

# Smart UAV Framework for Multi Assistance

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**Abstract.** — Unmanned aerial vehicles, which are also familiar as drones, play an important role in military and National emergency. Our motive in this project is to present the real time possibilities of using UAVs in rescue operations. UAV's can be practically used to transport goods on demand, provide medical support in urban areas, save people stuck during floods, analyze the scale of damages, monitor large performance inspection activities, human gatherings, ORS, deliver food and other necessary material, supply automated external defibrillators, support rescue operations and for emergency transport activities.

**Keywords:** UAV- Unmanned aerial vehicles, AI-Artificial Intelligence, CNN-Convolutional Neural Network, Surveillance, Cloud.

## 1 Introduction

Artificial intelligence & drones is pair made in technology. Pairing technology of the machine learning with AI along with the art of UAV drones allow ground-level operators an overview of entire area. Since a long time drones play key diagnostic roles in a very form of sectors — including defense, natural disaster relief, agriculture [10], security and construction. With their capability to extend potency and enhanced safety, drones became one of the important tools for everybody from fire - fighters to farmers.

As we all know these days the unmanned aerial vehicles (UAVs) have become a popular technology with the ability to upgrade the commercial production industries and also the property right outside of the military. UAVs would be able to accelerate recovery operations & rescue from natural disasters and may be used for autonomous delivery [6] systems. Unmanned aerial vehicles (UAVs) are developing technology with firm resolution for fixing many common public and personal operations. Public departments such as, police department, public safety and transportation management and public healthcare are beginning to use UAVs to convey prompt warnings regarding the catastrophe and improve the performance of rescue and resumption operations when a telecommunication infrastructure in an exceeding area is

broken or otherwise not available. Natural disasters have been increased at an distressing rate in the world. Every now and then we hear in the news about a locality full of catastrophe, tsunami or a hurricane etc. There is a necessity to look at such a catastrophe stricken areas before tasking the required rescue and help operations.

Smart UAVs are so popular, in fact, that the method of getting medical attention in remote regions in India should be improved to extend wellness management accessible. The healthcare system should try and aim to supply the simplest and quick necessary medical help to all any one far and near the country while enhancing for time and cost efficiency. However, India's current healthcare and wellness system is disorganized & lacks the accessibility of medical services in various parts of country. AI in healthcare is used for complex algorithms & software to emulate human cognition with analysis of medical data.

The primary thought of AI applications related to health is to analyze relationship between treatment techniques and patient health. Drones used as a security camera for monitoring outside activities like violence of rules or theft and protest to acknowledge the people or monitor their activities. Even for street surveillance [9], concerned authorities are using drones to transmit messages and spread awareness about the lockdown measures that the government has undertaken, particularly in areas that lacks open communication channels for health insights and information. Drones equipped with loudspeakers are conventional to make public announcements to stay back indoors, take all the necessary precautions, maintain social-distancing and wear a mask when stepping outside from home. Doctors and hospitals need medical supplies and laboratory testing quite often, and drones are the fastest and safest ways to deliver medication supplies and transport required samples from hospitals to laboratories.

The use of drones for medical reasons brings about numerous advantages, such as instant help, less time for travelling to the destination of patient, reduction of complications within the injured due to a brief time to attend for rescue, support and enhancement of basic functioning of medical necessity and their emergency teams, and therefore the room to succeed in places which are otherwise inaccessible for basic means of medical support.

AI drones used in construction companies can scan and cover a larger the area of buildings within some minutes, than any human would have required to complete. In defense and military areas drones have become suitable to develop for the unmanned tools to attack or bombard on the enemies during the conflicts. Military officers often should patrol areas so as to go looking for any potential threat, illegal activity or any intrusion within the borders of the city that may put the lives of the civilians in threat. Such areas involve very high risk to human life.

The Aerial Surveillance System is used feasibly to induce this job shunned any loss of human life also the rate at which the operation will be done will definitely

going to be quicker with help of the drones. Until recently, though, drones were only ready to display what their cameras captured. Now, because of computer science software, they'll perceive their surroundings, which enables them to map location, track objects and provide analytical feedback in real-time.

