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Drone: The Solution to Delivery Problems

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Abstract: ***This proposed drone focuses on providing essential medical aids in rural or hilly regions where it is difficult to reach fast. This drone can be used during natural calamities like earthquake, flood and landslide. It will help to deliver medical supplies and lab samples. Moreover, blood samples will also become unusable after travelling long distances from hilly areas to the laboratories. It can be overcome by using this drone. It can give the real time video of the location. In India, due to heavy traffic the emergency need of blood and medicines are delayed, but this problem can be overcome by our drone. This drone can automatically travel the given path without any control from user. It can be also controlled manually during some obstacles or dangers at any time.***

Keywords: Unmanned Aerial Vehicle (UAV); Biocompatible; Autopilot; Satellite communication, Real Time Video.

I. INTRODUCTION

The commonly name drone or the unmanned aerial vehicle is the type of aircraft which is controlled by a ground base remote controller. First pilotless aircraft was invented in the 19th century for the purpose of war fighting. In India first unmanned aerial vehicle was take off on November 2009 for Indian air force stated by DRDO Rustom. The delivery of essential commodities by drones is discovered after the year 2000. In recent time unmanned aerial vehicle (UAV) has become very popular in various projects and research field. In India drone is mainly used in defense purpose. The delivery drone can be used in the areas affected by natural calamities. It is a great problem in India to deliver food, drinking water, medicines and other necessary material in an affected area in proper time. Many casualties occurs due to non-availability of food, medicines and other materials in proper time. It is easier to deliver anything by using modern technology instead of human being. It will save transportation expenditure. In this proposed drone, 4 propeller and lithium polymer rechargeable battery to generate the thrust are used. This drone can carry 1 kg weight and it can fly near about 100ft. It has also the GPS which will track the exact location of the affected area and it can be seen on the PC. The telemetry is used which will send and receive data between the drone and ground station. A camera is used to load the image of the location and will send. If the remote area has no internet connection then the GSM is used to keep contact with the device. This drone can be used to supply essentials by air when there occurs earthquake, fire breakout or any other natural calamities. Therefore, delivery drone will be a fruitful device for any disaster.

II. MOTIVATION

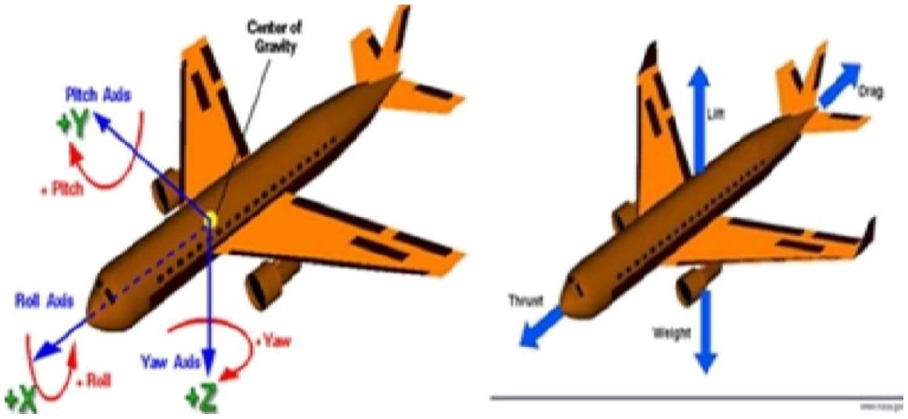
In past few years, many research about making of unnamed aerial vehicles has been done because it is human friendly as well as safe for the environment. The development of this device has opened a vast opportunity in the field of remote sensing, aerial surveillance, filmmaking, disaster relief and delivery. The main aim of our project is faster and low-cost delivery. In our country due to traffic congestion delivery becomes slower. Transportation by trains, aero planes and trucks becomes expensive, slower and also affects the environment. Blood samples becomes unusable if kept for a long before experiment. In case of emergency need some medical aids fails due to heavy traffic or higher cost. Avoiding the above stated problems we designed a device that can be used for delivery at a very short time in lower cost and will also not affect the environment. It can also give real time update about certain places affected by some natural or man-made disasters. Our drone can also detect the presence of human body for safety and rescue.

