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Surveillance Drone

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ABSTRACT

A large majority of the Quad-copters were originally built by hobbyists who understood the simplicity of the vehicle. By adding four motors and four propellers to a lightweight frame constructed of light wood, carbon fiber, or fiber glass then connecting it to a remote control transmitter via a small control board fitted with a gyroscopic stabilization system and connected to a LiPo battery these craft were relatively simple to construct. Experimentation has led to the configuration of variations of the Quad-copter by using different amounts of arms we have seen Tricopters, Hex copters and Octocopters (with eight arms). Other configurations include a Vtail and an H frame variation.

Keywords : LiPo, H Frame, Quadro-Copters, Aerial Vehicles

I. INTRODUCTION

Over the last few years we have seen a massive growth in the manufacture and sales of remote control airborne vehicles known as Quad-copters. These Unmanned Aerial Vehicles have four arms and fixed pitch propellers which are set in an X or + configuration with X being the preferred configuration. They are sometimes referred to as Drones, Quad-rotors or Quadro-copters.

In the standard format two propellers will spin in a clockwise direction with the other two spinning in an anticlockwise direction allowing the craft to vertically ascend, hover in the air and fly in a designated direction. The Quad-copter is a simple format with very few moving parts and has rapidly become a favorite vehicle for remote control enthusiasts and is widely being used as an effective Aerial photographic platform.

Quad-copter, also known as quadrotor helicopter or quadrotor, is a multirotor helicopter that is lifted and propelled by four rotors. Quad-copters are classified as rotorcraft, as opposed to fixed-wing aircraft, because their lift is generated by a set of rotors. In a Quad-copter, two of the propellers spin in one direction (clockwise) and the other two spin the opposite direction (counterclockwise) and this enables the machine to hover in a stable formation.

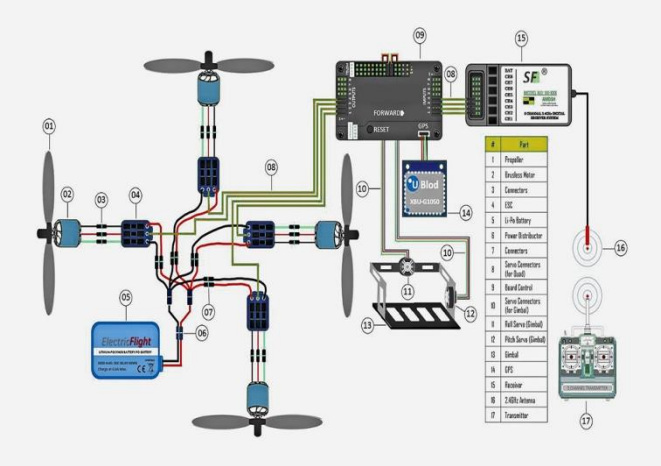


Figure 1 : Block Diagram of System

II. LITERATURE SURVEY

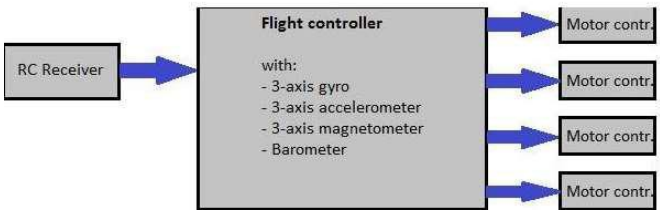
The quad rotor project required extensive research into similar systems. By reviewing others work, we used this insight to develop our system. To this end,

research papers from various quadrotor groups were used as guides in the early development of the dynamics and control theory.

No	Author name	Publis-hed Year	Proposed work	Result	Link
1.	MAHEN M.A, ANIRUDH S NAIK, CHETHANA H.D, SHASHANK A.C	July 2014	DESIGN AND DEVELOPMENT OF AMPHIBIOUS QUAD-COPTER	It had a capability of carrying out surveillance from 25 meters height for a duration of 15 minutes	Drone\Important\2-70-140446857730-34 112.pdf
2.	Moulesh Kumar[1] Nitish Kumar [2]Dr T H Sreenivas[3]	June 2015	Autonomous Navigation of Flying Quad-copter	The project could go in a variety of directions since the platform seems to be as flexible as we initially intended	Drone\Important\1434520907110.pdf
3.	Prof. Swati D Kale, Swati V Khandagale, Shweta S Gaikwad, Sayali S Narve, Purva V Gangal	Dec 2015	Agriculture Drone for Spraying Fertilizer and Pesticides	It implement a control loop for agricultural applications where UAVs are responsible for spraying chemicals on crops	Drone\Important\V5I12-0222101.pdf
4.	Anuj Tiwari[1], Abhilasha Dixit[2]	2015	Unmanned Aerial Vehicle and Geospatial Technology Pushing the Limits of Development	This paper finally present UAVs as more reliable, economical, autonomous and easier to use technology	Drone\Unmanned Aerial Vehicle and Geospatial Technology Pushing the.pdf

III. METHODS AND MATERIAL

SYSTEM ARCHITECTURE



CONTROLS :

Roll – Done by pushing the right stick to the left or right. Literally rolls the Quad-copter, which maneuvers the Quad-copter left or right.

Pitch – Done by pushing the right stick forwards or backwards. Tilts the Quad-copter, which maneuvers the Quad-copter forwards or backwards.

Yaw – Done by pushing the left stick to the left or to the right. Rotates the Quad-copter left or right. Points the front of the copter different directions and helps with changing directions while flying.

Throttle – Engaged by pushing the left stick forwards. Disengaged by pulling the left stick backwards. This adjusts the altitude, or height, of the Quad-copter.

