



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 9, Issue 9, September 2020

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Fertilizer Spraying Drone for Agriculture Application and Controlling it over Wi-Fi

Kalyan M. Patil¹, Dr. Manasi M. Patil²

PG Student, Department of Electronics, Walchand College of Engineering, Sangli, India¹

Professor, Department of Electronics, Walchand College of Engineering, Sangli, India²

ABSTRACT: Drone are the becoming increasingly popular for commercial and non-commercial uses a special in the field of farming, photography. The main source of Indian economy is agriculture. The agriculture production depends on various environmental parameters like temperature, rain, etc. It is also affected by other major biological factors such as pests, diseases, etc. These biological factors can be controlled by human beings with the help of pesticides, ultimately increasing the productivity. Pesticide exposure affects the human health in various ways and causes neurological and skin diseases. This projects aims to overcome 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. The aim of this study is to provide a general review on the advancement of drone technology, its ongoing usages, implications and recommendations for effective implementation of prospective applications for development and planning in agriculture area.

KEYWORDS: flight controller, mobile apps, quadcopter, Spraying mechanism.

I. INTRODUCTION

The prime importance of crop yields in agriculture area is pesticides and The use of unmanned aerial vehicle is becoming increasingly common technique in carrying out this task mainly because of reduction in cultivated land, labor shortage, unscientific and outdated method. Manual spraying of pesticides and fertilizers are mainly responsible for the increase in the number of chronic diseases and it also increases human efforts. The potential health effects of pesticides include allergies, asthma, and hypersensitivity, and pesticide exposure is also linked with cancer, hormone disruption, and problems with reproduction and fatal development. However, some factors may reduce the yield, or even cause damage to crop due to excess amount of pesticides and fertilizers. Atmospheric condition, such as the intensity, humidity and direction of the wind while spraying add further complexity to the control problem. In this paper, we will describe an architecture based on drone which can be employed to implement a control loop for agricultural applications where drone is responsible for spraying fertilizer on crops. The process of applying the fertilizer is controlled by means of the feedback obtained from the wireless sensor network (WSN) that is Wi-Fi based. The aim of this solution is to support short delays in the control loop so that the spraying drone can process the information from the sensors. Moreover, we evaluate the impact of the number of communication messages between the drone and minimize the burden of the farmer in spraying the fertilizers and pesticides.

One of the main reasons is unavailability of worker for the farming activity work. Other reasons are prone to fertilizer, unwanted diseases caused by insect/animal bite like snake. The drone will be helpful in spraying fertilizers, and crop protection products while being controlled by a single person and he will operate drone from a safe area. By changing the type of container used, the device can be used for spraying fertilizers, pesticides and crop protection products There by greatly minimizing the time taken and maintaining the safety distance, precautions for the farmer while spraying fertilizers. This system will work on the principle of thrust and lift. It has ability to regulate the thrust/lift through varying the speed of the rotors through a radio controller. This RC will be fitted with a micro controller programmed to vary the speeds of rotary wings compatible with microcontroller software programming. The proposed work in this paper recommends the use of unarmed vehicles (UAV) in the agricultural sector for spraying crop protection products like fertilizers and pesticide

II. RELATED WORK

In the paper [1] given detail about implementation of Agriculture drone for automatic spraying mechanism. They gave problem statement of World Health Organization where it estimates that there are 3 million cases of pesticide poisons in each year and up to 220,000 deaths, primarily in developing countries. They also explain what care the farmer should have to use to avoid harmful effects of pesticides and fertilizing effects as well as cost effective technology using components. In the paper [2] given detail about implementation of Agriculture wonder drone. They gave detail about Quadcopter and sprayer module and also discuss pesticide content to the that can't easily accessible for human beings. They discussed used of multispectral cameras which is used to capture remote sensing images to identify the green field as well as the edges of crop area.

In the paper [3] given detail about implementation of Agriculture Wonder Drone System. The wireless drone system based on flight controlled board(FCB), GPS, Brushless DC motor, electronic speed control (ESC), wireless transceiver, frame, propellers and battery, etc. They used flight controller board for controlling the function of drone such as movement, lifting, positioning, etc.

