



FABRICATION OF QUADCOPTERFOR AGRICULTURAL SPRAYING

**Suman Pandipati; K. Rakesh; L. Mahesh Kumar;
P. J. V. Lokesh; Y. Jeevan; Roopsandeep Bammidi**

Department of Mechanical Engineering, Aditya Institute of Technology and Management (A), Tekkali, India, 532201

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Abstract: Unmanned aerial vehicles (UAVs) are being used more frequently for agricultural spraying as a result of their effectiveness and precision. This project involved building a quadcopter without sensors, cameras, or GPS for agricultural spraying. The quadcopter was created to rapidly and effectively cover a sizable amount of agricultural land, while also minimizing the usage of pesticides and the impact on the environment. The quadcopter's frame, which was made of lightweight materials to give strength and durability while minimizing the aircraft's overall weight, was used in its construction. The quadcopter's frame was made to accommodate four brushless motors, each of which had a propeller to give lift and movement. Four electronic speed controllers (ESCs) were used to control the motors' rotational speed and direction. The high-capacity lithium-polymer (LiPo) battery used by the quadcopter has sufficient power to run the motors and spraying system continuously. A tank, a pump that pressurized the liquid, and a nozzle that released the pressurized liquid over the crops as a fine mist made up the spraying system. A KK 2.1.5 circuit board served as the foundation for the flight control system, which was wired to the battery, four ESCs, and other components. The quadcopter's circuit board was configured to retain its position and altitude while flying steadily. Additionally, it provided buttons and an LCD panel for the user to use to change flying characteristics including the throttle, pitch, and roll. A handheld radio transmitter that interacted with a quadcopter receiver was used to control the aircraft.

Keywords: Agricultural Spraying, Drone, Quadcopter, Spraying system, UAV (Unmanned Aerial Vehicle).

I. Introduction

The aim of this paper is to design the drone that is unmanned aerial vehicle (UAV) for agricultural purpose for spraying pesticides. In India agriculture is the huge sector. But now a days it's facing a lot of problems due to non-using of modern techniques [1]. 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 [2]. The design of a drone mounted spraying mechanism for Agricultural purpose and for spraying disinfectants. This method of spraying pesticides on Agricultural fields reduces the number of labors, time, cost and the risk involved to the personnel involved in spraying the liquids [3]. In India, agriculture employs more than 60% of the workforce. It acts as the Indian economy's foundation. By giving farmers secure farming, agriculture can be improved in terms of productivity and efficiency. One of the most exciting developments to emerge in recent years is the unmanned aerial vehicle (UAV), generally known as the quadcopter. A WHO [World Health Organization] survey determined that up to 18,000 individuals per year, or roughly three million workers, perish from insect repellent. Our effort tries to lessen the effect of insect repellent on people and compares it to traditional methods



of spraying pesticides over a wide area in short bursts of time and employing automated fertilizer spraying. This device essentially groups the spray equipment into the frame of a quadcopter.

The major industry in India is agriculture. But since that it no longer employs modern methods, it has a number of issues. Farmers wear appropriate disguises and scarves and take several safety precautions, especially when spraying urea. So, there are no negative effects on the planters. Because they must achieve the desired outcome, it is also completely impossible to avoid pesticides. The risk provided by insects and animals, as well as chemical interaction with pesticides, are additional concerns. The drone shown in figure 1 can be used to spray insecticides and safeguard crops. One person can accomplish this by operating the UAV while keeping a safe distance between them. The farmer's time will be cut down, and it will also keep him or her safe. Countries all over the world have promoted the ideas of precision agriculture and smart agriculture, emphasizing the use of emerging technologies like robots to increase the production and sale of agricultural products. This is done to increase the production of staple foods and decrease the shortage of agricultural workers. UAVs are thought of as a new generation instrument for advancing smart agriculture and precision farming [4 - 7].



Fig. 1 Quadcopter

II. Methodology



The purpose of employing a quadcopter for agricultural spraying is to increase crop spraying efficiency and efficacy, resulting in improved crop yields, less chemical use, and minimal environmental impact. Quadcopters can spray more precisely and strategically, requiring less chemical and posing less of a risk of over spraying. This can raise the standard of the crops while lowering the chance of environmental harm. Quadcopter use can also save time and resources by swiftly and effectively covering wide areas, which reduces the quantity of labor needed for spraying. For farmers, this can result in higher output and lower expenses. Quadcopters can also lessen their negative effects on the environment by releasing less pollutants into the air and water. This could result in a more environmentally friendly method of farming and safeguard the wellbeing of both people and wildlife. By limiting the exposure to potentially toxic chemicals, the use of quadcopters for agricultural spraying can help create a safer working environment for farm workers. The overall goal of employing a quadcopter for agricultural spraying is to maximize the effectiveness and efficiency of crop spraying while minimizing the environmental impact and encouraging sustainable farming methods.

