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Quadcopter With Pesticide Spraying Mechanism In Agriculture Field

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ABSTRACT: Pesticides are mainly used for better crop yields in the agricultural field. In order to avoid man power we can use aircraft and drones for carrying out this operation because of its speed and effectiveness in spraying. By introducing such kind of agricultural automatic and sensing technologies we can able to increase the agricultural productivity. Here we introduce Quad-Copter (QC) which is light weight and low cost. In manual spraying there are some factors that reduces the yield. An automated aerial pesticide sprayer is basically quad-copter with pesticide spraying mechanism is introduced. When compared to manual spraying, large area of field can be covered using quad-copter. In a short span of time. This project will overcome the ill-effect of pesticide on human being by using quad-copter for spraying pesticide by pesticide spraying mechanism.

Keywords: Quadcopter, Agricuture and Sprayer

1 Introduction

A Quad-copter is a multi-rotor aerial and vertical takeoff and landing vehicle. It is an aircraft that is lifted and propelled by four rotors. Quadcopter is classified as rotorcraft as opposed to fixed-wing aircraft because its lift is derived from four rotors. Quad rotor crafts has a sophisticated control system in order to allow for balanced flight, so as to eliminate the inherent instability induced by minor differences in the thrusts and reaction torques exerted by the motors. In the quad rotor every rotor plays a role in direction and balance of the vehicle as well as lift unlike the more traditional single rotor helicopter designs in which each rotor has a specific task lift or directional control but never both.

Each rotor produces both a thrust and torque about its centre of rotation as well as a drag force opposite to the vehicle's direction of flight. Quadcopter achieves lift, yaw, roll and pitch simply via a manipulation of the thrusts of four motors relative to each other. This way fixed rotor blades can be made to maneuver the quad rotor vehicle in all dimensions. Applications of quad copter are in Blood transfer, agricultural surveying, weather forecasting, traffic forecasting.

Pesticide exposure can cause a range of neurological health effects such as memory loss, loss of coordination, reduced speed of response to stimuli, reduced visual ability, altered or uncontrollable mood and general behavior, and reduced mo-tor skills.

2. LITERATUR SURVEY

The spraying time of pesticides is dependent on the quantity of pesticide to be sprayed. For example,for 1000 ml of pesti-cides, spraying time is around 5 minutes.If we want to in-crease the quantity of pesticide to be sprayed,the weight lifting capacity of the quadcopter must be increased. This is done by choosing higher specicification of BLDC i.e more than 1000 rpm/kV.

The flight time of the quadcopter is around 8 minutes. To in-crease the flight time we need to choose higher specification for LiPO battery. The

height of spraying is around 6-7 feet. The area covered is 10 feet by 10 feet.

3. PRINCIPLE OF OPERATION

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. Quadcopter frame consists of two to three parts which don't necessarily have to be of the same material are

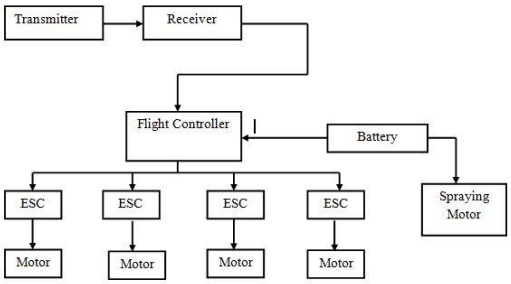

Fig 1. Block Diagram

- The centre plate where the electronics are mounted.
- Four arms mounted to the centre plate.
- Four motor brackets connecting the motors to the end of the arms

Most available materials for the frame are:

- Carbon Fibre
- Aluminium
- Wood such as Plywood or MDF (Medium-density fibre board)
- Carbon fibre is most rigid and vibration absorbent out of the three but also the most expensive.

Fig.2. HJ450 Frame

In cases of severe vibration problem it could mess up sensor readings. Wood board such as MDF plates could be cut out for the arms as they are better at absorbing the vibrations than aluminium. Unfortunately the wood is not a very rigid material and can break easily in Quadcopter crashes. As for arm length, the term "motor-to-motor distance" is sometimes used, meaning the distance between the centers of one motor to that of another motor of the same arm in the Quadcopter terminology. The motor to motor distance usually depends on the diameter of the propellers. To make you have enough space between the propellers and they don't get caught by each other. Aero foil of a propeller is shaped so that air flows faster over the top than under the bottom. There is a greater pressure below the aero foil than above it. This difference in pressure produces the lift. Lift coefficient is a dimensionless coefficient that relates the lift generated by an aerodynamic body such as a wing or complete aircraft the dynamic pressure of the fluid flow around the body and a reference area associated with the body.

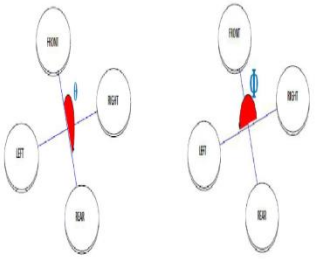

Fig.3. Pitch and Roll direction

4. PESTICIDE SPRAYING MECHANISM

For the pesticide spraying mechanism we use pesticide tank of capacity 200 ml, submersible dc motor pump ,11 V battery, switch, mini nozzles. When the switch is turned on, the motor pumps the pesticides through the pipe with the help of the battery. The pipes supply the pesticides to the nozzles so that it sprays with a certain pressure and uniformity, thereby avoiding wastage.

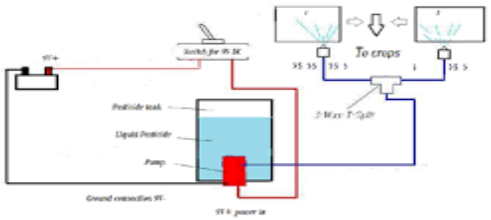

Fig 4. Pesticide Spraying Mechanism

5. RESULT

The spraying time of pesticides is dependent on the quantity of pesticide to be sprayed.For example,for 500 ml of pesti-cides,spraying time is around 3 minutes.If we want to in-crease the quantity of pesticide to be sprayed,the weight lifting capacity of the quadcopter must be increased.This is done by choosing higher specicification of BLDC i.e more than 1000 rpm/kV.

The flight time of the quadcopter is around 8 minutes.To in-crease the flight time we need to choose higher specification for LiPO battery.The height of spraying is around 6-7 feet.The area covered is 10 feet by 10 feet.

Fig.4. Quadcopter with Transmitter

6. Conclusion

Pesticides and fertilizers are more important to control pests. Quadcopter are maneuverable and cheaper to operate. Even QC can be operated in hill areas rather than using man power. Efficiency of spraying can be increased.

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