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PESTICIDE SPRAY DRONE IMPLEMENTATION AND DESIGN IN AGRICULTURE

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Abstract: There are too many technologies involved in today's agriculture, out of which spraying pesticides using drone is one of the emerging technologies. Whenever we use manual pesticides spraying causes many harmful side effects. So, this pesticide spraying drone reduces the time, number of Labour and cost. The application of pesticides and fertilizers in agriculture areas is of prime importance for crop yields. The use of aircrafts is becoming increasingly common in carrying out this task mainly because of its speed and effectiveness in the spraying operation. However, some factors may reduces the yield, or even cause damage.The process of applying the chemicals is controlled by means of feedback obtained from the wireless sensor network(WSN) deployed on the crop field. The aim of the solution is to support short delays in the control loop so that the spraying UAV can process the information from the sensors. We evaluate an algorithm to adjust the UAV route under changes in wing intensity and direction. Moreover, we evaluate the impact of the number of communication messages between the UAV and minimize the waste of pesticides.

I. INTRODUCTION

Over the last few years we have seen a massivegrowth in the manufacture and sale of remote control vehicles known as Quad-copters. These unmanned aerial vehicles have four arms and fixed pitch propellers which are set in an Xor
+configuration with X being the preferred configuration. Some times, referred to as drones,quad-rotors or quad-copters. The quad-copter is a simple format with very few moving parts and has rapidly become a favourite vehicle for remote control and is being widely used has an effective aerial photographic platform. A large majority of the quad-copters were originally build by hobbyists who understood the simplicity of the vehicle. Quad-copter uses four propellers, each controlled by its own motor and electronic speed control.By using accelerometers we are able to measure angle of the quad-copter in termsof X<Y and Z accordingly adjust the RPM of each motor.

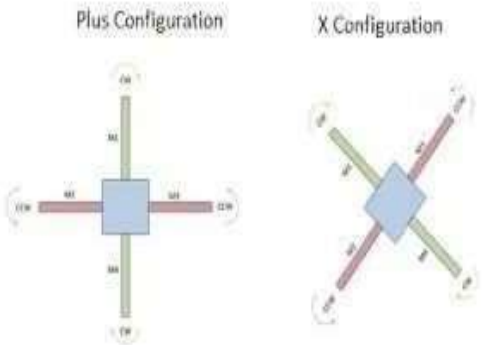

Fig 1: Quad-copter Configuration

II. LITERATURE REVIEW

The WHO (World Health Organization) estimates there are morethan1 million pesticide cases in every year. In that more than one lakh deaths in each year, especially in developing countries due to the pesticides sprayed by human being and handling of pesticides. The health effects of pesticides

include asthma, allergies and hypersensitivity,and pesticide exposure to cancer, hormonedisruption and problems with reproductionand fetal development. Other pesticides maybe irritated the skin and eyes. More pesticidesare very dangerous carcinogens. Other pesticidesmaybe9InternationalAcademicRese archJournalofEngineeringSciencesFebruary affects the hormone and endocrine system ofthe body. Even though very low levels ofexposure during spraying may have leads to health effects. Pesticide exposure can cause a wide range of neurological health effects inbody such as memory loss, loss of coordination, reduced speed of response to stimuli, reduced visual ability, altered or uncontrollable mood and general behavior,and reduced motor skills.

Pesticide exposure can cause a range of neurological health effects such as memory loss, loss of coordination, reduced speed of response to stimuli, reduced visual ability, altered or uncontrollable mood and general behavior, and reduced motor skills. Two types sprayers are available Hydraulic and low volume sprayer. Groundnut, Cotton, Pomegranate, Grapes, Silk worm feed, etc.require pesticide spraying.

III. PROPOSED SYSTEM

Here the drone with pesticide sprayer which is the combination of a quad-copter and a seeding system, we had synchronized a seeding system toa X configured quad-copter. Thus, the combination of these two equipment results in the formation our DRONE WITH PESTICIDE SPRAYER. Now a brief explanation about the quad-copter and seeding system quad-copter otherwise we can called as quad-rotor helicopter and it is lifted and pushed by four rotors. The quad-copter stage gives security because of the counter pivoting engines.

BLOCK DIAGRAM AND WORKINGPRINCIPLE:

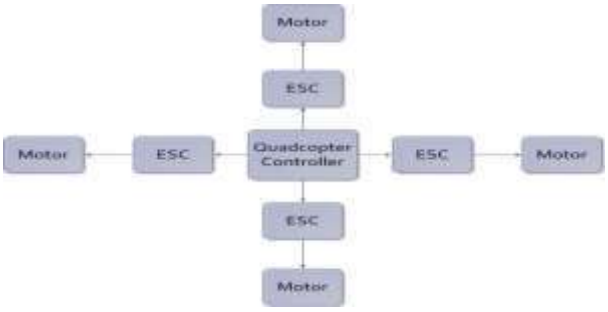

Fig: 2 Block Diagram

The components used in the block diagram are:

- **Flight Controller :** the flight controller isa brain of the drone and its provide the auto level function. . The LCD screen andbuilt in software makes install and setup easier than ever. A host of multi-rotor craft types are pre-installed, simply select your craft type, check motor layout/propeller direction, and calibrate your ESCs and radio. The original KKgyro system has been updated to an incredibly sensitive 6050 MPU system making this the most stable

KK boardever and allowing for the addition of an auto-level function. At the heart of the KK2.1.5 is an AtmelMega644PA8- bitAVRRISC-based microcontroller with 64k of memory .An additional polarityprotected header has been added for voltage detection, so no need for on- boarding soldering.