Trim – Buttons on the remote control that help you adjust roll, pitch, yaw, and throttle if they are off balance.

The Rudder – You might hear this term thrown around, but it's the same as the left stick. However, it relates directly to controlling yaw (as opposed to the throttle).

Aileron – Same as the right stick. However, it relates directly to controlling roll (left and right movement).

The Elevator – Same as the right stick. However, it relates directly to controlling pitch (forwards and backwards movement).

Bank turn – A consistent circular turn in either the clockwise or counterclockwise direction.

Hovering – Staying in the same position while airborne. Done by controlling the throttle

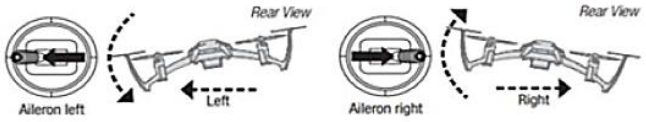


Figure 1 : Simple sketch of roll, pitch, yaw, and throttle on a transmitter and Quad-copter

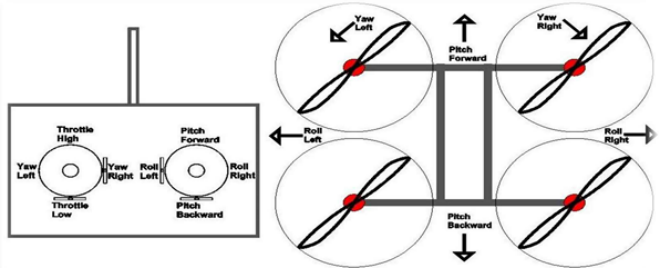
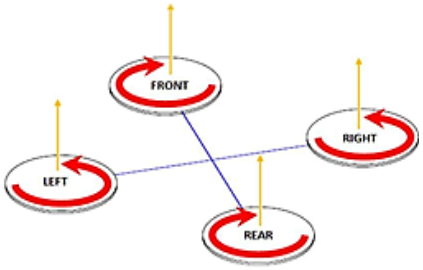


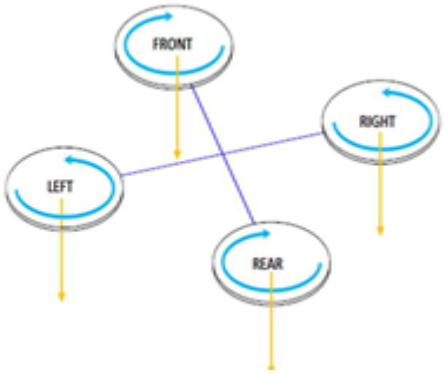
Figure 2 : Simple sketch of roll, pitch, yaw, and throttle on a transmitter and Quad-copter

Frame principle : Frame is the structure that holds all the components together. The Frame should be rigid, and be able to minimize the vibrations coming from the motors. Quad-copter frame consists of two to three parts which don't necessarily have to be of the same material:

- The center plate where the electronics are mounted
- Four arms mounted to the center plate
- Four motor brackets connecting the motors to the end of the arms
- Most available materials for the frame are:
- Carbon Fiber, Aluminum
- Wood, such as Plywood or MDF (Medium-density fiberboard)



TAKE OFF MOTION

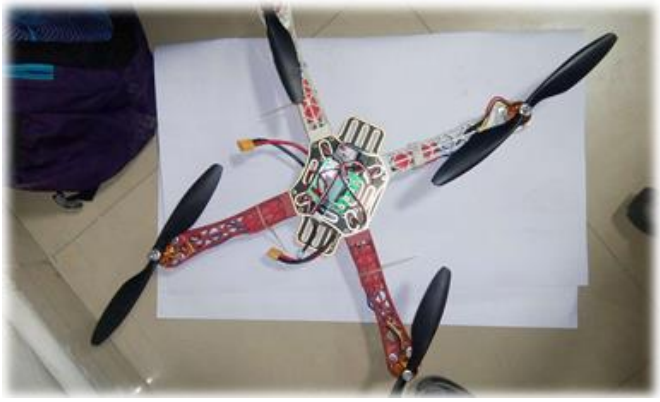


LANDING MOTION

IV. RESULTS AND DISCUSSION

Result Analysis –

After configuring all the parts, assembling as required, configuring Software, finally we obtained our Quad-copter which is shown below. We need to test the Acceleration Calibration every time when we change the ground surface area.



V. CONCLUSION

As per the design specifications, the quad copter self stabilizes using the array of sensors integrated on it. It attains an appropriate lift and provides surveillance of the terrain through the camera mounted on it. It acts appropriately to the user specified commands given via a remote controller .Its purpose is to provide real time audio/video transmission from areas which are physically in-accessible by humans.

Thus, its functionality is monitored under human supervision, henceforth being beneficial towards military applications. It is easy to manoeuvre, thereby providing flexibility in its movement. It can be used to provide surveillance at night through the usage of infrared cameras. The system can further be enhanced for future prospects. The GPS data logger on the Quad-copter stores its current latitude, longitude, and altitude in a comma separated value file format and can be used for mapping purposes.

VI. FUTURE SCOPE

Future of a quad-copter is quite vast based on various application fields it can be applied to. Quad-copter can be used for conducting rescue operations where it's humanly impossible to reach. In terms of its military applications it can be more widely used for surveillance purposes, without risking a human life.

As more automated quad-copters are being developed, there range of applications increases and hence we can ensure there commercialization. Thus quad-copter can be used in day to day working of a human life, ensuring their well-being.

VII. REFERENCES

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