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Design and Fabrication of Pesticides Spraying Drone for Agriculture

Prof. Rohini Pochhi , [1]Shubham Sanjay Jaisingpure , [2]Kunal Eknath Charde , [3]Pravin Motilal Patle , [4]Mamta Giridhar Radke , 5Ankita Bhojraj Gate

Project Guide, Department of Electronics Engineering, Tulsiramji Gaikwad Patil College of Engineering and Technology, Nagpur.

Students Name, Department of Electronics Engineering, Tulsiramji Gaikwad Patil College of Engineering and Technology, Nagpur.

Abstract –

There are many technologies involved in modern Agriculture, where spraying with pesticides using drones is one of the emerging technologies. Spraying with personal insecticide causes many harmful effects on the workers involved in the spraying program. Exposure effects can range from mild skin irritation to birth defects, tumors, genetic mutations, blood and nerve disorders, endocrine disorders, dehydration or death. The WHO (World Health Organization) estimated that as many as one million infected cases were sprayed with insecticides on the plant. This explored the design of a non-aircraft aircraft fitted with a 12 V sprayer, a 0.50 Gm Liter storage tank, 4 microphones for atomize with a good spray, an octocopter stop frame, a suitable seating frame, 8 m - Brushless Direct Current (BLDC) has suitable propellers to produce the required thrust of about 38.2 KG (100% RPM) and a suitable Lithium-Polymer (LI-PO) battery with a current capacity of 22000 mAh and 22.2 V to meet the required current requirements and voltage. The First-Person View (FPV) camera and transmitter can be adjusted and wireless to monitor the spraying process and monitor pest infestation on plants. This pesticide spray drone reduces the time, number of workers and the cost of installing a pesticide. This type of drone can also be used to spray disinfectant on buildings, bodies of water and in densely populated areas by altering the flow of pump discharge.

Key Words: Drone, Agriculture, Payload, Sensors, Pump, Spray etc.

1. Introduction

India is an agricultural-based country, where more than 50% of the population relies on the agricultural sector. Population growth leads to improved productivity and the level of agricultural protection. Insects often damage plants, reducing production and killing them by using other pesticides. Often, the agricultural field suffers losses due to plant diseases. Pesticides and fertilizers are an important part of pesticides and plant growth. Spraying with hand pesticides, as well as fertilizers affects people leading to cancer, allergies, asthma, and other diseases. Therefore, automatic control of fertilizer spray, and crop monitoring can be done with a quadcopter, which is used for many programs such as search and rescue, Hazmat, police, code testing, Emergency Management, fire. Additional benefits of quadrotor are flexibility, increased charge, higher lift capacity and stability. Control of the quad copter is easier than other aircraft. Quad copter is used in dangerous areas and is used indoors and outdoors. It contains a universal sprayer that spray liquid and solid content. The global pipeline sprays both pesticides and fertilizers but a pressure pump is used for pesticide spraying, and it has not been used for fertilizer spray. GPS can be used to automatically steer the quad copter and remotely control over large areas. The quad copter controlled by automatic control and paid upload is controlled by RF Transmitter and motors. Figure 1 shows a diagram for crop monitoring using a UAV.

Fig 1. Crop monitoring using UAV

In the current year crop health monitoring is an important role in the agricultural sector. Diseases can be detected by UAV mounted on camera (Uncontrolled Air Vehicle). The UAV controlled by Transmitter Channel contains mode1 and mode 2.Crops should be monitored intelligently using the raspberry pi. Various plant diseases and injuries are identified by a camera mounted on a UAV. After crop protection, it is discontinued to apply fertilizers and pesticides based on crop damage. Our approach to developing this approach in the Indian agricultural sector tends to increase crop protection and productivity and

improve plant growth in fertilizer spray and pesticides based on crop damage.

2. Related Work

Shilpa Kedari et al [6] proposed a less expensive, less expensive Quadcopter (QC) system. The quadcopter is also known as the Unmanned Aerial Vehicle (UAV). These quadcopters are small, and the system can be used for indoor and outdoor plants. Quadcopter is an independent aircraft spraying spray and fertilizer using an android device. Between quadcopter and android device connectivity is made a Bluetooth device in real-time operation. This program is used to reduce the problems associated with the agricultural sector, and to increase agricultural productivity.

