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# Automatic Arial Vehicle Based Pesticides Spraying System for Crops

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***Abstract:*** ***Aircraft are becoming unmanned increasingly popular as demands for increasing population and agriculture are being met. With the right cameras, detectors and components, Drones will contribute to a simple, effective and accurate cultivation. The solutions proposed for these drones can help improve things even further if they are integrated into various machine learning concepts and internet concepts. This document highlights the related work in this area along with suggested solutions that can be integrated into drones using the result of the Microcontroller 8051 module.***

***Keywords: ADXL 335, ESP 8266, GPS.***

## I. INTRODUCTION

The implementation in agricultural fields of fertilizers and pesticides is essential for crop yields. Because of the velocity, precision and efficiency of the spray procedure, the use of aircraft becomes prevalent. The farmers spray pesticides throughout the farm with spray bags. Farmers must carry the spray sac for pesticides which strains them. Even then, farmers cannot distribute pesticides equally throughout the farm. And it'll also take time. The user can spray the liquids uniformly throughout the field using drones. This decreases farmers ' workload and finishes work very quickly the use of independent methods to inspect farm health has become increasingly attractive in latest years. In these fields, robotics has jumped to offer exciting and efficient alternatives to various stages such as harvesting or plowing [1]. The use of drones is very efficient in agriculture and in intelligent farming in relation to satellite technology; given that unbroken aircraft can give farmers a birds eye perspective of their elders. In comparison with Remote Technology. The drones use allows an overview of the region and a better utilization of farmers ' time.
Our work aims to create a system that is able to quickly ana lyze the soil condition. Robotics jumped into these elders and offered interesting and effective solutions for various phases, such as plowing or harvesting. The use of drones is very effective in agriculture and smart farming in comparison with satellite technology because unmanned aerial vehicles (UAVs) can provide farmers with a clear-sighted vision on their elders still close to the land and therefore give them a more detailed assessment. This is a principal application for the project. The use of drones in particular allows for a general survey of the zone and a better utilization of farmer's time.

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To this end, we are developing a system that can quickly analyze the soil condition. The idea is to approach the correlation between the acquired parameters of radar or satellite and the roughness values derived from RGB-D cameras or laser scanners.

## II. LITERATURE REVIEW

In order to finalize the work, the reviews of following literature have been taken. Spoorthi.S, Dr.B.Shadaksharappa, Suraj.S, V.K.Manasa [1] have presented system called FREYER Drone. FREYR drone is designed to produce a quad copter containing pesticides that spray across the farm that both reduces the work of farmers but soon concludes its work. Pesticides and fertile products are of prime importance for crop production in agricultural areas. This will develop a user-friendly farming interface. The FREYR Drone is a quad copter spray pesticide for agriculture that helps farmers to spray the pesticides throughout their land to reduce work, which may evenly spray on their farm. The farmer can use an android application to control the drone, and can also use the drone interface Wi-Fi (ESP-8266) module in connection to the application. It precisely drives the land area of that farm land through GPS irrespective of the crop form and the pesticide-spritzing drone will accomplish the job. Paolo Tripicchio and Massimo Satler [2] have presented Drone use is increasingly popular in agriculture. Drone use is increasingly popular in agriculture. The paper provides a new approach to differentiate elds by the use of a RGB-D sensor. Two different measurement algorithms were designed to make sure they were successful in the classification of the plowing techniques. In commercially available unmanned air vehicles, the system can easily be integrated. Experimental tests show that the proposed methodology can provide an adequate classification of elder plowing depths. Arnab kumar Saha, Jayeeta Saha, Sachet Sircar, Soummyo Priyo Chattopadhyay, and Himadri Nath Saha [3] Presented IoT-based crop quality enhancement drone on farm. The need for an increased population and agriculture is growing in popularity for aerial vehicles that are not owned. Drones with suitable cameras, sensors and integration modules make agriculture simple, efficient and precise. The solutions that are proposed for these drones can help improve the scope of the further development by integrating them into various conceptual machine learning and Internet of Things. This paper highlighted the work in this field and suggested solutions that can be incorporated into the drone through the Raspberry Pi 3B module.


