

Arduino Based Pesticide Spraying Robot

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Abstract - A robotics-based outlook is basic to manual a robot platform designed autonomously to drive through the growth in an area in step with the designed idea of open structures. The proposed gadget is advanced to place into impact agricultural manufacturing. This type of device can be useful in the agriculture field wherein we want to spray the pesticide to unique plant life. The drone may be beneficial in spraying pesticide and crop protection products on the identical time as being managed by using the usage of a one-man or woman operating from a secure vicinity. By converting a kind of discipline used, the device may be used for spraying fertilizers, pesticide and crop safety material like manure and so on. This project is ambitious to overcome the unwell consequences of the pesticides on human beings and also used to sprinkle insecticide over large areas in less interval of time by using an automated aerial pesticide sprayer.

Key Words: SPRAYER, METHODOLOGY, PWM LiPO Battery

1. INTRODUCTION

Day by day the population of India is increasing and to full fill the necessity of food modernization of agricultural sectors square measure vital because of chemical fertilizers the fertility mechanization in spraying devices fertilizers and pesticides square measure distributed equally on the farm and scale back the number of waste, which ends in hindrance of losses and it's going to be terribly important to boost the performance and productivity of agriculture through at the same time supply secure cultivation of the farmers. Although spraying of pesticides has become obligatory it additionally proves to be a harmful procedure for the farmers. Farmers, particularly once they spray pesticides, take too several precautions like carrying appropriate outfits, masks, gloves etc. so as that, it doesn't motive any harmful results on them. Zero million humans are afflicted by extreme poisoning and its fee is 2-three in step with minute, with close to twenty,000 folks ending from exposure per annum, it'll Mechanization offers higher productivity in stripped-down enter. Farmers square measure the utilization of the same ancient ways for spraying fertilizers and pesticides. There is a wish of development during this quarter and most commonly on fertilizers pesticides spraying technique because it needs larger efforts and time to spray by mistreatment typical manner. This paper focuses notably on the way to scale back the wearisome effort applied by the farmers and additionally to bring an enormous modification within the aged ways of agriculture. Several surveys everywhere the planet square measure terminal that farmers square measure losing their lives principally thanks

to the spraying the harmful pesticides and fertilizers manually.

2. OBJECTIVES

The points are as below:

1. To accumulate the drone the use of crucial components.
2. To design a mechanism for spraying and managing parameters like spraying pace manage, monitoring tank status, deliver a pesticide/fertilizer spraying tank on it and maybe pass across the fields, change the height of spraying the usage of liner traversing mechanisms, this can permit the advanced system to spray at distinctive heights for one among a kind plants and so forth.
3. To sprinkle chemicals or insecticides or pesticides aerielly.
4. To construct this machine in such a way that it can travel across any type of terrain.
5. To make this machine solar powered, so that it can be readily charged using the energy received from the sun.

3. THE HARDWARE SYSTEM

1. Propeller:

It is a kind of fan that transmits energy by using converting rotational motion into thrust.

2. Arduino Uno:

Arduino Uno is a master device, an electronic prototyping board based on Atmega AVR Microcontroller ATmega 328P and operates on +5V.

3. Motor Driver module:

We used an L398d motor drive and it is used to control speed and route of motors.

4. Bluetooth Module (HC-05):

Operating Voltage: 4V- 6V and it can operate in Master/Slave mode.

5. Water float sensor:

Water glide sensor is used to monitor the tank popularity. Whenever the fertilizer tank is empty, there will be a buzzer indication to refill the tank.

6. Fogger:

A fogger is used to create a fog made up of pesticides to destroy insects.

4. METHODOLOGY^[1]

Initially quadcopter has assembled the use of necessary additives including Flight Controller Board (FCB), GPS, Brushless DC Motors, Propellers and Battery, and many others.

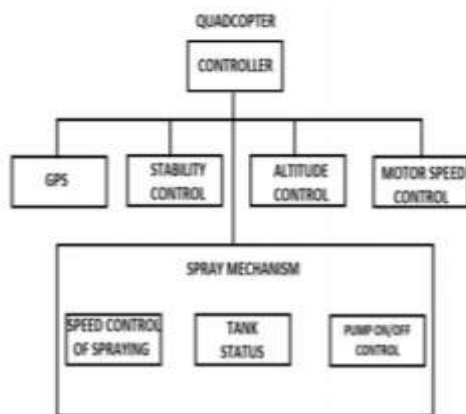


Figure-1: BLOCK DIAGRAM QUADCOPTER

The flight controller board is used to the movement, lifting, positioning and many more.

