

A NOVEL SYSTEM TO DETECT THE HUMAN BEING BURIED UNDER RUBBLE USING PIR SENSOR

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Abstract— Disasters like earthquakes, tsunami, bomb explosion and floods often cause loss of precious human lives. During such emergency situations, and especially in urban disasters, in order to prevent loss of life and property, various essential services like policemen, fire fighters and medical assistance etc, are deployed. Rescue operations are performed mostly by human and trained dogs, often in very dangerous and risky conditions. Hence, to make the rescue operation more safe and effective, mobile robots have been proposed which detect alive human beings and wirelessly communicate with the rescue team. This work aims to develop an economical kit, which works using PIR sensor etc. It can be used in areas where rescue is needed. The stick senses the human body temperature using PIR sensor and alarm/indicator indicates the signal when it detects alive body and the message is displayed in LCD.

Keywords— *pir sensor, atmel microcontroller, relay circuit, Lcd.*

1. INTRODUCTION

A unique Passive Infrared sensor is used in the project which emits infrared rays to detect humans. As live human body emits thermal radiation it is received and manipulated by the PIR sensor to detect humans. Once the people are located it immediately gives audio alert visual alerts to the authorities so that help can reach the live person so fast. Disasters can be of two kinds- natural and human-induced.

Besides natural disasters, an urban area is very susceptible human-induced disasters. They include industrial accidents, transportation accident, accidents during mining, warfare etc. Whatever may be the reason, during such calamities, various services are deployed for rescue operations. In order to increase the probability of saving lives of the victim, the rescue operation needs to be faster. But, sometimes, it is difficult for rescue personnel to enter into some parts/areas of the Warfield or earthquake affect basis for alive human detection into the signals that are easily read or interpreted by remote observer or rescue team.

2. LITRATURE REVIEW

In initial days dogs were used because of their High sensitivity to any slight motion or Human presence. But it was hard to totally depend on them since they can predict the presence of a living victim and dead victim and also they were not able to expose the exact situation of the human.

One major drawback was dogs could not work independently. They need assistance of a human. It means, the need is totally or partially independent to human factor but still depends on human.

Later techniques such as

1. Optical devices namely Tactic Pole Utility system
2. Acoustic devices like Microphones and Amplifiers were used but with limited applications.

Robots are now achieving good progress in many fields like Military, Industry, Medicine, etc., with proven efficiency. They are playing an important role in replacing Human factor in almost all fields.

Usha Tiwari, Rahul Kaushik, Shraddha Subramaniyan, (2012), "A technical review on Human Rescue Robots", VSRD-IJEECE, Vol. 2 (3), 127-134 has explained about designing a Robot to navigate in the rubble with various sensors. This method used 2 methods to detect alive human, one is IR radiation emerging from the live humans and other is using the sound or cry for the help made from the humans.

Mauricio Correa, Gabriel Hermosilla, Rodrigo Verschae, Javier Ruiz-del-Solar, (2012), "Human Detection and Identification by Robots using Thermal and Visual information in Domestic Environments", J Intell Robot System(2012)66:223-243 has given the concept of enabling robots to detect and identify humans in domestic environment. This work was done with the aid of Thermal and Visual Information sources that were integrated to detect humans and further processed to verify it.

Remote Operated and Controlled Hexapod (ROACH) is a six-legged design that provides significant advantages in mobility over wheeled and tracked designs. It was equipped with predefined walking gaits, cameras, which transmit, live audio and videos of the disaster site, as well as information about locations of objects with respect to the robots position to the interface on the laptop. Specialized robots have been designed for these types of environments such as KOHGA the snake like robot. This robot was constructed by connecting multiple crawler vehicles serially, resulting in a long and thin structure so that it can enter narrow space. Quality work has been done in the field of robotics. They came into existence in the early 21st century but since then enormous improvements have been made in its concept, design based on purpose of use. Various rescue robots have been developed and some of these are – CRASAR (Centre for Robot-Assisted Search and Rescue) in University of South Florida. This

robot was used for first time in real conditions on 11th September 2001 in the World Trade Centre disaster. Different sensors like millimeter wave radar for measuring distance, a color CCD camera for vision and a forward-looking infrared camera for the human heat detection were used in it.