S.Sabikan et al [14] used the USP platform used to upgrade the autonomous Remotely Piloted Vehicle (RPV) quadcopter to fit any application. Improvements to the configuration of the quadcopter test bed, which is capable of performing independent aircraft work are presented in this paper. It is a simple, quick, and effective way to build a quadcopter test bed for any research purposes. Among the many Open Source Project (OSP) Arducopter platforms are considered and the basic functions of each component of both software and hardware are described in detail. The Unrestricted Source Project platform is the most effective method due to the flexibility of both hardware and software. This improved module was tested in the outer space to test the basic features of aircraft operation, to calculate parameters such as altitude and attitude, trajectory map production. Finally, the USP quadcopter platform is a complete quadrotor framework developed for any external application or research application.

Sadhana B et al [15] proceeded to upgrade the above routes and developed a quadcopter UAV and a simple shower module for pesticide spraying in the agricultural sector to increase production and protection equipment. The total cost of this project quad copter lift weighs 1 kg and is used to spray the pesticide from the ground as shown in Figure 2. This quadcopter is controlled by Arduino UNO AT mega328 and Brushless Direct Current (BLDC), Electronic speed control (ESC).), MPU-6050 combining MEMS accelerometer and MEMS gyro on one chip, Radio receiver, LIPO battery and pesticide spray module.

Fig 2: Pesticide spraying mechanism

Munmun Ghosal et al [5] developed a tracking system where air pollution is detected by a GPS module to determine longitude and latitude. This system monitors data using various sensors such as temperature sensor (LM35), humidity sensor (AM1001), MQ6 smoke, MQ135 CO2, LDR light intensity, and GPS L80 for location tracking and Arduino board control. Factors considered are smoke, CO2, temperature, light intensity and humidity. The air quality indicator is monitored and displayed on a web server using an Apache server to determine the location where the contamination is noticeable and can be managed before a dangerous situation arises. It is a low cost and a more efficient model, therefore, can be concluded which can be used to monitor the spirit of small application.

Yallappa D et al [20] developed a six-dimensional BLDC drum spray mounted on a hexa-copter frame to increase the charging capacity of 5 kg, LiPo (Lithium polymer) batteries, pesticide tank, pump, and supporting frame. The total weight of the spray installed on the drone is calculated based on parameters such as charge capacity, supporting frame design, seat gear, liquid tank design, selection engines, battery, propeller, aircraft controller, transmitter and receiver. This spray is very useful for spraying chemicals on rice fields and field crops that reduce the cost of pesticide application and pollution Further analysis is done regarding the emission and stress level of the pesticides to determine how much fertilizer is sprayed. to ensure that it sprays all over the plants. This method works because the human intervention in chemical spraying is reduced. Fig. 3 shows a non-flying aircraft developed by the above method of spraying the plants.

It will explain the research of the selected project and explain the history of go kart. It will update the basic components of the system itself.

The AGRICULTURE DRONE project required extensive research on UAVs and several equipment, and similar programs. By reviewing the work of others, we have used this understanding to improve our system. To date, research papers from different quadrotor groups have been used as guidelines in the early development of dynamics theory and control.

3. Motivation

- The inspiration for this project is Pesticide spray drones and sanitizer, these are the first drones that made us think of making a useful vehicle and planting seeds.
- Farmers have now started using drones for spraying with pesticides.
- This makes it easier for farmers as they just have to plan the aircraft without flying and leave the plane over the field with the pre-defined patterns to cover a large area with pesticide this is a quick and effective way to

spray pesticides and it is safe as the farmer does not inhale toxic fumes.

4. Objective

- The goal of our project is to design, use, and test a stable flying FARMING AGRICULTURE that can be used for Seed Sowing. With this we can build a low-cost tool that will be used for agricultural purposes especially in planting. By this we can reduce the working time of the agricultural field for the purpose of planting.

The final design of the AGRICULTURE ROBOT had to meet the following features:

• THE AGRICULTURAL ROBE must be able to fly and land in a stable manner.
• Seed sowing process should be done thoroughly.
• The alignment of the quadcopter with the seed system should be done without imperfection.