III. WORKING PRINCIPLE

There are four fixed propellers of the Quadcopter which is fixed with vertical orientation which provides the input force and six degrees of freedom. The movement of Quadcopter is controlled by individually varying the rpm of the four motors. The Quadcopter tilts towards the at the side of slow spinning motor by changing the lift and rotational force which helps it to roll and pitch which again divides thrust into two sides through which linear motion is created. The rotors rotating the propellers in anticlockwise or in clockwise in pair to control the yaw due to drag force due to which aerodynamic torque is cancelled. The center of gravity lies in same plane of the rotors. The efficiency of same class has different efficiency unlike helicopter thus it makes a Quadcopter difficult to stabilize.

There are five kinds of movements of a Quadcopter after taking off, each movement is differentiated by different motor.

A. Hovering is the condition in which all the motors rotated in same speed generating same thrust which is equal to the payload so the Quadcopter hovers maintaining an equilibrium at an altitude.
B. Vertical movement by increasing and decreasing the speed of the rotors at same the Quadcopter will move upwards and downwards at along z axis.
C. Roll movement of front and rear rotors rotates in same speed but left and right have different speeds, with the increase in the speed of respective rotor the other rotor (left or fight) decreases.
D. Pitch movement is defined by left and right rotor having same speed but front and rear rotor having different speed
E. Yaw movement, in this case front-rear having same speed and left and right pair fi3also have same speed but each pair has different speed. lf the front pair speed increases then the left and right rotor pairs speed decreases and vice versa.
F. By the lantern technology we can use the internet over the rural areas and where the internet connection is not permanent. We can provide the internet connection with the drone wherever it goes.
G. And the by the Soler cell technology the drone can charge itself and store the charge in the battery for long distance deliveries.



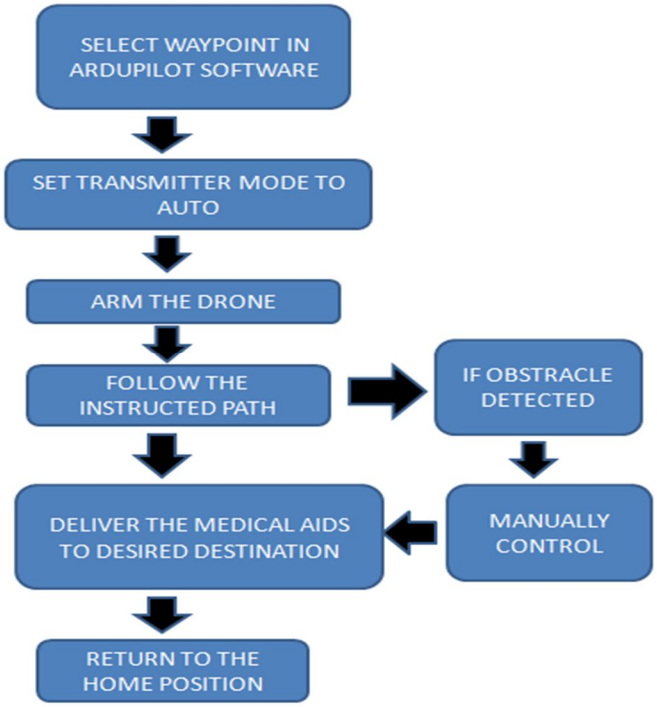


Fig. 1. Functional Route of the Drone Model.

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IV. COMPONENTS

A. APM 2.8 BOARD

Advanced power management or APM is a power management
system. IQ used mainly for robotics. It is an ardupilot flight controller which i8 the upgraded version of 2.5 and 2.6. The mission planner software is used to control the ardupilot board. The APM can control planes, copters and Rovers. It has the accelerometer. The three-axis gyroscope with high performance barometer.

