MEDICAL DRONE A LIFE SAVER IN EMERGENCY SITUATIONS

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Abstract

Drones are flying robots that can deliver payloads, ushering in a new era of industrial applications such as farming, environmental surveillance, public safety, product delivery, and many more. Drones, also known as unmanned aerial vehicles, have a GPS, flight controller, electronic speed controller, brushless DC motors, propellers, lipo battery, camera, transmitter, and receiver. Thousands of people die every day as a result of medication not reaching disaster-prone areas in time. For healthcare providers, drones are a game changer. They needed to develop realistic solutions to increase efficiency and serve everyone, including persons with impairments. It's difficult to get to. The primary goal of this work is to define the medical drone, which can save lives in emergency situations, and to explain how the drone arrives at the emergency scene. They allow platelets, vaccinations, contraceptives, snakebite antibodies, and other medications to be delivered to impacted areas. They can also reach sufferers in need of rapid dosing within moments, which can spell the difference between life and death in some circumstances. Drone carriers are a novel concept in the delivery of healthcare and other medical services. This technique has found new applications in a variety of sectors.

Keywords - Drone, unmanned aerial vehicles, disaster, payloads, vaccines.

1. INTRODUCTION

Drones have the potential to significantly improve healthcare capacity and efficiency methods. Uavs are defined in this study like any uavs, including fixed-wing aircraft and rotary-wing aircraft. Remotely piloted aircraft can be single or multi-copter aircraft. Incorporation of aerial drones (UAVs), sometimes unmanned aerial vehicles (uavs), with health-care systems represents a significant possibility. [1]. Rural areas, which house half of the world's population, are defined differently in different countries, but they all have a low population density and a variety of natural resources. These places are underrepresented in terms of healthcare. Until today, medical services and blood were supplied to rural, underprivileged populations via conventional methods of travel like walk, plane, or car. These options are limited, especially in places distant from area clinics, with weak or quasi ground transportation infrastructure, or with physical roadblocks like mountains. Because they may have to avoid debris or falling objects in the air, the drones must be nimble and have a quick control response. A safe working environment is created by having good agility. Radio technology is used in more modern UAVs for controlled flight [2]. Then there was the invention of the integrated circuit. This has resulted in unmanned aerial vehicles (UAVs) that can be controlled by electronic autopilots. Modern UAVs are controlled by flight controls and human controls. This enables them to perform longer, more reliable aircraft on their own supervision also while operating under the supervision of an aviator during the most difficult parts of the operation. Drones have been employed in agricultural equipment to disseminate medicines in organic fields and to perform easy and safe pesticide discharge over crops. Similarly, we have built a drone capable of delivering crucial and vital medications in locations where effective transportation is unavailable to the indigenous people. This uav can deliver prescribed medication to places where no physical vehicle, such as those used by transportation service, can reach. In any pandemic condition where human contact is prohibited and social separation is critical this unmanned drone drug delivery system has the potential to be a strong weapon in the fight against the outbreak in health management facilities. In disaster situations in which the current transportation infrastructure is inadequate has been destroyed by a flood, earthquake, or other natural disaster, this type of unmanned aircraft delivery mechanism could save important lives with substantially less effort [3]. Recent studies have revealed that many people die as a result of cardiac arrest. As a result, drones can be used to deliver critical equipment, such as a bionic manipulator that uses visual stimuli to aid a patient in heart attack while being treated [4]. The purpose of this article is to find real-world applications of drone telemedicine and related sectors. The format of the paper is outlined here: The System overview is described in Section II. Section III includes Design concept. Section IV: Conclusion.

2. SYSTEM OVERVIEW

We used the hexacopter to in reality provide an explanation for the obligations that a drone can carry out in an emergency scenario whilst imposing a Medical drone, a existence saver in emergency situations. The block diagram of the hexacopter with stay role monitoring and a surveillance digital camera is shown below in figure 1.

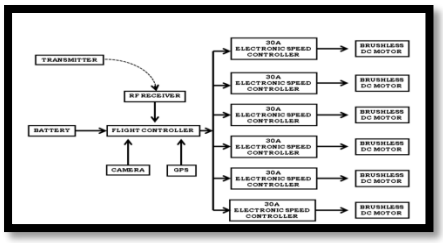

Figure 1: Block Diagram of the Hexacopter

The block diagram of hexacopter is divided into three sections, which are as follows:
A. Hexacopter
B. Global Positioning System
C. Digital camera

A.Hexacopter:

A hexacopter is a type of uav that has six propellers and six motors. Six propellers are arranged in a circle around the main body. They are separated via way of means of one hundred twenty degrees. Hexacopters are powerful, light-weight plane able to sporting huge payloads.
The hexacopter is made up of the following parts:

- Flight Controller
- Battery
- Electronic speed controllers
- Brushless DC motors
- RF receiver
- Transmitter

Flight Controller

The aircraft's brain is the flight controller KK 2.1.5. It's a PCB containing a number of sensing devices the motion of the uav as well as operator instructions. This information is then used to regulate the motor speed, causing the vehicle to move as directed [5]. The ATMEL mega 664PA, an 8-bit AVR Arm processor, is included in the KK 2.1.5 board. A mcu with 64 kilobytes of memory is utilized. Beginners will find it easy to get started. It includes firmware that has already been programmed. During the activation or deactivation process the KK 2.1.5 piezo buzzer emits an audible warning on the board. It is the most stable, with an inbuilt gyroscope and a 6050 MPU instant feature .There are eight rotor outlets and five command interfaces on this circuit board. An ISP, a Lcd screen, and a polarity-protected voltage controlled input. A six-axis accelerometer/gyroscope, a piezo output with a fuse, and a piezo output with a fuse. The user-defined signals from the K.K.board are processed by ATMEL [6].

