AI based smart UAV

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Contents

Abstract

- Unmanned aerial vehicles, also known as drones, can play a significant role in military and civil emergency medicine.The aim of the study was to present the real possibilities of using them in rescue operations and to examples from all over the world.

- Unmanned aerial vehicles can be applied to transport goods on demand, provide blood in urban areas, save sinking people, analyses the scale of damages, monitor large human gatherings, perform exploration activities, deliver blood samples and other analysis material, provide automated external defibrillators, support rescue operations and air transport, and perform agricultural activities.

Introduction

- Artificial intelligence and drones are a match made in tech heaven.Pairing the real-time machine learning technology of AI with the exploratory abilities of unmanned drones gives ground-level operators a human-like eye-in-the-sky.

- More than ever before, drones play key problem-solving roles in a variety of sectors — including defense, agriculture, natural disaster relief, security and construction. With their ability to increase efficiency and improve safety, drones have become important tools for everyone from firefighters to farmers.

Objectives

- Areas are being disinfected to prevent spread of Novel coorona virus ensuring safety of workers by using drones.

- They cover a large area(6 km) as compared to areas which human being can cover(3km).

- Real time analysis for crowd gathering and keeping the count of the crowd gathered by video monitoring and giving relevant instructions.

- Besides, the UAV is capable of storing the data which can be use when necessary.

Literature Review

Sr. No.	1.
Title	IoT based Unmanned Aerial Vehicle system for Agriculture applications
Author and publication details	Dr. Usha Rani. Nelakuditi, M. Manoj Vihari , M. Purna Teja IoT based Unmanned Aerial Vehicle system for Agriculture applications. 2018 International Conference on Smart Systems and Inventive Technology (ICSSIT). doi:10.1109/icssit.2018.8748794
Methodology	Pesticides and fertilizers help to maintain the health of the crops and avoid the damage caused by pests respectively. Using Unmanned Aerial Vehicles (UAV) for spraying pesticides can cover large area in short time with reduced use of chemicals and water. A sprayer mechanism was added to the body of Quad copter. They can spray the pesticides uniformly to nook and corner of the field without need of a farmer
Advantages	The main advantage of this drone is reduction of spraying time.It can fly across different terrains and there will be even spraying of the fertilizers from a single safe place. The average area covered by the prototype system is around 3 feet by 3 feet at a height of 6 feet. The spray time is about 1 minute for the 250 ml of content.

