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A DRONE FOR SPRAYING PESTICIDES, FERTILIZERS AND DISINFECTANTS

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Abstract : *Today's agriculture is too reliant on technology, and one of the emerging technologies is the use of drones to spray pesticides. The People Participating in the Spraying Procedure Have Many Negative Adverse Effects from Manual Pesticide Spraying. Slight skin irritation to birth defects, tumours, genetic changes, blood and nervous system disorders, endocrine disruption, coma, or death are just a few of the effects of exposure that can occur. The World Health Organization (WHO) estimated that manually applying pesticides to crop fields resulted in one million cases of illness. This paved the way for the development of a drone equipped with a spraying mechanism that has a 12 V pump, nozzles to atomize in fine spray, a quadcopter configuration frame, an appropriate landing frame, four brushless direct current (BLDC) motors with an appropriate propeller to produce the necessary thrust, and an appropriate lithium-polymer (LI-PO) battery that has a current capacity of 22000 MAH and 22.2 V to meet the necessary current and voltage requirements. The time, labour requirements, and expense of applying pesticides are reduced with this pesticide spraying drone. By altering the flow discharge of the pump, this type of drone may also be used to spray disinfectant liquids over structures, water bodies, and in densely populated areas.*

Keywords - *Flight Controller, Motors, Pesticides Spraying, Sanitization, Surveillance*

I. INTRODUCTION

Agriculture is India's most important industry, making up a shocking 18% of the nation's Gross Domestic Product (GDP) and employing 50% of all employees. Agriculture is crucial to the economy of our country, but it has not yet realised its full potential because of inefficient crop monitoring techniques, subpar irrigation systems, and the requirement for pesticides. In India, there are about 35 drone start-ups working to advance agriculture drone technology and reduce prices. The goal of this endeavor is to build an Unmanned Aircraft Vehicles (UAV) that can address this problem and quickly spray large amounts of insecticides.So, the primary goal of this project is to construct an agricultural drone for pesticide application. Agriculture relies heavily on the usage of pesticides, and doing so will be much simpler if intelligent devices like robots are used. The construction of a quad copter UAV spraying mechanism and surveillance system is discussed in this project. We also talk about the integration of the sprayer module with the quadcopter system in this project. The system under discussion entails creating a prototype using basic, affordable hardware such a BLDC motor, flight controller, ESC, camera module, spraying system, etc.

II. LITERATURE SURVEY

With this trial, Dongyan et al. (2015)[1] concluded that flight height causes the difference in swath range for M- 18B & Thrush 510G. Huang et al. (2015)[2] created a low volume sprayer that is integrated into unmanned copters. Dongyan et al. (2015)[1] investigated effective swath range and uniformity of drop distribution over upstanding scattering systems like M- 18B and Thrush 510 The helicopter has a 3 m main rotor perimeter and a maximum load capacity of 22.7 kg. With every 45 twinkles, it used to carry at least one gallon of gas. This study opened the road for the creation of crop product UAV upstanding operating systems with a higher target rate and larger VMD drop size. Six BLDC motors and two LiPo batteries with a combined capacity of 8000 mAh each were used in the development of a hexacopter by Yallappa et al. (2017)[3]. Their research also includes the examination of spray liquid discharge and pressure, spot liquid loss, and the estimation of drop size and viscosity. They succeeded in creating a drone with their design that can hold 5.5 L of liquid for 16 minutes. Kurkure etal. (2018)[4] used a straightforward, inexpensive setup to study a quadcopter UAV and its scattering medium. Both liquid and solid content are detected using the universal sprayer system. In their research, they also analysed various regulators needed for agricultural uses and came to the conclusion that a quadcopter system with an Atmega644PA is best owing to its efficient execution. An armature anchored on a UAV that might be used for agricultural activities was reported by Rahul Desale et al. (2019)[5]. Their UAV was made to cover agricultural areas with cameras and GPS in addition to dispersing. Cost and weight considerations went into their design. They utilised a microcontroller with firmware built in, model kk2.1.5. With the help of a Jeer Pi running the Python programming language, Prof. B. Balaji et al. (2018)[6] created a hexacopter UAV for spreading fungicides as well as crop and terrain monitoring. Moreover, their UAV has a variety of detectors, including the DH11, LDR, and Water Level Monitoring detectors. After analysing the results of this research, they came to the conclusion that proper use of UAVs in agricultural fields might result in savings of 20–90% in labour, water, and chemical abuse.

