

Title – QUADCOPTER

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QUADCOPTER



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This is to certify that the Research work titled --**Quadcopter**-- that is being submitted by --**Harshavardhan, Rishabh kumar singh, saif ahemad khanand Rachit Kaushik** - is partial fulfillment of the requirements for the award of **Bachelor of Technology**, is a record of bonafide work done under my guidance. The contents of this research work, in full or in parts, have neither been taken from any other source nor have been submitted to any other Institute or University for award of any degree or diploma.

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ABSTRACT

Now days in the time of advance technology creates many positive as well as negative effects into the world.

One hand, it helps the mankind to make their life easy and comfortable. And on the other hand it will create the chances of big destruction. Quadcopter is one of that thing or technology which can become the boom for the mankind and on the other hand it can prove cures for the same. In this paper, we will represent how mankind can be effected by this and how we can use the quad copter in the positive way by improving some basic functions of any quad copter.

Here we discussed the quad copter as small as well as large UAV (Unmanned Ariel Vehicles). Which makes the importance of quad copter more at this time? When the technology advancement is in its boom it is the demand of the society that new and advance quad copter should be bring into the role. Not only for safety but also to makes our country equal to other on term of advance technology, advance thinking and advance safety purposes. In 1907, A four rotor helicopter which designed by Louis breguet. Actually, it is the first aircraft which can lift itself from the ground. then Etienne oechmichen made helicopter and uses the propellers. And after this Dr. George de Bothezat and Ivan Jersome developed this aircraft. These invention lead to the final development of the drone. But we can't use Drone in various field so Quad copter is invented specially for those purposes where we can't use Drone.

The problems which comes with the Quadcopter is of night vision or working in dark area but in this project, we have discussed and given the solution for this vision problem. The battery which we used in this has more voltage which is showed in details. All these factors motivate the development of the Quadcopter.

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List of ABBREVIATIONS

UAV	Unmanned Aerial Vehicles
ESC	Electronic speed controller
KV	Kilo volt
HD	High-Definition
IR	Infrared radiation
LIPO	Lithium Polymer

1

Introduction

1.1 Project background

A quad copter is a multi-rotor with 4 blades. A quad copter is generally, a small R/C system designed for recreation; it's mostly a hobby toy.

Quadcopter are common referred to as quad copter. Quad copter work very similar to helicopter due to the fact that they move very similarly to helicopter. However,quad copter as they have 4 rotors and have no need to tip the rotors, the quad copter tips its whole self. This allows the quad copter to do numerous more amounts of tasks than any regular helicopter. Quad copter also vary the speed of individual blades in order to move themselves.

A quad copter usually consists of 5 parts: A frame, 4 motors, 4 ESC's (Electronic Speed Controllers), 4 rotors, and a control board, of which type varies. The frame is usually comprised of carbon fiber or wood, although it is not uncommon to have a different material. Quad copter is mainly use for safety purposes this is true but it only use for this is a myth .In military, the Quad copter is used as the main equipment. Main purpose of this is to get the useful information through this by technology by keeping the operator in a safe distance. Many companies use this for delivering the products. It mainly consists of four propellers, one camera, flight controller, electronic speed controller.

1.2 RESEARCH PURPOSE AND MEANING

Quad copter is used in test and research field. This used to evaluate more ideas in many fields. Quad copter used by military agencies. It is used in search and rescue operations. Many companies used for delivering products. It reduces the time and distance also. In this special type of quadcopter is used which can carry more weight. Media use the quadcopter for taking pictures and capturing exact location also quadcopter is used for taking pictures of celebrities.

1.3 OBJECTIVE OF STUDY

Investigate the use of UAV(Drones) for transmission line inspection and maintenance. Improve repair time. Improve power outage restoration times, find broken components quickly with better success. Equip drones with HD cameras, IR camera, corona camera, RFI antenna to perform diagnostic survey of high voltage transmission lines. Perform autonomous flights using map of the system. The main objective of studying this is to find the problems faced by the Quad copter during its applications and resolve it by giving new ideas. The camera which is use in the Quad copter usually doesn't prove more useful in the night .But in this study we will discuss how the camera become more useful or which type of camera will be more useful. The battery which named in this study has high voltage than any other so it become more efficient. By this way we can improve it.

