



# Earthquake Victim Detection System

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**ABSTRACT:** This paper aims to provide an approach for detecting the alive human victims at the disaster sites. It is seen nearly every year there occur many natural and man-made disasters which take a heavy toll of human lives and property. These disasters can be natural viz earthquake, building collapses, etc. While the other category includes man-made disasters viz road accidents, etc. Most of the times the loss is more because of delayed rescue or help post disaster. During disasters like earthquakes, bridge fall overs humans are buried or at places where it takes long for the rescue teams to reach. Thus a timely rescue can save such people. Identification of such victims by rescue workers like armed forces and para military forces is time consuming as the affected area is vast. This paper employs the use of a PC Controlled robot for detecting the presence of alive human beings at the disaster sites. This robot uses Passive Infrared sensor for detecting the presence of a victim and an Ultrasonic sensor to measure the distance of the victim or other object from the robot. This robot will also notify the operator about the presence of fire at the site where it has been sent. The results will be displayed on the screen of the laptop at the end of operator.

**KEYWORDS:** Disaster, Alive Human Detection, Ultrasonic Sensor, Passive Infrared Sensor, Fire Sensor.

## I. INTRODUCTION

Nearly every year various disasters such as earthquakes, landslides, collapse of man-made structures such as buildings, bridges are reported at different places in the world. These disasters take heavy toll of lives and property. Most of the times the loss is more because of delayed help to the victims. The disasters, may it be a natural or a man made, cause massive losses to the human community across the globe. Though a great focus has been laid down on the disaster preparedness strategies all over the world but not much emphasis has been laid down on developing better and cost effective technologies for reducing the after effects of disasters.

This research is intended to develop a system that can be used for detecting and hence saving the alive humans who are present at the site of mishappening with the use of robot. In this system there are two parts, one being the Controller Unit and other being the Controlled Unit. The Controller Unit is the laptop or the PC which is with the operator and the Controlled Unit is the robot. The robot will make use of the passive infrared sensor to detect the presence of alive human being and an ultrasonic sensor will also be present to know about the distance of the object or the victim from the robot. Microcontroller is used to control the entire functioning of the robot and it is the key component of the Controlled Unit. We know that there can be some fire as well at the site of disaster that may harm the robot. To overcome this and make the robot safe and to give complete detail of the disaster site, this robot will also indicate the presence of fire. The controller Unit is with the operator who is controlling the robot from a distance and will display the outputs to the operator. For instance, if an alive human is detected it will show the message "Human Detected" on the display. It will also show the distance of the object on the display. The advantage of this project is to reduce fatigue for rescue workers and access unreachable areas. Another advantage of using robots is that they can be deployed at dangerous surroundings such as the sites of chemical disaster without putting human life at danger.

## II. NEED OF PROPOSED RESEARCH WORK

**Existing Method:** Existing ways to detect the people under the rubble, earthquake and collapsed buildings are to use trained dogs, optical devices and acoustic life detector. The dogs can detect only the dead humans by smell and the optical devices have limited number of angles of freedom and to perform the function they require expert operators and cannot be used in inaccessible area. Acoustical detector like geophones are easy to use but they need quiet working

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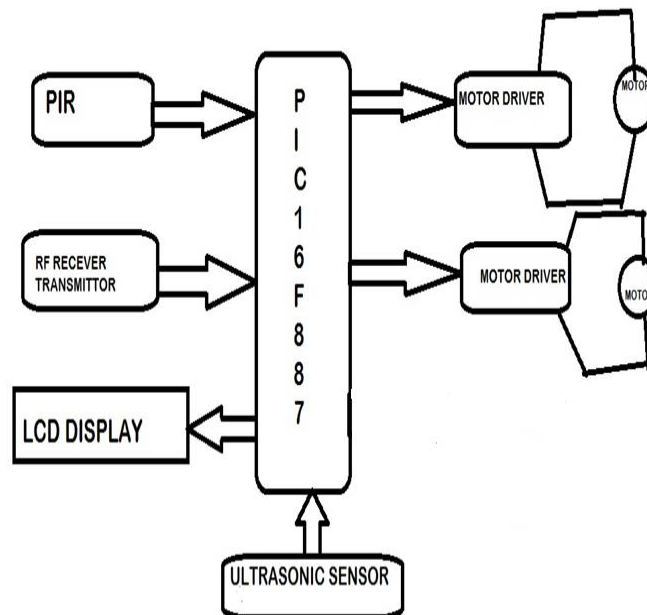
surrounding; it can not reach in critical situations. The systems that use microwaves in these robots are not well suited because if some person is not at a farther distance than the microwaves can heat up and eventually burn the body of the person.

