



A MULTI-PURPOSE DRONE FOR DRUGS DISTRIBUTION, SANITIZATION AND TO PROVIDE COVID-19 AWARENESS

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Abstract: A Multipurpose medical drone for the use in pandemic situation has been designed, fabricated, and presented in this project. An investigation on major issues in the hospitals during pandemic has been conducted and a conceptual prototype and detailed fabrication process has been presented accordingly. A multi-purpose drone with ability of sanitizing and delivery of medicine in outdoor during pandemic, is designed and fabricated. This is a cost-effective system that can be used in healthcare sections to reduce the risk of infection of front-line worker by sanitizing a patient's room and fastens the delivery of medicines such as vaccine to the locations which are difficult to access.

I. INTRODUCTION

To overcome the difficulties caused by pandemic, we should evaluate any alternative technique to control the pandemic. Drones, as the most dynamically developing part of the aircraft industry can be a very special tool in the hand of experts fighting against this pandemic. Drones have been effectively used in the past for a vast number of applications. In the case of a pandemic, we focus mainly on the overloaded work or insufficient capacity of workers in the hospitals, medical services. Experts must focus on higher effectiveness when managing the pandemic, meaning that they should use any new tools, facilities, or methods that could help to mitigate the lack of resources mentioned above.

II. OBJECTIVES

- To allow for instant transport of medical supplies like tablets, vaccines, syrups etc from medical stores to hospitals and emergency centers, we here design a medical supply delivery drone.
- Used to sanitize the contaminated zone without human intervention.
- Spread the awareness of the pandemic at the contaminated zone.

III. METHODOLOGY

The connection are made to the drone to work as medicine distribution, sanitization and give the awareness about covid-19, the container is connected to the drone carry the sanitizer, through the nozzle we spray the sanitizer to contaminated zone and patients room, carrier is also connected to the drone to carry the medicines to required area and if there is more than four members of group we give announcement through the speaker about covid-19 rules and regulation.

