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Pesticides spraying using Agricultural Drone

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Abstract - *In today's agriculture, there are far too many inventions involved. One in all the emerging technologies is pesticide spraying using drones. Manual pesticide sprinkler includes a number of negative consequences for the those that are involved within the spraying operation. A quad-copter that sprays pesticides throughout the farm reduces the job of farmers because it completes their current task. The appliance of pesticides and fertilizers in agricultural areas is of prime importance for crop yields. To create a user-friendly interface for the farmers, this will be done. Agricultural goal that enables the farmer to liberally sprinkling chemicals on his land. so it reduces his work which could equally spray everywhere on his farm. Here the farmer will manage the drone through a control Board-KK 2.1.5 and he will hook up with the drone through a Flysky-2.4Ghz, 4 channels that are interfaced within the drone. It can precisely route the realm of that exact farmer's land through a sender and receiver despite the form of the sphere and also the sector and type of the crop the chemical spraying drone will get the work done.*

Key Words: Microcontroller, BLDC Motor, Servomotor, ESC, Lipo Battery, Sprinkler.

1. INTRODUCTION

In India the major source of occupation is agriculture. About 60% of the occupation is done in agriculture. So, we need to spray pesticides and different types of chemicals to keep crops safe. In manual, it takes a considerable amount of time and energy for farmers for large areas of the field. Basically, it is harmful to farmers to spray pesticides and other chemicals with their hands. So we can use the technology and reduce the time and energy of the farmer by using UAVs (Unmanned Aerial Vehicles) called Drones for large areas of fields. Using these devices in the field provides better cultivation and good crop health. There are many kinds of drones that are used in agriculture; we need to pick the drone which is useful to us. The Drones can spray pesticides and insecticides for large fields. The device we make is a combination of sprikler mechanisms in a drone. The drone can be used anywhere in the fields even indoors or outdoors. This device contains a universal sprinkler that sprays pesticides, the global nozzle can spray both pesticides and fertilizers. When the drone flies in the air it takes images of the field from its elevation with the help of the controller who controls the drone through the remote. The images taken from the sky-view show the problems on the field, and infections of the crop like fungi, and bacteria. Drones complete the work in less time, and it also covers a vast amount of field within a short span of time. Drones also help in irrigation management with the help of thermal equipped with them. The drone sprikle at 40-60 faster than manual sprinkler. We need to use drones precisely so that there would be no problem when we use drones. Agricultural spraying drones have become popular in recent years. These drones can spray one hectare in approximately 15 min (depending on its model) with only 1 liters. Using these drones can speed up the field sprinkler procedure and decrease water and pesticide usage. Sprinkler drones have many types in the market which can be classified in liquid tank volume. Some sprinkler drones have First Person View (FPV) and some of them can spray orchards using a 3D map which is generated with a mapping drone. Recently, a new kind of these drones has been launched that can spray the field smart using an NDVI map which is generated with a multispectral mapping drone. Most of the crop fields have some trees, power towers or scarecrows but the spraying drone's user can over this obstacle using two methods.

2. BLOCK DIAGRAM

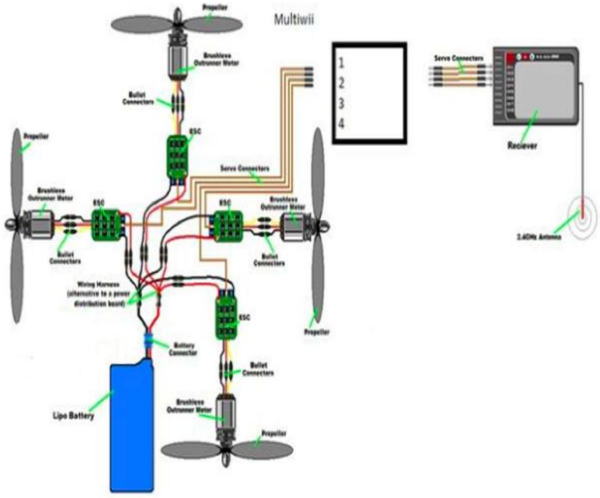

Fig.1: Block Diagram

3. PROPOSED WORKING

The operation of a Quad copter system is based on the airlifting phenomenon at high ambient pressure. The air is force downward by propeller at a high ambience pressure because of that an uplift force is made and as a result action reaction law is applied on the total system. When this

applied force overwhelms the gravitational pull of the earth, the entire system starts to fly into the air. However, there's a tangle with the rotation of propellers. If we tend to rotate the propellers in clock wise direction then because of this rotation, a force are going to be applied over the total system in one direction. In the same way, if we turn the propellers in the opposite direction, a force will be applied to the entire system, and it will start rotating the opposite way. To beat this downside we tend to rotate 2 propellers in dextrorotatory direction and remaining 2 propellers in anticlockwise direction. This development produces force in other way and that they get balanced and also the system remains stable while flying. For Quadcopter thrust and force movement, fundamental phenomena are applied. A quadcopter lifts itself to great heights by using its four propellers, two motors that create thrust, and facilita cities. Motion of quad copter is outlined supported on the input values (x, y, z) given to that. Out of 4 motor connected with propellers, two motors rotate in dextrorotatory (CW) direction whereas different 2 in counter dextrorotatory (CCW) direction. Motion of quad copter is therefore controlled chieflyby 3 movements.

