

Detection and Intimation of Human Presence using UAV (Drones)

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I. INTRODUCTION:

Around the world there are a number of natural disasters that occur such as hurricanes, typhoons, earthquake etc which cause serious damage in the lives of hundreds of people. Humans are primarily required for the search and rescue operation which may affect their own life. During the time of any natural disaster there may be a number of humans who are stuck in their houses without any help, so the identification of such people must be done with the help of humans which may be inaccurate.

When compared to humans, machines are proved to be extremely accurate and less time consuming. Thereby human detection in unmanned aerial vehicles will be of great importance in giving an accurate detection of the presence of people in inaccessible areas where the rescue team may not be able to reach and provide accurate measures.

Since the rescue team does not possess the exact information they have to enter the disaster zone with just an approximation, and there are chances for the non occurrence of humans also which may result in the loss of precious time as well as the drain of money which could have been put to better use in rescuing the people who are actually stuck in some location.

ABSTRACT

Quad copter is capable of achieving a vertical flight.

It can fly in a stable manner and can be used to monitor and collect data in a specific form from different regions. The Unmanned Aerial Vehicles (UAVs) are being operated in risky environment and its use is becoming more common day by day. We can make use of these unmanned aerial vehicles as a platform which supports the use of various sensors, and other computer operated systems which help us to reach even those areas that are currently inaccessible and can perform the required tasks with ease. Finding the people who are trapped due to some natural disasters is very hard because we are not aware of their exact location thereby making it very time consuming and a complex process.

The main application of this drone is detecting the presence of humans where natural disasters have affected the surrounding areas and giving intimation by means of a GSM to the nearby rescue team.

Keywords: Quad copter, Unmanned aerial Vehicle (UAV), sensors and computer systems, human detection and intimation

At times like these UAV's can prove to be of great help because it reduces the amount of time that is taken by the rescue team. It can fly even in the toughest of terrains and can almost give accurate information on the presence of humans in that area and can intimate that information almost immediately to the rescue team so that they can also prepare for the same. At the same time it also provides information about the latitude and longitude of the detected humans so that even that time of searching for the exact location of the human presence can be minimized. This knowledge of the presence of humans in a particular area can be of great use to the rescue team as it gives them an idea and at the same time it can increase the chances of the survival of the humans who are under threat.

One such example for the natural disaster is the flash floods that occurred in Kerala which took the lives of around 37 people and around 36,000 people were displaced, due to the occurrence of landslides and the overflowing of the reservoirs in the state of Kerala. The state that took extreme pride in its natural beauty with hundreds of coconut and palm trees was found to be battered because of the extreme and severe monsoon that hit the state. The affected people

who were homeless were asked to move to the 350 relief camps that were present across the state. The devastation and the misery that was caused because of this incident are immeasurable as it has led to the loss of hundreds of homes which were destroyed in the heavy downpour.

There are still people who have not been identified and are stuck in inaccessible areas. By the implementation of this unmanned aerial vehicle we can at least help identify those people who do not have any means of communication to ask for the help of the rescue team. At such time the UAV can go to that location and search for the presence of any humans and can immediately intimate the rescue team of the location of the detected humans so that they can be well equipped for the mission and can take the necessary measures to help rescue the lives of humans who are stuck and guide them to a much safer location.

By making use of this UAV we can detect the presence of the humans who are trapped in the affected areas and give intimation by means of GSM to the mobile so that the rescue team can be alerted.

II. SYSTEM DESIGN

Component Specification

Frame:

Quad copters make use of frames which are made of four plastic drilled rods which has a square cross section in order to fit the motors on it. It also consists of two center metal plates. The weight of the frame is around 150g, and this weight primarily depends on the type of metal that we use to build up the frame. Between the centers of the two mounted motors there is a spacing of around 60cm. The two metal plates that were placed can be used to mount the microprocessors or the flight controller as well as the receiver over the middle section of the frame.

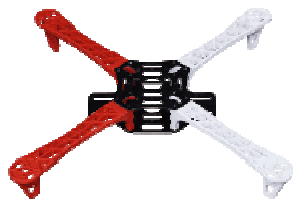


Figure 1 Frames

ESC (Electronic Speed Controller):

The electronic speed controller's primary purpose is to regulate the speed of the electric motor. The reversing of the motor can also be achieved. In order to control the speed of the drive motor in the full size electric vehicles also the ESC can be used.