III. METHODOLOGY

A multirotor copter with four rotors that lifts and propels the craft is referred to as a quadcopter, quadrotor copter 6, or simply a quadrotor. Due to the fact that quadcopters employ a series of rotors to create lift, they are considered helicopters rather than fixed-sector aircraft. A quadcopter may hang in a steady position because two of its propellers rotate in one direction (clockwise) while the other two in the other way (anticlockwise). originally, the motors which we used have an egregious purpose to spin the propellers. Motors are rated by kilovolts, the advanced the kV standing, the briskly the motor spins at a constant voltage. Next the Electric Speed regulator or ESC, is what tells the motors how fast to spin at any given time. We need four ESCs for a quadcopter, one connected to each motor. The ESCs are also connected directly to the battery through either a wiring harness or power distribution board A built-in battery eliminator circuit (BEC) is a feature that many ESC1s include. It enables you to power effects like your flight controller unit and receiving antenna without attaching them to the battery itself. The counter spinning motors on the quadrotor platform provide it stability. The "brain" of the quadcopter, utilised for flying in the air, is the flight regulator. It contains the sensors, such as gyroscopes and accelerometers, that control how quickly each quadcopter motor spins. Its goal is to stabilise the aircraft while it is in flight. To do this, it collects signals from the on-board gyroscopes (roll, pitch, and yaw) and passes them to the processor. The processor then processes the signals in accordance with the firmware of the druggies (for example, in a quadrotor) and moves the command signal to the implemented Electronic Speed Regulators (ESCs). The mixture of these signals tells the ESC to make precise adjustments to the

1. Flow Chart:-

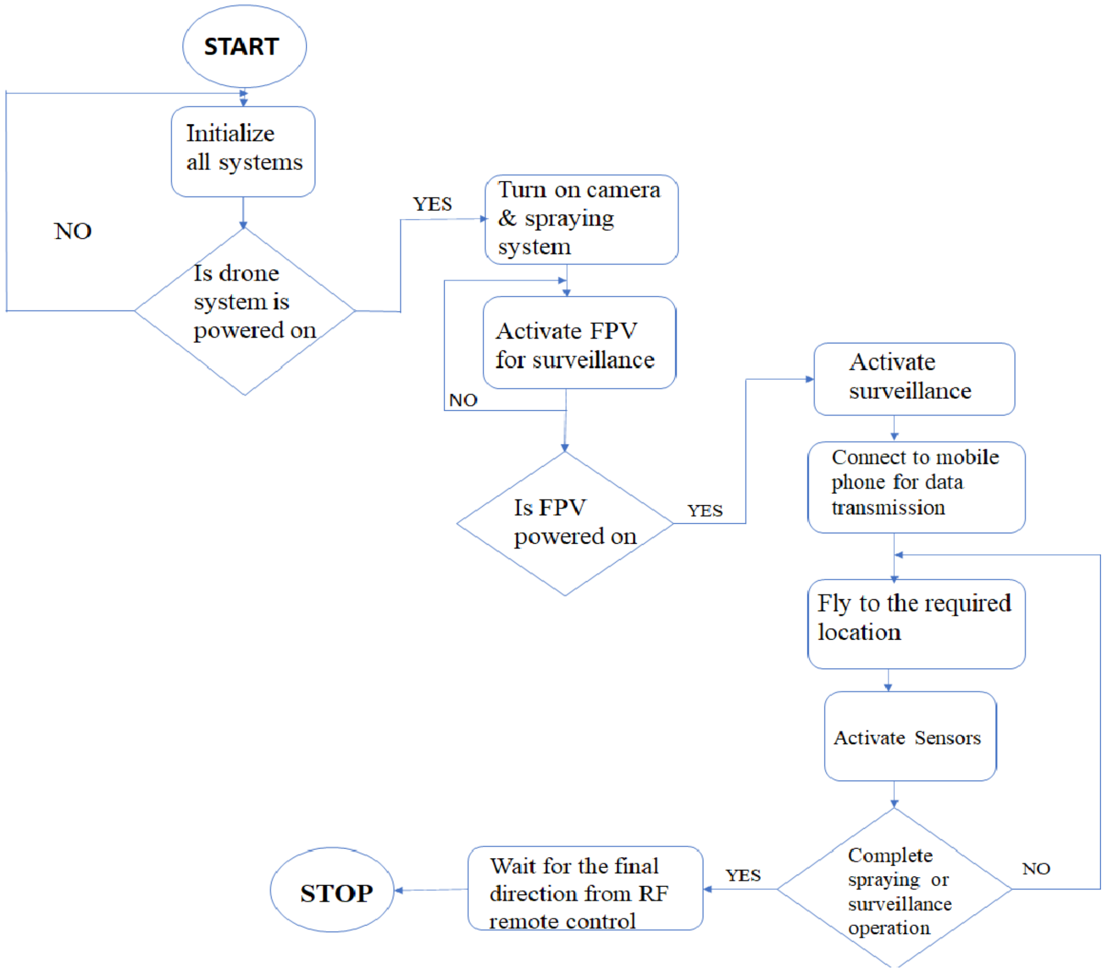

Fig 1:Flow Chart

The information will be sent out by the transmitter and received by the drone's receiver. The signal is sent from the receiver to the flight controller, where it is analysed using the gyroscope and accelerometer sensors. The signal will be analysed before being delivered to a ESC, which will then use the signal to determine how much current to send to the motor. The motors and propellers are mechanically connected to one another to provide rotation and thrust. The FPV camera uses the flight controller's power source to record video, which is then processing by the transmission and sent to the receiver on the ground. The Li-Po battery's electricity is used by the pump to pressurise the liquid in the storage tank, which then travels through pipeline and into the nozzle where it is sprayed. By adjusting the input current, which is controllable from the transmitter, the pump's flow rate may be adjusted.