A quadcopter is a kind of unmanned aerial vehicle (UAV) used for agricultural spraying, which involves dousing crops with insecticides or fertilizers. The quadcopter is furnished with both a tank for storing the spray solution and a nozzle for spraying it on the crops. The quadcopter can effectively and swiftly cover huge rural regions when piloted remotely. A quadcopter used for agricultural spraying has a number of essential parts that must function properly. The quadcopter's spraying system comprises of a tank for storing the spray solution and a nozzle for applying it to the crops. The tank is often constructed of a strong, lightweight material like plastic or aluminum and has the capacity to contain a variety of spray solutions. The quadcopter's nozzle is placed underneath it and can be moved to spray crops at various angles and distances. A remote control device is used to control the quadcopter. The operator can control the quadcopter's motions and spraying system using the remote control device, which communicates with the quadcopter via radio signals. The quadcopter may be operated from a safe distance thanks to the remote control unit's normal range of several hundred feet. The energy required to run the quadcopter's motors is supplied by a rechargeable battery. The quadcopter's battery may typically be found inside the quadcopter's body and can be changed or refilled as necessary. Overall, using a quadcopter for agricultural spraying is very effective and can help farmers save time and money. Farmers may

guarantee that their crops receive the proper dosage of pesticide or fertilizer without wasting any extra solution by automating the spraying procedure. The quadcopter is a perfect tool for modern agriculture because it can rapidly and effectively cover enormous expanses of field and system block diagram shown in figure 2.

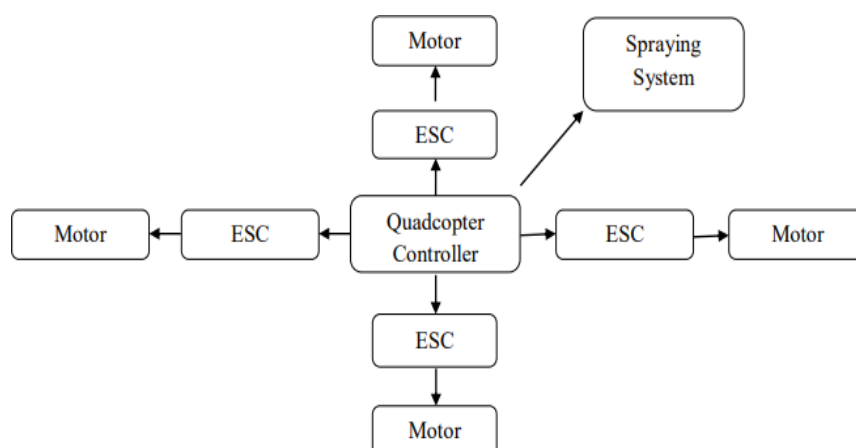


Fig. 2 Block diagram of the system

III. Results and Discussions

Successful application of the agricultural chemicals to the crops by the quadcopter. The spraying technique produced a high level of coverage by equally dispersing the chemicals across the test plot. Additionally, the quantity of chemicals sprayed was precise and consistent, which is essential for efficient agricultural spraying. Accessing challenging-to-reach places is one of the key benefits of employing a quadcopter for agricultural spraying. It can be challenging for ground-based spraying equipment to fly over uneven terrain and around obstructions like trees and buildings, but the quadcopter was able to do it. Additionally, the quadcopter made it



possible to apply the chemicals more precisely, resulting in less waste and ensuring that the crops received the proper dosage. The quadcopter's spraying performance was likewise impressive. When compared to conventional ground-based spraying techniques, the spraying process was completed substantially faster. This is because the quadcopter shown in figure 3 can efficiently and swiftly cover a big region. The outcomes of this experiment show the possibilities for spraying crops with a quadcopter. The quadcopter has a number of benefits over conventional ground-based spraying equipment, including better productivity, greater accuracy, and the capacity to reach regions that are difficult to access. The expense of employing a quadcopter for agricultural spraying is one of the biggest obstacles. The price of a quadcopter with a spraying system, as well as the costs of maintenance and repairs, might be high. However, employing a quadcopter for agricultural spraying may have long-term advantages that surpass the initial expenditures.



Fig. 3 Quadcopter with spraying system



IV. Conclusions

In conclusion, by combining all the components, we tend to produce a quadcopter that will be practical, affordable, and easy to operate so that farmers can use it for pesticide applications. Our quadcopter will be useful for farmers in spraying fertilizers, insecticides, and crop protection goods while being controlled by a single person working from a safe and secure area, which is the main benefit of this project. The servo motor speed in the sprayer we've integrated allows us to adjust the amount of spray as well. Currently, the quadcopter we've created is simply used to spray crop protection chemicals, but there are many potential uses for this concept in the future, such as crop surveillance to check on the health of the farm from a secure location. This project has plenty of possibility for more improvements in the future. To monitor moisture levels and temperature in agriculture fields as well as to detect numerous diseases that affect crops. Working in stormy, drenching weather and terrible conditions is a thermal camera.

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