A REVIEW ON AGRICULTURAL DRONE USED IN SMART FARMING

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Abstract - *In today's era, there are many development in precision agriculture for increasing the crop productivity. Mostly in developing countries like INDIA, around 70 to 75 % of rural people depends upon agricultural fields.*
Agricultural processes are chains of systematic, repetitive, and time-dependent tasks .UAVs are becoming more important to meet the demands of increased population and agriculture. Agricultural drone helps farmers to optimize operations performed in agriculture .Farmers Can see their farms from sky with the help of agricultural drone . The drones or UAVs collect information and communication technologies, robots, artificial intelligence, big data, and the Internet of Things. UAVs are easier to use and efficient also, farmers can easily operate drone. The UAV'S can also operate on the relay driver and commands given by the transmitter. In agricultural mostly economic loss is due to insects and pests. So farmers widely use pesticides for controlling the weeds, insects and plant diseases . This paper introduce a quad copter which is used for pesticide spraying in agriculture field Using UAVs , helps the farmer to improve the agricultural production and management of crops in eco friendly way.

Key Words: **(UAVs, IOT)**

1. INTRODUCTION

Main occupation in your country is agricultural but is still far short of other countries when it comes in adapting technologies for better output of farm. In last 5-6 years, the total investment in agricultural sector has increased by 72 to 80 %. By 2050 at least 70% of productivity growth should be achieve, this is the main goal of these investments. For precision agriculture and smart farming most important thing is remote sensing. UAV-based IOT technology is considered as the future of remote sensing in Precision Agriculture and smart framing .pesticides are the major problem for farmers as compared to pests because pesticides are the main agents to destroy pests so Drones are used to increase the productivity of crop and spray urea and pesticides in field.

Spraying urea is very important for plants growth and management. Human robot interaction (HRI) system is also introduced to face issues like regulations, safety and comfort. Flexible automation is also focused in this work, to reduce human efforts and increase efficiency of crop production. Unmanned aerial vehicle (UAV) can also be known as remotely operated aircraft A UAV can be described with four propellers in a cross configuration, which can be remotely controlled aircraft or can fly autonomously. Nowadays UAVs are also being employed in various commercial and industrial applications .Recently advances technology in (LPWAN) LONG RANGE WIDE AREA NETWORKS have made usage of wireless sensors into agriculture. UAVs can reduce working hours, less expensive than other agricultural machines and can be easily operated. UAVs can be used in filed mapping, plant stress detection, Biomass and Field Nutrient Estimation, Weed Management, Chemical Spraying, monitoring crop health, soil &field analysis, seed planting, crop spraying and spot spraying, crop mapping and surveying, irrigation monitoring and management, real time livestock monitoring, etc. In this paper, A review of the drone technology applied to the precision agriculture is presented.

1.1 Types of Drones

To design a drone first we have to calculate our payload, then with respect the load of payload motor, Electronic speed controller, Propeller, Battery has to be selected. Battery has to be selected by knowing the voltage and current requirement of the components. Then the thrust requirement has to be calculated and the design of frame decided by determining the required arm number, arm length.

1. Quadcopter-The prefix Quadcopter implies (Quad= Four), It is a drone design where there are four arms.

2. Hexacopter- The prefix Hexacopter implies (Hexa= Six), It is a drone design where there are Six arms.

3. Octocopter- The prefix Octocopter implies (Octo= eight), It is a drone design where there are eight arms.

2. COMPONENTS

Frame- The frame plays an important role in the drone for supporting all the components. It is necessary to take weight of frame in consideration because there will be difficulties in lifting of drone if the weight of frame is high. By taking all the parameters in consideration, we decided to use light weight wooden frame for fabricating the drone.

BLDC Motor- Brushless DC motor are also known as commutated motors or synchronous DC motor, This motors are powered by Battery via an inverter or an Electronic Speed Controller which produces an AC current to drive each phase of motor. The controller provides pulses of current to the motor winding which control the torque and speed of the motor. The rating of BLDC motors depends on the payload estimation. For our application, We are using the 1400 KV rating of motor which gives us approximately 1000gms thrust with 1145 propeller.

Fig -1: BLDC Motor

LiPo Battery- BLDC motors required high current for working. This high current flow capacity depends on the discharge rate of battery., Therefore here we used LiPo battery as this battery has high discharging current rating. For our application as per the motor rating we are using 2200mAh battery.

