HUMAN DETECTION SYSTEM USING IoT

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ABSTRACT

Natural calamities do occur and they are unstoppable. Thousands of people killed as a cause of disaster like earthquake. These words aren't the headlines of the newspaper but such news come after the disaster destroyed the field. The disaster in the New York City at 'World Trade Center' claimed lives of more than 5000 people. It was said if survivors has been found and rescue earlier the numbers of victims have been lower. There is no end to the number of lives lost as the result of such disasters as landslides, collapsed tunnels and avalanches. This project aims to give a practical design to build the first and simplified version of a rescue robot which has to be active within disaster areas like collapsed buildings where rescue teams cannot operate due to a lot of technical difficulties, which is connected by a smartphone via IoT. It will better to utilize some technically efficient equipment to achieve such mission rapidly and effectively. Microwave radar sensor is used for the search and rescue of victims trapped under the rubble of collapsed building during the earthquake or other disasters. By advent of this system the world death rate as a cause of an earthquake may decrease to greater extent.

Keywords: Microwave radar sensor, smartphone, IoT,

INTRODUCTION

Nowadays disasters are unpredictable. Natural disasters like floods, earthquakes and other geologic processes and manmade situations like bomb explosion, building collapse occur regularly and they cannot be predicted in advance to take necessary precautions. The change in atmospheric conditions and climatic changes are occurring in a rapid fluctuating manner. A disaster is a serious problem occuring over a short or long period of time that causes widespread human, material, economic or environmental loss which exceeds the ability of the affected people or community to cope using its own resources [1]. Disaster risk management activities are designed to increase the resilience of people, communities, society and systems to resist, absorb, accommodate and to recover from and improve well-being in the face of multiple

hazards. Activities for reducing and managing risks can therefore provide a way for building resilience to other risks. Most of the victims of earthquakes or other natural disasters in the world are trapped or locked under obstacles or rubbles or even under soil. There are systems which is used in disaster areas including detection of human presence using different radars. In the case of a disaster like earthquake the rescue operation is over a wide area under most difficulties. In the introduced system a Micro wave radar sensor is used in the robot to detect human presence. The robot is controlled by a smartphone-remote control and it should move with substantial speed in all directions that the user desires [2]. By using this system we can reduce the operation to the possible areas of human presence detected without wasting time. Time is the fact that the survivor life truly depends on. How much time can be reduced for an operationis an important factor of lives. Once a human target is located the system has to give an buzzer as well as a notificationwhich may help to identify and localize the victim location as soon as possible [3].

PROPOSED SYSTEM

The proposed system consist of transmitter side and receiver side. The transmitter unit comprises of the IoT dashboard(Smartphone) which controls the the movement of the motor driver in receiver side and also the communication between both ends. The receiver unit comprises of microwave radar sensor, ultrasonic sensor, power supply, ESP camera, motor driver, Left motor, Right motor, ATmega1608 microcontroller, WIFI-ESP8266 and alerting buzzer. Figure 1 depicts the work flow of the proposed system

i. Implementation

Initially the robot navigates in an open area and provided with ultrasonic sensor, which detects the obstacles on its path of movement. If obstacles are found that should be notified into the controlling device. The robot consists of two DC motors along with a motor and it should move with substantial speed in all directions that the user desires, that is, forward, backward, left, right. Blynk software is used in the IoT dashboard for controlling movements of the robot [4-5].

In this proposed methodology, ultrasonic is used for navigation purpose. Mainly microwave radar sensor is usedfor detecting the presence of human. When the microwaves emitted by the sensor senses a human body under the soil it get reflected to the robot and is notified on the transmitter side as notification in IoT dashboard through cloud server. Then vehicle will move towards the affected human for some distance. Pulse rate sensor will activates and checks pulse rates of human to find whether human is alive or not. ESP cam is used for providing live

streaming for persons who monitoring the disaster affected area. The application of modern IoT and cloud technologies makes controlling of the device globally. That is the robot can be controlled and monitored from any part of the world during the rescue operation. The data regarding a operation can be stored in the cloud and can be used during future operations.

System hardware requirements

A*) A T mega1608 microcontroller*

ATmega1608 is a microcontroller board supported by ATmega328P semiconductor unit. It has 14 digital input/output pins (of which 6 can be used as Pulse Width Modulated outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, and a reset button. Human detection module of the robot controlled by an Arduino microprocessor. When an individual is present withinthe range of the sensing element it creates a detection signal that is processed by Arduino and a (LEDsignal will glow on to indicate the direction. Here Arduino is used for controlling and coordinating operations in the circuit [6-8].

B) *Microwave radar sensor*

Microwave radar sensor is sensor that detects human presence within its operating range. They work entirely by motions in objects under the soil.

