Intelligent Pesticide Spraying System using Quad Copter

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Abstract— Traditionally pesticides are sprayed in agriculture manually so this kind of system literally harms the humans and lead to many serious health issues. So there should be a method to reduce this kind of backdrops. This paper concentrates on overcoming the backdrops of traditional pesticide spraying system using drones. This paper concentrates spraying the pesticide using drones. They are called rotorcrafts because it work's with a set of revolving twisted chord aerofoil's. The quadcopter is getting more excessively used due to many reasons such as Easy to build and assemble, complexity is less. Generally, in most of the cases, drones are used in Transporting objects, military, spying, educational use, rescue etc.

Keywords— Pesticide Spraying Quadcopter(PSQ),Spraying Kit(SK),Surveillance Camera(SC) ,Quad Copter(QC)

I. INTRODUCTION

The existing system to reduce the impact of fire is the Water sprinklers, fire fighting robots and extinguishers.Generally this is done by using some typical optical detectors That can detect the senses the fire place and pass on the Information and by using thermo switch, thermo couple and Tubular type. Automatic fire fighting area unit is used to Prevent the fire place but the extinguisher does not seem to Reach the required potential. The thermostat sensors present in The FFR senses the fire place but it have to be ready to build a Correct vary for sensing a fireplace. The drawbacks in existed system can be overcome by using drone to spray the pesticide. In this system it consists of a Quad copter with a small bottle which carries pesticide in it and surveillance camera that can be used to check the condition of field.

Generally fire fighting is done by humans and fire equipments which are operated manually. This system will not work to find the victims are there in that situation and practically it is not easy for a human to enter into the hazard place and find the victims so PSQ is the best solution to find out the victims and also to control the fire. This paper explains the components that are to be used to build a drone, designing the drone using AutoCAD, assembling, operation, forces acting on a quad copter and firefighting equipment. This is designed to use in very extreme temperature conditions and all this will be controlled at the ground station manually.

At present the firefighters crawl into the buildings and look for survivors using the FLIR (Thermal imaging infrared cameras) and finding out the victims manually by putting their lives at risk. The drone is used to find out the victims in the hazard and find out the hotspots. This helps to reduce the loss of lives of firefighters. This can be enabled by operating the drone who can navigate through the building quickly without any fear of crashing it to anything.

II. PROPOSED SYSTEM

This projects aims to overcome the ill effects of the pesticides on human beings and also used to spray pesticide over large areas in short interval of time compared to conventional spraying by using an automated aerial pesticide sprayer. This device is basically a combination of spraying mechanism on a quad copter frame.

Fig 1-Proposed System

A. COMPONENTS SPECIFICATIONS:

Frame:

The frame used in the QC, is made of four aluminum drilled rods with square cross-section in order to fit the motors on it and two center wooden plates. The frame has its weight about 180g; the weight mostly depends upon the type of metal that is selected to build a frame. The spacing between the centers of two mounted motors is 60cm and from the centre of gravity is 30cm.The microprocessors and flight controllers can be mounted on a plate that fits over middle section of the frame.

Fig 2.quad frame

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The propellers to design this FFD are in the rotates in either clockwise or anti clock wise in direction

Motors:

The selected motor is A2212/10T. The specification of the selected motor is

- 1400KV UAV brushless motor
- Ideal to work with 30A ESC(Electronic speed control)
- Efficiency current (maximum): 6-12A (>75%)
- Current (no load): 0.7A

The selection of the motor depends on the weight that has to be carried by it. The QD weight would easily produce an unstable flight and therefore the control algorithm has to be accurate. The amount of rpm per volt depends upon the QD weight and size.

Fig 3.Motor mounted

ESC (Electronic Speed Control):

The required ESC needed to run the motor is 30A.The modes of electronic speed control depends on the aerial platform used and a throttle range that can be programmed and compatible with all transmitters available in the market. It weight's about 25g has lot of uses such as superior current endurance, protection features.