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## III. OBJECTIVES OF PROPOSED WORK

The main objective of proposed work is as follows:

1. To provide automatic spraying capability to an Arial vehicle.
2. To use sensor fusion concept using accelerometer and gyroscope for direction orientations of Arial vehicle.
3. To design and use efficient algorithms for achieving desire rotation of motors for purpose of getting direction speed and spraying pressure.
4. To implement the system based on Microcontroller 8051 platform.

Detailed information of above processes is given below:

### 1. Methodology:

First, every consumer (farmer) needs to connect to the WIFI secured on the mobile Android-based WPA2 to connect to and then use our Drone. The LiPO battery rechargeable is connected to running engines. We use the 8051 Microcontroller to connect to the app with drone motors, which use hardware interface software. The Microcontroller 8051 Board is interfaced with an Android app via the Wi-Fi module. The 8-bit processor, a 16MHz clock speed, is Microcontroller 8051. The board can be set up with the Micro vision Keil software. The accelerometer is able to analyze and move or be dynamic the acceleration situations. We use a hardware system-related gyro accelerometer + (IMU) and interact with the 8051 board.

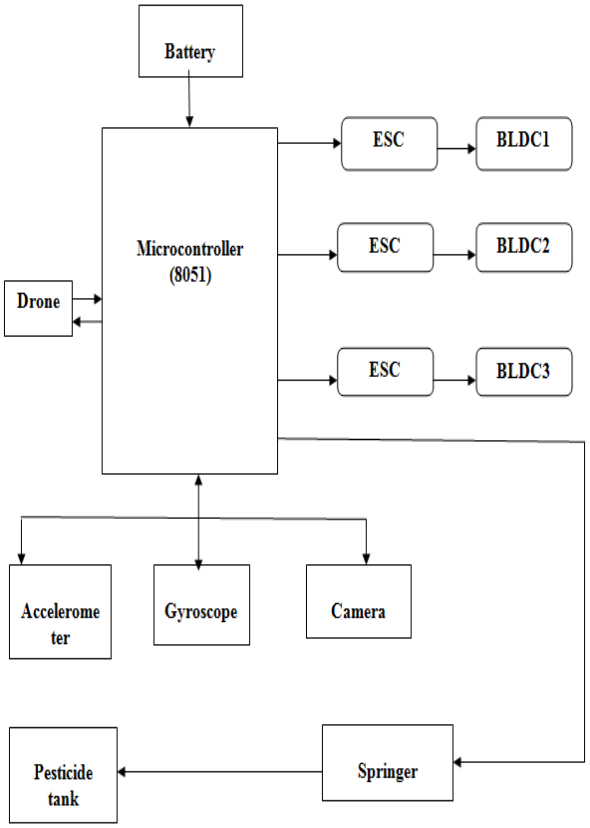


**Fig (a).Block Diagram of Automatic Arial Vehicle based Pesticides spraying system for Crops.**

Gyroscope is an 8051 board output sensor that maintains drone orientation. Gyroscope helps to balance and to keep the drone stable with x, y, z values. GPS UBLOX NEO 6 M offers high efficiency, cost efficiency and support for crop start-ups. We've used an immersable pump that is immersed in the fertilizer tank and pumps the fertilizers to spray.We are used in agriculture to spray fertilizers as the primary use of our crop. The substitution of an existing system is our product because we know farmers are spraying fertilizer with screwing bags and spraying weapons through the entire farm. There is already a Quad-copter we designed, to control the one we use the remote drone controller. But we developed an application for drone control, which interacts with the drone and sprays the fertilizer.