Fig 3: Flight Controller **Fig 4: Electronic Speed Controller**

- **Electronic Speed Controller:** It is used to vary the revolution per minute(RPM) of the motor. 60A rated ESC is used as per the motor and the batter specifications.The ESC controls the speed of an AC motor with frequency, not voltage. Volt battery into your power system, you have

  11.1 volts going to the motor with the full amper age potential of the battery backing that voltage. The AC brushless motors weuse are true 3-phase AC motors. The motors DO run on AC current. The ESCis a trapezoidal wave generator. It produces 3 separate waves (one for each wire to the motor).

  Motor has nothing to do with voltage or amps, but instead the timing ofthe current fed into it. By increasing and decreasing the wavelength (frequency) of the trapezoidal wave on the 3 phases, the ESC causes the motor to spin faster and lower. The ESC switches the polarity of the phases to create the waves. This means that the voltage through any given winding flows 'Alternately' one directionthen the other. This creates a push-pull effect in the magnetic field of each winding ,making the motor more powerful for its size and weight. The motor and the load that is placed on it, is what determines the amp draw from the ESC and the battery.
- **Battery:** Li-Po batteries are the most common battery types used for the drones.The battery that can be used Li- Po battery of 2200MAH capacity and 22.2V. In this battery six Li-Po cells are connected in series. A lithium polymer battery, or more correctly lithium-ion polymer battery(abbreviated variously as Li-Po ,LIP, Li-poly and others), is a rechargeable battery of lithium-ion technology range 4500mAh 3S 30C Lithium polymer battery Pack (Li-Po) batteries are better-known for performance, dependability and value. It's not a surprise for us that range Li-Po packs are the go-to pack for those within the grasp. Orange batteries deliver the complete rated capability at a value everybody will afford. They' reequipped with significant duty discharge results in minimize resistance and sustain high current masses.

  Every pack is supplied with gold plated connectors and JST-XH vogue balance connectors. All Orange Li-Po battery packs are assembled by the use of IR matched cells. in a pouch format. Unlike cylindrical and prismatic cells, Li-Pos come in a soft package or pouch, which makes them lighter but also less rigid.

Fig 5: Li-Po BatteryBattery Calculation:

We have to calculate the amount of energy it is consuming; hence we have now calculating the source required by the battery.

Max source = dischargerate*capacity Maxsource
=20×2200
Max source=44000 Max source=44Amp

- **Motor:** There are two types of commonly used DC motors: Brushed and brushless motors. BLDC motors are suitable for the drones. . A brushed DC motor generates torque by mechanically switching the direction of current in coordination with rotation using a commutator and brushes. Shortcomings of a brushed DC motor include the need for maintenance due to wear down of the brushes and the production of electrical and mechanic noise.
  All the PWM duty ratio can byadjusted using a microcontroller, etc. to change the applied voltage, thus allowing the speed of rotation and position to be controlled.

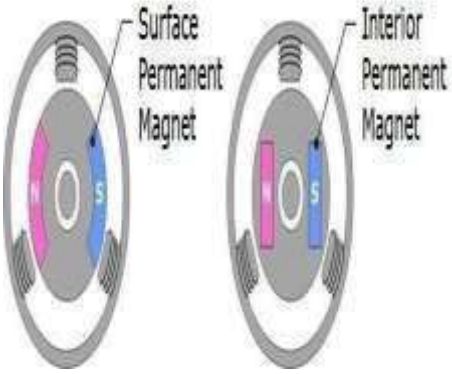

Fig 6: Brush-less DC Motors

- **Propellers:** The propeller is made up of carbon fiber which possesses high strength to weight ratio when compared to proper less made up of plastic . A propeller is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is producedbetween the forward and rear surfaces of the air foil-shaped blade, and a fluid(such as air or water) is acceleratedbehind the blade. Propeller dynamics can be modelled by both

Bernoulli's principle and Newton's third law. A marine propeller is sometimes colloquially known as pitch of the screw. Generally, increased propeller pitch and length will draw more current. Also the pitch can be defined as the travel distance of one single prop rotation. In a nut shell, higherpitch means slower rotation, but will increase your vehicle speed.

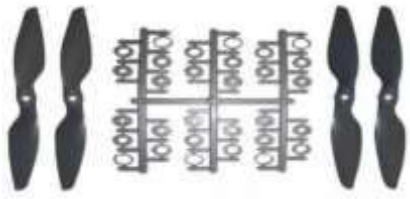

Fig 7: Propeller

IV. RESULT

The drone developed is more efficient and robust in nature compared to its contemporaries. It can fly across different terrains and varied weather conditions. The big-gest advantage of the drone is that it is customizable according to the requirement. The drone will also be useful to spray not only fertilizers and pesticides but also can be used to spray paints, monitor fields with the help of radio transmitter .To ensure a high-quality product, diagrams and lettering MUST be either computer-drafted or drawn using India ink.

Fig 8: Output for Pesticide Spraying Drone

V. CONCLUSION

In this project we have designed a DRONE WITH PESTICIDES SPRAYER which is an architecture based on unmanned aerial vehicle(UAVs) and a Seeding System that can be employed to implement a control loop for agricultural applications where drone with pesticides sprayer is responsible for seed sowing. Here by we can reduce the human efforts not much but some amount. This will be helpful in performing the seeding task done in agricultural fields in less time. This will reduce the labour costal so and per-form the work very accurate. This is completely operated by the radio transmitter and receiver with in the range of signal. If we are getting far away within the signal range then the drone based pesticides sprayer will not work properly.

VI. FUTURE SCOPE

Weight lifting capacity of the quad-copter can be increased by increasing the number of motors or by increasing the propeller size or by increasing the rpm of the motor. Flight time can be increased

by increasing the battery capacity. Pesticide carrying capacity can be increased by increasing the size of the tank. Larger area can be covered by using more nozzles which can be arranged in the form of array. Angle of spraying can be controlled for accurate spraying.

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