## 2 Literature Review

**2.1** Dr. Usha Rani, Nelakuditi, M. Manoj Vihari, M. Purna Teja [1] proposed an architecture stating IoT based Unmanned Aerial Vehicle system for Agriculture applications. As we know the pesticides and fertilizers are helpful to retain the bloom of the crops and avert the suffering caused by contagion that live on these crops. Using Unmanned Aerial Vehicles (UAV) for spraying, one can spray pesticides all over the crops and can cover larger area in very limited time also managing the use of chemicals and water at the same time. A sprayer mechanism was enabled to the drone. With this mechanism one can easily spray and prevent the crop from getting damaged with very less efforts.

**2.2** Mikhail Yu. Kataev, Maria M. Dadonova Qadeer [2] presented a model According to the model the monitoring of the research processes predicting crop yields, supervising the growth stages of the plant, using unmanned aerial vehicles are feasible for farming. One of the effortless solution for this problem is to process the received data (images) from the unmanned aerial vehicle (UAV). An essential segment of image processing linked with application of the clustering method to isolate the different varieties of plants in the field, such as, weeds. The given report presents us the examples of an application of the standard K-means method for clustering images of agricultural fields.

**2.3** Elloumi, M., Dhaou, R., Escrig, B., Idoudi, H., & Saidane, L. [3] proposed their design in 2018. In this paper contains design for monitoring the traffic on road using a UAV-based system. This UAV is capable of monitoring the traffic situation on a road, they collect and send the real time data of information about the vehicle to a traffic processing center to regulate the movement of vehicles. This paper states that the performance of their system is finer than the performance of those UAV which are fixed for trajectory traffic monitoring system in terms of coverage and events detection rates.

**2.4** Naser Hossein Motlagh, Miloud Bagaa, and Tarik Taleb [4] proposed a very clear and precise description about UAV-Based IoT Platform A Crowd Surveillance Use Case. This paper consists of a high-level perspective of a UAV-based integrative IoT platform for delivering the IoT assistance from greater height, in addition to the system orchestrator all together. As a visualized use case of the platform, the paper demonstrates how one can use UAVs to monitor the crowd depending upon the face recognition technology. They have designed a testbed consisting of a local processing node and one MEC node.

**2.5** Taku Noguchi and Yosuke Komiya [5] proposed an architecture where in the disaster prone area can be remotely monitored in real-time using collective UAVs. Here they have used a network of UAVs where each UAV will pass on the collected information to its subsequent UAV and then to the GCS at last. Every UAV maintains its connections with other UAVs and yet fly autonomously. The received information from the monitoring UAV is passed to other UAVs in sequence as to transfer the data to GCS. The proposed system replaces the UAVs in-flight with standby UAVs according to the remaining energy in order to prevent the monitoring disruption caused by their absence from the network.

### 3 Existing System Architecture/Working

The following figure Fig.1 shows the existing system architecture of Arduino based UAV. This system has Arduino as a core component and can be controlled through mobile GUI using Bluetooth.