### 2. Flow chart for drone controlling:

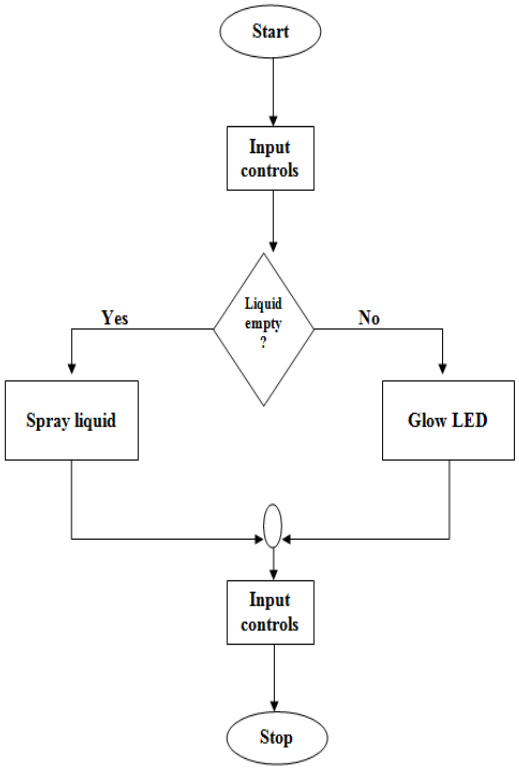


**Fig (b).Flow chart for drone controlling**

Flowcharts are used for used in designing and documentation of process and programmes. For controlling of drone at first step drone start with the help of input controls also motor starts running. If liquid in container is empty then LED indicator is glowed. Else liquid is sprayed from the container.

### 3. Flow chart of working of spray:

This is flowchart of working of spray.at initial stage drone starts then motor starts running with help of input controls if up then drone starts its movements like Hover, recording, touchdown, shutdown. If drone is not goes in upward direction then it will shut down.

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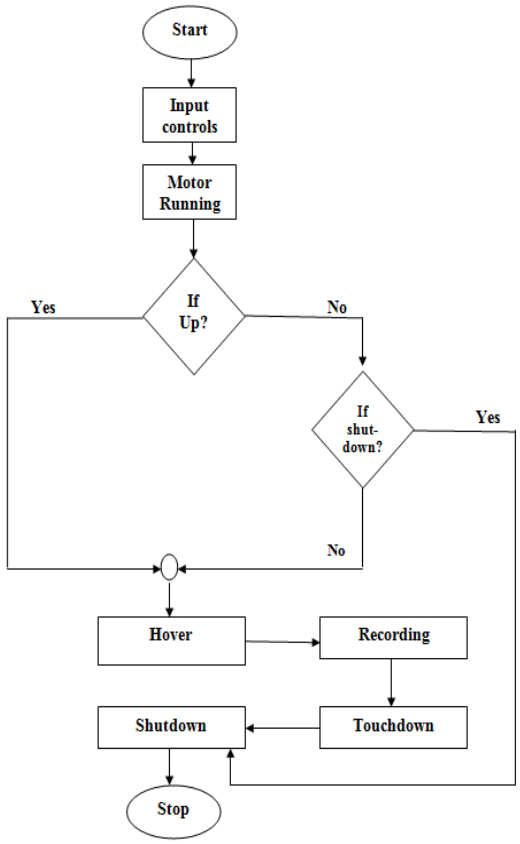


**Fig (c).Flow chart of working of spray**

**4. Hardware Interface:**

MPU-6050 Gyro+Acc connect with an I2C Interface board, HMC5883L is connected to a HMC-62C Bus, and the ESC is connected to analog ports. Devices supported by this program are android mobile devices; data are strings and text messages. Also the GPS 6050 is linked to the 8051 board, which identifies places.

**5. Software Interface:**

We interfaced with the software components via the Android studio. Library features are NDK of Android. The information is available at the altitudes, movements and rotations. The library functions are SDK (software development kit). The nature of communication is directly related to peer. APACHE Server houses the HTTP Server.

**6. 6. Communication Interface:**

The server communication is peer by peer. The message is formatted in plain text strings. Standard communication with HTTP. The communications security is WPA2 PSK. The rate of transfer of data is 100mbps.