Literature Review

2.1 Introduction

The Quad copter comes in use around 1900s but It's mainly comes into the role after 2010. It mainly uses for military and defense .It is got more cheaper and less in cost more efficient ,price of camera , sensor also dropped and battery power get improved. Were once humans can watch the earth through large air craft and satellite were as now it is expanding and developing. Thanks to quad copter. Sometime people get confuse between drone and quad copter. Beside military drone can be used for civil purposes and for commercial use also. They keep track for many events like disaster, wildfire. Quad copter can be use of many of these same applications .However when you think of drone flying as a recreational pursuit you are thinking of quad copter.

There are many different types of Quad copters are present in the market all designed to offer varying degree of recreational use, for example you can purchase nano copter for flying around the yard and into the garden .These type of Quad copter allow you to take pictures even from the large distance. These recreational Quad copter has less regulation then other type of drones. However there are certain rule that the guide should know and follow also, like no Quad copter is allow to enter the certain radius of white house. It also wise to inform that person before flying the Quad copter into his area it avoid the chances of frightening them, like this Quad copter and Drone are very close related to each other but different in their different in their motive . The Drone is use for mainly the safety purposes were the quad copter is use for the recreation and fulfillment of your hobby of flying drone.

2.2 REVIEWS

Many scientists and engineers have different views on Quad copter. We must say that some of their views are really important for not only the development of the Quad copter but also knowing the real motive of the Quad copter. Let's know some of their views.

Previously Maldonado- Ramirez spore sampling devices is mounted under the wing near the center of wing chord and has servo arms that was approximately of 8 inches. But the problem comes in the dynamic stability of during its opening and closing. In 2010 French company name parrot release the parrot drone. it gets immediate success and appreciated critically and commercially also. Getting the CES innovation award. For electronic gaming hardware and selling upward of half million units.

IN 2013 December, Amazon release a video showing the dream of his its founder JEFF BEZOS for drone based delivering system. In an interview the BEZOS tells the advantages of drone based delivery.

IN 2016 the best drone making company DJI 'S PHANTOM 4 introduce smart computer vision and machine learning technology. This allow it to avoid the obstacle which comes in the front. In recent year, various control algorithms have based on optical flow. Bruno Herisse, Francois-XavierRusotto,Terek Hamel.and Robert Mahiny presented a nonlinear controller for hovering flight and touchdown control for vertical take –off and landing. UAV using inertial optical flow. The VTOL vechicle is assumed to be a rigid body, equipped with the minimum sensor suit, man hovering over a textured flat target plane.

Aero Quad and Ardu copter are open – source hardware and software project based on Arduino for the DIY construction of quadcopter.

Parrot AR drone is a small radio controlled quadcopter with cameras attached to it built by Parrot SA designed to be controllable by smartphones or tablet devices.

Nixie is a small camera –equipped quad copter that can be worn as a wrist hand.

Airbus is developing a battery powered quad copter to act as an urban air taxi at first with a pilot but potentially autonomous in future.

Lily camera is a startup attempting to make a quad copter camera drone, sued by the san Francisco district attorney after they closed down without fulfilling any of their pre – order.

The Bell Quad Tilt Rotor concept takes the fixed quad copter concept further by combining it with the tilt rotor concept for proposed C-130seized military transport.

Dr George de Bothezat and Ivan Jerome developed this aircraft, with six – bladed rotors at the end of an X – shaped structure. Two small propellers with variable pitch were used for thrust and yaw control. The vehicle used collective pitch control. Built by the US Air service it made its first flight in1922.

CONVERTWING MODEL A QUADCOPTER- In this design it consists of two engines driving four rotors through a system of v belt. It does not need any tail rotor. We can control it by varying the thrust between rotors. Flown successfully in mid 1950s. This proved the Quad copter design and it was also the first four rotor helicopter to demonstrate successful forward flight.

