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App based Rescue Operation Using Quad-Copter

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ABSTRACT: This paper is to provide an idea of using the quadcopter to help the people stuck in natural disaster such as flood,earth quake,etc.The main operation of this quadcopter is to provide live streaming using normal android phone through droid cam app to the recue team and to offer wifi using the beagle bone black.

KEYWORDS: Rescueteam, Live streaming, droid cam, wi fi production.

I. INTRODUCTION

The project proposed in this document is for the benefit of people. Human life is the most precious as resurrection is still impossible .Of course we don't have enough guts to take riskoverour life. This is the main reason for which man has gonethrough the quest of some alternative go. Finally the result is unmanned aerial vehicle (UAV) which can do the complex works of man in a simple way without any major risk. QR can fly anywhere and transmits theinformation from the respective areas to his master.The rescue missions during disasters like floods; earthquake etc. has been really under a great risk. During disasters the main problem is that we can't reach the specific area at exact time. The design job includes selecting the required components like Sensors, microcontroller unit, etc which are the necessar parts required to fly the QR. In order to save victim, we use live streaming through android mobile using Droid cam app which sends message to the control team.

II.FUNCTIONALITY

Copters are one of the most complex flying machines due toversatility and maneuverability to perform a number of tasks. Classical helicopters are usually equipped with a main rotor and a tail rotor . However the UAV (Un manned Air Vehicle) presented in this project is known as a quad copter o a quad rotor Quad rotors are symmetrical vehicles with four equally sized rotors at the end of four equal length rods. By making useof multiple rotors it allows for greater thrust and maneuverability . Each of the rotors on the quadrotor helicopter produces both thrust and torque.Given that the front rear motors both rotate counter-clockwise and the other two rotate clockwise, if all rotors rotate in same direction they will cause quad copter rotate in that direction due to torque as shown in figure 3.1 although it provides lift. In order to overcome this two rotorsare rotated in clockwise direction and others two in counter-clockwise direction at same speed.

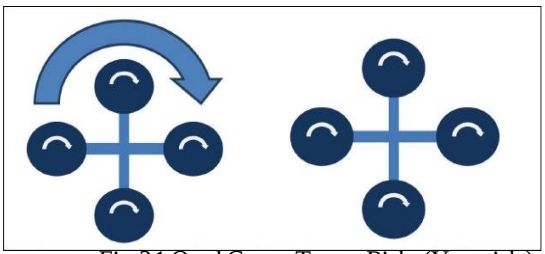

Fig.3.1 Quad Copter Torque Right (Yaw right)

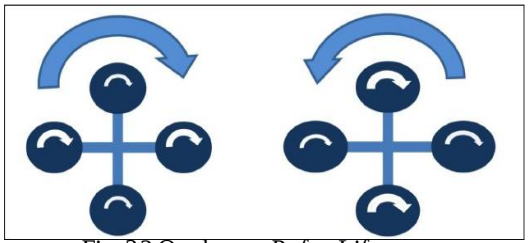

Fig. 3.2 Quad copter Perfect Lift

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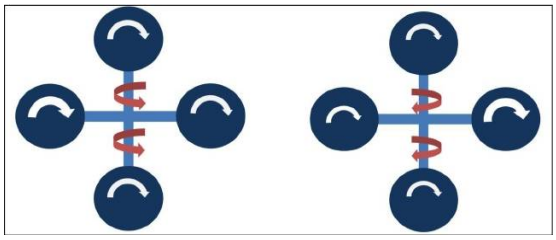


Fig. 3..3 Quad Copter Yaw Right and Yaw Left

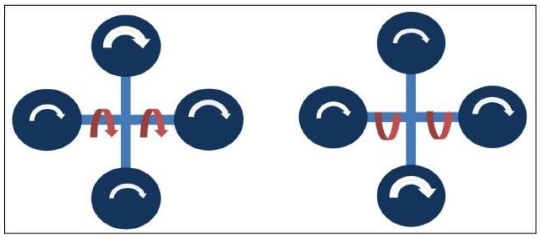


Fig. 3..4Quad Copter Yaw Right and Yaw Left

Any flying object has three kinds of motions
1. Yaw
2. Pitch
3. Roll

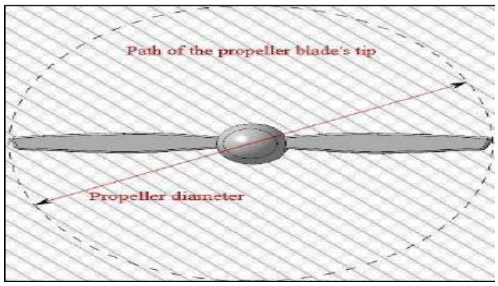
Yaw: Rotation of a flying object in its own plane (or) Rotation about Z-axis is known as yaw motion.
Pitch: Rotation of a flying object perpendicular to its own plane and about X-axis is known as Pitch.
Roll: Rotation of flying object perpendCircular to its own plane and ab
out Y-axis is known as Roll. We achieve all these motions for quad copter as described below.
Yaw motion is achieved by rotating two clockwise or counter-clockwise rotors at higher speed than other two. As illustrated in fig. 3.3. In fig. 3.4thick arrows indicate that those rotors are rotating at higher speed compared to remaining. Asresult quad copter is giving yaw left (i.e.Counter clockwise).

Roll motion is obtained by rotating one of the two counter-clockwise rotating rotors at high speed and other at low speed.
Pitch motion is obtained by rotating one of the two clockwise rotating rotors at high speed and other at low speed.