B. AC Brushless Motor

Here we use the brushless ac motor to change the revolution of the ae motor. The brushless motors are powerful motors which increase the speed of propellers by higher torque. The ESC controls the movement or speed of the brushless motor by creating the rotational magnetic field. The motor has an electromagnet. men the electromagnet get electricity then it crcate8 a magnetic field on armature and repels the magnets at the Stator. Then the armature rotates 180 degree.

C. ESC

Electronics Speed Controller or ESC is a working powerful component. It connects the controller with the motor. ESC mainly takes the signal from the controller and also from the battery and then it give it to the brushless motor and it will spin. The ESC controls the reverse direction of
motors.

D. Power Module

The main usage of power module is to monitor the total power consumption. It sends the direction to the APM 2.8 as well as the lithium-polymer battery to control the voltage of battery and current consumption.

E. GPS with Compass

GPS stands for Global Positioning System. It is a device which helps us to navigate. It gives us very accurate path direction. We can easily at our destination point using GPS

F. 2200 mAh Lithium-Polymer Battery

lithium polymer battery is mainly used for robotics fields. The battery is very light weight and small size.it gives the longlife period with full charging capacity. The main advantage of this battery is the instantaneous discharge current is up to SSA.

G. Propeller (10A5)

A propeller is a rotating device with radiating blades to set pitch and it will form a helical spiral. It changes the power of rotation to linear thrust. It acts upon a working fluid that is air or water. Creating a difference of pressure between two surfaces the motion of rotation is converted to thrust. the propellers are come with thin and wide blades. The propeller is two types - Counter clockwise and clockwise. The counter clockwise propeller rotates anticlockwise and the clockwise propeller rotates in clockwise direction. Here 1Ox4.5 means it has 10" diameter and its pith angle is 4.5“

H. UPS Stand

It can hold the GPS to stable it on air.

I. Telemetry

Telemetry is mainly used for data transmission wirelessly. It is also the collection of automatic measurement or data at remote sources. It mainly measures any quantity in different locations for monitoring. It has some parts to control the whole process. it has a sensor, a transmission path, a display, recording or control device. the transmitter and receiver part will create the whole process. Generally sensors at the source calculate the electrical or physical data and convert it to electrical voltages with timing data. Then it forms a stream of data which transmitted through a wired or wireless medium or both combinations. At the receiver the data stream is disaggregated and display the original data.

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J. Camera (Transmitter+Receiver)

It is a small and light weight device and its price is reasonable. This is used to send real time video using a video transmitter. Then at the receiver we can see the video output. Using camera, we can see the location details to track the right point.

K. Power Distribution BOARD: Power

Distribution board is a lightly weight circuit board. It used to distribute the power by u sing a single battery across all the motors and other components. It gives a neat path of connecting the battery to all the ESC's. It has the positive and negative terminals. It has the copper and solder joints. It is easily soldered and unsolder end.

L. 450 Frame

The 450 quadcopter Frame comes with stronger mold construction for no more board breakage at hard landing purpose. It offers two pair of frames of different colour for front and back purpose.

M. FS-I6 Controller

It has a transmitter (inbuild) and a receiver for communication purpose. It is used to control our drone in a range of 2.4ghz and a transmission power of< 20 dB. lt has two modes called auto and manual. It has 6 channel which we can configure as our wish. It also has 4 stick mode selectable, backlit LCD screen display.

N. B3 Charger

B3 Lippo charger is used to charge ta lithium battery which supply the main power supply the drone. It is primarily used for charging the drone.

O. Servo Motor

Servo motor is rotary motor which allows for perfect combo of angular or linear position and acceleration. It is generally used for closed control system.

P. Landing Gear

It is the undercarriage of an aircraft or Unmanned Arial Vehicle and may use as either take off or land. It supports the craft for standing when it is not flying. It protects the craft from damage.