Figure 2 ESC Controller

Propellers:

A propeller closely resembles the blades of a fan that is used to convert the rotating motion into thrust. It generates thrust and torque that helps in maintaining the drone in a flying position and also in maneuvering it. The torque is measured by Newton's third law which says that every action has an equal and opposite reaction that helps in the flight of the drone by pushing the air down thereby pushing the rotor up.



Figure 3 Propellers

Motors:

The motors that are used in the quad copters is 1000 KV DC brushless motor that is ideal to work with the 30A electronic speed controller. Depending on the weight that the quad copter has to carry we must select the required motor.



Figure 4 Dc Brushless Motor

Battery:

The battery which is used is a Li-Po battery which is Lithium Polymer that is rechargeable and the life cycle degradation rate is greater. Based on the capacity and the rate of discharge of the battery the required battery is selected. The selection of battery plays a critical role in determining the life time and the performance of the system. There are other factors as well that determine the type of battery to be used such as the weight of the drone, the number of propellers used and so on.



Figure 5 Battery

Flight Controller:

The flight controller is used to control the four rotors and is also used to provide stabilization to the system. The circuit consists of multiple built-in sensors that is used to detect the orientation changes. It stabilizes the quad copter in the air by receiving commands from the user and thus controls the motors.



Figure 6 Flight Controller

PIR Sensor:

The Passive Infra Red (PIR) detects the heat that is emitted naturally by humans and animals that is used to detect the motion. The sensor has a field of vision that will detect any of the sudden change in the infrared energy whenever a person within the range of vision changes suddenly and thereby triggering the sensor.

PIC16F877A Microcontroller:

The PIC microcontroller PIC16F877A is the micro controller that is used in this system. It is easier to use as even the coding which is used in this is easier to implement. Another important advantage of the microcontroller is that we can write and erase the code for a number of times without any problem. This is possible because of the FLASH memory technology that is used. It has around 33 pins that are used for input and output and has a total of 40 pins.



Figure 8 PIC16F877A Microcontroller

III. EXISTING SYSTEM

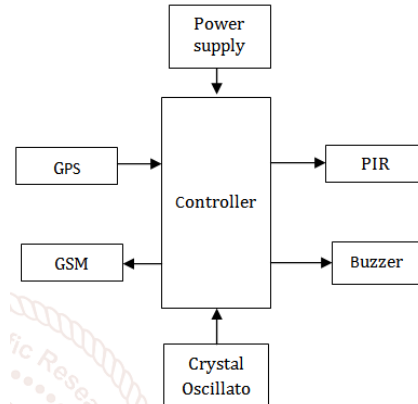
In the existing system the PIR device is placed all told direction moving golem that may maneuver within the earthquake prone areas. The golem is driven on a geared dc-motor for enhanced torsion and low speed and stepper motor for enhanced turning accuracy thence the precise management of position is monitored. The golem consists of a simple machine geared drive with DC motors connected to perform forward and reverse movement. The explicit UAV is capable of work that gives the presence of humans and gives the intimations of the individuals within the actual space and providing this data to the close rescue team thereby facultative them try to do the required measures with reference to the data given

IV. MONITORING MODULE

The core part of this system is the PIR sensor. The system functions on the infrared radiations that are emitted from the human body. Infrared radiation (IR) has a wavelength of around 0.7 to 300 micrometers. Humans emit infrared radiations. It has been assimilated that a human body radiates the IR at a wavelength of 10 micrometers to 12 micrometer. PIR sensor is a passive electronic device that detects the motion of the humans by sensing an infrared fluctuation. It consists of three pins (drain, gate and source). A high signal is redirected to alert the pin when the PIR detects an IR radiation. This module is accountable for detecting human position in the disastrous conditions like earthquake and sending those signals to the microcontroller in order to notify the rescue teams about the location of the victim. This module consists of a PIR sensor for detecting humans by the infrared radiations that are emitted via the human body.

V. PROPOSED SYSTEM

In order to overcome the above mentioned drawbacks there is a proposal for a system that replaces the DC driven robot with a flying quad copter. This project proposes a flyable quad copter that moves in the disaster-prone area and helps in detecting the people who are alive and at the same time alerting the rescue team of their presence with the help of GSM so that appropriate measures can be taken. Because of it timely help and support can be provided to the people and the lives of the humans stuck in the disaster can be saved.



VI. CONCLUSION

UAV's prove to be more efficient than robots because they can fly through the disaster area which may be difficult for the robots to reach because of the uneven terrains. The information provided by the UAV can alert the rescue team so that they reach the location in time with all the necessary provisions that can guide the people out to safety.

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