

Multipurpose fire extinguisher drone

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ABSTRACT: The Multipurpose Monitoring and Fire Extinguishing Drone (MMFE-Dr) seems like a promising solution for monitoring air pollution and extinguishing fires. Its ability to measure various pollutants and transmit real-time data to a cloud server can be very useful for air pollution monitoring. Additionally, its fire extinguishing capabilities can be a game-changer in firefighting.

It is true that drones are increasingly being used in firefighting due to their advantages over traditional firefighting methods. Drones equipped with sensors and cameras can provide valuable information about the size and scope of a fire, helping fire fighters to make better decisions about how to combat it. They can also be used to detect any trapped people or animals in a building or area affected by fire, allowing fire fighters to quickly rescue them.

Overall, the MMFE-Dr has the potential to be a very useful tool for air pollution monitoring and firefighting. As technology continues to advance, we can expect to see more innovative solutions like this in the future

KEYWORDS: MMFE-Dr (Multipurpose Monitoring and Fire Extinguishing Drone), UAVs(Unmanned Aerialvehicles)

I. INTRODUCTION

It is important to have a way to monitor and detect harmful gases in the atmosphere, as exposure to these gases can have negative effects on human health. The use of drones, or unmanned aerial vehicles, can help with this task by autonomously navigating through polluted areas to measure the concentration of these gases. Fire-fighting drones are also becoming more commonly used in fire departments to help extinguish fires in a more efficient and effective manner.

The system you describe is equipped with sensors that can detect harmful gases such as carbon monoxide, smoke, alcohol, and LPG, as well as measure temperature, humidity, sound pollution, and health metrics such as spO and heart rate. These sensors are attached to a drone, which acts as a carrier to navigate through polluted areas and collect data. The system also includes a fire extinguisher that can be used separately to help extinguish fires. The sensors used in the system include MQ2, MQ3, MQ4, MQ7, LM393, DHT11, and Max30100, and the system is



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powered by a 10000mah battery. The fact that all of the operations are integrated into a single system makes it unique and cost-effective compared to other systems that may require multiple devices to achieve the same task.

II. RELATED WORK

The concept of air pollution monitoring and fire extinguisher in a drone is already exist, but this idea was come combined concept and less priced in people. measure of toxic gasses in atmosphere and it can be monitoring 24 hours by the battery backup[1]. Drone based method to increase the application of concept and it is very useful to heavy toxicity area or highly populated space[4]. The proposed model is targeting many criteria less priced application and many options included unmanned Arial vehicle. This technique uses an approach which combine fire extinguisher [12]with gas monitoring and hence it works produce very good results.

The work of the project is divided in two sections 1) Gas monitoring, 2) Fire extinguisher. Gas monitoring is done by applying software and using a display board to monitoring the level of gasses[3]. And applied a threshold level to measuring. Then, connected components are paralleling so the power distribution is very easy size of the project is reduced. Finally, the two sections are connected in unmanned Arial vehicle[2]. After fire detection the sensor is workedand on the extinguishing system and at the same time monitoring the gasses.

III. METHODOLOGY

Multipurpose Monitoring System

In this section, the designs of all the components of multipurpose monitoring system are described as shown in fig:3.1. The gas sensorskit, which can be characterized by four sensors: MQ2(smoke), MQ3(Alcohol), MQ4(LPG), MQ7(CO), Soundsensor (LM393).Temperature,humidity(DHT11).Health(max30100).The microcontroller Node MCU , Arduino promini, TFT 2.8inc touch display ,wifi modem and the power supply or power bank of 10000 mAh with an output of 5 V that powers all the sensors and display for longer than 10hrs of operation . The weight is approximately 0.451 kg

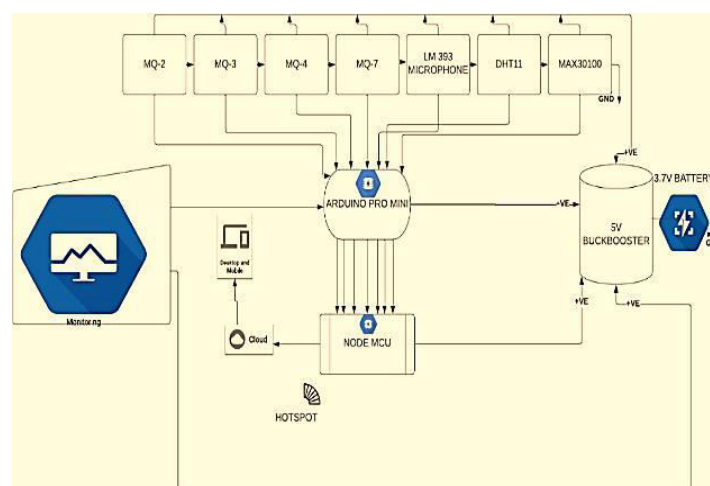


FIG.3.Block diagram of multipurpose monitoring system



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The procedure is as follows. Turn on the power supply. All sensors send data to the Arduino pro mini for data processing, and Node MCU transmits all data in the mobile application in real time and TFT display. Description of sensors. a simple gas quality, temperature, humidity, sound monitor is created and implementing the device is different risk areas. Health can be monitored in current health issue situations (spo2, heart rate) This design is very compact and multipurpose monitoring for 24hrs by usb 5v and 10hrs by power bank, it is easy to attach in drone to reach in higher orrisky areas.