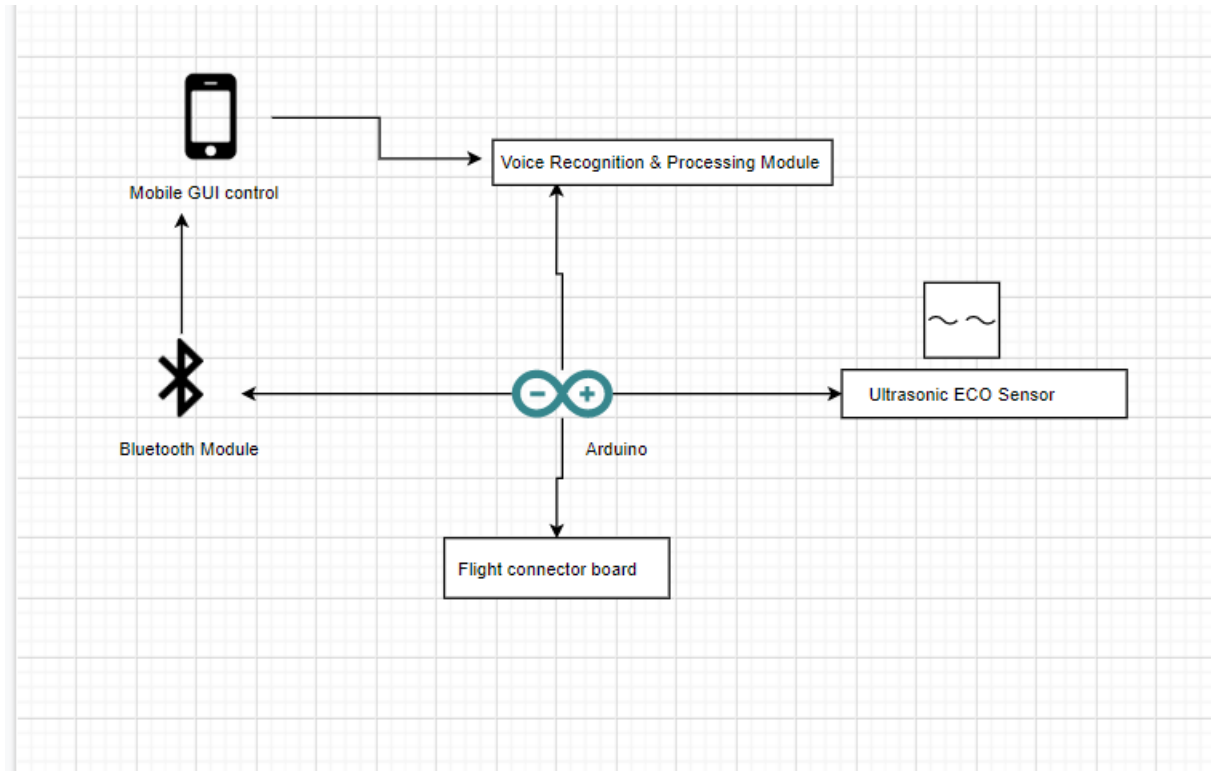| Sr. No.	2.
Title	Farm Fields UAV Images Clusterization
Author	Mikhail Yu.Kataev, Maria M. Dadonova Qadeer. 2019 International Multi-Conference on Engineering, Computer and Information Sciences (SIBIRCON)
Methodology	The monitoring of the research processes, controlling the phases of plant growth, predicting crop yields, using unmanned aerial vehicles are relevance for farming. One of the options for solving the problem is to process the received images from the board of an unmanned aerial vehicle (UAV). An important part of image processing connected with application of the clustering method to isolate different types of plants in the field, such as, weeds. The report shows examples of an application of the standard K-means method for clustering images of agricultural fields.
Advantages	UAV easily and often used to satisfy the need for rapid monitoring, assessment and mapping of natural resources by the user at a spatial-temporal scale. Digital devices on board the UAV allow more detailed spatial images than satellites
Disadvantages	This project can incorporate collision avoidance in Aerial Surveillance System.This can be done by using Infrared sensors to detect obstacles, Thus the Aerial Surveillance System will be able to make its path through the hindrances and reach the destination quickly

Sr. No.	3.
Title	Monitoring Road Traffic with a UAV-based System
Author and publication details	Elloumi, M., Dhaou, R., Escrig, B., Idoudi, H., & Saidane, L. A. (2018). Monitoring road traffic with a UAV-based system. 2018 IEEE Wireless Communications and Networking Conference (WCNC). doi:10.1109/wcnc.2018.8377077
Methodology	UAVs monitor the traffic on a city road, they are responsible for collecting and sending, in real time, vehicle information to a traffic processing center for traffic regulation purposes. We show that the performance of our system is better than the performance of the fixed UAV trajectory traffic monitoring system in terms of coverage rates and events detection rates.
Advantages	The first advantage of UAV based Road Traffic Management systems is that they allow the monitoring of a larger area. UAVs can move from one area to another. UAVs can perform vehicle identification when equipped with cameras and image processing capabilities, without the need for embedded sensors within cars.
Disadvantages	UAVs are limited by battery life and their use causes privacy issues.

