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# DESIGN AND CALIBRATION OF SMART AGRICULTURE PESTICIDES SPRAYING DRONE

A. Sindhuja[1], Dr.D.Lakshmaiah[2],D.Karthik Reddy[3], G.Varun Goud[4], G.Poojitha[5], D.Pravallika[6]
[1] Assistant Professor, Sri Indu Institute of Engineering & Technology, Hyderabad.
[2]Professor& Head of Dept., Dept. of H&S, Sri Indu Institute of Engineering & Technology.
[3-6]Student,Dept. of ECE, Sri Indu Institute of Engineering & Technology, Hyderabad.

**Abstract—** The world population has increases day by day and projected to reach 9 billion people by 2050, so that the agricultural consumption will also increase. There is extreme need to fulfil, the food demand of each and every person. Agriculture sector is most promising sector, dealing with the lot of problems now a day's one of the main problems labour unavailability for farming. Other problems or difficulties are extreme weather events, inadequate amount and inefficient application of fertilizer, infection, diseases, allergies and other health problems due to chemical application. The main aim of our project is to highlight the importance of drones in agriculture and to reduce cost efficiency and to save the human life from snake bites and from sunstroke. Agriculture and allied sectors are the most crucial sectors of the Indian economy, but agriculture sector is facing lot of difficulties now-a-days one of the main reasons include unavailability of labour for the farming processes. Other reasons are prone to chemicals, unwanted diseases caused by insect/animal bite. The drone will be helpful in spraying fertilizers, pesticides and crop protection products while being controlled by a single person operating from a safe area.

## 1. INTRODUCTION:

In India, Agriculture is a major sector of our economy but still it is far short of western countries when it comes to adapting latesttechnologies for better farm output. Farmers in developed world have started using agricultural drones equipped with cameras to improve the process of crop treatment.

Agriculture in India constitutes more than 60% of occupation. It serves to be the backbone of Indian economy. It is very essential to improve the productivity and efficiency of agriculture by providing safe cultivation of the farmer. The various operations like spraying of pesticides and sprinkling fertilizer are very important.

Though spraying of pesticides has become mandatory it also proves to be a harmful procedure for the farmers. Farmers especially when they spray urea, take to many precautions like wearing appropriate outfit masks and gloves.

It will avoid any harmful effect on the farmers. Avoiding the pesticides is also not completely possible as the required result has to be met. Hence fore, use of drones in such cases gives the best of the solutions for this type of problems, along with the required productivity and efficiency of the A quad copter, is unique design of UAVs which has four rotors in their model. The lift of quad copter is generated by these rotors. In four rotors, the two opposite rotors are turn in clockwise direction (CW) and the other two turn in counter clockwise direction (CCW).The application of pesticides and fertilizers in agricultural areas is of prime importance for

crop yields. The use of aircrafts is becoming increasingly in carrying out this task mainly because of education in cultivated land, labour. Shortage, unscientific and out-dated method. Manual spraying of pesticides and fertilizers are mainly responsible for the increase in the number of chronic diseases. The potential health effects of pesticides include asthma, allergies, and hypersensitivity, and pesticide exposure is also linked with cancer, hormone disruption,

and problems with reproduction and fatal development. However, some factors may reduce the yield, or even cause damage (e.g. crop areas not covered in the spraying process, overlapping spraying of crop areas, applying pesticides on the outer edge of the crop). Climatic condition, such as the intensity and direction of the wind while spraying add further complexity to the control problem

**METHODOLOGY:**

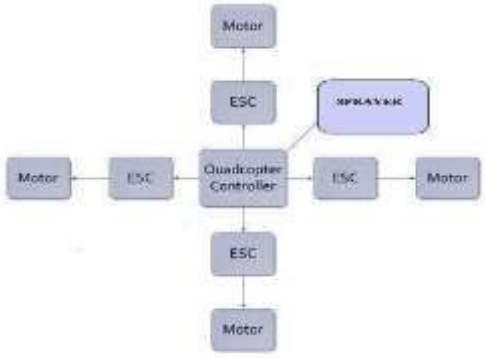
The flight controller is the main board in the UAV is embedded with the most advanced firmware and responsible for the actual flight. Flight controller controls lot of things simultaneously during the flight or UAV. It built with a micro controller and communicates to the four brushless motors. BLDC motor connect with the rotors in directions of the UAV configuration model. These BLDC motors are controlled by the Electronic Speed controllers (ESC).