Fire Extinguishing Drone

The MMFE Dr framework is designed with various components including a 920kv brushless motor, 30amp ESC, DJI Flight controller, 4500mAh LiPo battery, flysky 6-channel transmitter receiver, and servo motor. The brushless DC 920Kv motor of the MMFE Dr is powered by a battery that converts electrical energy into mechanical torque. Brushless DC motors offer several benefits such as precise speed control, high efficiency, reliable performance, low noise, and long lifespan. To power the MMFE Dr device, a 4-cell lithium polymer battery with a capacity of 4000mAh is used, providing advantages such as lighter weight, higher capacity, and superior discharge rates compared to other battery types. The voltage of the battery must match that of the motor, while the capacity of the battery represents how much power it can hold, with higher capacity resulting in greater battery weight. The electronic speed control (ESC) circuit controls the speed and direction of the electric motor by connecting to the main battery and the brushless motor. The DJI NAZA mLite flight controller, operating on a 32-bit processor running at 72 MHz and compatible with the 2.4 GHz receiver of the 6-channel module, is used as the primary flight controller for the MMFE Dr device, enabling wireless control at a range of up to 500 meters. The device is also equipped with a 500ml fire extinguisher that is triggered by a servo motor through the 6th channel of the transmitter for manual control in small fire extinguishing as mentioned below in fig:3.2

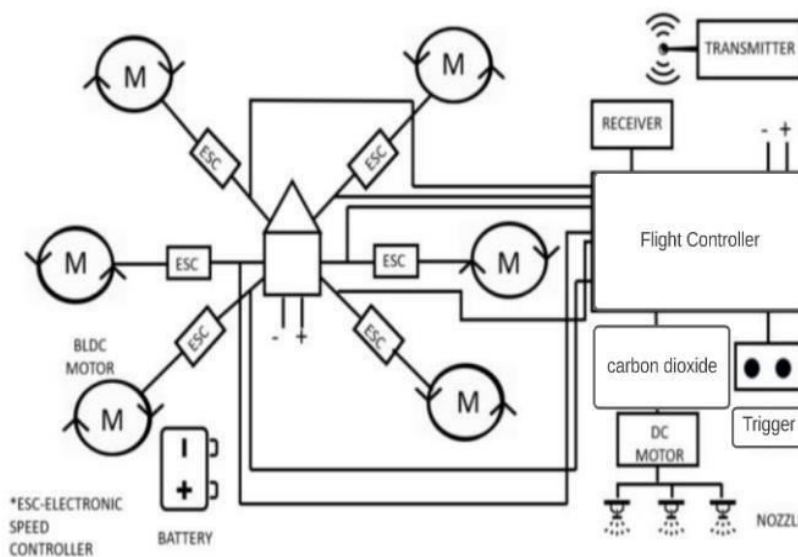


FIG :3.2 Block diagram of drone



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IV. EXPERIMENTAL RESULTS

Figures shows the results of multipurpose monitoring system. Fig 4.1 shows the image of heart rate and blood oxygen level , Fig 4.2 shows the image of gas monitoring that is LPG , Carbon monoxide, Alcohol, Smoke Fig 4.3 shows the image of weather monitoring that is temperature and humidity Fig 4.4 shows the image of sound level monitoring



FIG: 4.1 HEALTH



FIG: 4.2 GAS



FIG: 4.3 WEATHER



FIG:4.4 SOUND

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V. CONCLUSION

Multipurpose monitoring and fire extinguishing drone by mobile smart sensing in areas with poor accessibility such as those subjected to burning from forest fires or unsafe gas leakage in an industrial situation. MMFE can be used for analyzing smoke, Alcohol, LPG, CO, Sound, Temperature, humidity, Health. In addition, a fire extinguisher is used in drone to off the fire explosions and save life. Data observing is available as real-time information via a mobile application.

Both systems can buy separately according to needs, there by a cost effective product is formed. It will be a unique product in present and common product in future as expectation. The MMFE Drone is indeed a versatile and effective tool for monitoring air quality in various smart applications like health, temperature, humidity, sound etc. Its compact design and wireless connectivity make it easy to install and operate in a wide range of environments, from urban neighborhoods to highway tunnels. In Smart Cities, MMFE Drone can help local governments and municipalities to monitor and manage air quality in real-time. This information can be used to inform city planning decisions, such as the placement of new parks, the routing of traffic, or the development of new urban green spaces. Airports can use MMFE Drone to monitor air quality in and around the airport, including runways, hangars,

Overall, the MMFE is a powerful tool for monitoring air quality in a wide range of smart infrastructure applications. Its versatility and ease of use make it an ideal choice for anyone looking to improve the health and well-being of their community while promoting sustainable development

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