Drone Based Disaster Management System

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Abstract— Previous surveillance systems were based on aircrafts and CCTV cameras. Limitations of these systems are less cost effective and restrictions over areas to be monitored. Such systems are highly dependent on human operator for supervision and intervention. So, we have adopted the monitoring using drone technology which can overcome the limitations of both systems explained above. as drones have meaningful growth and is useful for detecting faults in critical areas. drone based image capturing system based on platform arduino controller and multichannel sensing module. This paper focuses mainly on operational and tactical drone application in disaster management using a time-scaled separation of the application, like pre-disaster activity, activity immediately after the occurrence of a disaster and the activity after the primary disaster elimination. Paper faces to 5 disasters, like nuclear accidents, dangerous material releases, floods, earthquakes and forest fires. Author gathered international examples and used own experiences in this field. Results and discussion: An earthquake is a rapid escalating disaster, where, many times, there is no other way for a rapid damage assessment than aerial reconnaissance. For special rescue teams, the drone application can help much in a rapid location selection, where enough place remained to survive for victims. Floods are typical for a slow onset disaster. In contrast, managing floods is a very complex and difficult task. It requires continuous monitoring of dykes, flooded and threatened areas. Drone can help managers largely keeping an area under observation. Forest fires are disasters, where the tactical application of drone is already well developed. Drone can be used for fire detection, intervention monitoring and also for post-fire monitoring. In case of nuclear accident or hazardous material leakage drone is also a very effective or can be the only one tool for supporting disaster management.

Key words: Drone Disaster Management, Flood, Earthquake, Hazardous Material, Forest Fire, UAV, UAS

I. INTRODUCTION

A disaster is a natural or man-made (or technological) hazard resulting in an event of substantial extent causing significant physical damage or destruction, loss of life, or drastic change to the environment. Motion Detection can be done in many ways. There are many solutions available for this. But it seems to be more complexity and ineffective on real time application. To make the system handle in easier and with more security, this proposal impends cheap and more effective technique for Moving Object Detection. A disaster can be defined as any tragic event stemming from events such as earthquakes, floods, accidents, fires, or explosions. It is a phenomenon that can cause damage to life and property and destroy the economic, social or cultural life of people. We introducing the technology & fly procedure of drone & used the drone technology to get real time live video. This live data is casted & analyzed the environment changes caused by floods. It includes detection to avoid crashing of drone by IR Sensor due to distraction to human operator. The drone based technology was developed over several years, & there is including fixed propeller for rotary wings. The characteristics of drone to the task of providing a good platform to replace the man were detected to ensure the security & ability with visual images, allowing users to understand actual situation. With advance in technology development, the function of drone is widely used for different purposes in recent years. This have included serving the development of city infrastructure, research in agriculture, fishery & farming, monitoring environmental protection, forestry management & disaster management like floods or debris flow. Many technological breakthroughs in recent years have emerged in places areas where it was least expected. Unmanned aerial systems, for example, have transitioned from highly defense-focused applications to a multitude of commercial use cases that transcend industries. But what makes UAS, more commonly referred to as drones, fit for emergency response? As previously discussed, aerial views are critically helpful in large-scale disaster zones. Drones, designed to be agile, fast and robust, empower response teams with a substantial upper hand without costing as much as manned flight operations. Because many are autonomously flown, drones can access hard-to-reach areas and perform data-gathering tasks that are otherwise unsafe or impossible for humans.

