HUMAN RESCUE ROBOT IN NATURAL CALAMITIES

[1]Ms. Aafreen Bano Ansari, [2]Ms. Nagma Khan.

[1,2]*Information Technology Department, M.H Saboo Siddik College Of Engineering*
University of Mumbai,Mumbai,Maharashtra,India.

Abstract—*In today's world many areas are getting affected due to natural calamities. Under such conditions the rescue team must make quick decisions for the rescue of the victims. But such tasks can be risky cause under some extreme conditions even the rescue team is unable to reach such places. Previously, trained dogs and rescue personnel were employed to perform all these tasks but it becomes difficult for them to moveinextreme conditions. In order to help under such conditions, we are proposing a human rescue robot under natural calamities. This will be a robocar that will detect the presence of humans i.e. victims at the places of natural emergencies and thus inform us via text message that an object or motion has been detected. Thus by using this robot, we can quickly get the amount of information required for the rescuers to find and reach the victim. This robot can operate in two modes detecting humans through Infrared waves and as well as through their voice or scream. The robot is for human rescue but along with that the robot's own safety is also a point of concern. Thus the obstacles coming in path would be avoided by the robot in order to prevent collision. There would be night vision camera which would be working independently thus providing us live streaming of the current situation.*

I. INTRODUCTION

Human Rescue Robot In Natural Calamities is a robotic system based on a IOT technology. It would reliable robot for identifying and detecting the presence of humans in a calamity effected area. The robot senses some additional details about the human presence and activities thus could be useful to analyze their existence thus helping the rescue team to find out the victim from the detected location. There by successfully carrying out the rescue operation of the victim. Since it not only identifies the human based on the movements or activity but also based on the voice or scream, there would be more chances of victim identification even if a victim is unable to move. Also the exact location and alert message is provided by the robot on victim detection, thus by making it more quick and easy to find and rescue the victim in less amount of time. The robot also contains sensors which are able to detect the obstacles, thus it would help for the safety of robot i.e. it will prevent it from dashing to wall or any kind of obstacles in the path. We would constantly be able to track the location where our robot is heading due to the GPS module attached to it and quickly receive a text message on human detection either based on voice or movements carried out by the victim, with the help ofGSM module. The robot is not just limited for human identification; it is much useful for helping the rescue team to reduce their work. The rescue team which due to some conditions is unable to move to some areas, so this robot would help them by easily moving to such areas and analyzing each and everything in the path thus by detecting human if present. This will help the rescue team as well as save their time.

The wifi module has been used in order to reduce the limitations of distance coverage and also a 12V battery is used for providing the power. Since the robot is based on IOT technology we would be able to control it from any distance and place.

II. OBJECTIVES

- The objective of this project is to implement a very cost effective mechanism of human identification and detection in any calamity affected areas.

- The main purpose of this project is to develop a remote user interface to control a robot via a wireless wifi module.

- It is aimed to construct a control system that enables the complete control of the interface on which it is based.

- The general objective can be stated as, to co-ordinate appliances and other devices through short message service.

- Ability to get the live stream of the current scenario.

- There are large amount of chances of human identification and detection since it considers both movements as well as voice for detection.

- Since we can track the location of robot, we can easily get the exact location of victim.

- The project helps to identify and detect humans in areas where the rescue team cannot reach thus by helping in the rescue operations of the victims which might otherwise be undetected.

- The project helps on behalf of the rescue team which will help them save their time and effort.

III.   EXISTING SYSTEM

The existing system consists of some problems like high cost,less compact, less accurate human detection since the PIR can sometimes misunderstand between human body rays and rays from a high heat object.The proposed system is able to solve all these problems. Also with the use of IOT technology we can control the robot and its movements from anywhere. The existing system consists of only PIR sensor for human detection. Hence we can make use of PIR and microphone both for more accurate detection based on movements and scream as well.