Q. Solar Cells

5v 200mah solar panels are mainly used here for souring the charge from sunlight which is made by gallium arsenide.

R. Lantern

The outer net is a device which can be used to provide data communication to remote areas. The device called lantern is mainly used for receiving the data from satellites.

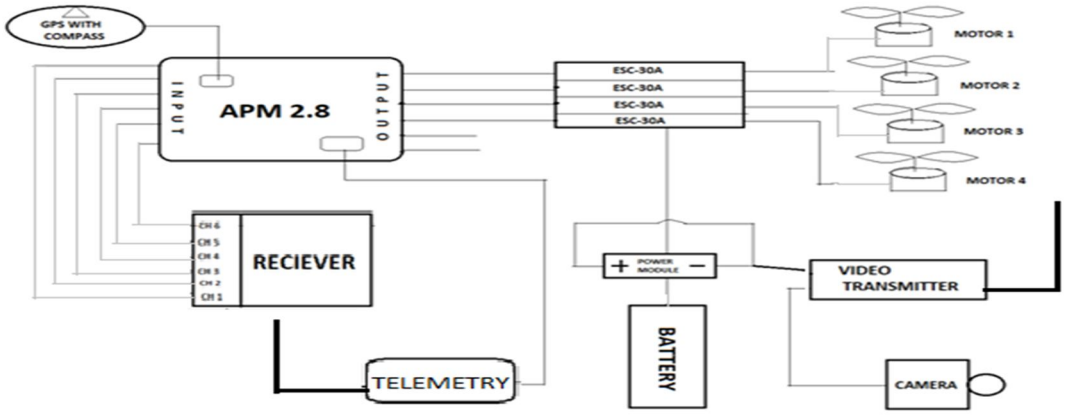

Fig. 2. Circuit Diagram for this proposed model

V. ADVANTAGES

Drones will play a major role in almost all fields in near future. Like,

A. It will reduce the time of delivery of packets.
B. It will be solution to heavy traffic.
C. The drone will reduce transportation cost.
D. It controls environmental pollution.
E. Also, human errors can be minimized.
F. It can reach inaccessible to mankind and provide help there.
G. It is highly efficient because of the thin and highly efficient gallium arsenide (GaAs).
H. It can communicate with satellite a device called lantern which is attached with the drone.

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VI. FUTURE SCOPE

Drone is a technology that will occupy a vast business market in near future especially supplier drone.Now let us talk about own drone:

A. It is very advantageous for services like patrolling and search and rescue purpose.
B. This can contribute to safe infrastructure maintenance and management.
C. It can give media access where hard to reach.
D. In near future we can drive it using GSM technology of mobile phone to avoid network problem.
E. By a technical device called “Lantern” we can remotely communicate with the drone by supplying the internet by it and by the solar cells we can store the charge and can go without worrying about discharging of power.

VII. CONCLUSION

In recent past years, we had seen that me interest in drone delivery of essentials (medicines, organs, bloods) to remote areas. But very little information has been reported about the impact and the feasibility of drone for delivering medicines. The full usefulness, effects and potentials of drones regarding medical transportation are unknown but it had promise. The role of drones for medical purpose transport is promising but for future research to access feasibility, safety, awareness and demand of drones is garmented. The main concept of the project was to apply designs and engineering concepts to drones, medicines to improve the accessibility of healthcare materials in India. The use of drones for medial 8upply delivery will reduce suffering and provide many Indian citizens with the chance of recovery. This wit1 create supporting ecosystem around industry .However we have use here the solar cells for the power supply for drone ,but we can also use Perovskite solar cells instead of that for future purpose .We believe that this prototype system is very important step for the future of solar cells, batteries .There have been many alternative resources of energy that are promising which includes hydrogen fuel cells and bio-fuel cells, but nothing is as limitless as solar energy .Solar power air vehicles are necessary for greener society and can be an significant part of the future aviation.