Fig-2: LiPo Battery

ESC- An Electronic Speed Controller is electronic circuit which is used to control the speed of BLDC motors, its direction I and also act as dynamic brake. For our application we are using 30A rating ESC. We decided this as per motors, battery and propeller specification.

Fig – 3: Electronic Speed Controller

Propeller- As per the frame size and motor rating, the size of propeller is selected. Thus we are selecting the propellers of size 11" and weight 25 gms each.

Fig – 4: Propeller

Flight Controller- Flight controller helps to drive the drone by taking stability, speed, acceleration, gyro in consideration. For this purpose we select the KK 2.1.5 controller. The main feature of these KK is it is easier for calibration. It has inbuilt firmware.

Fig – 5: Flight Controller

Radio Controller- Firstly, The transmitter should be calibrated with the flight controller using the receiver. After calibration transmitter will link with the drone, as per the transmitter the drone will work.

Fig – 6: Radio Controller

3. METHODOLOGY

UAV are properly known as drone. Basically drone is flying robot which working in combination with GPS, the flying machine may be remotely controlled. A drone has been built which will be operated by frequency controller and send live audio-visual feedback. For smart agriculture method in farming. This RF transmitter and receiver operating in the frequency of 2.4GHz are used. In this paper we proposed a comprehensive design for constructing small-scale UAV, Quadcopter which is easily fully operational, reliable and safe. Also the less costly for farmers. UAV has two configurations for designing. One is cross (×) configuration, second is plus (+) configuration. According to our design we prefer the cross configuration of drone.
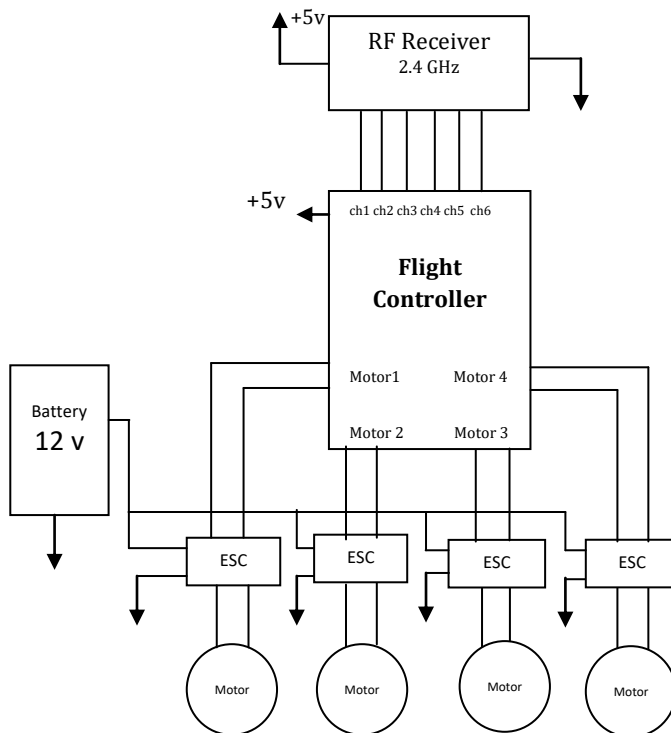

Fig -7: Block Diagram of Agricultural Drone

3.1 ADVANTAGES OF DRONE

Drone helps farmers to optimize the use of seed, fertilizer, water. To react more quickly to any threats like weeds, pests, fungi to save time. By using drones revolutionized agriculture by offering farmers major cost savings, improves efficiency and profitability. By using quick surveying drones can map the property and report on crop health. Improves spraying accuracy and also used for monitor livestock and irrigation system.

3.2 APPLICATIONS OF DRONE

Nowadays drone technology is more popular for smart agriculture method. In this paper the developed drone can be used for number of applications such as firefighting, monitoring flood affected areas, for overview condition of climatic changes in farming. Like that we are using drone for spraying pesticides on crop in agriculture by using innovating method. Drone technology is also used to assess soil condition.

4. CONCLUSIONS

Drones have already vastly altered in agriculture industry. Infact drone use is becoming more useful to small farmers. In future there will be exponential growth in the area of drones as the cost of drones and agriculture drones in particular continue to drop and become easier to us. In the modern farming next time we need our vast crops monitored, surveyed , analyzed, watered and sprayed , call on our new best friend, the agriculture drone to help you out.

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