Various types of drones is discussed in paper [4] which is based on case study in Malaysia. Different types of drones such as Quadcopter drone, Hexacopter Drone, Fixed-wing Drone. Drone can be classified into multiple categories depending on their functions, size, weight, number of propellers, aerodynamic flight principles, range, equipment, cameras used and so on.

The paper [5] presented a drone simulator in a 3D environment that helps operators control and manipulate the drone before it is actually being used. This paper proposes an approach to address the aforementioned issue by constructing a virtual reality simulator that allows operators to get practice with drone in a mimic real world environment before their devices actually being used. Real-world map data was retrieved from Open-Street-Map. Path planning algorithm was adapted for optimal routing in 3D settings. Perceived on easy-of-use was evaluated to improve the simulator.

III. METHODOLOGY

Drone Based Aerial Pesticide Sprayer mainly consists of two parts. The Quadcopter and the Spraying Mechanism.

(A). Quadcopter:

Initially Quadcopter is assembled using necessary components such as Flight Controller Board (FCB), GPS, Brushless DC Motors, Electronic Speed Controller (ESC), Wireless Transceiver, Frame, Propellers and Battery etc. Flight controller board is used to control the functions of the drone such as movement, lifting, positioning, etc. FCB will be programmed for handling different sensors such as GPS, barometer, accelerometer, gyroscope etc and components such as motors. The drone will can be programmed for two modes i.e. Manual mode and autonomous mode. Following are some of the functions of the Flight Controller of the quad copter. As shown in the Fig 1 Initially drone will be hovered at required altitude, and then it is switched to Altitude Hold mode, which maintains the same altitude until it is switched back. For sensing the current altitude barometer is used. For more accurate altitude measurements additional sensor such as sonar can be used.

(B). Spraying Mechanism:

The spraying mechanism mainly consists of a microcontroller which is programmed to perform various functions. It also contains a tank to which a water pump is connected. To this water pump, a splitter is connected which spits the pesticide to the two nozzles which are connected at the two opposite ends and spraying is achieved. It also contains a motor driver circuit to control speed of spraying and pesticide level indicator circuit with buzzer, for detecting when the pesticide is empty.

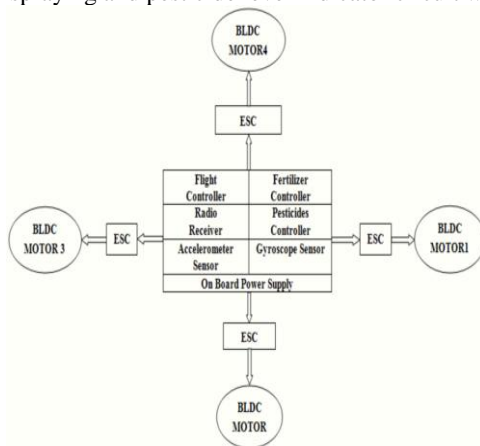


Fig: 1 Block Diagram of Quadcopter

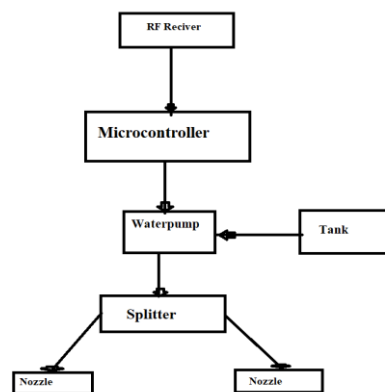


Fig: 2 Block Diagram of Spraying Mechanism



(C). Controlling spraying mechanism over WI-FI:

Once code uploaded in nodemcu, we have to open the arduino monitor from our arduino ide. In Arduino monitor we will see our Wi-Fi module has been requesting to the Wi-Fi router for IP allotment. After getting IP address it will starts its server. After starting its server Wi-Fi module show its server address on Arduino monitor as show in bellow fig 3. This address is the HTML address of the motor controls web page which is designed by user to operate spraying mechanism. now copy this address pest it in our web browser, after hitting enter we will see following webpage in fig.3



Fig.3 Arduino serial Monitor Output window



Fig. 4 Client (mobile, laptop) Output Window

To work it in proper way both the server and client must be connected to same defined network. In order to establish connection between two system given by user they must be on the same defined network. If any one of them using different network, we will not able to access webpage or we will not able to control fertilizer spraying system. As soon as we put above address in client mobile or laptop browser a web page will be seem on client side showing the controlling of motor for controlling amount of flow of fertilizer.

