Design of Surveillance based Quadcopter using Arduino

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Abstract— In this growing world with hugh increase in the technology there is equal development in automobiles which creates traffic leading to some pollution, traffic jamming and air pollution. So it take maximum than required time to reach from one point of place to another, thus we must look forward to some airplanes. Our Quadcopter is one of flying module used to lift the materials from one point of distance to another in least time also can be used for surveillance and security techniques. At industrial level use applications, this Quadcopter is made using flight controlling board module which comes with programmed Arduino nano light controller board and balanced gyroscope module for balancing the flight for smaller applications. It cost is effective and useful method. To built the Quadcopter efficient and fighter for small stage applications this project of module is proposed, which design a Quadcopter using Arduino Nano board. It has wide and many application like Quadcopter mounted with smart wireless camera that could be used for surveillance and security of wide and large areas such as forest, army base surroundings etc.

Keywords: MPU 6050, Arduino Nano Atmega328 microcontroller, Camera, BLDC Motor, Flight controller Board, ESCs (Electronic Speed Controller), Propellers, Transmitter and Receiver

I. INTRODUCTION

In this recently existing Quadcopters [1], they are compact motor rotor craft air lifter that can be used for indoor and outdoor tasks. Like a conventional copter like helicopter they can hover. However, they have other advantages such as small size, low power consumption, vertical takeover without tail rotor and dynamic. In recent times, there has been an hugh growth of interest in quadcopters spurred by the availability of cheap and open-source copters.

Popularly and newly, quadcopters are normally and locally called drones and we will use these terms interchangeable in our research project. The quadcopter built in this project module, with a control driver Arduino Nano board, from ROS (Robot operating system). they recently used Parrot AR Drone as it is a low-cost, quadcopter with a large amount of software support available for its control[2].All the computation is performed over board on a ground-based laptop and some modification to hardware also on-board software are required. The Copter drone is equipped with a full HD wireless video recording camera which can be used to recording videos or snapping pictures via smart mobile externally insist on it. The drone communicates with external drivers (or in our case, the driver arduino nano flight controlling board) using Internet and Wi-Fi[3]. We can access the image stream sent by the drone through Wi-Fi, using ROS and the arduino autonomy driver, which is used by visual tracking methods.

A. Problem Statement

Dismantling energy and time to grow up and down many times. There are much environments that humans and human-controlled airlifter cannot safety enter, such as the nuclear reactors and etc. In Today's life, we have kid games which give the sense of immersivity with an artificial and imaginary world like we have never observed[4]. A human can play as a different and various race together and become the worlds most force warrior of the world. Higher-end games and future games gives us chance to save the world billions of times over with billions of different types. However, Higher-end of video games are therefore based solely on the artificial. In Now-a-days fast growing world, we have the incredibly advanced feats of aerospace, megatronics, electrical and computer engineering to give the household toys for the new babies of ability to fly with responsive controls[5]. We can use aeronautical airplanes and quadcopters remotely and within few minutes without any form of professional training and instructions. The man flying the quadcopter can feel the significant sense of missing out on something. We hope that our design can overcome the current flying quadcopter which is not limited only to the yield of games[6][5], and that it can place in various effective hobbies and atttractions that could make use of this added level of immersion in the aim of life.

B. Scope

1) Weather detection Potentially, they could sample the atmosphere in difficult to reach, where weather data is scarce[5][1]. The data received from the copter could then be integrated into prediction models and modules improving their resolution, stability, ability
2) 3D mapping Analysts used stereoscopes to hunt for visual clues about enemy movements on photos and video that were snapped together to form mosaic and networked maps.
3) Monitoring wildlife In particular it would be very useful to help and large gull chicks that hide in the dense forest on the island, using an infrared wireless camera..It would be interesting to see if a small loudspeaker could be attached to use as a scarring method for playing alarm calls to frighten large sound from the island in spring and autumn weather and etc.

II. BLOCK DIAGRAMS

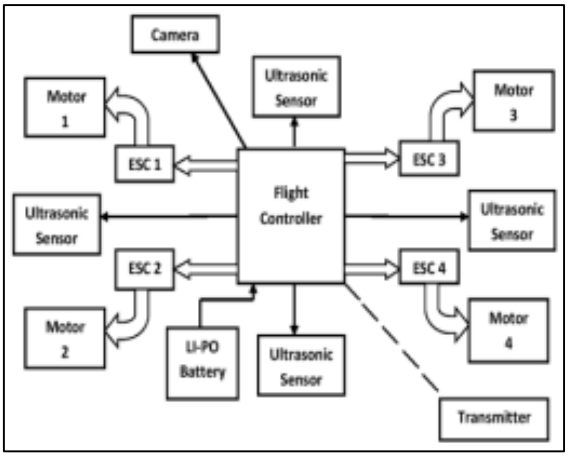


Fig. 1: Block Diagram of Quadcopter

III. COMPONENTS REQUIREMENT

1) Arduino Nano.
2) MPU 6050.
3) Electronics Speed Controller – 30A
4) Brushless Motor – 2200KV/6T
5) Lithium Polymer Battery – 2200mah
6) Propellers – 10.5*4
7) Frame – 450quad
8) Ultrasonic Sensor.
9) Camera – Smart Wireless.
10) KK 2.1 Flight controller (Optional)