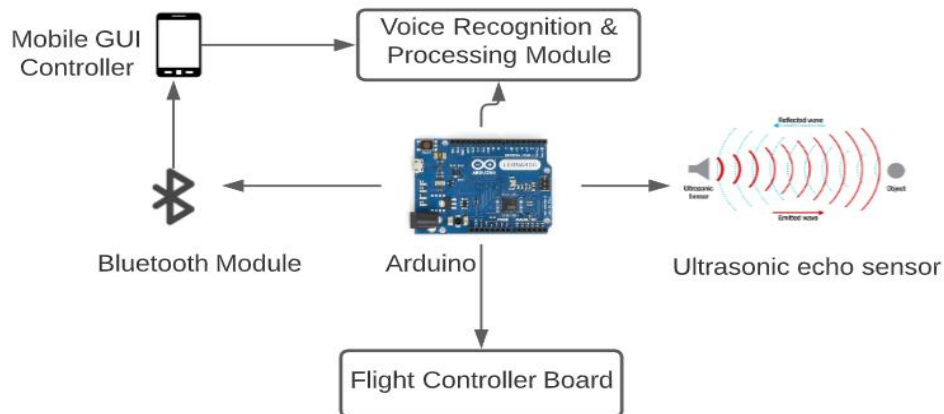


Fig.1 Existing System Architecture

**Working :** Usually the drones are controlled with the help of an Radio Frequency (RF) remote, or in case using an autopilot enabled with a GPS module for automatic controlling by directing the proper path to drone. Here in this system a drone is constructed using an Arduino Uno.

The major motive of this project is to gather the data that is the video information from a particular known public area. So as to get the video information, we have to designate the rate of maximum dimensions that the drone is capable of covering by using Arduino programming. As its name suggests, autopilot meaning the drone need not have to be controlled rather it will be controlled by itself, and that the flight controller will handle the controlling action of the drone which consists of built-in sensors to balance the drone. Arduino Uno is the main controller of the system, which gives the appropriate signal to flight controller. To maintain the feasibility & stability,

it consists of an OpenPilot CC3D microcontroller (or any flight controller), as well as a camera to take the real time data. Finally, the system includes a Bluetooth module to turn the drone on/off and display the live data using an Android mobile device or Bluetooth Low Energy Module.

#### **4 Objective**

- (1) To make use of UAV for spraying disinfectant in public areas like airports, railway station, Park and roads.
- (2) To reduce human efforts as drones can disinfect approximately 50 times more area in comparison to any other traditional methods and at the same time keeps human operators out of harm.
- (3) To make people aware, apart from spraying disinfectants these drone have public monitoring and warning system equipped with camera.
- (4) To monitor high risk places by real time analysis for crowd gathering and keeping an eye on the crowd gathered in a particular area and give relevant instructions to the gathered crowd using the fitted speakers.
- (5) Besides, this to trace the real time location of UAV flying in a particular area and the data is stored which can be used when necessary.

#### **5 Proposed System Architecture/Working**

The following figure Fig.2 represents the system architecture of UAV drone armed with surveillance cameras and speaker for making the public briefing. The capability of UAV for aerial inspection is emphatically strengthening the police's capability to contest and manage the spread of the pandemic. By conveying circumstantial awareness on a real-time basis, this technology gives the Police the means to interpret and set up resources very quickly and easily to manage emerging situations