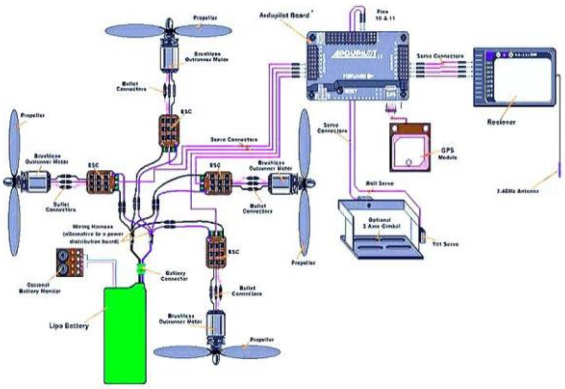
- Available system

• QUEENSLAND agricultural workers will now be able to use automatons to broadcast plans after a review of the law to catch renaming. Acting agricultural professor Bill Byrne said the new system would be particularly useful in using chemicals in areas where people could not get in or a problem area [3].

- Aerial Sprayer

• Aircraft spray is another type of spray that benefits farmers with large farms. This method of farming is not the same as farmers with small and medium-sized households. With a splash in the air the bath is completed with the help of a small helicopter controlled by the remote. In that spray it is mixed with a lot of powder and then sprayed on the roof from a certain height [3].

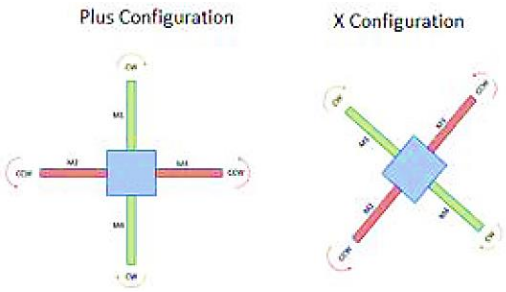
5. Functional Diagram



6. Working

- Named our project DRONE WITH PESTICIDES AND SANITIZER SPRAYER which is a combination of Quadcopter and Seed System, we have adapted the sowing system to a fixed X quadcopter. The combination of these two machines therefore results in the formation of our SPRAYER.
- Now a brief description of the Quadcopter and Seeding System A quadcopter called a quad rotor helicopter or quad rotor is a multi rotor helicopter that is propelled and propelled by four wheels. Quadcopters are named rotor makers, instead of flying machines of suspended wings, due to the fact that their lifting is due to the rotation of the rotors.
- In a quad copter, two propellers turn one way (clockwise) and the other two turn the other (opposite the clock) and this gives the machine the ability to float in a steady motion. From the outset the engines we used have a clear reason to respond to the propeller. Engines are measured in kilograms volts, the higher the kV level, the higher the engine turns at a constant voltage. Next up Electric Speed controller or ESC is the one that advises engines to turn quickly at any time.

Over the past few years we have seen a tremendous growth in the construction and sales of remote-controlled aircraft carriers known as Quadcopters. These Invisible Aerial Vehicles have four arms and a fixed pitch propeller set in the X or + X configuration which is the preferred configuration.



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Quadcopter Configurations

They are sometimes called Drones, Quadrotors or Quadro copter. In normal format two propellers will rotate in a clockwise direction with the other two spinning in opposite directions that allow the ship to hover straight, float in the air and fly in a designated way. The Quadcopter is a simple format with very few moving parts and has quickly become a car for remote control lovers and is widely used as an effective aerial photography platform. Most Quadcopters were originally made up of hobbyists who understood the simplicity of a car. By adding four motors and four propellers

to a simple wooden frame, carbon fiber, or fiberglass and connecting it to a remote control transmitter with a small control board fitted with a gyroscopic stabilization system and connected to a Lippo battery these systems were limited. easy to build. Exploration has led to the development of Quadcopter diversity using the various weapons we have seen Tri-copter, Hex-copter and Octocopter (eight-arm). Other configurations include the V-tail and the H-frame variant.

7. Components Details

HJ450 Frame

- This is a very simple glass fiber quadcopter frame and easy to build frame This Flame wheel is one of the best known outside frames for many good reasons:
- It is less expensive
- It lasts a long time in popularity.