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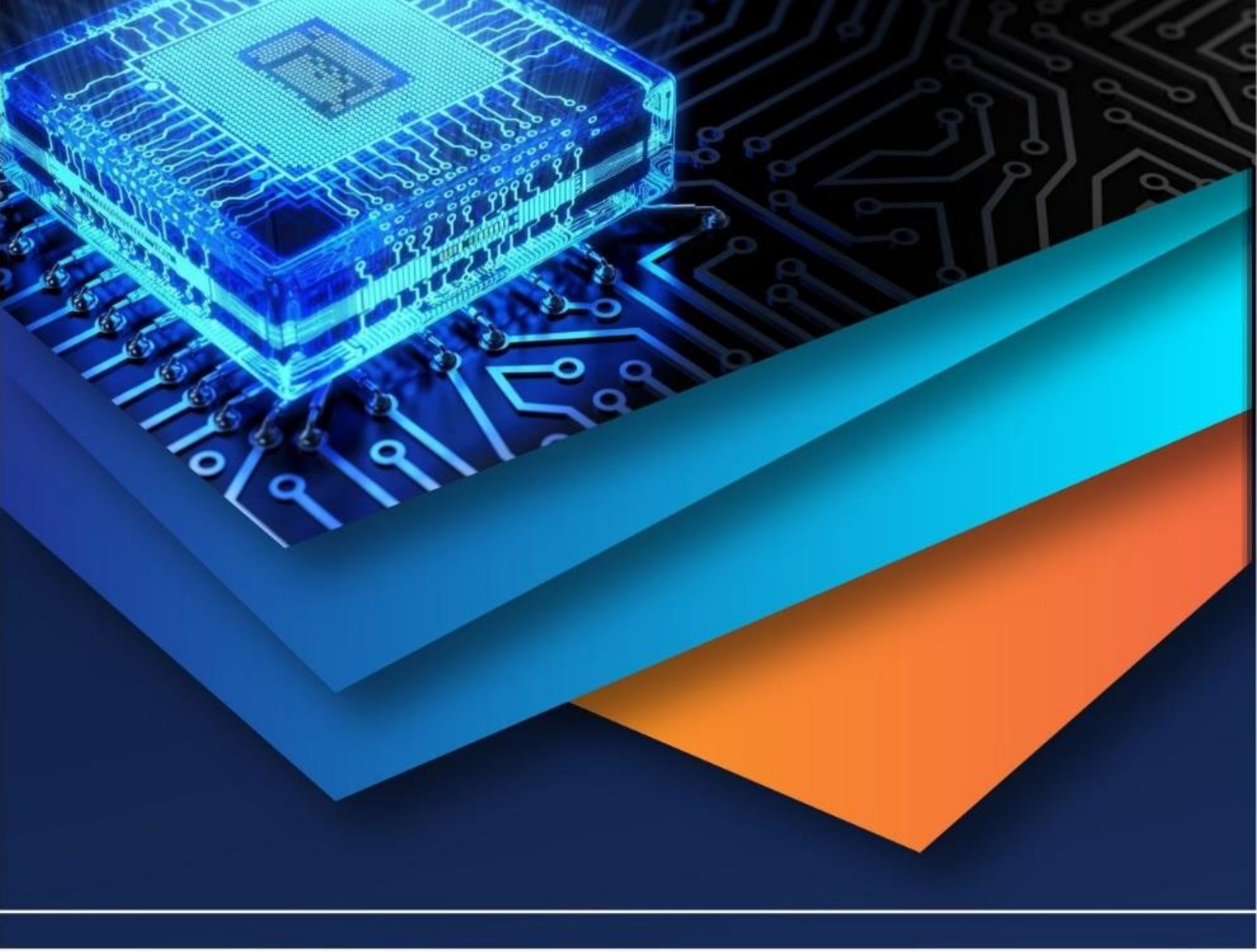
Fig 3. Prototype of Drone



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