II. LITERATURE REVIEW

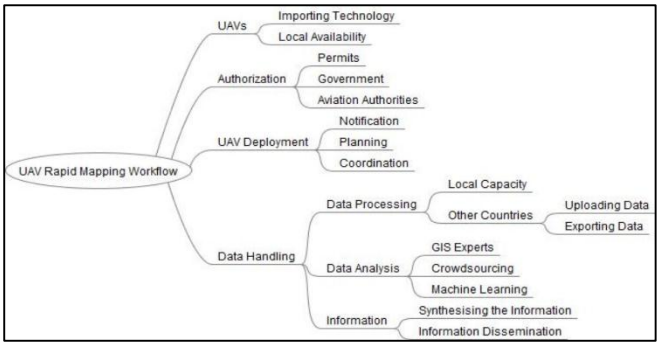
Whether you call them unmanned aerial vehicles (UAVs), miniature pilotless aircraft or flying mini robots, drones are rapidly growing in popularity. They are still in the infancy stage in terms of mass adoptions and usage, Drones have already broken through rigid traditional barriers in industries which otherwise seemed impenetrable by similar technological innovations. Over the past few years, Drones have become Central to the functions of various businesses and governmental organizations and have manage to pierce through areas where certain industries where either stagnant or lagging behind .from quick deliveries at rush hour to scanning an unreachable military base, drones are proving to be extremely beneficial in places where man cannot reach or is unable to perform in a timely and efficient manner. Adoption of drone technology across industries leapt from the fad stage to the mega-trend stage fairly quickly as more and more businesses started to realize its potential, scope, and scale of global reach. Whether drones are controlled by a remote or accessed via a Smartphone app, they possess the capability of reaching the most remote areas with little to no manpower needed and require the least amount of effort, time, and energy. This is one of the biggest reasons why they are being adopted worldwide, especially by these four sectors: Military, Commercial, Personal, and Future Technology. Drone Technology History and Today's uses

drones have been around for more than two decades, but their roots date back to World War I when both the U.S. and France worked on developing automatic, unmanned airplanes. From technically manning sensitive military areas to luring hobbyists throughout the world, drone technology has developed and prospered in the last few years. Individuals, commercial entities, and governments have come to realize that drones have multiple uses, which include Aerial photography for journalism and film, Express shipping and delivery, Gathering information or supplying essentials for disaster management, Thermal sensor drones for search and rescue operations, Geographic mapping of inaccessible terrain and locations, Building safety inspections, Precision crop monitoring, Unmanned cargo transport, Law enforcement and border control surveillance, Storm tracking and forecasting hurricanes and tornadoes. Development of hundreds of more uses of drones is underway due to the multiple investments pouring into this promising industry every day.

A. Military Drone Technology

Military usage of drones has become the primary use in today's world. Used as target decoys, for combat missions, research and development, and for supervision, drones have been part and parcel of the military forces worldwide. According to a recent report by Goldman Sachs, military spending will remain the main driver of drone spending in the coming years. Goldman estimates that global militaries will spend $70 billion on drones by 2020, and these drones will play a vital role in the resolution of future conflicts and in the replacement of the human pilot. Military spending also tends to come in larger increments, as a single US Predator drone costs approximately $4 million, and total spending for the program is estimated at a total of almost $2.4 billion. Unmanned Aerial Vehicles will continue to be applied in various military operations due to their high convenience in reducing losses and enabling the execution of high profile and time-sensitive missions.

III. PROPOSED SYSTEM



Drone based system basically consists of flight controller for controlling purpose where it controls motors to fulfill the design of drone and used for interfacing camera for live video transmission. Brushless DC motors are used to design the drone.

Infrared Sensor (IR) and LPG Gas detector are used. IR sensor is used to detect presence of object in particular range and LPG Gas detector is used to detect the leakage of LPG Gas. System design is divided into two parts namely hardware design and software design.