Transceiver:

There are two types of transmitters which are used to transmit signals that can be either analog or digital.

1. Analog transmitter.
2. Digital transmitter.

With no lag between your drone and the transmitter, you can fully push your quad copter to its limits. A receiver is the opposite of transmitter. Transmitter transmits the signal by receiving it from source wirelessly. Whereas the receiver receives this wireless signal and passes it to the device. R16SCAN is used as a receiver here

Fig 4.Transreciever

Battery:

The battery is LiPo battery (Lithium Polymer) i.e. rechargeable batteries and has great life cycle degradation rate. The selection of the battery depends on the capacity and battery discharge rate. In order to get the best lifetime and performance the choosing of battery plays a crucial role. The battery selection also depends on the size of the drone, no of motors and the type.

PID Micro controller:

The microcontroller selection depends upon the functionality of the drone. The parameters that are to be considered while selecting the microcontroller are expandability and full programmability. This is the ideal flight controller for your rotor aircraft. The PID microcontroller is the acronym of Proportional Integral Derivative Controller is most commonly used for quad copter stabilization & its control. It consumes less power So the flight time increases proportionally.

Flight Controller:

Flight Controller gives stabilization and controls all the multi rotors. It consists of a circuit board with build in sensors that detect orientation changes. It receives commands from the user & controls the motors in order stabilize the quad copter in air

Fig 5.Flight Controller

B. SOFTWARE DESIGN IMPLEMENTATION & RESULTS

Software implementation of QD using CAD CAM in Solid Works Software.

Step 1: Developing the X-frame

Step 2: Adjust the top, right and front plane.

Step 3: cut the Extruders

Step 4: X frame arm

Select the frame arm material is low gloss plastic

Step 4: Design the battery.

Step 5: Design the spinner.

Step 6: Design electrical connector.

Step 7: Design the piller.

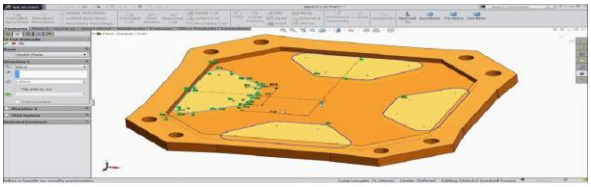
Step 8: Design the fan.

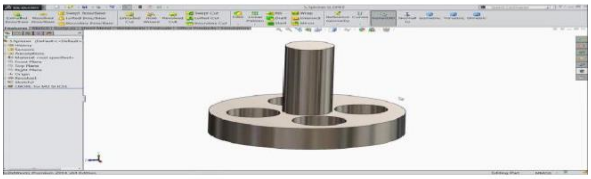
Step 9: Design the motor.

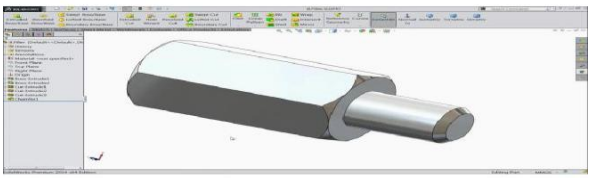
Step 10: Design the Power distribution board.

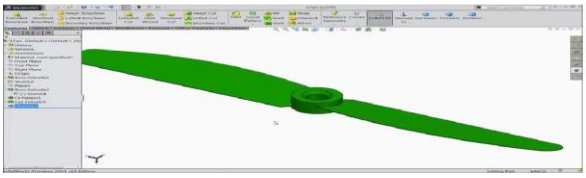
Step 11: Constructing electrical units.

Step 12: Assemble all the designed components on the base plane.