Battery

The potential of a battery is measured in mill amperes. Mill ampere-hours vs hours If you've got a 4200 mA battery, this offers your drone one hour of 4200 mA power, or 4.2 lots of power. In theory, the bigger you're potential, the longer your drone can fly, however there's a trade-off.

Electronic speed controllers

Electronic speed controllers (ESCs) enable uav flight systems to regulate and alter the speed of the aircraft's dc motor. The flight controller sends a signal to the ESC, which causes the ESC to raise or decrease the input power as needed, allowing the propeller's rpm to change [7]. Active or regenerative braking, which is the process of transforming a motor's mechanical energy into electrical energy that may be used to replenish the drone's battery, can also be handled by Electronic Speed Controls. The motor may operate as a generator during deceleration, and the ESC manages extra current that can be sent down in to power pack. The Simonk 30A Brushless dc ESC can power motors using up to 30A of electricity. It runs on 2S–3S Rechargeable batteries. This ESC contains a charge eliminator circuit that feeds 5V and 2A to the detector, removing the need for a separate receiver battery [8].

Brushless DC motors

Motors for drones and unmanned aerial vehicles (UAVs) are most commonly used to spin the propellers of multirotor drones, allowing them to fly. Brushless motors are much more powerful for their weight than brushed motors, and they last much longer. Brushed motors are typically used in the smallest drones, whereas brushless motors are used in larger drones and UAVs because they can support the extra weight of the additional electronics. Brushless drone motors must also be powered by an electronic speed controller (ESC) [9].

RF Receiver & Transmitter

A radio frequency transmitter-receiver board receives data and wirelessly transmits it to various components via its antenna. A Uav Transmitter is an electronic appliance that wirelessly sends instructions to a receiver, which is linked to the uav being remotely piloted [10].

The specifications of all the components used in the hexacopter are discussed in table I.

Table-1: Specifications of all components

Specifications	MODEL	COLOUR	OPERATING VOLTAGE(v)	DIMENSIONS (mm)
FLIGHT CONTROLLER [10]	KK 2.1.5	GREEN	4.8-6.0	52x52x12
ELECTRONIC SPEED CONTROLLER [11]	SIMONK	YELLOW	5	34x24x9
BRUSHLESS MOTOR[12]	920KV 2212	RED	7-12	28x28x46
TRANSMITTER &RECEIVER[13]	DIGITAL RADIO TRANSMITTER	BLACK	12	189x97x295
BATTERY	ORANGE 4200/3S-35C	ORANGE	11.1	140x43x25

B. Global Positioning System

We employed a global positioning system (GPS) in our study to detect the uav's accurate position data in order to pilot the drone carrying time-sensitive products like medications to the delivery address [15]. The vehicle's position is determined via Global Positioning System, which is a fundamental component of most UAV navigation systems [16]. The UAV GPS is also utilized to calculate the actual speed and position of the vehicle [17].

C. Digital camera

A drone camera's purpose is to provide a vantage point that is impossible to see from the ground, and often in inaccessible or dangerous conditions for humans [18]. It provides the user with an aerial view of a variety of surfaces, allowing the collection of data, images, and videos for a variety of purposes. Uavs are employed to keep an eye on precise locations, chemical and biochemical risks, and epidemics. In high-risk contexts, drones have been shown to be capable of gathering information such as the number of victims in need of attention and triaging [19].

3.DESIGNCONCEPT:

A hexacopter, or uav with six rotors and six motors, is denoted by the prefix "hex." Around the main body, the propellers are arranged in a circle. They are separated via way of means of one hundred twenty degrees. Hexacopter's are powerful, light-weight plane able to sporting big payloads. A drone with six rotors is known as a hexacopter. The F550 body served as the inspiration for this hexacopter. The kk2.1.5 Flight controller microcontroller is applied on this hexacopter. The Flight controller is the drone's intellect. In our project, we constructed a far off-managed manually piloted Hexacopter. The remote delivers radio indications to a control system radio receiver. The flight controller then controls and manages the charge of DC motor vehicle by sending indications to the ESC after receiving those signals [20]. The vehicles used are vital in determining the aircraft's capacity. The leased vehicles have a maximum load of 920kV, which is suitable for delivering medications. On our drone, we have got hooked up a container to move medicines.