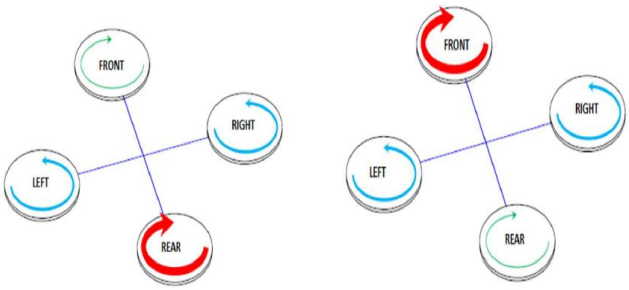

Fig.2: Forward Motion and Back ward Motion

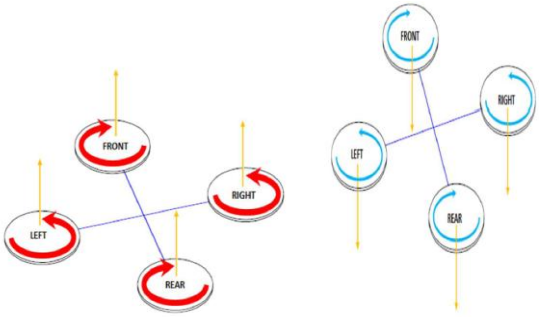

Fig.3: Take off Motion and Landing Motion

4. HARDWARE SPECIFICATION

1. Electronic Speed Controller

- Current Draw: 30A Continuous/35A
- Burst Voltage Range: 2-4s Li poly
- BEC: 5V3A Linear
- Weight: 35g.

Fig.4:ZESC

2. Brushless DC Motor

Brushless synchronous motors powered by a DC electric source are known as DC electric motors or electronically communicative motors that are powered by a DC electric source via an integrated inverter/switching power supply, which produces an AC electric signal to drive the motor. during this context, electrical energy, could be a sinusoidal waveform, but rather a bi-directional current with no restriction on the waveform. Additional sensors and electronics control the inverter output amplitude and waveform therefore percent of DC bus efficiency and frequency (i.e. rotor speed).

Motor selection is performed by calculating the weight from all equipment then dividing by the entire number of motors installed. Speed Control may be a board for controlling the speed of the motor. The speed control are installed at the underside of the motor.

Specifications:

- KV: 1300KV/1000KV/850KV/750KV
- Pull: 930g/890g/875g/866g

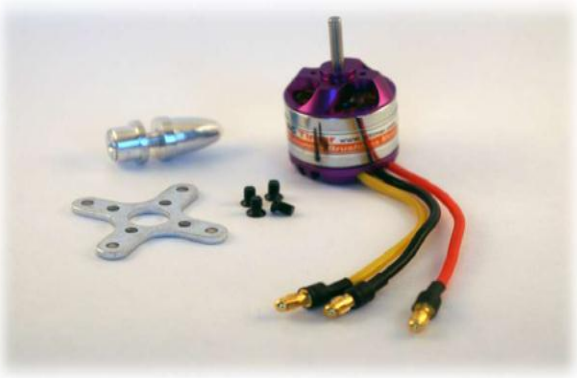

Fig.5: Brushless Dc motor 1000 kv

3. Fly sky Transmitter and Receiver

Fig.6: Fly transmitter and receiver –CT6B

- Channels: 6channels
- Model type: Heli, Airplane, Glider
- RF power: less than 20db
- Modulation: GFSK
- Code type: PCM
- Sensitivity: 1024
- Low voltage warning: LED warning
- DSC port: yes
- Charger port: yes
- Power: 12V DC(1.5AAA*8)

4. HJ450 Frame

This is the glass fiber quad copter frame which is very simple and easy to build frame This Flame wheel is one of the most popular frames out there for a number of good reasons:

- It's relatively inexpensive
- It is famously durable
- The centre plate doubles as a power distribution board which tidies things up quite a bit and allowed me to get rid of my ugly DIY wiring harness.
- The design is really well thought out - it's a compact frame. Plenty of room for receiver, control board, ESCs, and battery, with mounting options .

Fig.7: HJ-450

5. CONCLUSIONS

The projects goal is to create an intuitive user interface for the farmers. The Drone helps the farmer spray pesticides throughout all of his property because it is a pesticide sprinkler drone for agricultural use. So that it reduces his work which can evenly spray everywhere his farm.

In this article agricultural sprinkling drones were investigated. These drones have multiple advantages and some disadvantages. In conclusion, it is highly recommended to use agricultural sprinkling drones instead of traditional methods to achieve more productivity. It is suggested that other researchers work on improving battery function and smart spraying crops in which the drone sprays only the infected parts of the field based on multispectral mapping systems.

ADVANTAGES

- Speed
- Water Usage
- Pesticides Usage
- Health
- Field Coverage
- Uniform Spraying
- Muddy Fields
- Night Spraying

DISADVANTAGES

- Batteries Endurance
- Tank Volume
- Cost

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