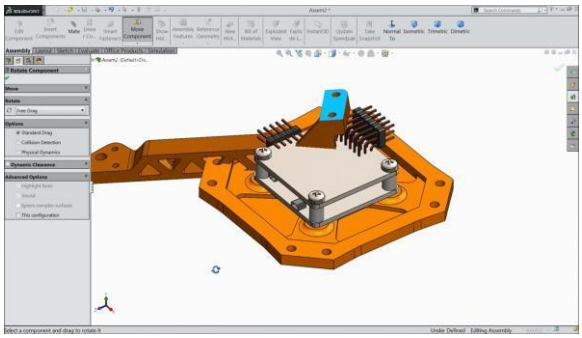




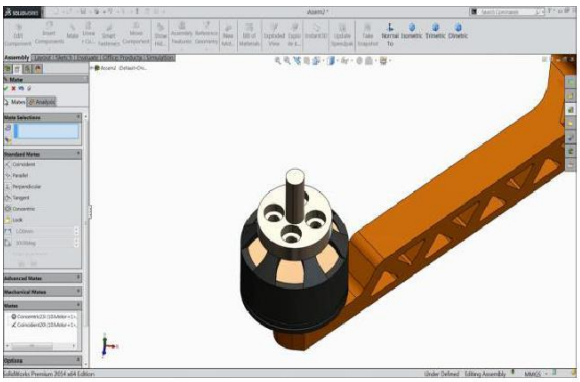


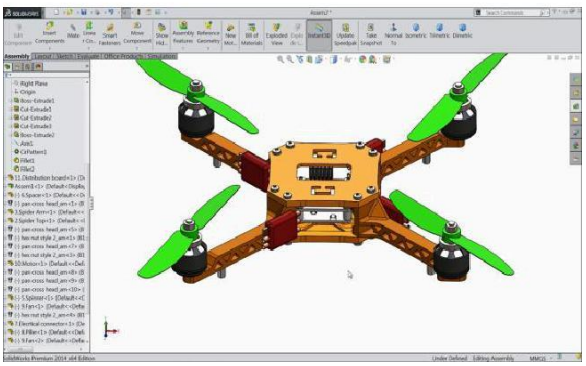


Fixing the arms to the base

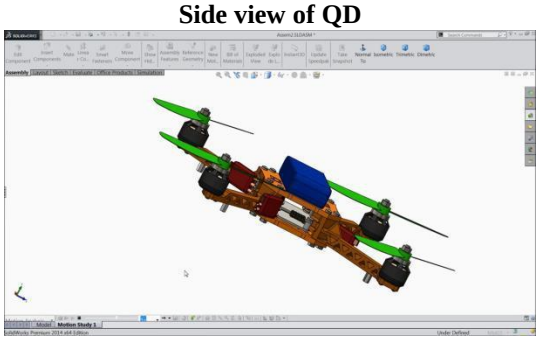


Mounting motors on the arms





Side view of QD



C. HARDWARE IMPLEMENTATION:

Considering all the above specifications QD can be designed by following the below steps:

Step 1: Assembly of QD frame

Arms are screwed on the bottom plate of the frame first then flip the frame and start screwing on the top plate. Now mount the plates for the motors.

Step 2: Mounting the motors & speed controllers:

Mount the motors on the mounting plates with facing inwards by using hex screws. Solder the ESC's on power distribution board.

Step 3: Mounting the electronics

Fix all the ESC's & power distribution board to the frame and connect all the ESC's to the corresponding motors. Step 4: Flight Controller setup

Mount the flight controller board on the top of the frame. Now remove the red wires from ESC's except from one ESC because flight controller needs power from only one of the ESC.

Step 5: Configuring the Brain

Dump the code into the flight controller & follow the corresponding control mode to balance the QD.

III. CONCLUSION

This new concept of PSQ provides affective spraying of pesticide can be achieved. By this PSQ the effect of highly toxins which are present in the pesticides may harm the human by using this problem can be prevented. The PSQ is used where there are fewer labours to find. One can hasten the pesticide spraying process and cover large area in short time. Encounters with venomous snakes, which can be found regularly in fields can be prevented. As spraying is done from lower altitude, environmental pollution can be reduced.

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