2. Block Diagram

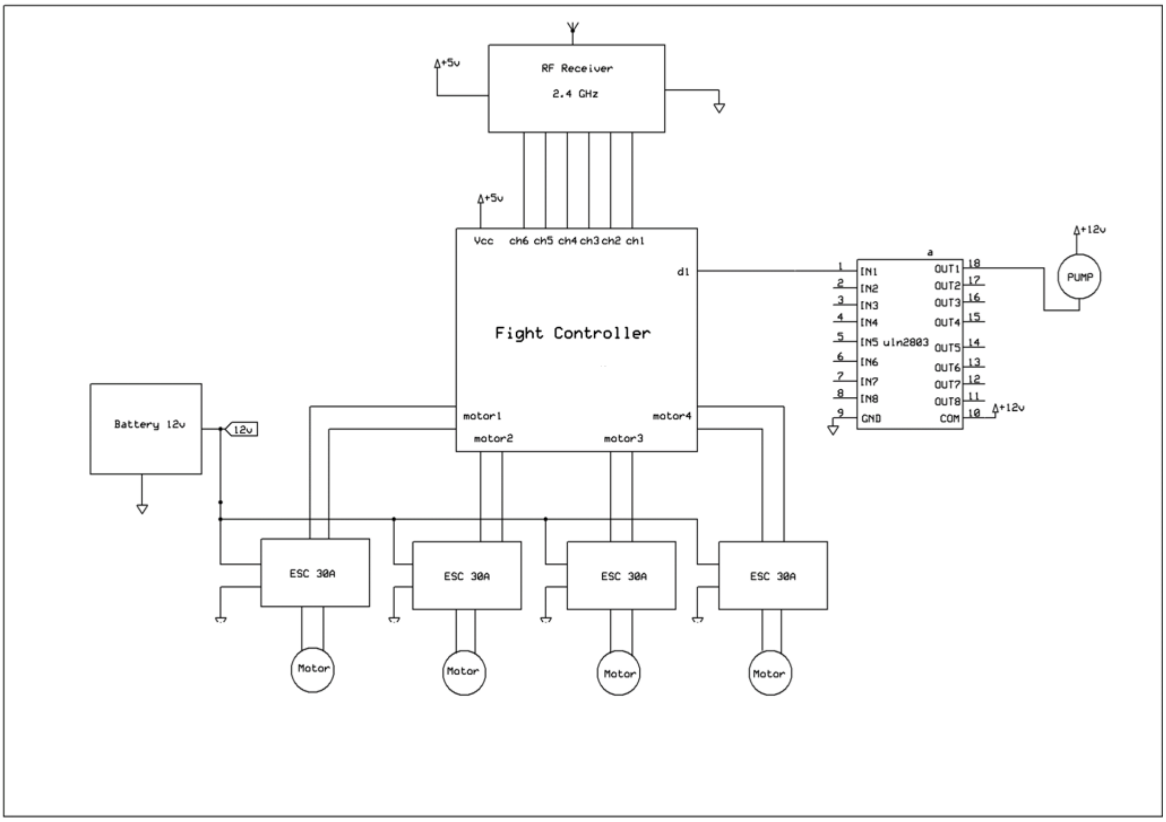

Fig 2: Block Diagram

IV. RESULT AND DISCUSSION

Crops might be improved by the agriculture drone. Drones in agriculture can assist farmers in transforming the sector. Today's farmers spray insecticides with a hand pump. Spraying crops with pesticides by humans takes a long time, and they seldom apply the insecticides evenly. Yet, compared to utilising a human, we can do the spraying task faster with a drone. Humans charge between 100 and 200 rupees per day to spray pesticides; in contrast, a drone uses just 3 watts of power and only costs 10 rupees per hour. There is no chance of crop damage because the nutrients will be sprayed equally by the drone. According to World Health Organization studies, a drone would prevent ailments like skin conditions brought on by fertiliser while also saving time when spraying pesticides (WHO). Drones will thereby reduce farmers' efforts for agricultural purposes.

Fig 3:Hardware Implementation

The transmitter will send the signals, and the drone's receiver will receive them. The flight controller receives the signal from the receiver and processes it using the gyroscope and accelerometer sensors. The signal will be analyzed before being delivered to a ESC, which will then decide how much current to send to the motors based on the signal it receives. In order for the propellers to revolve and generate thrust, they are mechanically connected to the motors The FPV camera uses the flight controller's power source to record video, which is then analyzed by the transmitters and sent to the receiver on the ground. The Li-Po battery's electricity is used by the pump to pressurize the liquid in the storage tank, which then travels through the pipeline and into the nozzle where it is sprayed. By adjusting the input current, which is controllable from the transmitter, the pump's flow rate may be adjusted.

V. Conclusion

In order to prevent the health problems that the chemicals might bring to those who spray manually, insecticides and fertilisers are sprayed on agricultural fields using unmanned aerial vehicles. We have a camera on this drone for surveillance.The drone's design minimises manual labour and saves time. Also, this will save labour costs, and the drone's price is lower than that of other agricultural drones. This drone may also be used to spray water, land, and densely inhabited regions with disinfection substances.

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