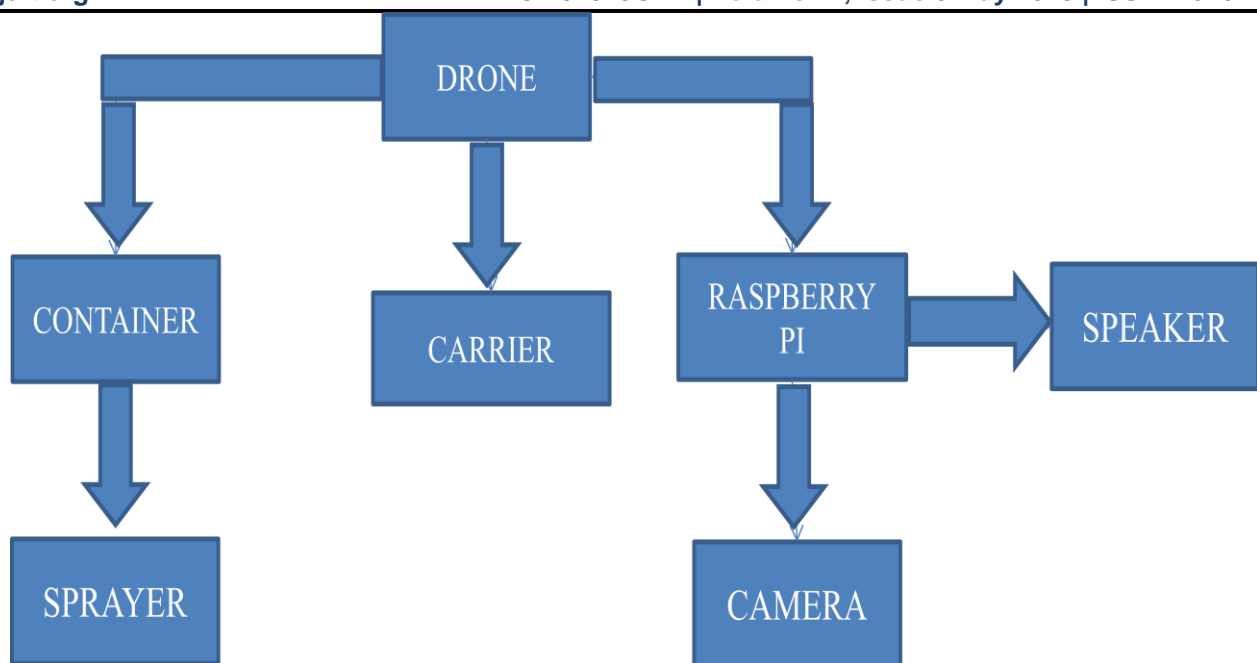


FIG 1 : BLOCK DIAGRAM

To know about group of members we write python code and dump into the raspberry pi which is connected to the drone, through in build camera it capture the picture and send to us if there is more than four members recorded audio will announced automatically.

IV. SOFTWARE DESCRIPTION

1. Raspberry Pi 3
2. Python language for image processing

The Raspberry Pi 3 Model B+ is a single-board computer developed by the Raspberry Pi Foundation. It is an upgraded version of the Raspberry Pi 3 Model B, offering improved performance and additional features. Here are some key details about the Raspberry Pi 3 Model B+:

Specifications:

Processor: The Raspberry Pi 3 Model B+ is powered by a 1.4 GHz 64-bit quad-core ARM Cortex-A53 processor, which provides a significant performance boost compared to its predecessors.

Memory: It comes with 1GB LPDDR2 RAM, providing sufficient memory for most applications and tasks.

Connectivity: The board includes built-in Wi-Fi (2.4 GHz and 5 GHz) and Bluetooth 4.2, allowing easy wireless connectivity for networking, IoT (Internet of Things) projects, and peripheral device pairing.

Ethernet: The Raspberry Pi 3 Model B+ has a Gigabit Ethernet port, enabling fast wired network connections.

USB Ports: It features four USB 2.0 ports, allowing connections to various USB devices such as keyboards, mice, external storage, and peripherals.

Video and Display: The board has a full-size HDMI port, enabling connections to monitors and TVs. It supports resolutions up to 1080p for high-definition video output. Additionally, it includes a CSI camera port for connecting the official Raspberry Pi Camera Module.

Audio: The Raspberry Pi 3 Model B+ supports stereo audio through a 3.5mm audio jack or HDMI.

Storage: It utilizes a microSD card slot for primary storage, where you can install the operating system and store data. The board does not have built-in storage.

GPIO: The board features a 40-pin General Purpose Input/Output (GPIO) header, allowing connection to external devices and sensors for project expansion and customization.

Power: The Raspberry Pi 3 Model B+ requires a 5V micro USB power supply. It is recommended to use a power supply with a current rating of 2.5A for optimal performance.

Operating Systems and Software:

The Raspberry Pi 3 Model B+ supports a range of operating systems, including the official Raspberry Pi OS (formerly known as Raspbian), Ubuntu, and various Linux distributions. It also supports programming languages like Python, C/C++, Java, and more, making it a versatile platform for software development, IoT applications, robotics, home automation, and educational projects.

The Raspberry Pi 3 Model B+ is a popular and versatile single-board computer that offers improved performance, connectivity options, and features compared to its predecessors. It provides a cost-effective solution for a wide range of projects, from hobbyist tinkering to professional applications. With its small form factor, GPIO pins for hardware integration, and a supportive community, the Raspberry Pi 3 Model B+ has gained popularity as a flexible and accessible platform for learning, prototyping, and building various innovative projects.

The Image Processing software is a powerful tool designed to manipulate, analyze, and enhance digital images. It utilizes advanced algorithms and techniques to process images, allowing users to perform a wide range of tasks such as image editing, filtering, enhancement, segmentation, and feature extraction. The software provides a user-friendly interface and a comprehensive set of tools to cater to various image processing needs.

Key Features:

Image Editing: The software offers a variety of editing tools to modify and retouch images. Users can adjust brightness, contrast, saturation, and apply various filters to enhance image quality. It also supports cropping, resizing, rotating, and flipping images.

