

# Survey on Sanitizing Drones

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**Abstract:** The COVID-19 pandemic has profoundly altered common social and economic patterns. With the clear need to sanitize and disinfect. The drone can effectively disinfect areas without human intervention with remote monitoring. The Quadcopter is Remote controlled which enables remote monitoring to disinfect the required areas. The Quadcopter is designed in such a way that it can carry the required payload up to 12 feet and disinfect the areas without human intervention.

**Keywords:** Covid-19, Drone, Quadcopter, Sanitizer, ESC, Li-Po Battery, Motors.

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## 1. INTRODUCTION

Covid-19 has led the world to an unprecedented public health crisis. Corona virus outbreak features a significant impact on health, economy and standard of living for the people around the world. To beat the difficulties caused by pandemic, we should evaluate any alternative technique to confront the new coronavirus.

At present world drone technology is incredibly familiar and versatile. Nowadays Drones are employed in long range wars as a weapon and also as a helper of fighter within the war. Drones, because the foremost dynamically developing an element of the aviation industry, are going to be a awfully special tool within the hand of experts fighting against this pandemic. It has been effectively employed within the past for an unlimited number of applications including spraying pesticide in agricultural fields.

Drones could also be effectively accustomed perform the sanitization process. A drone mounted sprayer was developed for application of sanitizer sprays in areas which needs disinfection which reduces human intervention. The device plays a awfully important role in running the drone system, this drone is essentially controlled with the help of a remote controller. Motors are accustomed pump the sanitizer through pipe to sprayed through nozzles and also the desired areas are sanitized. Therefore, the foremost objective of this project is to sanitize areas with less human intervention and help to hunt out good or best sanitization using drones to support the fight against the COVID-19 pandemic.

## 2. LITERATURE SURVEY

Dwi Mutiara Harfin et al [1]. has proposed a drone or Unmanned Aerial Vehicle (UAV) to spray disinfectant indoors. the use of drones which are easy to manage and will reach various parts of an area in an exceedingly building by only using one controller can reduce human physical contact with places prone to corona virus. This research paper used a quadcopter UAV which consists of 4 propellers, each which is mounted on an 11.1 Volt brushless motor. A 2200 KV BLDC motor is used and controlled by the SP Racing F3 flight controller. The motor functions as a propeller drive and LiPo 3S is used as current source. 200 ml of disinfectant is carried and sprayed. These drones are accustomed monitor high-risk residents, in order that they do not leave their homes, to deliver food to chop back human physical and drones within the delivery of medicines for patients who need medical treatment reception.

Shubham Kishor Patil et al. [2] Proposed health monitoring and sanitizing drone for pandemic. As drones are becoming employed in our standard of living and it's great demand within the market. during this paper they have used Quadcopter because of its durability, and it's good weightlifting capacity which can lift up to a few to 4 kg of weight easily and additionally to this, they have also installed health monitoring system so as that the drone could also be operated from one fixed position. MLX 90614 temperature sensor is utilized during this paper, which provides the upper stability to the drone, it also has receiver which determines information like

location, time and velocity and it must be assigned with the trail which might help the drone to wing its own. Arduino UNO is utilized here as microcontroller, this project requires two microcontrollers, one for the drone and also the opposite UNO board is installed within the bottom station. Using ESP32 camera module for camera and surveillance and thus the camera board is AI thinker module, it's programmed for face detection and action detection. they have used two software namely Arduino IDE and Mission Planner, two software are required to program both the receiver and AI thinker camera module. This drone is accustomed conduct survey at public place to chop back the manpower, which automatically reduces the infection and setting the trail for the drone is being very useful function. By using such techniques, the time for sanitizing the given area is being reduced. The temperature sensing range is being boosted up to 5 meters from 2 to 5 meters.

Tuton Chandra Mallick et al. [3] This paper proposed the event of an autonomous unmanned aerial vehicle (UAV) which is controlled by wireless technology through graphical programme (GUI). This proposed design is capable of flying autonomously and also capable to trace pre-loaded mission automatically. Drone calculations are which makes it fly manually and automatically. The author used IMU 9DOF (3-axis accelerometer, 3-axis gyroscope & 3-axis magnetometer) which ensures smooth movement, graceful motion, and trajectory tracing. This drone is capable to fly in several modes. The full weight of implemented design is 1.46kg and it carrying capacity is 0.5kg. Several PID loops designed to induce better stability and performance in several mode. All signals are processed by a strong high speed controller board which makes it more efficient and effective. during this paper the work was the aimed to style a quad copter which will try stable its position in line with preferred altitude.