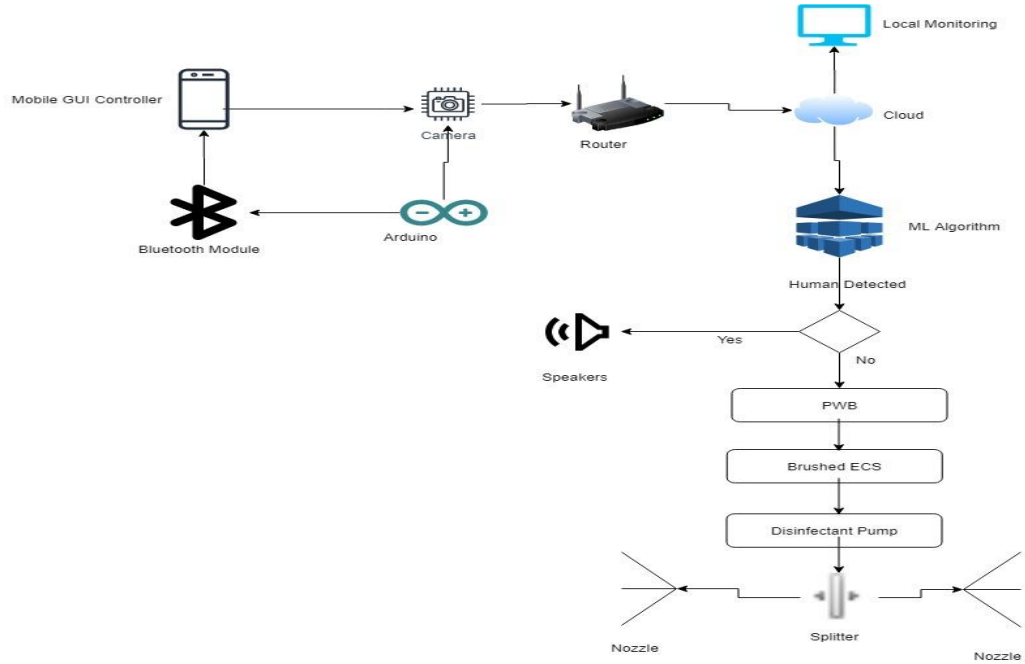


Fig 2 : Proposed System Architecture

**Working:** Here we have used Arduino as the core component and all the other components are interfaced with Arduino. The DC motors are connected to the Arduino. These motors are mainly used for motion controlling and positioning the drone. The DC motor creates its own magnetic field which is an input to the motor's rotor which will help the drone to take off from the ground. The brushless DC motors are attached to the propellers these DC motors produce the necessary thrust that helps propellers to cause the circular motion. These components are covered with drone frame that gives shape to the drone and helps to hold all the components together. The strength of the drone depends largely on the quality of frame used. The IP camera is connected which will capture all the real time images/video of a particular area and pass the data to cloud over internet. From cloud the data is accessed and here Machine Learning[7] comes into picture. The main purpose of using Machine Learning is to make sure that any object (humans particularly) are detected and then depending upon the output the further action is taken.

For object detection we have used YOLO algorithm i.e. You Only Look Once (YOLO) [8]. This algorithm is used for real time object detection and it is the most effective object detection algorithm. It has CNN (Convolutional Neural Network) that uses Deep learning algorithm for object applies one single neural network to an entire image and then divides the whole image into boundaries and predicts the bounding boxes. For this it uses pre-trained data set called COCO data set. YOLO algorithm

detection. It classifies the objects within the images frame. It is prominent because it brings about high efficiency there by also being able to run it in real-time. The meaning of algorithm “only looks once” is that the algorithm scans the given image or video at once and requires one forward propagation to pass through neural network to predict the object in the given image or video. Now depending upon the results which we get from ML the further action i.e. if the output show that the area is free from crowd then decontaminates the area by spraying the disinfectant with help of nozzle and splitter. We have made use of splitter here as it will divide the flow of disinfectant in two direction thereby covering a larger area . And if the output shows the presence of some crowd then it will take the action of making the necessary announcement with speakers as to maintain the social distance to control the spread of disease. For communication between user and the drone we made use of transmitter & receiver .A radio control system consisting of 2 elements that is the transmitter & receiver. The antenna on the transmitter will help transmitter to send the control signal to receiver and the receiver in turn passes on the signal to flight controller with which the drone can be moved. The drone is enabled with flight controller, it directs the RPM of each DC motor depending upon the input received. The command is fed to the flight controller and it in turns manipulates the DC motor accordingly. The flight of the drone is controlled using Bluetooth low energy module which makes use of Web Bluetooth .Web Bluetooth is a technology mainly used of making 2 bluetooth devices communicate with each other. All these components are powered using Lithium polymer or Lipo Batteries.



The above image is the snippet of the output showing the objects that are detected

using YOLO Algorithm. This output is then stored in Cloud and can be used when needed.



The above image shows the output when YOLO algorithm is applied to the video and it detects particularly the humans as our project concentrates not just the detection of objects but specifically on detecting the crowd in the particular area.

## 6 Conclusion

The UAV can provide the best and quick possible medical attention to all needy people over a specified region along with optimizing for time and cost efficiency. The drone along with GPS can also be used as a function of surveillance and counting a crowd in a specific location which can be treated as future advancement of our UAV. Also drone can be made more efficient by increasing its weight capacity which can be then also used for emergency delivery system in remote regions as to bring healthcare at convenience. The change in direction of wind flow, increase in distance between controller and the drone, or any other environmental changes like heavy rain, fog can limit the efficiency of proposed UAV.

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