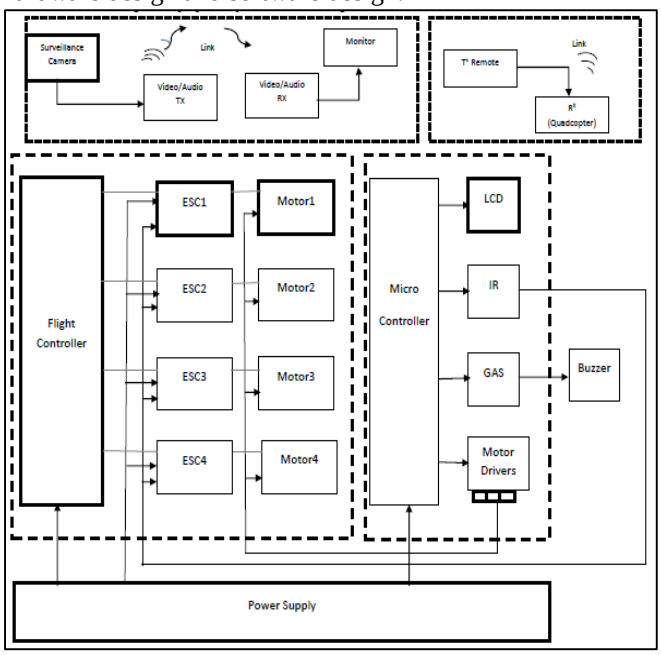
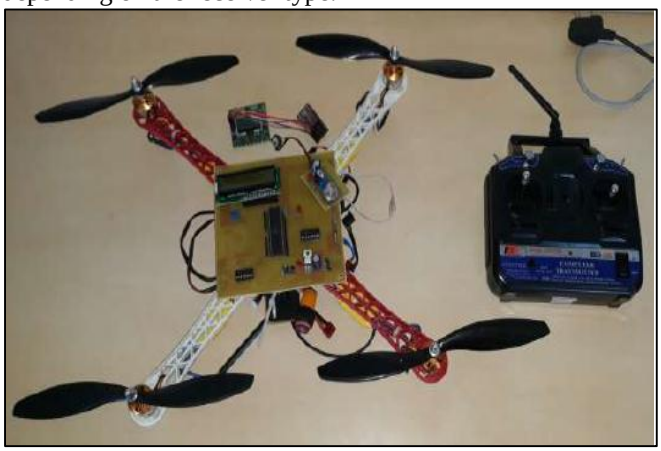
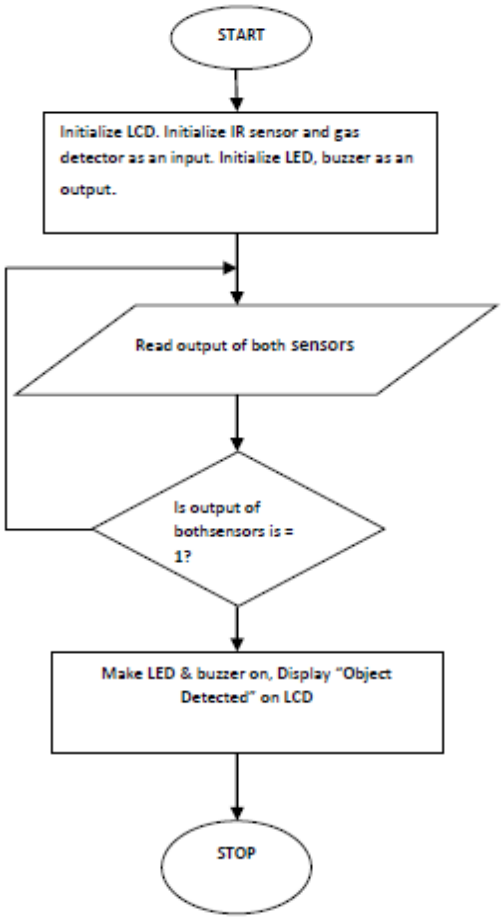


Fig. 1: Block Diagram of System

Wireless cameras are basically described as a wireless transmitter carrying a camera signal. The Camera is wired to a wireless transmitter and the signal travels between the camera and the receiver. This works much like radio. The sound you hear on a radio is transmitted wirelessly and you tune to a certain frequency and hear the sound. Wireless cameras have a channel also. The receiver has channels to tune in and then you get the picture. The wireless camera picture is sent by the transmitter the receiver collects this signal and outputs it to your Computer OR TV Monitor depending on the receiver type.