Karan Kumar Shaw et al. [4] The potential of using drones for spraying disinfectant liquid to fight against the COVID-19 pandemic is examined. The effect of drone-parameters such as flight altitude, flow rate and flight speed are used to examine the characteristics of the drone. The task is to create a thick film layer by wiping 3D matrix, this is used for the calculation of the drone parameters. This represented the presence of disinfectant in the optimal surface coverage by the parameters. Thickness of the layer of the surface coverage is determined and it is about 10g/m<sup>2</sup>(10um). By using the flight parameters with surface coverage data and the tank size, which is mounted on the board, it is possible to calculate the area which can be covered by the drone. The speed of the drone is calculated in different range of flight speed. First flight speed range is about 10km/h, in this case the thickness of the layer is between 12 to 300 times. Second range is about 30km/h flight speed, in this case the layer thickness is between 4 to 100 times. Third range is about 40km/h and in this case the layer thickness is between 3 to 75 times. From these 3 cases it is observed that disinfectant surface volume varies with the change in parameter. With the 10km/h low flight speed it is reached the highest value of 30g/m<sup>2</sup> and at 50km/h of high flight speed the lowest value is achieved. By the results it is observed that the disinfectant per unit area is varies with respect to the changes in the parameter and the disinfectant per unit area is in the range of 30-0.24g/m<sup>2</sup>.

T Andrasto et al. [5] Proposed a system for sanitization. The system includes the usage of a drone for sanitization. The drone is assembled in a X6 Tarot framework. This design can accommodate 6000ml of sanitizer. But it can lift 4500ml of

liquid and spray it when it is flying. The system uses Mission Planner software which has co-ordinates of the areas to be disinfected. The co-ordinate system uses 6 axes for the movement of the drone. The drone can spray continuously for 7.38 minutes. During the testing process, a remote control has been used. Spraying system using a drone can help in spraying easily and cut the amount of time needed.

Yallappa D et al. [6] mentioned that in India, agriculture plays an important role. Farmers should also adapt new framing technologies so that they can enhance the crop growth and save time in doing things manually. Using technologies will defiantly help the farmers to meet all their needs. As the demand for the food is increasing, using these technologies will help farmers to grow the required amount of crop and meet the needs of the costumers. A six blade hexa-copter is used in this proposed paper. It can lift up to 5kg of payload, uses the battery of 8000mAh, and 12V battery is coupled with the pump and helps in pumping mechanism. And camera is also installed for the better view of the farm can spray the pesticides effective to all the parts of the field. This has helped in effectively spraying the pesticides and also it is less time consuming.

Agoston Restas et al. [7] A drone is designed to perform the dissection course in the agricultural land. Disinfecting the crop field plays an important role in the development of agricultural fields. Spraying pesticides in agricultural field using drone reduces the manual work and the time required for the dissection of the entire agricultural land. BLDC motor is used to run the drone system. Propellers are used to take off the drone and this propeller produces 38.2KV of thrust. Electronic Speed Controller is used to control the speed of the motors. An external power supply is used with 22000mAh batteries. In addition to this flight controller is used. Flight controller contains accelerometer and gyroscope, this combination of accelerometer and gyroscope receives information from the receiver and passes it to the Electronic Speed Controller. Radio Transmitter and Receiver section is used to collect the information from the accessing remote and to act accordingly. To capture the navigation of the drone a FPV camera and transmitter is mounted on the board. A tank with the storage capacity of 6lit disinfectant liquid is fixed on the drone body. A set of pump and nozzle is used for the pumping mechanism. DC water pump with 12DC capacity is used to pump the sanitizer through the nozzle. The proposed drone is successfully disinfected the required area in the crop field.

K Ramesh et al. [8] Proposed a system during the pandemic which can sanitize indoor and outdoor. The system uses a hexacopter for spraying the sanitizer. The UAV is remote controlled and autonomous. The hexacopter has a capacity to carry 2 litres of sanitizer. The Pixhawk autonomous module is used as the flight controller. The UAV has vertical take-off and landing and does not need a runway. In the autonomous mode, it uses GPS to locate the places to be sanitized. The co-ordinates of the areas to be sanitized is uploaded manually by the user via a graphical interface of the Mission Planner software. The hexacopter follows the co-ordinates for sanitizing. This system can sanitize large areas in a short span of time and a smaller work force. It also improves the safety of the personnel working in the disinfection process.

Vikram Puri et al. [9] proposes the aim to spotlight the importance of drones in agriculture and elaborate top drones present within the marketplace for Agriculture monitoring and

observation for yielding better crop quality and preventing fields from any style of damage. With the mixture of Wi-Fi technology in drones stylish of person View (FPV), drones are visiting be integrated with HD cameras like GoPro, DJI, Parrot and many of others.