Electronic Speed Controller (Fig. ESC-30A)

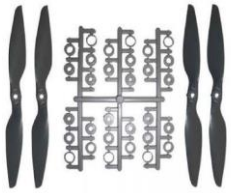
- Electronic speed control, or ESC, is what tells engines how fast they turn at any given time. You need four ESC quadcopter, one connected to each engine. ESCs are then connected directly to the battery using a cable harness or power distribution board.

Brushless DC Motor

- Brushless DC electric motor (BLDC motors, BL motors) also known as electronic commutated motors (ECMs, EC motors) synchronous motors are powered by a DC power source through an inverter / switching generator, generating signal AC power. driving a car.

Propeller

- In this quadcopter project, there is a need for two types of propeller to require the purpose of flight. A pair of clock operators (CW) and anticlockwise (ACW) are required. Care should be taken when completing the propeller. A propeller is a type of fan that transmits energy by converting circular motion into a thrust.



Flight Controller

- KK2.1.5 is the next major version of the first generation KK flight control boards. KK2.1.5 was built from the ground up to deliver a multi-rotor aircraft for everyone, not just professionals. LCD screen and built-in software make installation and setup easier than ever. A wide variety of handicrafts with lots of ash are introduced first, just choose your art type, check the design of the car / propeller, and measure your ESCs and radios.

FLYSKY Transmitter and Receiver

- The FLYSKY Transmitter and Receiver we use is a CT6B with 6 channels. Requires PC to change channel dynamics, servo mixing and deceleration. The radio transmitter and receiver lets you control the quadcopter.

LiPo Battery

- Quadcopters typically use LiPo batteries that come in a variety of sizes and configurations. We usually use 3S1P batteries, which display 3 cells in conjunction. Each cell is 3.7 volts, so this battery is rated at 11.1 volts.

8. Result Analysis

• The upgraded drone is more efficient and robust in nature compared to its predecessor. It can fly in different places and in different climates. The great advantage of the drone is that it is customized according to need.
Airless airplane will also be useful for spraying not only fertilizer and pesticides but can also be used to spray paint, monitor fields with the help of RADIO TRANSMITTER. To ensure the highest quality product, drawings and characters MUST be computerized or drawn using Indian ink.

9. Future Scope

• Quadcopter weight lifting capacity can be increased by increasing the number of engines or by increasing propeller size or by increasing engine rpm.
• Flight time can be extended by increasing the battery capacity.
• The capacity of the pesticide can be increased by increasing the size of the tank.
• A large area can be covered using a series of microphones that can be arranged in an orderly fashion.
• Spraying angle can be controlled for proper spraying.

10. Advantages

• Safety: protect farmers from pesticide damage, toxic poisoning and heat shock;
• High efficiency: can spray 50-100 hectares per day, 30 times more than the traditional spraying method;
• Environmental protection: can spray pesticides on a stable and focused area, reduce water and soil pollution;
• Pesticide protection: high level of atomization, chemical fog can be suppressed at all levels of the crop, can save more than 30 percent of pesticides;
• Water saving: can use low-volume spraying technology, water consumption is only 10% of the traditional spraying method;
• Low cost: cost is only 1/30 of traditional spraying.

11. Disadvantages

Flight Time and Flight Area :

• There are problems with the use of drones in agriculture. Most agricultural drones have a short flight time, between 20 minutes and an hour. This may not work in monitoring a large acreage. The flight distance also limits the radius that can be covered each time of flight. Drones designed to monitor long flight and long range are relatively expensive.

Heavy Cost for Good Feature Drones :

• Well-designed yellow aircraft with features that make them suitable for agricultural use are very expensive. This is mainly to repair wing drones that can cost up to $ 25000 (Precision Hawk's Lancaster). For some agricultural drones, heavy costs include hardware, software, data editing, tools and thinking sensors.

12. Conclusion

In this project we have designed DRONE WITH PESTICIDES SPRAYER which is an unmanned aircraft-based aircraft (UAVs) and a Seeding System that can be hired to operate an agricultural use loop loop where the drone is sprayed with pesticide spray and Sanitizer spray to sow seeds. Here we can reduce people's efforts not so much but a certain amount. This will help to make the planting work done in the agricultural sector in a shorter period of time. This will reduce labor costs and also make the work more efficient. This is fully utilized by the radio transmitter and receiver because of the signal.

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