The Camera sees the image, the camera then provides the video to the transmitter, then the transmitter sends the wireless signal to the receiver. There are many types of wireless cameras. You can make most any camera wireless by adding a wireless transmitter and receiver. The camera and transmitter require power. The power is provided by battery and/ or transformer / adapter.



The kit consists of a transmitter and a receiver. It adopts an advanced wireless transmission scheme and has the advantages of a long transmission range, strong anti-interference and high mobility. It can transmit AV signals of DVD, DVR, CCD camera, IP TV, satellite set-top box, digital TV set-top box and other similar devices, by means of radio waves and receive them at distant end and input them to a TV set to be displayed. It enables you to easily realize wireless sharing of HD AV data and enjoy untrammeled hi-fi visual effects.

There are so many other different techniques for the solution this problem. But those are not that reliable. In order to reduce man intervention and save the labour cost and time both can use microcontroller to control, operate and synchronize this task. The microcontroller can be programmed to control its speed and also can set the required speed through potentiometer to get our work done. Synchronization has been done here using wireless method. RF communication technology has been used here for wireless communication. Motors are synchronized with the master slave method. The motor speed is transmitted using the RF Module from the transmitter and using PWM Technique the speed is received in the receiver side and the motors will run at synchronized speed.

One of the main tasks drones may perform is to provide temporary communication infrastructure. Stable and low energy devices should compose the main backbone infrastructure. Ideally, blimps could perform this role quite well. They are stable and, given their characteristics, possess a much larger autonomy than the average drone. For example, the X-Tower from Stratxx can fly for 23 days broadcasting 12 channels of digital TV during this entire time. Flying at a relatively high altitude, blimps have the advantage to provide a large footprint coverage. The covered area can be further extended by interconnecting multiple blimps. To avoid interference, backbone nodes should have two interfaces, one to work as access point to other nodes, and a second interface dedicated to handle the backbone traffic, i.e. routing other backbone nodes traffic and accessing the backhaul. Any other node of the region, user's equipment and even other drones, could use the deployed infrastructure to exchange data. Fixed wing drones have a lower autonomy than blimps, but they have the advantage of being able to cover the region faster. Equipped with GPS, 3D cameras and trusting open geographical databases, these drones can provide the data for the automatic generation of an up-to-date map of a relatively large region in a matter of minutes. Such maps can be further distributed and used by different agencies on the coordination of the research and relief efforts. The fixed wing drones can coordinate themselves directly, through the blimp backbone, or even through the ground backhaul, if they are in its communication range. This coordination is important to grant a full and optimal coverage of the region by the fixed wings drones. Given its characteristics, the most rational way to divide the areas are in strips, so that the drones can go over the strips one by one doing only one turn at the end. The advantage of dividing the area is also to be able to divide the work among different drones, if available.

A. Advantages of the Proposed System

1) Geographic Mapping
2) Law Enforcement, Save Lives
3) The mode of communication is radio frequency in this project
4) Low Cost, Low Risk, High Accuracy.

IV. APPLICATIONS

1) Such as used in paper mills , cruise electric vehicle, textiles mills, flour mills and robotics
2) It can be used for security purpose to detect suspected ones.
3) It can be used in rescue system.
4) It can be used as a military application.

V. FUTURE SCOPE

This system can be used for military application using GPS system. It is possible by keeping continuous track of the suspected person using camera and sending the information to the surveillance system using GPS.

VI. CONCLUSION

This system consists of drone based technology which is mentioned above. In addition to this flight controller and microcontroller is used for overall working for the system. Thus we have implemented and designed the drone of 450mm as per calculations with BLDC motor of 1000k v. For disasters purpose sensors such as IR Sensor and GAS sensor are used and interface with microcontroller. This application gives the result as a smart drone technology. The overall PCB layout and Flight controller is carried on drone. This system

uses camera for live video transmission which will reduce the cost. This system also detects the obstacle and makes the motors to rotate at a same speed to avoid crashing in absence of human operator. Hence using wireless transmitters and receivers we can take off at 90m-120m.

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