C Y N Norasma et al. [10] reviews the usages of UAV in agriculture applications. The aim of the project must be investigated before using the UAV technology for better data quality and analysis. an appropriate sensor and UAV should be identified before using UAV to assemble accurate data and precise analysis during this.

Varun Sharma et al. [11] Agriculture is one of the major sources of occupation in India. With the growing technologies in the field of drone. The drone is also being used in the field of agriculture which helps the farmers and the labours. As the drones works more efficiently than humans. The main aim of this paper is to increase the awareness to use the drones in the agriculture field so that the farmers will be aware of the growing technologies and can learn how to control the drone using remote and to implement them in their farms. To improve the production and the cultivation of the crops, the author in this paper has proposed that they are sprinkling water, spraying the fertilizers and pesticides, and used to spray chemicals like UREA. Drones are being used to spray the pesticides and fertilizers to the large farms and the drones can also click pictures from the certain height so that the framers can identify if the crops are being infected or if the crops are healthy, it also has a temperature sensor, which senses the temperature that is required for the crop and how much water is required for the certain crop. The UAV is used in this paper to increase the crop production and reduces the workload for the farmers and helps to save time for the farmers.

Olaiya O et al. [12] proposed that smart farming should be used in India and the farmers should use them to sow the seeds and to monitor the growth crop growth. As this the octocopter it is mainly used in the irrigation techniques, spraying fertilizers and pesticides and the drone can carry fertilizers or pesticides roughly around 3liters. The outcome of this paper suggests that there is limited intervention of human and improves the efficiency of the crop growth and accuracy in the production of healthy crops and saves time for the farmers and the decreases he workload for the farmers. Using such kinds of drones, helps farmers to reduce the wastage of pesticides, money and helps in managing the resources

### 3. LITERATURE GAPS

In [1], the proposed system has less load capacity, to increase loads capacity the specifications of the BLDC motor and battery capacity needs to be increased. The drone used here needs to be controlled manually which can be further improved to an automized drone as a future work.

In [2], the prototype has a camera which will capture the photos of sneezing or coughing action and notify the operator at the base station and it is required to assign a path to the drone so that the drone will fly on its own which is complicated needs a lot of requirements.

In [3], The PID loops used in this drone are roll control, Pitch control and Yaw control. It's difficult to monitor and control the

drone along with all these axes. The dynamics used for the design is in accordance with the autonomous drone. The drone orientation and acceleration and also, its angular rate depends on the algorithm and the design dynamics of the drone. The drone is autonomous, and its movement completely depends on GPS module system. It is a multicopter drone and it need some aerodynamic knowledge and mathematical solutions for the design with respect to the flight capacity. A ground station is established with a Laptop/PC for the monitoring purpose. Here it fails to meet all those autonomous requirements.

In [4], The octo-copter configuration is designed with eight arms. Electronic Speed Controllers controls the flight speed of the drone. This ESC is connected to the motors and to the power distribution board. The sanitizer tank should be placed on the board, and it should not touch the ground. If the ESC fails to guide the drone, then the drone falls back to the ground. In this case it is impossible to control the drone movement by the ground station. The established ground station should be able to monitor the drone even after the ESC stops working. The PC/Laptop should be in maintenance until the drone lands on the ground.

In [5], Spraying of disinfectant includes a lot of effort due to the COVID-19 pandemic. The effectiveness of spraying the disinfectant depends on the drone. The drone has some limitations for spraying the disinfectant, it can only carry 4500ml of disinfectant and spray them in 7-8 minutes. As you cannot disinfectant the entire area within 7-8 minutes. Motors speed also plays an important role in spraying mechanism. Remote control plays a very important role in running the drone, the components can be operated according to their function and can spray disinfectant liquid.

In [6], Spraying pesticides is one of the technologies that is in high demand. As the pesticide drones are expensive, many of the farmers cannot afford them. It is only helpful for that large fields. Farmers will not be having the knowledge to use the drone and they will want to use the old conventional methods for their farming. Many of the farmers will not be willing to take up new technologies because they want to continue the old conventional method, which is time consuming and also that include much of labour work on the field. Also doing things manually consumes a lot of time than doing it with technology.

In [7], the disinfectant spray covers different surface areas at different heights. Lower the drone, the layer of disinfectant spray is more. Hence, the area covered by the spray differs resulting in non-uniform spraying in uneven areas. Another issue here is the evaporation rate of the disinfectant spray. In humid areas, it stays in the liquid form for a longer time. The proposed system does not include any safety measures for the drone.

In [8], even though the drone is autonomous, the marked areas for disinfection should be checked before the process. The marked areas may be changed by anyone who knows how to do it. The level of sanitizer is not monitored continuously. The user should check the level of sanitizer before the process. It cannot fly to greater heights due to heavy payload.