IV. OVERVIEW

Quadcopter system works on the principle of air lifting technique with high pressure. The propellers of the copter force the air in downward with high pressure due to which an uplift force is created and as a result action reaction law is applied on the entire system. To overcome this problem we rotate two propellers in clockwise direction and remaining two propellers in anticlockwise direction alternately. This technique produces torque in opposite direction and they get balanced and the system remains stable while flying up in air. Two basic technique are used for movement of quadcopter, thrust and torque. Quadcopter uses its four propellers attached to motors which creates thrust and help quadcopter to fly high in the air. Motion of quadcopter are defined based on the input values (x, y, z) given to it. From four motor attached with propellers, opposite two motors rotate in clockwise (CW) direction while other two in counter clockwise (CCW) direction. Motion of different quadcopter is thus controlled mainly by three movements. These movements are classified as,

A. Yaw Rotation:

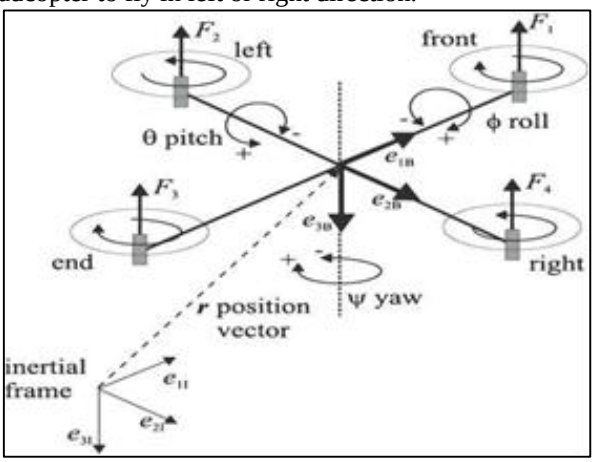
Yaw is described as movement of quadcopter either to left or right and it is controlled by throttle stick of transmitter. Yaw decides the direction of quadcopter.

B. Pitch Rotation:

Pitch is described as the whole movement of quadcopter either in forward direction or in backward direction. Its also controlled by throttle of receiver. Moving the throttle in forward direction moves quadcopter in forward direction while moving throttle backward moves quadcopter in backward direction.

C. Roll Rotation:

The movement about the longitudinal axis of quadcopter is known as roll motion. Left or right motion of throttle stick is followed by quadcopter, it moves in towards right when throttle move to right and moves to left when throttle stick moves in left direction. This parameter thus makes quadcopter to fly in left or right direction.

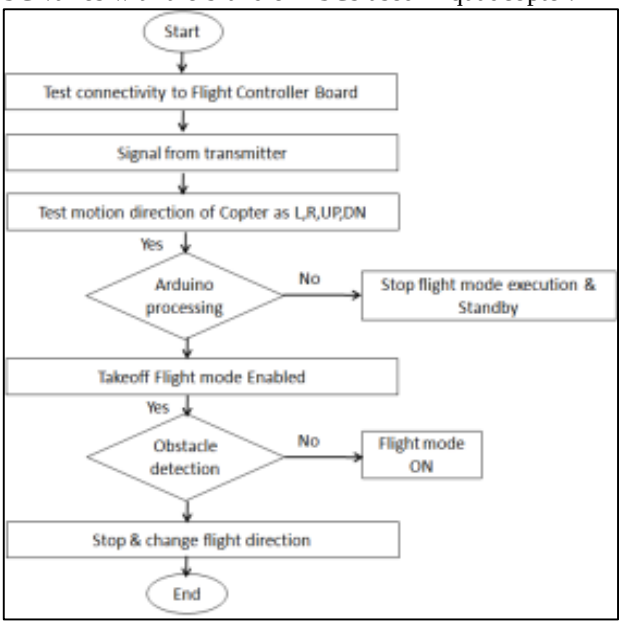


V. SOFTWARE IMPLEMENTATION

The micro controller ATMEGA328p is programmed using C language with arduino IDE software. Its a development environment that simply uses an user interface for adding and editing in the arduino coding language in the controller IC on the Arduino board. These program are utilized in such various calibration steps which includes:

A. Setup and Flight Calibration:

Setting up calibration illustrates the interconnections of different hardware components used in quadcopter. First step to go by program is uploaded on arduino board using IDE Software and then some motor arming routine. Calibration of ESC varies with the brand of ESCs used in quadcopter.



We found that the quadcopter built is small, fast oscillations in the roll, yaw and pitch axes in flight. To this, we reduces the vibration on quadcopter by balancing the propellers, we reduced the sensor board from the remaining vibration using vibration absorbing mount. Now quadcopter flight mode was much stable.

VI. CONCLUSION

In Recent Days, there is a lot of increasing interest and growth in Quadcopter due to its Hugh endurance and more lifting payload module. Different various videos have been published on the Internet and website by many Different research authors and have attract much attention from the humans and growth. This Paper is proposed the overview of Arduino platform and the basic of Arduino based flight control system, Ultrasonic HC-SR04 effective sensors are also being implemented. The effective changes in hardware and software can give high stability in this system. The stability of Quadcopter will depend on the PWM Tuning. It is to be needed tuned the flight controller with each different body frame.

Our research work includes a successful development of Arduino Nano based Quadcopter at a cheapest and affordable amount. Quadcopter which can be easily build by easily available shelf components. Now this can be used as a cheap cost alternative to many applications which includes pesticide spraying, end to end delivery within the transmitter's RF range, surveillance in defense and other important places like nation border, mapping through remote sensing, etc. by avoiding the obstacles and with very high level of precision.

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