Curtiss –wright vz – 7 was a VTOL aircraft designed by the Curtiss – Wright Company for the US Army. The vz- 7 was controlled by changing the trust of the each of the four propellers. The vz-7 was capable of hovering and forward flight and proved relatively stable and easy to operate



Fig 1: Parrot AR Drone

3

Main Components

3.1 FRAME

The frame is very important part of the Quadcopter. It supports all the parts including motor and other electronic parts and also prevent them from vibration. The frame is of different sizes. Size also depends upon the equipment which are also added in it. We have to be very precise while making it because the frame has to be strong and light weight at a same time. Anyone can make his own frame by using aluminum or wood channels. The frame arms are made up of ultra-strength material to survive any crash. The frame boards are high strength compound which wiring of ESC and battery more safe.

3.2 TRANSMITTER AND RECEIVER

The main function of Transmitter and Receiver is to communicate with the Quad copter. It carries the information or message to the Quad copter in very less time. The instructions which is given to the Quad copter receives the message and transmitter transfer the message to the Quad copter.

3.3 BATTERY

The lipo battery which is also known as lithium polymer battery is used .This battery is differing in amount of energy and voltage .It contains high energy and voltage around 11.1 volt and 14.8 volt.



Fig: 2 lipo battery

3.4 PROPELLER

The main function of propeller is to generate thrust and torque due to which the Quad copter can fly for more time. The force generate by propeller is measured in pounds and grams. As it is already mentioned that the four propeller is used in the Quad copter. Because for high time it has to be in air. Not more than four propellers are present in the Quad copter. We can say that because of its function it is the most important part of any Quad copter.

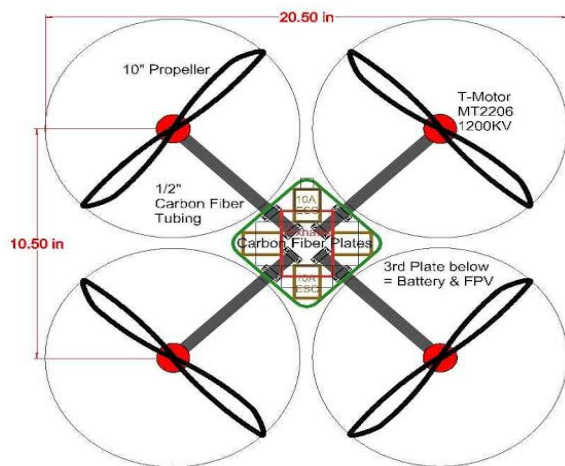


Fig : 3 propeller



Fig:4 Front view

3.5 REMOTE CONTROL

The function of remote control is to control Quadcopter and direction in which Quadcopter move. These function or movements has its own name.

Throttle: Move the left stick forward backward.

Pitch: Move the right stick forward or backward. It basically uses to increase and decrease the speed.

Roll: Move the right stick to left or to the right. This is used to move the sidaway to left or right.

Yaw: Move the left stick to the left or to the right this alter the direction quadcopter.

WFT06X-A Transmitter Features (Front)



Fig: 5 Remote control

3.6 MOTOR

Motor is the final and important part of the Quadcopter. This requires these specifications. There are two motors in this one moves clock wise while other works anti clock wise. They are connected to the electronic speed controller for example, Q250 quad copter is equipped with 5030 size propellers.



Fig: 6 motor

Design of Quadcopter

4.1 Design

Size of Quadcopter can be varying from a size of insects to the size of a professional UAV. The size of Quadcopter depends upon its application and also the equipment which is use in this like cameras, sensors, weapons. Quadcopter has four propeller which is in cross and plus section. The hover stability prevents the Quadcopter from crashing either through wind or because of its own weight.