Fig 4 will be output of client side web browser which show some buttons which is used to perform our task as per need. we can start and stop the spraying of fertilizer using web page. we can also change the flow of fertilizer as per our need. we can select any three speeds for controlling amount of flow of fertilizer. At last of the web page, status of the motor is showed, is it spraying or not?

IV. CONCLUSION

The use of a UAV can be a good way to spray pesticides. In particular, they can have high impact on operations of diseases or weeds prevention, Also, they can be used in cases when spraying needs to be done in some inaccessible areas like rivers, lakes or swamps. Drones are highly adaptable technology as they are constantly changing in an innovative way to provide greater utility. This project reviews the basic techniques to design fertilizer spraying drone. The main idea behind this project is to automatically drone will reach to set farm area and done saved work of spraying fertilizer. The development of appropriate sensors and their specifications to suit with concurrent environmental issues by adhering and adopting the protocols and policies is required and should be highlighted for decision making purposes.

REFERENCES

[1] Prof. P. P. Mone, Chavhan Priyanka Shivaji, Jagtap Komal Tanaji, Nimbalkar Aishwarya Satish "Agriculture Drone for Spraying fertilizer and Pesticides" IJRTI, Volume 2, Issue 6, 2017.

[2] Prof. S. Meivel M.E., Dr. R. Maguteeswaran Ph.D., N. Gandhiraj B.E., G. Srinivasan Ph.D. "Quadcopter UAV based Fertilizer and Pesticide Spraying System" International Academic Research, Journal of Engineering Sciences, Volume 1, Issue 1, February 2016.

[3] Prof. K. B. Korlahalli, Mr. Mazhar Ahmed Hangal, Mr. Nitin Jituri, Mr. Prakash Frances Rego, Mr. sachin M. Raykar "An Automatically Controlled Drone based Aerial Pesticide Sprayer" K. L. E.Institute of Technology, Hubballi, Project reference no.:39S_BE_0564.

[4] Abdul Aziz Ab Rahman, Wan Shafrina Wan Mohd Jaafar, Khairul Nizam Abdul Maulud, Norazilawati Mohd Noor , Midhun Mohan, Adrian Cardil, Carlos Alberto Silva, Nik Norasma Che' Ya, Nasrul Ikhwan Naba. R. Nicole, "Applications of Drones in Emerging Economies: A case study of Malaysia" Proceeding of the 2019 6th



International Conference on Space Science and Communication (IconSpace), 28-30 July 2019, Johor Bahru, Malaysia

- [5] Vinh T. Nguyen, Kwanghee Jung, Tommy Dang ,” DroneVR: A Web Virtual Reality Simulator for Drone Operator”, 2019 IEEE international conference on artificial intelligence and virtual reality(AIVR)
- [6] Xiao Han, Jing Wang, Jiayin Xue, Qinyu Zhang “Intelligent Decision-Making for 3-Dimensional Dynamic Obstacle Avoidance of UAV Based on Deep Reinforcement Learning” 2019 11th International Conference on Wireless Communications and Signal Processing (WCSP)
- [7] Smruthi S, R Srivari Krishna, Manoj Panda “Low Energy Sensor Data Collection using Unmanned Aerial Vehicles” Proceedings of the Third International Conference on Trends in Electronics and Informatics (ICOEI 2019) IEEE Xplore Part Number: CFP19J32-ART; ISBN: 978-1-5386-9439-8.



INNO  **SPACE**
SJIF Scientific Journal Impact Factor

**Impact Factor:
7.512**

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details