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QUADROTOR FOR AGRO FARMING USING MPU-6050 AND BLUETOOTH MODULE

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Abstract - *For bringing advancement in agriculture and reducing human efforts an unmanned aerial vehicle i.e. agricultural drones can be brought into use. Drones can provide farmers with detailed view of crop from the air in terms of irrigation problems to soil variation and even pest and fungal infestations. Agricultural Drones with advanced sensors are giving farmers new ways and means to increase yields and reduce crop damage . The main aim of this project is to help farmers overcome problems of their crop fields without actually going to the fields and manually inspecting them. The drone has been built using a light weighted frame called the body. BLDC motor of 3000mAh,25C has been used whose speed is controlled using Electronic speed control. The Drone is operated using a Bluetooth module. The sensors attached in the drone gives knowledge of different conditions like soil humidity, temperature. Spraying of seeds, pesticides and insecticides can be done using this UAV.*

Key Words: UAVs, ESC, Bluetooth module accelerometer, Brushless motors, remote sensing, Li Po battery, propeller.

1. INTRODUCTION

One of main source of income in of India is Agriculture. The production rate of crops in agriculture is based on various parameters like temperature, humidity, rain, etc. Which are natural factors and not in farmers control. The field of agriculture also depends on some of factors like pests, disease, fertilizers, etc which can be control by giving proper treatment to crops. So the main aim of this paper is to design agriculture drone for spraying pesticides and other chemicals.

This paper describes the development of quad copter UAV and the spraying mechanism. The discussed system involves designing a prototype which uses simple cost effective equipment like BLDC motor, Arduino, ESC wires, etc.

1.1 BLOCK DESIGN

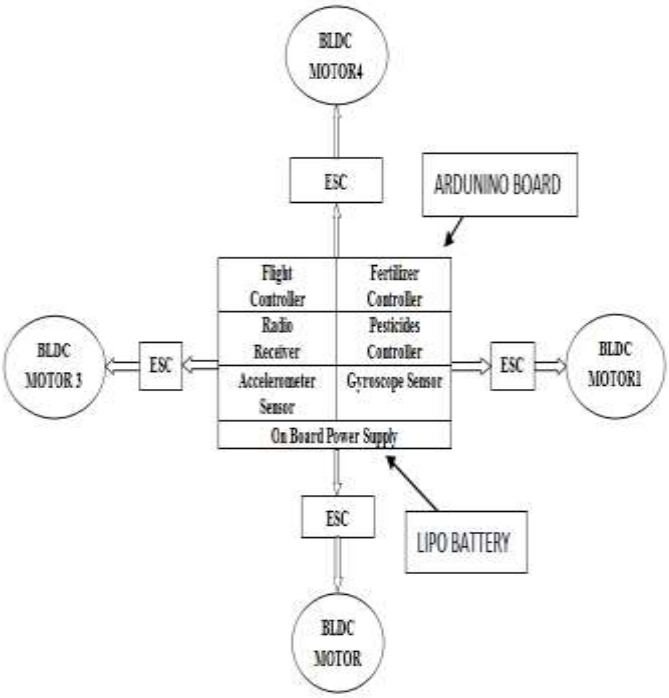

Fig-1: Block diagram

1.2 Working description

BLDC Motors converts the electrical energy to mechanical energy.

ESC (Electronic Speed Control) converts the PWM signal from the flight controller to drive the BLDC motor by providing appropriate level of electrical power. Accelerometer Sensor measures acceleration and force. Gyroscope Sensor measures angular velocity, i.e. the rotational speed around the three axis. LIPO Battery LiPo battery is used as a wireless charger Here we are using 3SP1 batteries which give us 11.1V. Arduino board used for the flight controller.

2. COMPONENT

1. Arduino uno

Fig- 2: ARDUINO UNO

The Arduino UNO board based on the ATmega328P microcontroller has 14 Digital pins, 6 Analog pins which can be used for interfacing. It can be powered by a USB cable or by an 9 Volt battery.

Fig-3: program for testing

2. Brushless DC electric motor (BLDC)

Fig-3: BLDC Motor

Brushless DC electric motor also known as electronically commutated motors that are powered by a DC electric source via integrated inverter/switching power supply, which produces an AC electric signal to drive the motor. A BLDC motors for quadcopter is constructed with a permanent magnet rotor and wire wound stator poles.

3. ELECTRONIC SPEED CONTROLS(ESC)

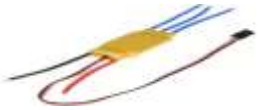

Fig-4: ESC

ESC is used to control BLDC motor. It takes signal from microcontroller and breaks into 3 parts and sends it to the BLDC motor. We would require 4 ESCs as we are using 4 BLDC motor. The ESC has a battery input and a three Phase output for the motor. Each ESC is controlled by a PPM.

4. BLUETOOTH MODULE

Fig-5: Bluetooth module

The Bluetooth module is as shown in fig above.

The TX and RX are connected to RX and TX of ATmega328 respectively.

5. LIPO Battery

Fig-6: LiPo Battery

Lithium batteries are the preferred power sources for most electric modelers today. They offer high discharge rates and a high energy storage/weight ratio.

3. RESULT

The diagonal propeller should rotate in opposite direction to each other to get desired upthrust and diagonal distance between two propeller is 25cm.

Fig-7: Hardware Implementation & testing

For proper working of drone upthrust should be twice the weight of the drone. Fig 7 shows the implementation and the testing process of quadrotor.

4. CONCLUSION

We have described an architecture based on unmanned aerial vehicles (UAVs) that can be employed to implement a control structure for agricultural applications where UAVs are responsible for spraying and applying chemicals on crops. The process of applying the chemicals is controlled by means of Bluetooth module.

5. FUTURE SCOPE

Now we are using Bluetooth module but in future in order to achieve a greater range we can use Wi-Fi module and also if we want to operate from home then GPS module can be used. From the future perspective, agriculture drone can assist farmers to reduce excessive use of water and will contribute to reducing the chemical load on the environment by spraying on the plant that require attention. Drones are not only confined to the agriculture sector but can successfully be used across several industries such as Military and for delivering pizza.

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