**7. System features:**

The massive use of our spray pesticides / fertilizers will provide farmers with pesticides across a wide area of territory. It is highly efficient and economical. This is trustworthy for fluid pesticides or fertilizers. Manner in which the drone operates makes it simple to handle. It is controlled via an ARDUINO, GPS, ACCELEROMETER, WIFI MODULE, GYRO and DIGITALCOMPASS based android based mobiled app. The down airflow is caused by the drives raising the drone, increasing it and helping to spray pesticides on fertilize.

**8. Component Description:**

**A. AT80C51 Board:** A microcontroller with 40 digital I / P O / P pins from which 14 pins are available for PWM purposes. It enables you to insert the new, system-based software code.

**B. ACCELEROMETER ADXL335**: for reading X, Y, Z velocities voltages, 3rd axis accelerometer IC. The acceleration is calculated due to various gravity, and we can define the tilting angle.

**C. HMC5883L 3 AXIS MAGNETOMETER**: It is a 3-axis digital compass magnetometer that enables you to direct the drone interfaced by I2C.

**D.SERVO MOTOR**: For controlling object positions, rotating objects, the Servo motor is used. This can also be used as a switch. This is small and includes built-in circuits to link them directly to the board 8051. There are three brown (GND), red (5V) and yellow (PWM) color cables. PWM input is connected to a digital output pin in Arduino.

**E. WIFI MODULE ESP 8266**: The WIFI module uses the serial software port and the serial hardware port to upload and debug it. ESP 8266 is a module for the transceiver. It is small and low cost and works at 3.3V and uses up to 250mA of current energy. It is not usually powered by 3.3V and not 5V, so we use a leveled conversion to communicate with Arduino.

**F. LI-PO BATTERY:** For most electrical models, The preferred energy resources are lithium batteries. There are elevated release rates and high weight / energy storage ratios. It's not trivial to properly use and load them properly.

## IV. EXPERIMENTAL RESULTS

The primary elements have already been discussed in every diagram. First of all any user should connect to WIFI in mobile android secured via WPA2 and use our DRONE.

**Fig (d) Spraying Drone**

LiPO battery charging is linked to running engines. We use Microcontroller 8051 to link the app with software and hardware interface Drone motors.

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The 8051 board is connected to an Android app via the Wi-Fi module. The AT8051 is an eight-bit processor that can be used to program the 16MHz clock speed. The accelerometer measures the acceleration forces and can be static or dynamic. We use the accelerometer + IMU gyroscope which is connected to and interfaced with the hardware system. Gyroscope is a sensor that provides the board output and keeps the drone orientation. The gyroscope contributes to balancing and drone stability by providing x, y, z values. GPS UBLOX NEO 6 M is cost efficient and highly efficient and Assistance to initialize crop yield location. We used a pump immersing in the fertilizer tank which pumps the fertilizers and transmits them into the sprinkling plant to spray.

**Fig (e) Flight Controller**

Our drone is mostly useful for crop producers and farmers at high and low standards. At least farmers ought to have basics. Knowledge about using a smartphone so that the app we created for our project can be used by customers. Our products can be used for testing by farm engineers and technicians.

## V. CONCLUSION

The project is designed to create an easy-to-use interface. This Drone is an agricultural pesticide pumping drone that helps the farmers to pull pesticides across their land to reduce his work, which may spray evenly in his entire farm. The farmers can control the drone by the Android app here and can connect to the phone via the Wi-Fi module on the drone. The pesticide sprinkling drone precisely passes through the land of the particular famer via GPS irrespective of the field form. and the type of culture the job is done. The board 8051, the open-source prototype platform for electronics, has been used here, and interfaces the WiFi module with the GPS.We used ACCELEROMETER GYRO (MPU06050), MAGNETOMETER (HMC005883L) to balance directions and directions. We have a wireless camera that allows us to communicate high resolution pictures and obtain.

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