1.3 CALCUATIONS OF QUADROTOR

1. All the FOUR motors are placed displacement at **equidistant** from the centre.
2. All the adjacent motors should be placed perpendicular to each other.
3. Two motors connected at one arm should be more than half the size of the two propellers.
4. The parameters of Propellers are pitch and Diameter.
5. **Pitch** is the a propeller makes in a complete spin of 360° degrees.
6. **Diameter** of a propeller is the 'diameter' of a circle circumscribing the tips of the Propeller blades.

Fig. 3.6 Propeller Diagram



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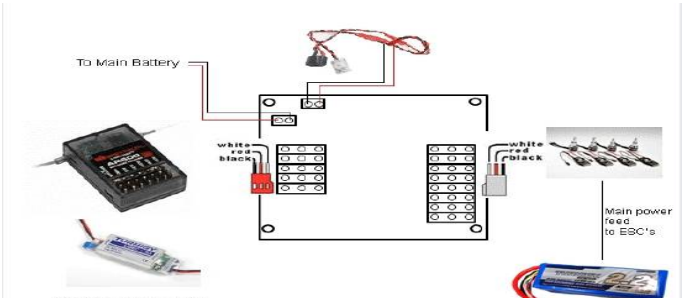
$$T = \frac{\pi}{8} D^2 \rho (\Delta v)^2$$



Where,
T = Thrust [N]
D = Propeller Diameter [m]
ρ = Density of air [1.225 Kg/m^3]
Δv = Velocity of air accelerated by Propeller 20.91 m/sec [m/sec]
T= 1 Kg = 9.806 N

Calculation of Pitch of propeller
Calculation of the pitch using the diameter found already

$$T = 4.392399x10^{-8} \cdot RPM \frac{d^{3.5}}{\sqrt{pitch}} (4.23333x10^{-4} \cdot RPM \cdot pitch - V_0)$$

Where,
T = Thrust (N)
RPM = Propeller rotations/min
d = Diameter of propeller (inches)
Pitch = Propeller pitch (inches)
Vo = Propeller forward air speed (m/sec) (for static thrust Vo = 0)

4.1 KK 2.1 Multi Rotor Control Board

The KK2.1 is the evolution of the first generation KK flight control boards and has been engineered from the ground-up to bring multi-rotor flight to everyone, not just the experts. The LCD screen and built-in software makes installation and set up easier than ever. The original KK gyro system has been updated to incredibly sensitive 6050MPU system making this the most stable KK board ever and adds the addition of an auto-level function. At the heart of the KK2.1 is the ATMEL Mega 644PA 8 bit AVR RISC-based microcontroller with 64k of memory.

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An additional header has been added for voltage detection, so now there is no nee for on-board soldering. A handy piezo buzzer is also included with the board for audio warning when activating and deactivating the board, which can be supplemented with an LED for visual signaling.

1.4 Binding of receiver

The Flight Controller Board must always have a source of +5v from an ESC,eitherone of themotors ESC or from a se parateunit feeding the Receiver.If each ESC has a BEC (normal unless OPTO types)then it may be necessary to remove the power feed from the other ESC, usually by cutting the power line (RED) Cable onthe other ESC.Set up a new model on your transmitter and use a normal airplane profile and bind the reciever to the transmitter.The digital transmitter at frequency range of about 2.4ghz is binded to the receiver to be fixed on to the quad copter.

1.5 Self Level Settings

Self Level Settings are independent from normal PI settings.
P Gain – The power of the self levelling. Higher number is stronger.
Too high will causeoscillations. To low and it's slow to self level.Limits the max power of self levelling. Higher number is higher li mit.
ACC Trim Roll compensates for self level drift when the KK2.1.X had the ACC calibra- ted when it wasn't exactly level.
ACC Trim Pitch compensates for self level drift when the KK2.1.X had the ACC calibr- ated when it wasn't exactly level.
It's better to calibrate the ACC with the KK2.1.X level rather than use the trims. Make sure the KK2.1.X is mounted level in the multicopter.

2.App

An **application** is a software program that's designed to perform a specific function directly for the user

2.1 **Droid cam**

Droid cam is a tool for Android and PC that will allow you to use your mobile phone as a PC webcam. This app, with a complex configuration, perfectly shows on your PC the image taken by the **mobile phone's camera**. The free version of Droid Cam lets you access basic functions, although you cannot improve the image resolution.
Droid Cam turns your Android device into a wireless web cam, letting you chat on Skype, Google+, and other programs. You can also use Droid Cam as an IP webcam, or Surveillance Camera, via a Internet browser virtually on all networks. It can be used as a pet cam, spy cam, or a security camera .

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Features

Chat using "Droid Cam Webcam" on your computer, including Sound and Picture. Completely free with no usage limits. Connect over WiFi or USB cable. Use other apps while Droid Cam is streaming. Surveillance/IP webcam MJPEG access (access camera via a browser o from anotherphone/tablet/etc).Simple and efficient Designed to save battery and space as much as possible.

2.2Installation and configuration of droid cam on your mobile phone and PC

To use Droid Cam, it is necessary to install the Android app and the PC client. If you want to connect your mobile **phone's webcam** to your PC, you can choose between WIFI, Ethernet or USB. The USB option is the most advisable, although it needs to grant certain permissions to the mobile phone. With 2 million downloads, Droid Cam is the web camera app for Android. You can start using Droid Cam through various methods Connect via Wi Fi,Connect via USB ,Connect via Internet Browser or another Device (IP Camera).

Wi Fi Server Mode (Droid Cam X only, 3G/LTE compatible)

The app works with a PC Client component that installs the webcam drivers, and connects the computer with the Android device. Clients for Windows or Linux are available.

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III. CONCLUSION

The quad copters are now a days used in military, agriculture,home delivery of products, where as the quad for rescue operation with above specifications and attachment mean to be helpful to the rescue team to recover people over disaster area before they reach the danger situation and also to provide wifi to the disaster area where there would be lack of network.

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