3. EXISTING SYSTEM

The project proposes a mobile rescue robot that moves in the disaster, earthquake prone area and helps in identifying the live people, injured people, location and rescue system operations. Hence due to the on timely detection in natural calamities this can save precious life & great loss even without the help of large number of rescue operators. The proposed system consists of a mobile rescue robot control Module. The mobile rescue robot consists of four units that are namely Sensor unit, Micro-controller, Camera unit, Motor driver unit, Transmission unit [2]. The sensor unit must be directly interfaced to the micro-controller. The sensor devices monitor current readings and sends data to the Micro-controller. The controller circuit is responsible for transmitting this information. Controllers are designed at hardware level. The 2.4GHz RF module is interfaced with the micro-controller via the standard serial port. These data's are updated by the PC/SERVER So that rescue team can view the readings real time and camera is used to detect motion & live visualization of critical situation of the disaster.

3. DRAWBACKS

Rescue less number of people

It cannot perform simultaneous human body localization and communication over WSN

This detection system is not highly reliable

It cannot identify whether it is human beings or obstacle.

4. PROPOSED SYSTEM

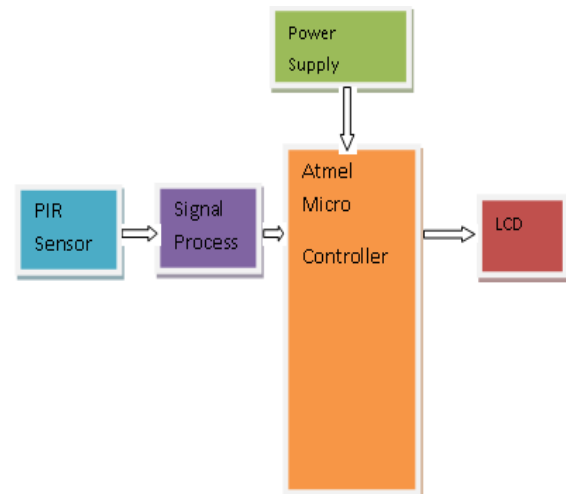
Human can be detected using a PIR sensor. A PIR sensor is a sensor that produces passive infrared signals, these signals can detect heat. Human being produces heat which is detected using this sensor. Human being produces 9 to 10 microns of heat. A PIR sensor's angle of detection is restricted to 180o i.e. except the area below the robot it can sense in all the other directions. The distance up to which PIR sensor can detect is restricted within 12 ft. As the sensor's range is less, the sensor is mounted to a robot that can move automatically. If the sensor detects the human, it sends the signal to the RF transmitter to produce Radio Frequency signals. Radio Frequency signals can travel up to 200 ft. The diagram below shows the connectivity for the transmitter side.

The Receiver Side consists of ATMEGA328 microcontroller (Arduino Uno). Its input and output are Radio frequency receiver and a buzzer respectively. Once the signal from the transmitter is received by the RF receiver it notifies the Arduino. Arduino in turn sends a signal to the buzzer, which triggers the buzzer to produce continuous beeps. This continuous beep indicates that there is a presence of a human to the user. The diagram below shows the connectivity for the receiver side.

5. COMPONENTS REQUIRED

1. PIR Sensor

2. Transformer
3. LCD Display
4. Buzzer
5. Microcontroller



6. CONCLUSION

Human detection Robot is to provide more security for the users to protect their belongings from robbers. The robot can move in all the directions automatically without controlling it, which makes the system more effective to use. As the Robot can move, it covers lot of distance that reduces the use of many sensors or many robots. When the Robot finds a human it can notify the users by producing continuous beeps. The Robot can be modified further by attaching a visual camera where the image of the intruder can be notified. If the robot is attached with SONAR (Sound Navigation And Ranging) it can determine the distance between the human and can detect the IR image of the object.

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