

# AUTOMATED FIRE FIGHTING DRONE FOR WILD LIFE FIRE DETECTION AND EXTINGUISHING

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**College** : *V.S.M'S Somashekhar R. Kothiwale Institute of Technology, Nippani*

**Branch** : *Department of Mechanical Engineering*

**Guide(s)** : *Mr. Iragouda D Patil*

**Student(S)**: *Mr. Tohid A Makandar*

*Mr. Shivam S Rajgire*

*Mr. Suban M Pangire*

*Mr. Omkar R Amble*

## **Keywords:**

Forest fire, detection IOT, Drone, Fire ball, Extinguish, remotely, fly, application, life, wildfire etc.

## **Introduction:**

1. Drones are basically flying unmanned robot that can be remotely controlled or made to fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with onboard sensors and GPS.
2. According to the data indicated by the Times of India, about twenty-seven thousand people have died due to fire accidents and about one million and sixty thousand cases of fire were reported in the year 2017 alone.
3. Containment of fires is a challenging and risky task. In today's world firefighting is achieved through manually operated fire equipment and the involvement of fire personnel is absolutely necessary at the site of fire.
4. Fire fighters risk their lives while tackling fires and are prone to physical as well as mental injuries.
5. Developing effective method to extinguish fires with minimal casualties has become vitally important. Lately, the research in UAV systems have received rising attention in various civilian and military applications as for their ability of working without human-assistance in complex, difficult and uncertain environment, which allows longer durability.
6. Multi- rotor drones are also very easy to manufacture and are comparatively cheaper when compared to other drone options. Numerous rotors can be placed on the body of the drone according to the requirement and functionality of it.
7. With advancements and developments in drone technology we can leverage the application of drones for firefighting services. Drones as of now have a superior capacity than the unaided eye for early identification with regards to rapidly spreading fires.

This project deals with the concept of automated fire fighting drone for wild life fire detection and extinguishing.

**Objectives:**

1. To develop an unmanned aerial vehicle which can navigate and fly using hand held remote control operated by the fire fighting employees from safer distance.
2. To deploy a sensor-based system which can detect wildfire when the drone is flying
3. To develop a mechanism this can carry fire extinguishing system as a payload of the drone.
4. To develop automated fire ball dropping mechanism which will drop and extinguish the fire automatically if it is detected in the fire detection system.
5. To deliver the fire extinguisher ball in an area that is difficult to approach by conventional methods. (Narrow passages, indoors)
6. To implement the environmental conditions and for visualization using first person view camera which is mounted on the drone which captures the live video and sends it to the controlling end.

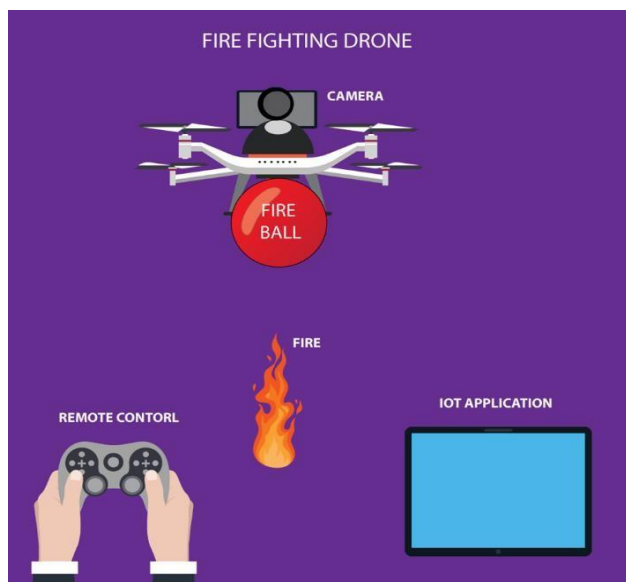
To develop innovative design is to be made for the dropping mechanism of the fire extinguisher ball which is mounted on the drone.

**Methodology:**

The following are the standard components:

1. Brushless DC motors
  2. ESC (Electronic Speed Controller)
  3. Propeller
  4. Hexa-copter Body
  5. Lipo Batteries
  6. RCB 6I transmitter with receiver module (2.4GHz)
  7. Arduino micro-controller
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1. The literature review is carried to study the current as well as existing system. Different research papers from different research scholars were studied to arrive at the problem definition.
  2. The UAV Fabrication and Assembly in this phase the basic structure of the unmanned aerial vehicle is developed. This involves mechanical fabrication of UAV and its assembly
  3. The Fire Ball Drop Mechanism in this phase the fire ball dropping mechanism is developed which will drop the payload to the detected fire location. This involves development of servo-based mechanism which will release the fireball to the fire location.

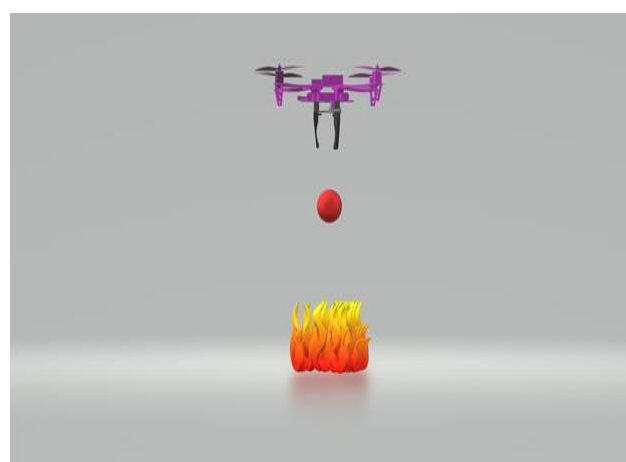
4. The Fire Detection System In this phase the controller is interfaced with fire sensor is mounted on the UAV. The system is capable to detect and correctly identify fire in such situations is deployed on Drone.
5. The IOT system Development In this phase the IOT system is developed which will communicate with the UAV over the internet and update the Realtime location details of the fire as well as the navigation status.



Illustrative diagram



3D Side view of drone



View of releasing payload



View of fire extinguishing

**Conclusion:**

1. Fire has always been a devastating phenomenon but with the technological advancements it becomes easier to tackle it.
2. This project describes one such solution to the problem of fire fighting with the help of drone technology and an appropriate extinguishing system.
3. It maps out and demonstrates the process of constructing a drone that is capable of extinguishing small- scale fires.
4. The proposed project is expected to solve the problems related to safety and operational problems in fire fighting situations by providing a smart drone-based solution for fire fighting.
5. The proposed project is expected to detect the Wildlife fire using sensors and camera feed and extinguish it by dropping a payload to the detected area using UAVs

**Scope for future work:**

1. Fire extinguisher ball is used as fire extinguisher by fireman as it releases Carbon-dioxide when it burns.
2. Due to this feature, it can then be loaded on to drone and released.
3. Usually, the fire man is not aware about intensity of fire at accident spot. This can be overcome by using thermal camera infrared thermal images can help plot a 3D heat map of the of the spot.
4. With the help of this process the transmitter controlling fireman can strategies where the fire extinguishing ball can be dropped at the earliest.
5. From the implemented project we can conclude that the above project has wide scope and can be used for extinguishing of the fire from the distance.
6. The project has wide scope for further modifications.
7. In future the project can be made more advanced by implemented automated fire detection using deep learning approaches.