The systems that use some other techniques like carbon dioxide sensors are also great to use but they have a disadvantage of being costly and hence these systems also need a certain alternative that is cheap as well as efficient.

**Proposed Method:** The proposed method uses a PC Controlled robot that can be sent at the site of any disaster or some other mishappening by the person who is controlling it. This robot is controlled by the PC with the use of Bluetooth. This robot has a passive infrared sensor to detect the presence of the human beings at any place of interest or in any kind of rescue operation. This also uses an Ultrasonic sensor to measure the distance of the object or the victim from the robot. The robot will also notify the operator about the presence of fire at the site where it has been sent. The results will be displayed on the screen of the laptop at the end of operator. In this robot, a microcontroller is used to control the motion of the robot.

### III. BLOCK DIAGRAM

The commands from The Controller Unit are being received by the robot, which is controlled with the help of microcontroller. The microcontroller used here is PIC16F887. The microcontroller is the heart of the robot as all of its functions are being controlled by the microcontroller. After reception of command the robot starts operating as per the command given to it by the operator. Whenever the robot moves in any direction than the output of the desired sensor is sent by the robot to the operator. The desired sensor can be selected by the operator at The Controller Unit. Once any alive victim is detected the PIR sensor output goes high and it is being sent to The Controller Unit and the output is displayed on the screen.



### IV. FLOW CHART

First the desired direction is to be set in which we want the robot to go for detecting the presence of victims. Once the direction is set, the robot starts to move in that respective direction. If the output of PIR sensor goes high than it



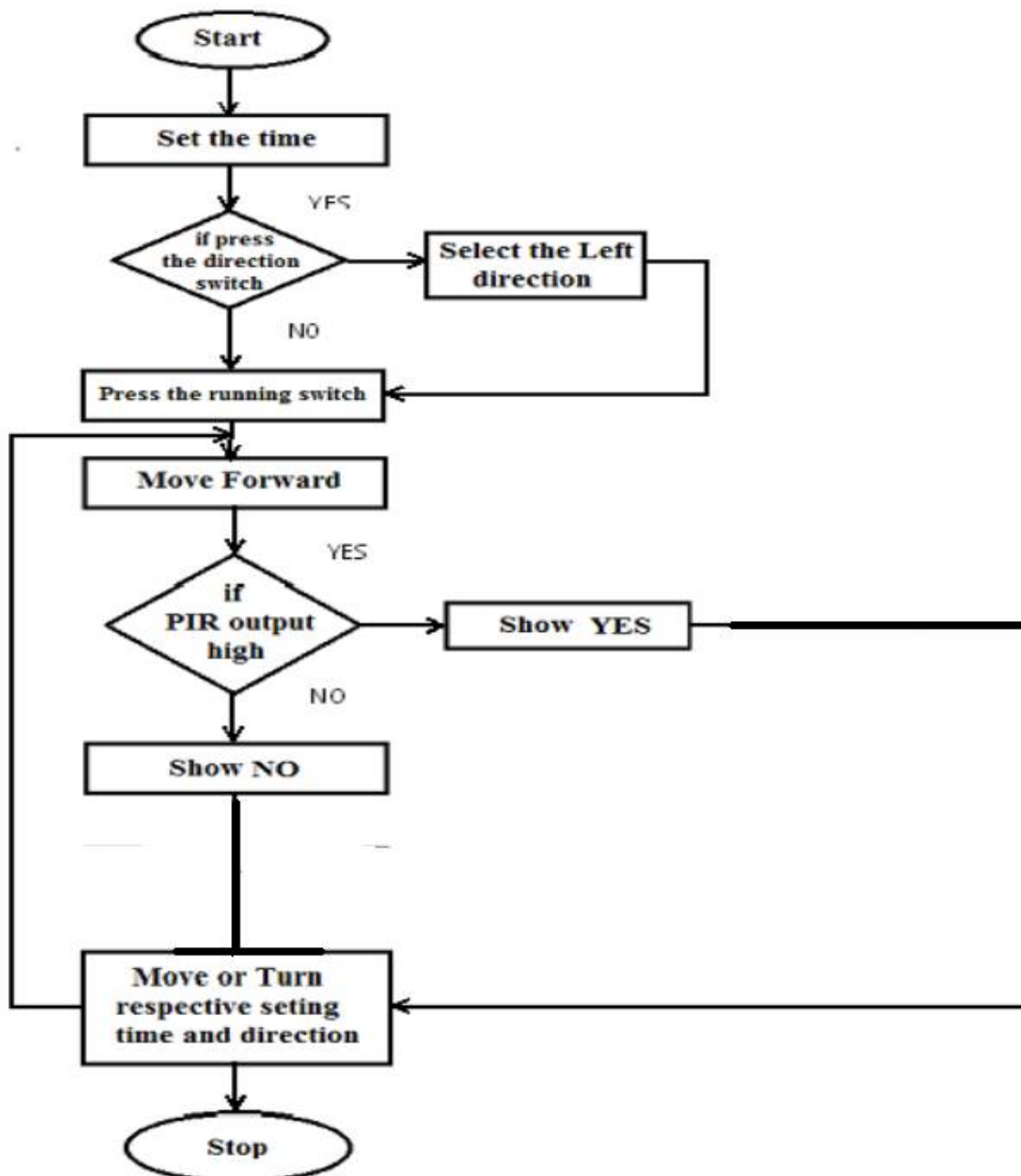
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send“DETECTED” to The Controller Unit and the result will be displayed on the screen. If there is no victim present at the place tha PIR ensor output goes low and the robot will send “NOT DETECTED” to The Controller Unit to display the result on the screen. Now, we can decide whether to move the robot in the same direction or switch the robot movement to some other direction. After this the same procedure will continue.