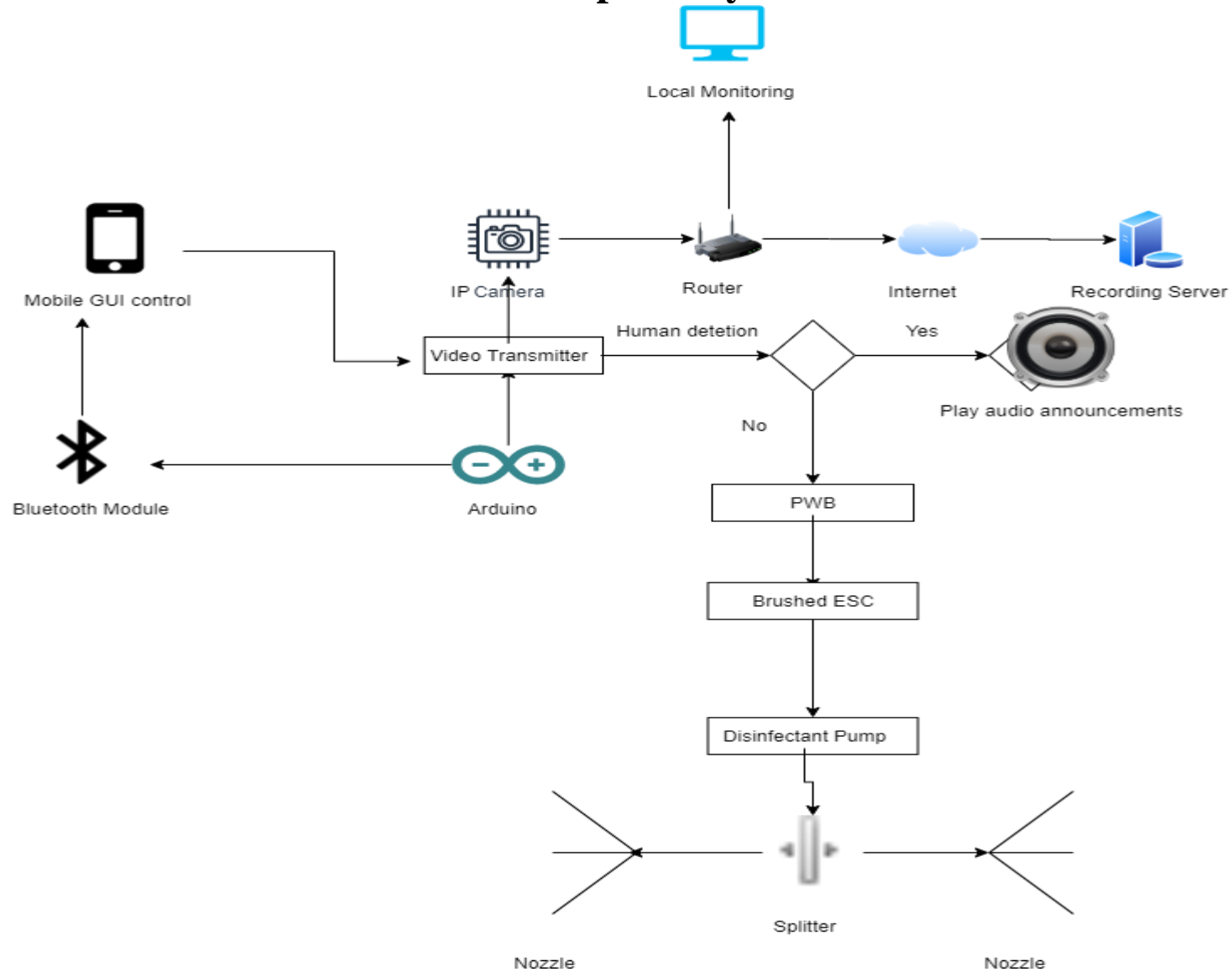| Sr. No.	4.
Title	UAV-Based IoT Platform: A Crowd Surveillance Use Case
Author and Publication details	Naser Hossein Motlagh, Miloud Bagaa, and Tarik Taleb. IEEE Communications Magazine (Volume: 55 , Issue:2 , February 2017)
Methodology	A high-level view of a UAV-based integrative IoT platform for the delivery of IoT services from large height, along with the overall system orchestrator, is presented in this paper. As an envisioned use case of the platform, the paper demonstrates how UAVs can be used for crowd surveillance based on face recognition. They have developed a testbed consisting of a local processing node and one MEC node
Advantages	The System Orchestrator is assumed to have all necessary intelligence to be self-capable to autonomously self-operate, self-heal, self-configure, and adequately resolve any possible conflicts from diverse policies
Disadvantages	The overall system has more energy consumption and the overall processing time can be reduced