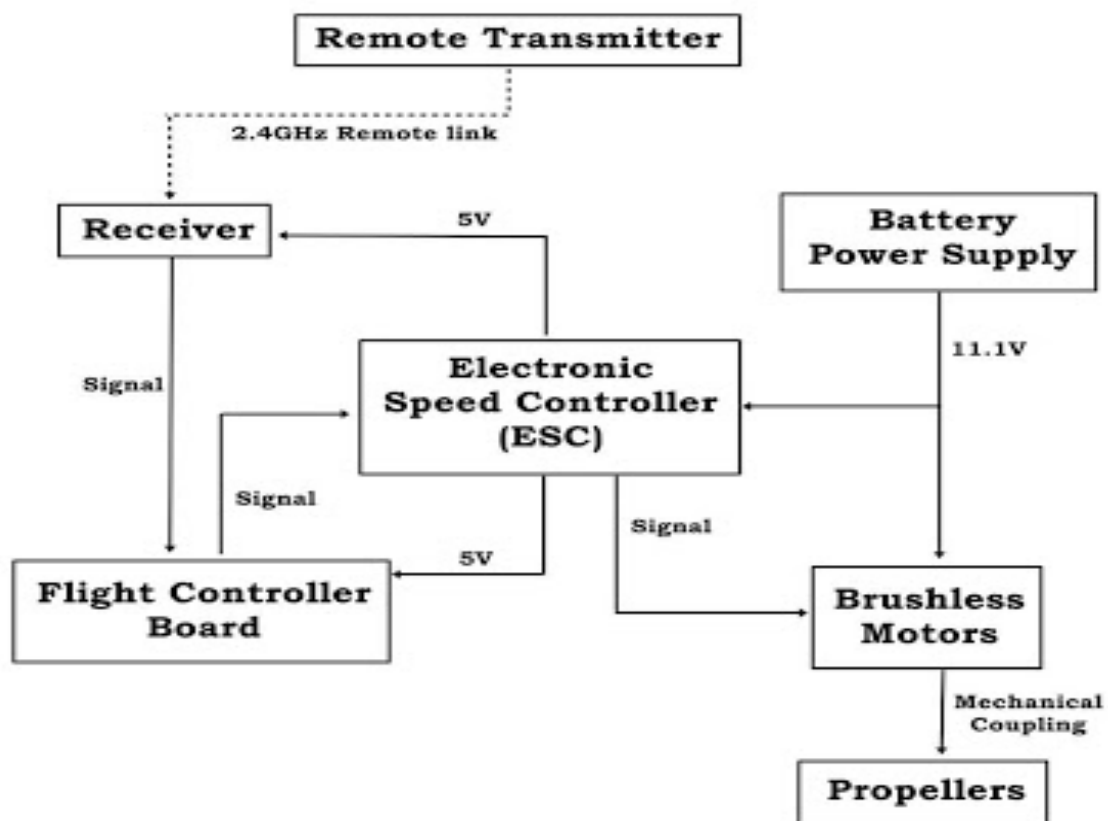


Fig: 7 block diagram

4.2 Working

A Quadcopter is a multirotor craft that is lifted and propelled using four rotors. The propellers are vertically oriented and each of them works in varying speed. The two rotors which are fixed work in opposite directions; one works in clockwise and another works in anticlockwise direction. This type of working helps the pilot to control the quadcopter.

In order to understand how a quadcopter works let's examine this

- Its frame is the most important part of the quadcopter. The motor, battery and propellers are mounted over this. So it needs to be more stable.
- There are four rotors in which two rotors rotate clockwise and two rotate anticlockwise. They are connected to the electronic speed controller which helps them to spin.
- Electronic speed controller has three wires: current supply, motor wire, and controller wire. It links the motor with batteries.
- Transmitter and receiver help to control the Quadcopter in different heights.
- Control board is the backbone of the quadcopter; it controls the motors which provides the correct balance in long run.
- Propellers ensure that the Quadcopter does not spin around so it doesn't lose the balance.
- Steering helps to steer the quadcopter correctly.
- Next is yaw, which is rotating the propellers in clockwise directions and counter-clockwise. However, one opposite pair of motors has to be slowed down, hence balancing the craft on the air.
- A balance of different forces has to be in use when hovering the craft in the air. Hovering requires the controller to counter the gravitational pull on the craft with lift.