In [9], it suffers from limited battery life and might kick off and land safely in small, confined areas and are best for starters to be told Drone Flying which might be improved with a much better battery.

In [10], the limitations of the UAV are the load and dimension of the sensors of low-cost UAV. the insufficient or medium format chosen are normally less stable and not accurate. The Low-cost UAV have limitations in reaching a particular altitude due to a less powerful engine. The path-planning system doesn't use professional pilot, the high-speed ultra-low situation, data downloading function during real-time application, the dimensions and payload to avoid bottleneck then the software for its automatic processing.

In [11], the proposed paper the major disadvantage is that it is very difficult to teach farmers how to use the drones as many of them are illiterate. Not every farmer knows the advantages of using the drone. If there is any problem while spraying the sanitizer, pesticides, or any chemical the farmers are not capable of rectifying them and hence, will stop using the agriculture drone.

In [12], being exposed to pesticides for a long time has been linked to many health issues such as cancer, chronic illness, asthma, hypersensitivity and many more. It can also cause reproductive problems as the pesticides contain harmful chemicals.

#### 4. PROPOSED METHODOLOGY

This project is being designed to sanitize the given area with the help of drone and with less human interaction. Flight controllers are installed to send the instruction to the drone and the drone acts accordingly. Gyro sensor is used which will even sense smallest change, it will be having drive arm, stator and sensible arm and gives us the correct reading of roll, yaw and pitch motions' receiver which is present on the flight controller receives the signal and it decodes it and sends it back to the microcontroller.

Microcontroller sends the received signal to the ESC (Electronic Speed Controllers). ESC is used to control the brushless DC motors, when the signal is received by the microcontroller, it creates thrust and the drone can be moved in the desired direction.

Two kinds of propellers are used in this project, pushers and pullers which gives the thrust when it rotated clockwise and anti-clockwise direction respectively. KK is used as it has accelerometer and gyro sensors which is used for stabilization and feedback control, no direct power supply from battery is given to the KK board, board will be having ATMEGA 168 microcontroller which process the input and gives the desired output. This system is powered by 11.1V LiPo battery.

Power distribution board distributes the power equally among the four motors. IR controlled switch is implemented to control the spraying mechanism, when the button is pressed, it will send the infrared signals to IR receiver which consists of photo LEDs. It produces a high input which will drive the submersible motor connected to a 9V battery through a relay to switch it ON or OFF. When the motor is switched ON, it pumps the sanitizer through the pipes and

then the sanitizer is sprayed through the nozzles. IR switch helps in controlling the spraying mechanism and to avoid the excess spraying of the sanitizer.

For the pumping mechanism, submersible DC motor pump, 9V battery, switch, pipes fitted to T-split and mini nozzles are used. When the switch is turned ON, the motor pumps the sanitizer to the pipe with the help of battery. Infrared remote switch is used, as there is direct contact connection from battery to motor there are chances of wastages of sanitizer before the quadcopter takes off, IR switch is used to control the ON and OFF motion of the motor, this is done to avoid the wastages of sanitizer

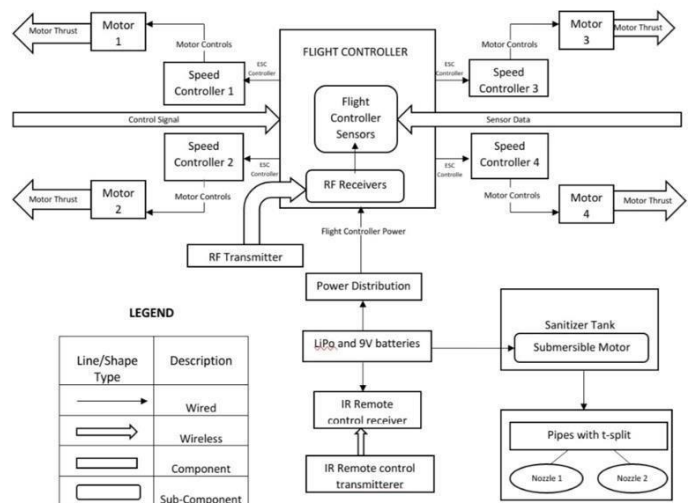


Figure 4.1: Block Diagram

#### 5. CONCLUSION

The proposed mechanism provides a drone sanitizer which can be controlled using a remote control. A pumping mechanism is provided for spraying of the sanitizer. The drone can fly up to 15 feet and carry the payload. The same mechanism is used in Agricultural drones.

The project can be improved by making it autonomous, or by adding camera and GPS. The drone can be tracked using a phone or a software. There is high scope of improvement in this project. It is really important in the current scenario.

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