

**“RC DRONE QUADCOPTER AS SPY CAM”**

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**ABSTRACT:** *The main Moto of the paper is to design a budget friendly Quad copter .The quad copter will be controlled from a RC (Remote controlled) Through a certain distance wirelessly. This small and highly manageable system which will acquire data such as video, images from a camera which is installed in the quad copter and send them to the base station. The paper would have an impact on carrying out future rescue missions. It will have the ability to help assist, locate and save victims, faster with more efficiency than any other option. It can also be used as a measure for survey or surveillance.*

**Keywords:-***Quad copter, Remote Controller, surveillance*

## 1. INTRODUCTION

Quad copter is a drone which is the next form of helicopters which having more dynamic stability than the helicopters. It is a small type of Unmanned Aerial Vehicle (UAV). Unmanned Aerial Vehicles have most often been used in the field of military but they are also used for search and rescue, surveillance, traffic monitoring, weather monitoring, firefighting, research applications in scientific community, fire sensing and some important areas. Quad copters are unmanned aerial vehicles with ability of vertical take offs, landings and hovering at a desired location. Quad copter consist of four rotors which are attached at the end of the frame structure. A pair of rotors in one arm facing each other rotates in clockwise direction while the adjacent pair of rotors rotates in anticlockwise direction. Therefore, the Resultant torque acting on the air frame structure is zero. Quad copter is a device with an intense mixture of electronics, mechanical and mainly on the principle of aviation. The Quad copter can be customized and sized according to our own convenience. It can be designed as much small as we want by using the small sized components we need to make it.

A Quad copter is a multi-rotor helicopter that is lifted and propelled by four rotors which is operated to fly independently. It is a type of a small representation of Unmanned Aerial Vehicle (UAV). Quad copters are classified as rotorcraft, as opposed to fixed-wing aircraft, because their lift is generated by a set of rotors (vertically oriented propellers). It has four rotating blades that collectively produce thrust to lift the whole thing up. Two rotate clockwise and two anticlockwise so it does not keep spinning. The interesting part is that all four of the rotors must be continuously controlled in speed for the system to stay stable in air. It is not the same as setting each at the same

speed since the imbalance in weight will cause it to drift towards one side. Hence it is a control system with the input being its orientation-tilt, movement, acceleration and output being the speed of rotation of each motor balanced propeller, forcing the air flow down it generates the thrust to lift the Quad copter above the surface. The Quad copter can be sized according to our own convenience. It can be designed as much small as we want by using the small sized components we need to make it.

## 2. NEED OF PROJECT

Personal Drones have been all the rage for the past few years, as toys, and primarily as new devices for capturing amazing aerial photography. As the technology has matured and become more mainstream, a number of practical and very interesting uses of Drone technology have emerged. In the past few months we have seen some amazing developments in the flying drone industry.

## 3. OBJECTIVE

The goal of our project is to design, implement, and test a stable flying Quadcopter that can be used to collect and save. Our plan was to choose an existing Quadcopter kit and add the required components to give the Quadcopter the capabilities to gather and log data autonomously.

4. BLOCK DIAGRAM

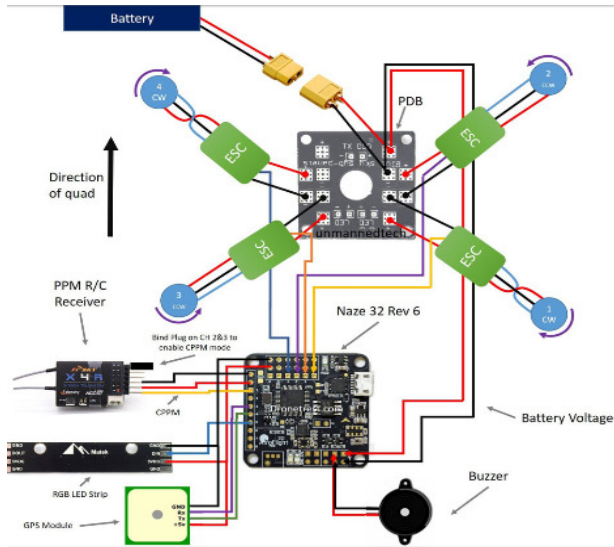


Figure 1: Block diagram of quadcopter

Quad copter: A quad-rotor helicopter (quad copter) is a helicopter which has four equally spaced rotors, usually arranged at the corners of a square body [2]. The quad copter is the advanced form of helicopter. A helicopter is flying vehicles which push air downwards by using rapidly spinning two rotors. The quad copter uses four rotors. As the quad copter uses four rotors, it is found to be quite difficult to control these rotors without any electronic assistance. Quad copter consists of four narrow air foils or lift generators located at the four ends of a perfect square shape. These lift generators are run by a very high speed motor and a precise balanced propellers, forcing the air flow down it generates the thrust to lift the Quad copter above the surface [3]. The Quad copter can be sized according to our own convenience. It can be designed as much small as we want by using the small sized components we need to make it.