5

Problem Description

5.1 Problem description

Quad copter is an essential technology for any country especially for human life safety .This can be used in various field such as military, media, many companies use it for delivering the product etc .In research field it proved its contribution many times but it has few limitation which are discussed below

1. In case of one rotor is jammed it leads to the failure of motor and ESC which ultimately results in total shut down of system.
2. If we use any other battery other than Lipo battery it fails to transfer the required amount of energy to the system.
3. In case it gets crashed it cannot be readily upgraded or repaired due to its sophisticated parts it requires good amount of time to come back in its best shape.
4. In most of the Quadcopter, camera is not installed inside the frame and also lack in night vision due to this it gets damaged very easily during any accident.
5. Many Quad copters don't have the air sensor because of this they are not able to avoid the collision automatically with any other aircraft such as aeroplanes, helicopters etc. while flying.
6. The heavy weight of the Quadcopter is another major problem which gradually decreases its time of flight.
7. Many Quadcopter not able to establish themselves in high altitude.

5.2 Problem Solution

1. COMPUTER VISION :

It allows the Quadcopter to avoid the obstacles some time completely navigate around them.

2. LIGHTING :

The standard light that come with the model is rarely bright enough to meet the night flight requirements. We can use lumen lights for this.

3. AIR SENSE :

It is used for getting the signal of nearby aeroplane and helicopter to stop collision. Air sense alert drone pilot for automatic dependent surveillance- broad casting signal lower the risk of collision

4. WEIGHT :

Reduce the weight so that the timing of flight increases. Our quad copter is established in high altitude.

6

APPLICATIONS

6.1 Application of Quadcopter

Quad copter can be used for multiple purposes. It has potential to be used for environmental, surveillance or commercial purposes etc. Some of them are mentioned below.

- Quadcopter is used in test and research fields. This is used to evaluate more ideas in many fields.
- Quadcopter is used by military agencies. It is used in search and rescue operations.
- Many companies use quadcopters for delivering their products. It reduces the time and distance also. In this special type of quadcopter is used which can carry more weight.
- Media use the quadcopter for taking pictures and capturing exact locations also. Quadcopter is used for taking pictures of celebrities.
- Forest fires can be easily detected and preventable if a quadcopter is used when the fire is at the initial stage.
- It helps the police force to get information and hence act as an informer without putting any human life at risk.
- It can also be very helpful in agricultural fields as this can help farmers for spraying crop pesticides.
- It can play a very vital role during natural calamities/ disasters as it is used to get the long-distance pictures accurately in the dark.
- Police can use it for capturing the photo of the number plate for speed driving.
- It plays a crucial role in border surveillance without putting any human life in danger. If it was present during the Kargil war, the war could be avoided.
- It is used in surveillance such as it is used recently in COVID-19 lockdown to keep an eye on civilians.

CONCLUSION

It is obvious that Quadcopter is a useful technology for future and it is also useful for the safety purposes. Military can use this for taking the information which is essential for country's safety. It allows the defense to collect the important information without putting the operator in danger zone. It will set the new commercial industry. Which will allow more occupations and opportunities.

The Quadcopter can be used to deliver the products by many companies. This technology can vital role during any epidemic when Whole area or country is in lockdown position and people do not allow themselves to come from their respective houses. With the help of Quadcopter, we can use to deliver the products, like medicines, Rashaan etc.

Quadcopter have potential to become the vital part of the society but it also can put the negative impact on the society.

It has limitations like, the training is very expensive and sometime launcher is needed to fly them which make them more expensive. They are more difficult to land then drone.

Though we can use it as replica of drone but it will not able to replace drone. It will not able to perform all the functions which drone can perform.

At end its important to be aware of the Quadcopter advantage and disadvantage in order to use it efficiently.

Advantages

- It proves very effective against the militant of AL Qaeda and terrorist group.
- It help in detecting forest fire
- It can used efficiently in monitoring environmental data
- It can help Police department in providing help to seek missing people
- It help the intelligence to gather the accurate information
- It helps to get the accurate information by keeping the user/operator at a safe distance.
- It is can be a robust backbone for our safety and security if used in an effective manner.

Disadvantage

- Domestic quadcopter violets the right to privacy.
- Some Quadcopter are lethal and not just used for surveillance
- People feel paranoid while surrounded with quadcopter
- It burns hole in the pocket as they are very expensive.

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