Filtering: The software includes a collection of filters to modify images based on specific requirements. Users can apply common filters like blur, sharpen, noise reduction, and edge detection. Additionally, advanced filters like morphological operations, histogram equalization, and color correction are available.

Image Enhancement: This software provides advanced techniques to enhance image quality. It includes tools for improving image sharpness, reducing noise, adjusting color balance, and removing artifacts. These enhancements can be applied globally or selectively to specific regions of interest.

Segmentation: The software enables image segmentation, which involves dividing an image into meaningful regions. It provides algorithms for automated segmentation, allowing users to extract objects or regions of interest from images. Segmentation is useful in various applications like medical imaging, object recognition, and computer vision.

Feature Extraction: The software facilitates the extraction of meaningful features from images. It includes techniques for detecting edges, corners, and key points. These features can be used for further analysis, object recognition, and pattern matching.

Batch Processing: The software supports batch processing, allowing users to apply a series of operations to multiple images simultaneously. This feature is useful when dealing with large image datasets or when applying repetitive tasks.

V. HARDWARE REQUIREMENT

6.1 CUBE ORANGE

➤ Processor

- 32bit ARM STM32H753 Cortex-M7 (with DP-FPU)
- 400 Mhz/1 MB RAM/2 MB Flash
- 32 bit STM32F103 failsafe co-processor

➤ Sensors :

- Three redundant IMUs (Accelerometers/Gyroscopes), Two Barometers, One Magnetometer
- ICM 20649 integrated accelerometer / gyro, MS5611 barometer on base board
- InvenSense ICM20602 IMU, ICM20948 IMU/MAG, MS5611 barometer on temperature controlled, vibration isolated board
- All sensors connected via SPI

➤ Power:

- Redundant power supply with automatic failover
- Servo rail high-power (7 V) and high-current ready
- All peripheral outputs over-current protected, all inputs ESD protect

➤ Interfaces

- 14x PWM servo outputs (8 from IO, 6 from FMU)
- S.Bus servo output
- R/C inputs for CPPM, Spektrum / DSM and S.Bus
- Analogue / PWM RSSI input
- 5x general purpose serial ports, 2 with full flow control
- 2x I2C ports
- SPI port (un-buffered, for short cables only not recommended for use)
- 2x CAN Bus interface
- 3x Analogue inputs (3.3V and 6.6V)
- High-powered piezo buzzer driver (on expansion board)
- High-power RGB LED (I2C driver compatible connected externally only)
- Safety switch / LED

6.2 BATTERY (12V,7Ah)

A rechargeable battery is a battery that can be recharged and used many times and is known as a secondary cell. Gaston Planet, a French physician, developed the world's first rechargeable battery in the year 1859. A battery is like a piggy bank. If you keep taking out and putting nothing back, you'll have nothing left. Present day chassis battery power requirements are huge. All the electronics require a reliable source power, and poor battery condition can cause expensive electronic component failure. Life span depends on usage— usually 6 to 48 months—yet only 30% of all batteries actually reach the 48-month mark. You can extend your battery life by hooking it up to a solar charger during the off months. Here, we have used rechargeable battery producing a fully charged output voltage of 12volts, with 7.2 AH. A battery cell consists of two lead plates a positive plate covered with a paste of lead dioxide and a negative made of sponge lead, with an insulating material (separator) in between. When electrical energy from an outside source is applied to a secondary cell, the negative-to positive electron flow that occurs during discharge is reversed and the cells charge is restored. A rechargeable battery, storage battery, or secondary cell (formally a type of energy accumulator), is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discharged after use. It is composed of one or more electrochemical cells. The battery stores electrical energy in form of chemical energy and the chemical energy again able to convert into electrical energy. The conversion of chemical energy to electrical energy is called discharging.