Quad copter flight dynamics

For controlling the altitude a particular type of controller is used. When the controller is moved up or down, the propeller speed is adjusted causing the quad copter to gain or lose altitude and also a way to adjust thrust of the rotors via voltage supply to perform standard flight operations and to position the quad copter into certain angular orientation depending on the circumstances of a particular flight routine. Thrust is one type of force.

When a system accelerates mass in one direction, the accelerated mass will cause a force of equal magnitude but opposite direction on that system. The force applied on a surface in a direction perpendicular or normal to the surface is called thrust [4].

**Yaw**-It is the vertical axis that passes through the geometric center of the quad copter. Rotational force vector of all the four motors acts at the center and cancels out each other at the exact geometric center, in conditions when it does not cancel and the resultant vector has net positive or negative magnitude the quad copter rotates about this axis clockwise or anti clockwise respectively.

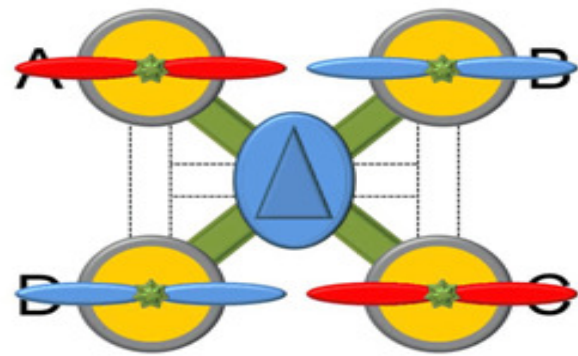


Figure 2: Yaw

**Pitch** -It is the axis that passes horizontally parallel to the plane of quad copter extending towards the front and back end of the quad copter

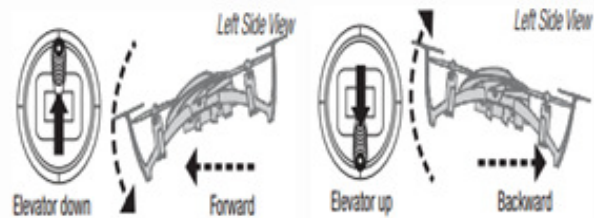


Figure 3: Pitch (Forward and Backward)

Rotational force vector of all the four motors acts at the center and cancels out each other at the exact geometric center, in conditions when the resultant of the rotational force vector is not zero but either positive or negative the quad copter moves in the forward or backward direction respectively.

**Roll** -It is the axis that passes horizontally parallel to the plane of quad copter extending from left to right. Rotational force vector of all the four motors acts at the center and cancels out each other at the exact geometric center, in conditions when the resultant rotational force vector is not zero but either positive or negative the quad copter moves in the right or left direction respectively [3]

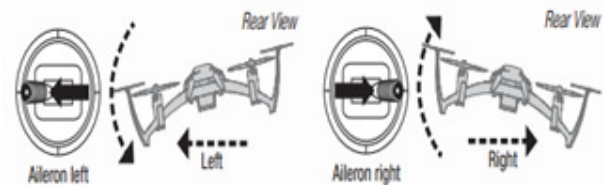
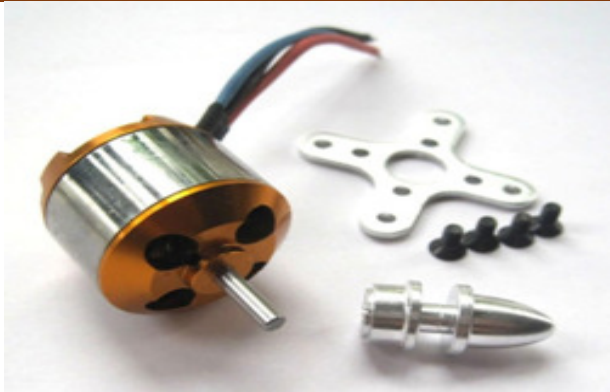


Figure 4: Roll (Left and Right)

**Motors and rotate regulators** -The quad copter needs relatively a high thrust of a motor. For this purpose are good AC brushless motors. The thrust is possible continuously control with PWM pulses. Generated PWM pulses for motors are form output ports of a kit whit the MCU brought on an ESC (Electronics Speed Control) of each motors [5].