Problem Definition

- The Government of India needs to lay down policies for Pandemic National Emergency (such as Covid-19 disease) and for disaster management to minimize collateral damage and loss of life.

- To improve this working cycle, an AI based smart UAV(unmanned aerial vehicle) has been developed for disinfecting roads and public places and to also monitor the situation during lockdown and store the information which can be accessed later (in case of National Emergency).

- The UAV has been enabled to make important announcements on detecting any human violating the Government Lockdown Rules.

Existing System

Proposed System

Local Monitoring

Mobile GUI control

IP Camera

Router

Internet

Recording Server

Video Transmitter

Human detetion

Yes

Play audio announcements

Bluetooth Module

Arduino

No

PWB

Brushed ESC

Disinfectant Pump

Splitter

Nozzle

Nozzle

Technological Stack

- Brushless DC Motors.

- KK 2.1.5 Flight Controller

- Raspberry pi

- Propeller

- Arduino UNO & Genuino UNO

- BLE-Bluetooth Low Energy Module

- Drone frames

- Lipo Battery

- Transmitter & Receiver

- Nozzle

- Splitter

- Goodle Cloud/SD card

- ML

- OpenCV- HOG algorithm

Scope

- The use of drones for medical purposes brings many advantages, such as quick help, shortening the time of traveling to the travel to a particular area for monitoring, also the UAV has been enabled to make important announcements and the opportunity to reach places inaccessible for basic means of medical transport

- The Arduino based UAVt can keep an eye on the crowd gathered over a particular area using ML and store the information over cloud which can be accessed when needed.

- There are several safety information campaigns but neither information campaigns nor the most perfect regulations will protect against threats that may be caused by the presence of a drone in a place not intended for.

Project Limitations

- Limited Payload capacity

- Limited range and operational time

- Real time video analysis

Summary

- The UAV provides the best and fastest possible medical attention to all people throughout the country while optimizing for cost and time efficiency. However, India's current healthcare system is inefficient & lacks the accessibility of medical services in various regions of country.

- Smart UAVs are so popular, in fact, that the process of seeking medical attention in remote regions in India should be improved to increase healthcare accessibility.

References

1. Oniniwu, G. Onojo, O. Ozioko and Nosiri, O. (2016) Quadcopter Design for Payload Delivery. Journal of Computer and Communications, Vol.4, PP:1-12.

2. Dr. Usha Rani. Nelakuditi, M. Manoj Vihari , M. Purna Teja IoT based Unmanned Aerial Vehicle system for Agriculture applications. 2018 International Conference on Smart Systems and Inventive Technology (ICSSIT). doi:10.1109/icssit.2018.8748794

3. Mikhail Yu.Kataev, Maria M. Dadonova Qadeer. 2019 International Multi-Conference on Engineering, Computer and Information Sciences (SIBIRCON)

4. Elloumi, M., Dhaou, R., Escrig, B., Idoudi, H., & Saidane, L. A. (2018). Monitoring road traffic with a UAV-based system. 2018 IEEE Wireless Communications and Networking Conference (WCNC). doi:10.1109/wcnc.2018.8377077.

5. Naser Hossein Motlagh, Miloud Bagaa, and Tarik Taleb. IEEE Communications Magazine (Volume: 55 , Issue:2 , February 2017)