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Human Detection System using Drone During Crisis

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Abstract: *The major challenge faced by any rescue teams is during the search of victims under debris in a disaster struct area. This system assists in the rescue process by identifying the exact location of the survivors at the earliest. As the system is a drone-based system, it can easily be mobilized and controlled. The system consists of a monitoring system which comprises of a camera module and a thermal camera to identify the existence of humans buried under the debris.*

Keywords: Drone, Raspberry Pi, Wi-Fi module, ESC (electronic speed control).

I. Introduction:

Disasters are one of the forces which a human can't predict. Natural Disasters occurrence frequency is increasing nowadays and humans fall prey to these disasters. The number of victims for disasters is also increasing not due to the disaster itself but due to the lack of rescue as rescuing is becoming harder.

To increase the efficiency and to decrease the time for finding the said victims under debris a system is purposed to find the location of the victims. This system consists of a remote-controlled Drone operated to find the victims under the debris of the area attacked by a disaster.

The Drone is operated in the disaster-prone areas. The drone is equipped with four brushless Dc motors to fly the drone.

The drone is controlled with the help of a 24 GHz, Transmitter and Receiver. The drone is connected to a Flight Controller to stabilize the flight of the drone in high attitude, a gyroscope is also installed to give the drone more stabilization during flight.

The system is also installed with Raspberry pi to connect the feedback of the drones to a system (computer or mobile) Raspberry pi is connected to a camera, a thermal camera, PIR sensor and a Wi-Fi module. The cameras are used to get information on the disaster struct area. The thermal camera helps in getting thermal imaging of the disaster struct area this imaging helps to identify the human body under the debris as the human body emits thermal radiation. The normal camera helps in locating the human body in real life this drone cannot detect humans under large debris and they are not provided with a live feedback system.

The proposed system overcomes these drawbacks with the help of thermal cameras and PIR sensor and sends a live feedback using the Wi-Fi module and raspberry pi micro-controller. The system is also installed with a flight controller to make the drone more stable to air resistances in a high attitude.

II. Drone System:

The Drone system is designed to make the rescue operations efficient. The system has a thermal camera and a PIR sensor to detect the thermal radiation emitted by human and send the victims location to the rescue team.

The drone system consists of:

1. Flight control module
2. Controller module
3. Communication Module
4. Monitoring & Capturing module

A. Flight Control Module:

The flight control module consists of flight controller (ARDUPILOT), ESC (electronic speed control) & Gyro scope to control the flight of the drone through a disaster-prone area.

The flight control module helps in stabilising the drone during flight & to control the drone more effectively.

imaging as thermal imaging is hard to understand.
This imaging is live-streamed to the connected system to help in decreasing the time required for rescue by the rescue team. This drone helps the rescue team to conduct searches more efficiently and the drone is also not affected by the ground debris to move across the disaster struct area.
In the existing system, the drone is equipped with various sensors like PIR sensors and cameras to detect the Human signal in a disaster-prone area. And the drone is driven via a general Dc motor. The drawback of this system is that

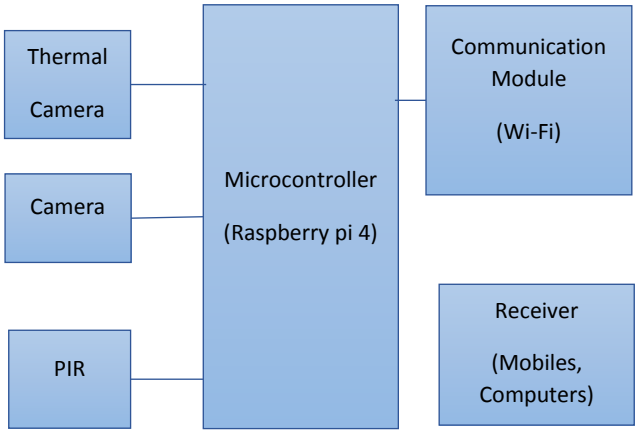
B. Controller Module:

The controller module of the drone system uses Raspberry Pi 4 for designing the drones data transmission system.
The Raspberry Pi bord is connected to sensors and the Wi-Fi module to receive and send data from the drone to the data base.
The Raspberry pi bords functions are

- To receive the data from the sensors and processes them accordingly.

To send the processed data to the database

Block Diagram of controller module:

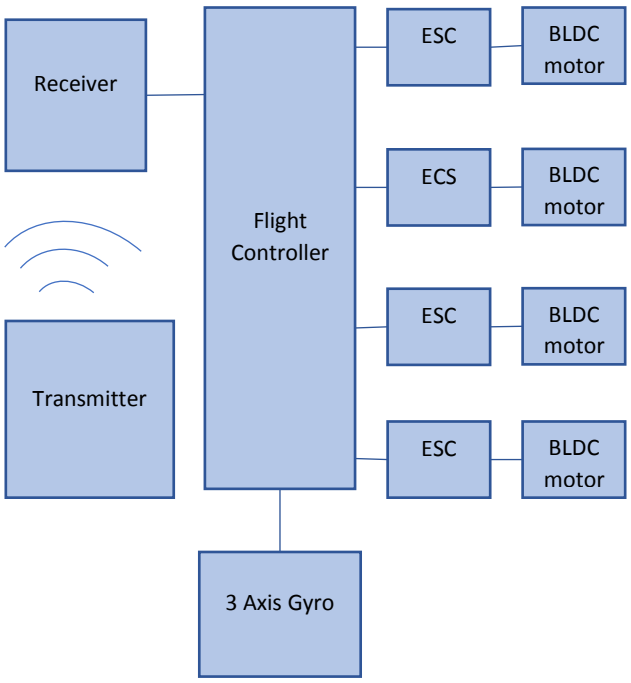


C. Communication Module:

The module consists of Wi-fi which establishes a connection between the application and the server. The module helps to send data from the drone to the server for storage or further processing.

The module enables live streaming of images recorded or taken form the drone via camera to the server. This helps in getting real time information about a area under supervision or under emergency.

Block diagram of flight control module:



As a human body emit a InfraRed radiation 0.7 to 300 micron wavelength which can be detected with the help of a PIR sensor and

III. System Deployment

The system is tested and implemented to suite the desired problem and its solution. The system shows the aerial view of the disaster struct area and it is displayed in devices which is it pre-programmed. The human is detected in a range of 5 meters which helps the rescuers to find the human and rescue them. The system has the ability to achieve high performance rank by detecting humans who are alive in devastated environments and that too at a relatively cost effective price and more efficiently.

IV. Conclusion

The system is built using drone, minimizing the limitations associated with robots that are static.

The use of drone makes the system more efficient than robots that are land base which have failed in disastrous conditions like the earthquake because it makes it difficult for the robots to move over the broken and ruined buildings. Drone is a real time autonomous system technology system which is proposed for detecting humans in disastrous conditions and intimating the rescue team about the exact positions of the effected human.

D. Monitoring & Capturing Module:

The monitoring & capturing module helps in obtaining the information from the disaster struct area with the help of camera, thermal camera and a PIR sensor.

The monitoring module consist of thermal camera and a PIR sensor which detects the thermal radiation emitted by a human body. Both these sensors helps in locating the victims in the vicinity of the drone

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