**Figure 5:** BLDC Motor

The ESC needs to know the position of the rotor of motor. The AC motors are 30-50% lighter against the DC motors with same performance. Use of these AC motors constructs lighter models which can fly longer. While selecting the motors it is necessary to check the performance of the ESC. The selection must be a good one because the take off and the concrete weight depends on the performance and properties of the motors.

### Controller of Quad copter

The quad copter is designed using simple GUI. The quad copter model is designed using two layer shape aluminum plate. Weight of the Quad copter is proportional with its hover ability. Less weight will increase hover ability of it with minimum power consumption.

### The Model consists of following parts:

The model of a quad copter consists of a frame where we mount everything, wood or carbon fiber, a control board the brain here we use motors and propellers for the movement of the quad copter, speed controllers or ESC to control the motors.

**Frame** -Every quad copter or other multi-rotor aircraft needs a frame to house all the other components. Things to consider here are weight, size, and materials



**Figure 6:** Frame

### Motors and propellers

The motors have an obvious purpose to spin the propellers. Motors are rated by kilovolts and the higher the kV rating, the faster the motor spins at a constant voltage. A quad copter has four propellers, two normal 'propellers that spin counter-clockwise, and two pusher 'propellers that spin clockwise.



**Figure 7:** Propeller

### Electronic Speed controllers

The electronic speed control or ESC tells the motors how fast to spin at any given time.



**Figure 8:** ESC

### Battery

LiPO batteries are used which come in a variety of sizes and configurations. These are small in size and light in weight but provides maximum power which has power rating in mA/hr (milliamps per hour).

### Overview of Camera

To Power On: press the power/mode button  
To Power Off: press and hold the power/mode

### Button

Turn camera ON and repeatedly press the power /mode button to cycle through camera modes and settings. The modes will appear in following order:

- Video- record video
- Photo-capture a single photo
- Burst Photo- capture photo burst
- Time Lapse-shoot a series of photos at set time intervals
- Settings- adjust camera settings, resolution and more

**To start recording** press the select button. The camera will emit one beep and the camera status lights will flash while recording.

**To Stop Recording:** press select button .the camera status lights stop flashing and the camera emits one beep to indicate recording has stop.

This camera automatically stops recording when the battery is out of power. Your video will be save before the camera powers off.

**Photo:** to capture a photo verify the camera is in photo mode

**To Take Photos:** press the select button. The camera will emit the camera shutter sound .

**To Take Burst OR Time Lesseps:** verify the camera is in correct mode, and then press the select button

**Setting:** press the select button to enter the setting menu .repeatedly press the power/mode button to cycle through options and the select button to select desired options. Or use the up/playback or down/ Wi-Fi button to cycle through the various option

## 5. APPLICATIONS

In military ground mainly used at border to detect intruders, land mines, enemy troops etc. keeping our soldier at safe distance.

- The only problem in military ground is that we should take care about the size of the quad copter during construction [10]. Now-a-days, quad copter in military ground helps to safe many of our soldiers life in terrorist attack also helps to have the information of the opposition party without any risk.
- Quad copter design have become a cynosure as to most research fields as they are an important concept of UAV they use and a electronic control system and electronic sensors to stabilize the air craft's.

**3D mapping:**small and light weight drone help in a surveying large landscape with thousands of digital images that can be stitched together in to a string of 3D maps.

**Search and rescue:**-drones are wide spread application to rescue the patients during injury or any manmade or natural. Drones have the ability to help assist, locate and save the victims, fasters with a more efficiency than any other options.

## 6. RESULT

According to the proposed plan the final outcome of this paper leads to the development of a quad copter that has a stable flight. This project is implemented using action camera, a frame where everything is mounted, motors and propellers for the movement of the quad copter, ESC to control the motors. The result is a very stable flight platform. The complete system helps in various applications such as surveillance Longer flight time can be achieved by adjusting trade-off between two variables, the battery capacity (weight) the efficiency of the thrust developed by the motors. The

efficiency of the thrust has two factors which are the efficiency of the motor itself and the propeller design.



**Figure 9:** Complete Model of RC drone

## 7. CONCLUSION

A surveillance system with the help of a quad copter can increase the security strength especially in the area where human interference is strictly prohibited. In all civilized countries surveillance of the terrestrial areas is very important. The core intension is to study the complete designing process of quad copter from the engineering prospective and improving their balancing and stability system. A quad copter that is wirelessly controlled by a computer is a challenging task. It will also help in analyzing various parameters like height, temperature, humidity etc. It can also be used for performing live video streaming with the help of a camera. Furthermore using some sensors like LIDAR collisions can be avoided, GPS can be attached for automotive navigation system. Also We Are Going Concentrate On This Project In Few Days.

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