Based on its weight and size, a drone is developed and engineered to give steadiness, adaptability, and pace while flying. A field system controls the uav, e-signals are first delivered to the KK Control Board, which incorporates a receiver and takes information from the Gps device at the same time. Flight controller, hexaframe, which links all of the parts, is coupled to the controller. We can control and guide the Drones from the ground station [22]. It has four important hexacopter controls: throttle, altitude, and altitude hold, Pitch, yaw, and roll your hexacopter will turn left or right as you roll it. This is achieved by moving your transmitter's joystick to the left or right, and vice versa. You may change the pitch by pushing the right hand joystick on the backwards or forwards transmission. At first, Yaw looks to be a little puzzling. It turns the hexacopter either anticlockwise.. The hexacopter's rotors are overworked. There is no power to take off because of the throttle. Throughout the flight, you are constantly occupied with the throttle. The high-voltage battery was removed. In order to keep the hexacopter in the air, the throttle must be used in both of the cylinders and by calculating the difference in temperature between the sky and the Push then gradually increase the throttle (left stick) to start the propellers spinning then pause. Get to know the sharpness of the throttle. Gradually move the throttle to the ground. Set the throttle to zero and allow the a hexacopter to ground. Wireless control's most prevalent use Model frameworks were originally established in the 1940s and 1950s with only one identity equipment, followed by

commercial gear [21]. Because the current needs were minimal, the transistor technique considerably lowered the battery's demands. The model's moving parts were commonly positioned in both of the cylinders in early mosfet sets, and the put away is controlled by an electromagnetic escapement strength in an adjustable strap ring, providing basic on/off steering command (right, left, and neutral) as well as, on occasion, distinct characteristics, including motor speed [22].In this study, a medical drone is used to deliver medications to emergency regions before people can arrive. Unlike other drones, it has a distinct future. Other drones transfer cargo or objects by landing on the ground, but this medical drone will deliver medicines or emergency medications by dropping them from the air using a parachute. This will be useful in pandemic conditions or in areas where the drone cannot land.

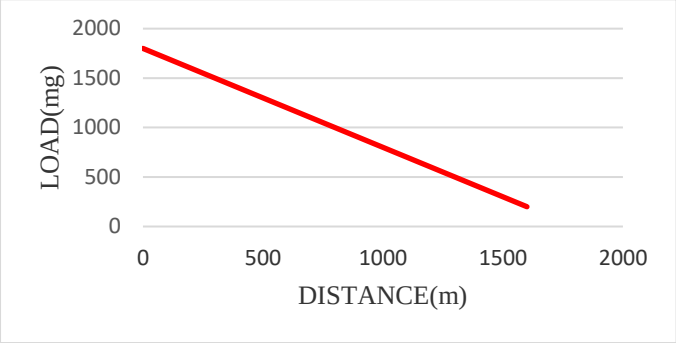

Figure 2: Load vs Distance

As the payload raises, the distance travelled by the drone decreases, as seen in Figure 2. To offset this disadvantage, a battery that can handle the load and travel distance must be employed.The table II compares the parameters of prior drones to the current drone employed in this paper as shown below.

Table II: comparing the parameters of different drones

s.no	Parameters	Drone1[18]	Drone2[19]	Drone3[Proposed]
1.	Weight(gm)	1000	1500	2500
2.	Distance(m)	800	1200	2000
3.	Speed(km/hr)	20	40	60
4.	Payload(gm)	500	1000	2000

Figure 3 : Experimental medical drone

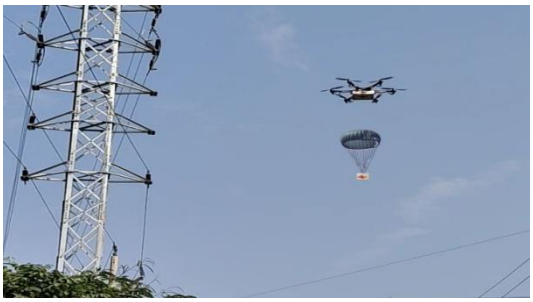

Figure 4 : Experimental medical drone delivering medicines using parachute

Figures 3 and 4 above depict our designed work; figure 3 depicts a medical drone, and figure 4 depicts a drone delivering medicine via parachute.

4. Conclusion

Drones for health reasons have substantial advantages, such as quick assistance, lowered transit less times to the patient in health problems in the wounded because of the short amount of time to seek for restoration, assistance and improved performance of fundamental operations of emergency health workgroups, and the able to attain locations unreachable by conventional forms of healthcare transit [25].This research highlights how to distribute critical medicines in areas where standard transportation services are unavailable, as well as in areas where the topography makes regular transportation techniques impossible. Second, important applications come during natural catastrophes such as floods and earthquakes, when people and doctors require crucial medicines that may be delivered swiftly utilising our medicine drone delivery system. This drone has the potential to be deployed in metropolitan settings. The growing population and the increased number of private automobiles on city streets have caused traffic congestion, making traditional delivery systems more difficult to operate. Unlike prior publications on drones, this one is beneficial for delivering medications during a pandemic without landing or touching down anywhere, or in regions where it cannot land. It will deliver with a parachute immediately.

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