Altitude manipulates:

Initially drones will be hovered at required altitude, after which it's miles switched to Altitude Hold mode, which continues the equal altitude until it's miles switched all over again.

Stability Control:

The balance of the drone is maintained by the sensors consisting of accelerometer and gyroscope through this system.

GPS manipulate:

It is used handiest in self-sufficient mode. In this mode, the FCB stored GPS parameters with the obtained GPS; to trade velocity of automobiles for navigating the given route. After attaining the closing area drone is landed efficiently.

Motor Speed Control:

According to the modifications within the values of various sensors the speed of the vehicles may be numerous to gain the required mission.

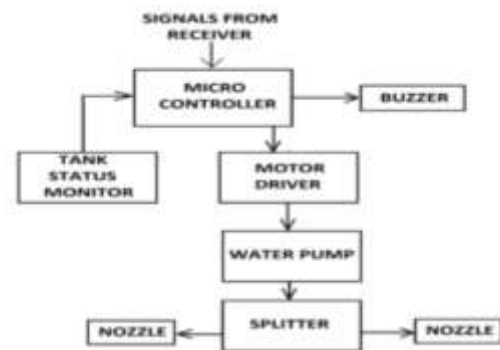


Figure-2: BLOCK DIAGRAM OF SPRAYER^[2]

The spraying mechanism, in particular, includes an Arduino UNO microcontroller. It additionally includes a tank of 250ml capability to which a water pump is hooked up.

a splitter is connected to this water pump along with the two nozzles at the two opposite ends and through this nozzle spraying is practised.

It also includes a motor driving force circuit to govern the pace of spraying and pesticide stage indicator circuit with buzzer, for detecting when the pesticide is empty.

The spraying mechanism plays the following features.

Pump ON/OFF manage:

It is used to turn On/Off the water pump that is used to spray. This is performed utilizing sending 5V control sign to the motor driving force circuit from Arduino.

Spraying Speed Control:

The pace of spraying is accomplished by sending a PWM^[3] sign to the motor driver IC.

Tank popularity:

The fame of the tank will be monitored the usage of a water level sensor. If the pesticide degree reaches beneath the threshold, say 25ml inside the prototype it can be notified to an operator by sending a manage signal to the Arduino which in return activates the buzzer. Hence the buzzer is heard and then the operator can land the quadcopter for refilling.

5. ADVANTAGES

1. Much less fuel intake.
2. Rate of productivity visibly increased
3. Ultra-low volumes spraying techniques avoid waste of water and floor waters contamination.
4. Much less noise pollution.

5. Also, reduce the hazard of a chance of respiration problems.
6. No risk for the operator because of low operating altitude.
7. Multirole frame.
8. By using the Bluetooth module we can paintings for distance on the sector in any atmosphere.
9. Farmer's don't need to go in the subject because robots do their paintings well and effectively.

6. FUTURE UP-GRADATION

1. Wireless Camera:

It is useful for clicking pictures and videos of plants.

2. GSM Module -

To indicate that pesticide in the tank is has been finished.

3. BLDC:

Weight lifting capacity of the quadcopter can be increased.

4. Solar Panel:

It can be instantly charge using solar energy and it also reduces the cost of the battery.

5. Tank Size:

Insecticide carrying volume can be increased by increasing the size of the tank.

7. RESULTS

The spraying time of insecticides is depending on the quantity of pesticide to be sprayed. For example, for a thousand ml of insecticides, spraying time is around five mins.

If we want to grow the amount of pesticide to be sprayed, the burden lifting capability of the quadcopter must be elevated. This is achieved through deciding on the higher specification of BLDC i.e. Greater than one thousand rpm/kV.

The flight time of the quadcopter is near approximately eight minutes. To boom the flight time we need to choose better specification for LiPO^[4] battery.

The height of spraying is 6-7 toes. The place protected is 10 x 10 toes. The biggest gain of the drone is that it's miles customizable according to the requirement. The drone may also be useful to spray now not best fertilizers and pesticides however also can be used to spray paints, display fields with the help of Wi-Fi digital camera too.

8. CONCLUSION

The predominant advantage of this paper is that our drone can be useful for farmers in spraying fertilizers, pesticides and crop safety merchandise while being controlled by way of a single man or woman working from a secure and secure region. The sprayer we've got integrated also can vary the amount of spray by various the rate of a servo motor. Presently, the drone we've got evolved is for spraying crop protection merchandise best but there is a lot of destiny scope for this idea along with crop surveillance for monitoring the health of the farm from a safe area.

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