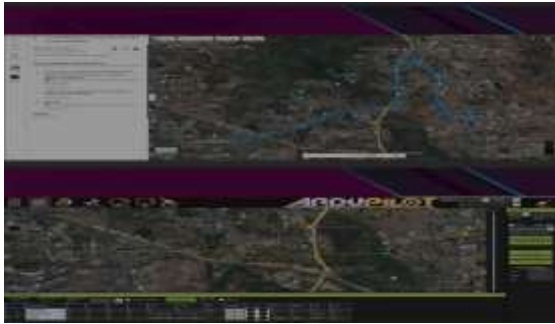
Strategic Advantages

By limiting the payload to one unit per mission, the system maximizes the drone's power-to-weight ratio, ensuring the 5300 mAh battery is not prematurely drained by excessive weight. This "single-strike" approach ensures that the UAV remains agile and responsive, reducing the risk of a crash during the critical deployment phase. This mechanical simplicity—moving from active spraying to a gravity-based drop—significantly increases the reliability of the system in high-heat environments where complex electronic nozzles might fail.

7. Result

This project is all about using smart tech to keep people safe. We built a specialized drone based on a stable F450 frame specifically to tackle fires before they get out of control. By using a high-precision GPS, the drone can navigate through thick smoke where human pilots might struggle to see.

The real breakthrough is the custom payload bay. We engineered a quick-response dual-servo system that carries and drops a 300g fire-extinguishing ball with pinpoint accuracy. With a high-capacity battery and a fully autonomous landing sequence, this drone provides a reliable, low-cost way to jump into dangerous situations so that human first responders don't have to.



The above figure shows the software we use to program the drone's name as the Mission Planner. This software is used to program the drone, and it sends the real-time location of the drone. It has a system of auto landing and auto tracking using a GPS module. The drone can connect to 15 to 16 satellites. Using this satellite we get the real location of the system. In case of any emergency where the drone cannot connect to the system or the satellite, then the person can control the drone manual; this is a major advantage.



Integrating the flight Mission and Payload Release

I used Mission Planner in my project, using this software to my drone to set up the flight rules. Smart Tracking: I used the GPS so I could watch the drone's every move on a map, making sure it stayed perfectly on course. The Drop: I linked my fire extinguisher box to the controls. With one flip of a switch, the box opens and drops the fire-killing ball exactly where it's needed. Auto-Home: After the job is done, the drone doesn't need me to steer it back. It uses automatic landing to fly home and touch down safely by itself. The drone can be used in both the case as a normal drone and fire fighting or fire extinguish drone

8. Conclusion

The idea of a Fire fighter drone will help to improve the response and reduce the time required to monitor an area and help a distressed civilian. The use of the Manual I area and heat model will provide valuable insights that would help the firemen to devise an appropriate plan of action that would otherwise be difficult. Human and explosives detection using cameras can help the firemen find distressed civilians. Using Fire

Extinguisher Ball, fire in a particular area can be reduced and an entry or exit route can be created.

9. References

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