6.3 WATER PUMP (12V, 3.5A)

The water hits the rotating impeller, energy of the impeller is transferred to the water, forcing the water out (centrifugal force). The water is displaced outward, and more water can now enter the suction side of the pump to replace the displaced water. The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water. These pumps use AC power otherwise DC power for energizing the motor of the water pump whereas others can be energized other kinds of drivers like gasoline engines otherwise diesel. The water pump is a portable device and can be applied in several household applications. These pumps are used for pumping the huge amount of water from one place to another. The main purpose of a water pump is versatile. A quality pump which can be selected carefully may be perfect for draining water from a low flooded region, refilling the swimming pool, and bathtub, circulating pesticides otherwise fertilizers. The collection of water pumps are very large, therefore, while selecting a strong and consistent one, one should think about the requirement.

6.4 NOZZLE

A nozzle is a device designed to control the direction or characteristics of a fluid flow (specially to increase velocity) as it exits (or enters) an enclosed chamber or pipe. A nozzle is often a pipe or tube of varying cross-sectional area, and it can be used to direct or modify the flow of a fluid (liquid or gas). Nozzles are frequently used to control the rate of flow, speed, direction, mass, shape, and/or the pressure of the stream that emerges from them. In a nozzle, the velocity of fluid increases at the expense of its pressure energy.

6.5 SWITCH CONTROL

Switch control is used to on and off the supply to the motor.

6.6 WATER CONTAINER

A usually large container for holding, transporting, or storing liquids.

6.7 LIPO BATTERY (10000 mAW ,11.1V)

A LIPO (Lithium Polymer) battery is a type of rechargeable battery that offers high energy density and low self-discharge rate. This makes them ideal for use in drones, which require long flight times and need to be able to maintain power during extended periods of inactivity. LIPO batteries are also relatively lightweight and compact, another important factor for drones which need to be as light as possible to stay airborne. Most drone manufacturers will offer LIPO batteries as an option for their products, and it's generally advisable to go with this type of battery over others such as NICD or NiMH if you want the best performance from your drone. That said, LIPO batteries can be more expensive than other types and they do require some special care when charging and storing.

6.8 PROPELLERS

A drone's propellers are essential to keeping a drone in the air. These spinning blades produce airflow, which lifts the drone in the air. The most preferred material for drone blades is carbon fiber because of its many advantages. Carbon fiber blades are the strongest, stiffest, and lightest of them all. Also, they offer less inertia and vibration, allowing for faster speed change. One of the most important parts of your drone are the propellers. These spinning blades are the wings to your craft, the very part that creates the airflow that lifts your machine into the air. Drone propellers come in many different shapes and sizes – they all serve the same overall purpose, but the flight characteristics of each can be dramatically different. The propeller on your drone is a wing, actually, in the physics sense of things, it is multiple wings attached together. Spinning the little wings around in a circle creates the same air pressures, thus causing lift. The basic concept of a fixed blade propeller is that the faster the motor runs, the faster your propeller spins and more lift is created. Basically, more power = more speed. There will be a theoretical maximum to this, eventually a propeller will spin faster than it can efficiently move air, but for the most part we won't hit that with our consumer drones.

6.9 Hex Here3 CAN GNSS Module

- Processor: STM32F302
- IMU Sensor: ICM20948

6.10 Raspberry Pi 3

The Raspberry Pi is a very cheaper computer that runs Linux , but it also provides a set of GPIO (general purpose input/output)pins, allowing you to control electronic components for physical computing and explore the image processing.

6.11 Amplifier

An amplifier is the electronic device that increases the voltage, current, or power of the signal. Amplifier are used in wireless communications and broadcasting and in audio equipment's of all kinds.

6.12 Connecting wires

Connecting wires is used to connect the Amplifier, speaker, switch, and supply. A connecting wire allows the electric current from one point to another point without resistivity.

VI. ADVANTAGES

- Saves human life.
- Promote safer Environment.
- Give the awareness about pandemic and social distancing.

VII. RESULTS





VIII. CONCLUSION

The main focus of this project is to design and analysis of an unnamed aerial vehicle modified and a mechanism gives solution for pandemic and helps to provide medicine without traffic and sanitize the contaminated zone and patients room and give a awareness about COVID-19. The main factors taken into account to help fighters against the pandemic and to save their lives.

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