**EXPERIMENTAL**

Computer aided design (CAD) (Catia v5 R20) was used to design and develop a drone frame for the drone plastic material was used as the frame material because of its light weigh. Six 1120 mm. long, square plastic profiles with the dimensions of

10 x 10 x 1 mm were used. Two sheets of hexagonal plastic plates with an edge length of 300 mm and a thickness of 2 mm were used. The chassis of the drone had four legs made of twisting

10 mm diameter aluminum pipe profiler. The height of the frame is 400 mm (Figure 1). A 1.5- liter capacity this paper, we describe an architecture based on unmanned aerial vehicles (UAVs) which can be employed to implement a control loop for agricultural applications where UAVs are responsible for spraying chemicals on crops [1]. The process of applying the

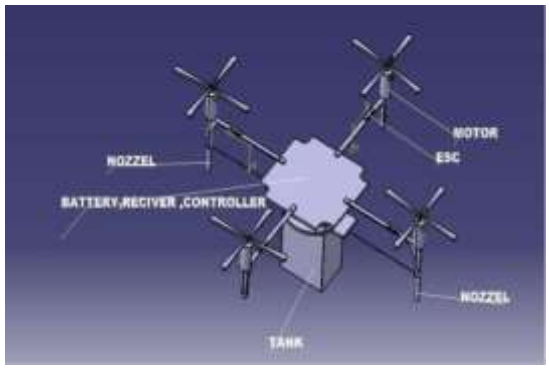



chemicals is controlled by means of the feedback obtained from the wireless sensor network (WSN).

**Fig 1.Methodology**

The aim of this solution is to support short delays in the control loop so that the spraying UAV can process the information from the sensors. Moreover, we evaluate the impact of the number of communication messages between the UAV and minimize the burden of the farmer in spraying. Plastic tank was mounted under the drone frame. A 12 VDC electric pump was used for the spraying. features. First of all, frame arms are positioned and assembled. Next, the electronic and flight controller, electronic speed controllers (ESCs), motors, battery and the pesticide storage tank were assembled (Figure 3). After the assembly process, the system was equipped with two arms at the rear in the direction of spraying nozzles.

**Fig** 2: 3D model of Drone




## THE HARDWARE SYSTEM COMPONENTS:

1. **Plastic Frame:** Most commercial RC drones that you buy today come with plastic frames. 3D printed molded plastic frames have become an incredibly popular amongst DIY drone enthusiasts. Electronic Speed Controller's:An electronic speed control or ESC is an electronic circuit that controls and regulates the speed of an electric motor. It may also provide reversing of the motor and dynamic braking. Miniature electronic speed controls are used in electrically powered radio controlled models. Full- size electric vehicles also have systems to control the speed of their drive motors.

2. **Dc pump:** DC powered pumps use direct current from motor, battery, or solar power to move fluid in a variety of ways. Motorized pumps typically operate on 6, 12, 24, or 32 volts of DC power. Solar-powered DC pumps use photovoltaic(PV) panels with solar cells that produce direct current when exposed to sunlight.

3. **Nozzle:** A spray nozzle is a precision device that facilitates dispersion of liquid into a spray. Nozzles are used for three purposes: to distribute a liquid over an area, to increase liquid surface area, and create impact force on a solid surface. A wide variety of spray nozzle applications use a number of spray characteristics to describe the spray.

4. **Pesticide tank :** A spray tank is a container for storing spray liquid like fertilizers and pesticides. We make spray tanks from food grade material. The Tanks are of heavy weight and can be produced on demand in various colours.

Motors: Practically all the latest drones use a brushless electric ―out runner: type, which is more. Reliable, and quieter than a brushed motor.

Motor design is important. More efficient motors save battery life and give the owner more flying time which is what every pilot wants.

**5.Motor Mount:** Sometimes built into combination fittings with landings struts or can be part of the UAV frame.

## CONCLUSION:

In this paper we have described an architecture based on unmanned drone that can be employed to implement a control loop for agricultural applications where drone are responsible for spraying chemicals on crops. The process of applying the chemicals is controlled by means of the feedback from the wireless sensors network deployed at ground level on the crop field. Furthermore, we have evaluated an algorithm to adjust the drone route under changes in the wind (intensity direction ) and the impact to the related number of messages exchanged between the drone and the WSN. However precision agriculture is about to know a further progress and drone will play a crucial role. Important savings(20% - 90%) in terms of water, chemical treatments and labor are expected. Flight regulations are an issue but drone, for most agriculture applications, have low weight and fly at low altitudes over uninhabited and private areas.

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of Agricultural Engineering, University of Agricultural Science, Raichur – 584104, Karnataka, INDIA

2. S. Meivel M.E, Assistant Professor, Jay Shriram Group of Institutions,Tirupur, India meivel.embsys@gmail.com

3. Dr. R. Maguteeswaran Ph.D, Principal, Jay Shriram Group of Institutions, Tirupur, India principal@jayshriram.edu.in.

4. N. Gandhiraj B.E, PG Student of ME, Jay Shriram Group of Institutions, Tirupur, India gandhi.covai@gmail.com

5.S.R. Kurkute1, B. D. Deore2, Payal Kasar3, Megha Bhamare4, Mayuri Sahane51, 2 Assistant Professor, Department of E&TC, SIEM, Nashik,

India3, 4, 5 Student, Department of E&TC, SIEM,Nashik, India.

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