C) *DC motor*

A DC motor is a rotating electrical motor that converts DC electrical energy into mechanical energy. These motors consume electrical power through direct current and convert this electrical energy into mechanical rotational motion. HereDC motors are used for the rotation of robot wheels.

D) *Ultrasonic sensors*

Ultrasonic sensors are sensors used to find obstacles that prevents the workflow of the object detection system.

E) *Battery*

A battery is an integration of one or many cells where the chemical reactions create flow of electrons, which in turn results in production of current. The positive terminal of the battery is called as the cathode and its negative terminal is the anode. The electrons will flow from anode to the cathode through an electrical circuit which will be connected externally. Here we have used a 9 Volt battery for powering up the robot wheels [9-11].

F) *Buzzer*

Buzzer is an indication device. It is used in an alarm circuit or any other audio output circuit.

Basically, it converts audio signals into sound signals. Here it is used in parallel with LED to indicate whether human trace is detected or not.

G) *ESP cam*

ESP cam is used for the live streaming of the area under observation from receiver side [12].

EXPERIMENT AND RESULTS

Several experiments are performed with the human detection system. The individual units of the system such as microwave radar sensor, ultrasonic senor etc are tested for specification. The fig (2)- graph represents testing of the microwave radar sensor and graphical plotting of the human presence detected. The y axis plot the distance from the victim. Fig (3) represents the corresponding reading of the distance in digital form. Any obstacles in the movement of the system is identified by the ultrasonic sensor and buzzer rings which can be seen by the team. Fig 4 depicts the IoT dashboard image and the schematic view of the human presence detected.

CONCLUSION

A simple, efficient solution for helping rescue workers in disaster management. As it is a wireless model, the system can enter into any area. It is very efficient in hazardous environments. The microwave sensor increases the efficiency of the system. We believe that through the development of similar and related techniques for life detection system, it will be possible to overcome the current fundamental problems in detecting buried victims and save many precious lives.

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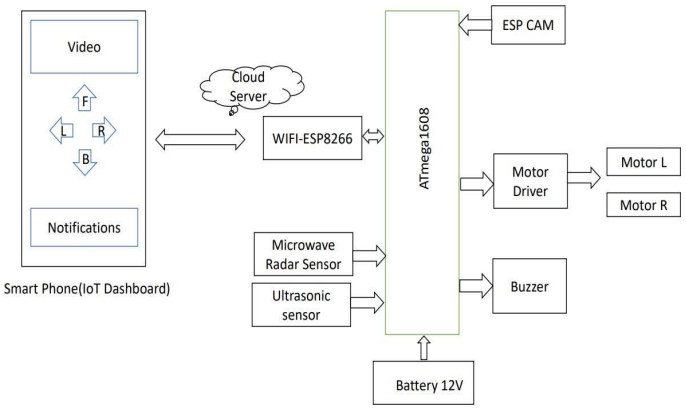

Fig. 1: Conceptual model

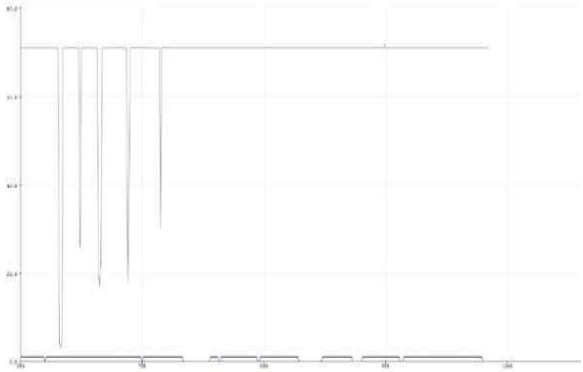

Fig. 2: graphical representation of the microwaves detected from radar.

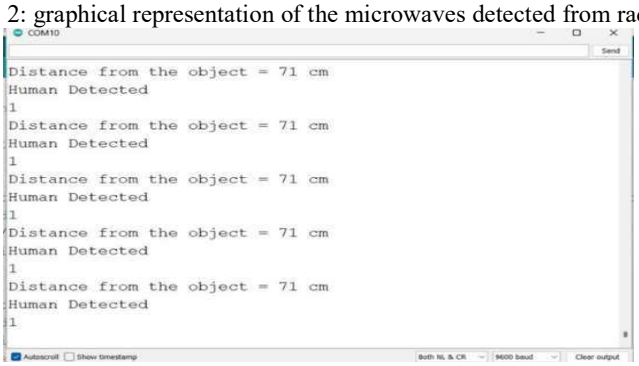

Fig. 3: Distance range

Fig. 4: represents the user interface IoT dashboard