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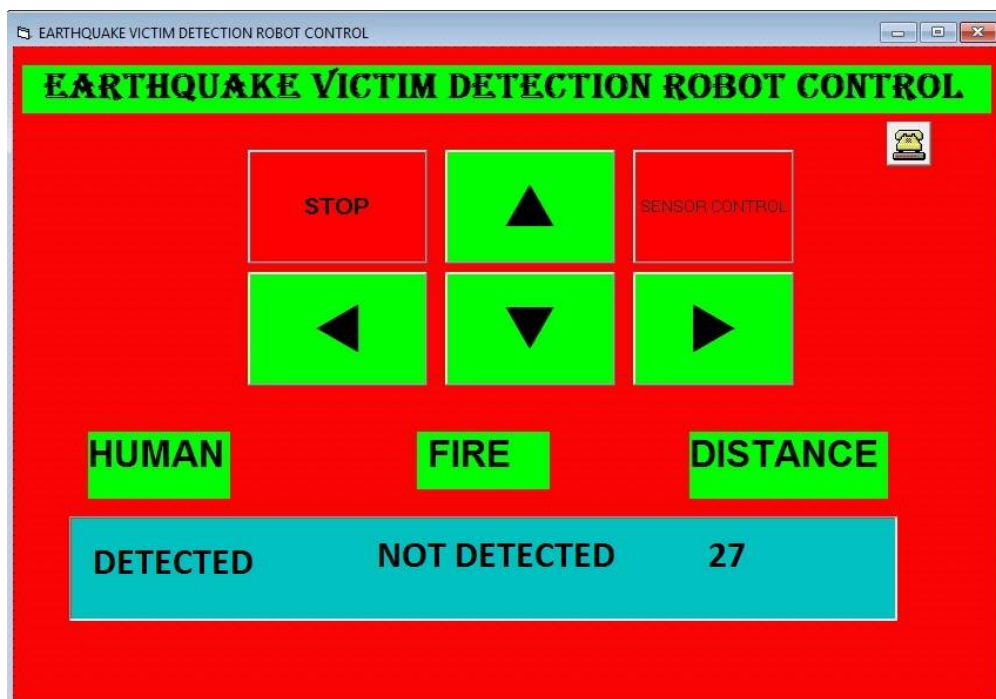
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## V.RESULT

The output of various sensors used in the controlled unit is displayed on the controller unit (laptop screen). These outputs are shown in the table below:

S.no.	PIR Sensor Output	Fire Sensor Output	Ultrasonic Sensor Output (distance in cm.)
1.	Not Detected	Not Detected	8
2.	Detected	Not Detected	27
3.	Detected	Not Detected	42



## VI.CONCLUSION

Thus the proposed approach is very much helpful in detecting the presence of the alive human victims who are present on the surface at different places at the disaster site. This approach is very cost effective as the different sensors and components used in this are not very costly. This approach can hence be adopted for the detection of victims at the surface at disaster sites.



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