IV.   PROPOSED SYSTEM

We have proposed a robot based on IOT technology In this project, we focus on a system named as Human Rescue Robot In Natural Calamities which will work in disaster environments of manmade structures like collapsed buildings, war fields etc. Human Rescue Robot In Natural Calamities tends to increase the number of detection of victims in uncertain areas in case of any environmental emergencies. Also it covers the large distance so that larger areas can be scanned and as many victims can be detected from different locations. The proposed robot senses some additional details about the human presence and activities thus could be useful to analyze their existence thus helping the rescue team to find out the victim from the detected location, there by successfully carrying out the rescue operation of the victim. Since it not only identifies the human based on the movements or activity but also based on the voice or scream, there would be more chances of victim identification even if a victim is unable to move. Also the exact location and alert message is provided by the robot on motion and object detection, thus by making it more quick and easy to find and rescue the victim in less amount of time. The robot also contains sensors which are able to detect the obstacles, thus it would help for the safety of robot i.e. it will prevent it from dashing to wall or any kind of obstacles in the path. A unique passive Infrared sensor is used in our design that emits infrared rays to detect humans. As a human body emits thermal radiation. manipulated by the PIR (Passive infrared sensor). Once a human target is located the system has to be give and alert which may be held to localize the victim location as soon as possible. The whole design of the robot is based on IOT technology and also a live stream camera for watching the current scenario of the place and controlling the movements of robot form any place.We would constantly be able to track the location where our robot is heading due to the GPS module attached to it and quickly receive a text message on human detection either based on voice or movements carried out by the victim, with the help of GSM module. The robot is not just limited for human identification; it is much useful for helping the rescue team to reduce their work. The rescue team which due to some conditions is unable to move to some areas, so this robot would help them by easily moving to such areas and analyzing each and everything in the path thus by detecting human if present. This will help the rescue team as well as save their time.

The proposed system has following modules:

1. Arduino Uno:
The Arduino Uno can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source. The AT mega 328 has 32KB,(also with 2 KB used for the boot loader).

2. Power Supply:
A power supply is an electronic device that supplies electrical energy to an electrical load. Here arduino nano, sensor, buzzer operates with DC 5V, motor driver circuit operates with DC 12V supply and this supply is provided by 12V battery.

3. PIR Sensor:
PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m. PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation.

4. Ultrasonic Sensor:
An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

5. Motor Driver (L293D):

This is a motor driver IC that can drive two motor simultaneously. L293D IC is a dual H- bridge motor driver IC. One H-bridge is capable to drive a dc motor in bidirectional. L293D IC is a current enhancing IC as the output from the sensor is not able to drive motors itself so L293D is used for this purpose. L293D is a 16 pin IC having two enables pins which should always be remain high to enable both the H-bridges.

6. DC Motor:

It is an electric motor that converts electrical energy into mechanical energy and it is called a DC Motor because it works on direct current. 12V DC power supply is required for the DC Motor for its operation. In this project DC motor is used to operate wheels of the vehicle.

7. WI-FI Module:

The ESP8266 is a Wi-Fi module that costs less than 5 USD. This makes putting your sensors on the net actually feasible. These seems to be three ways of using this module, in order of increasing complexity: 1. Sending it AT commands from a computer via an USB to serial adapter. This is mostly useful for testing and setup. 2. Interfacing with an arduino or any other microcontroller and using this board as a peripheral. 3. Programming the module directly and use its GPIO pins to talk to your sensors, eliminating the need for a second controller.

8. GPS Module:

The Global Positioning **System** (**GPS**) is a network of about 30 satellites orbiting the Earth at an altitude of 20,000 km. Once it has information on how far away at least three satellites are, your **GPS** receiver can pinpoint your location using a process called trilateration.**It** is a network of orbiting satellites that send precise details of their position in space back to earth. The signals are obtained by**GPS** receivers, such as navigation devices and are used to calculate the exact position, speed and time at the vehicles location.

9. GSM Module:

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

10. Camera module:

The camera module consists of a web camera and it is mounted on the robot and the video signal is transmitted to the receiver at control room. The camera module will transmit the video coverage of the paths and thus helping in easier mapping of the path to be taken by the rescue team. For real time applications, camera of high range is to be used to get good clarity and good coverage of area. The function of camera also help the robot from getting stuck in a pit as the obstacles lying in path is foreseen and required action can be taken, thus improving the life of robot in the disaster area. Due to which we can observe the robot & we can see live vision.

11.Microphone:

A **microphone** is a transducer that converts sounds into an electrical signal. They are characterized by their transducer principal such as condenser, dynamic, etc. It will be used to detect the victim based on their noise or scream if the victim is unable to move. They detect the sound in various patterns. Sound information exists as pattern of air pressure; the microphone changes this information into patterns of electric current.

### A. **Block diagram of the proposed system**
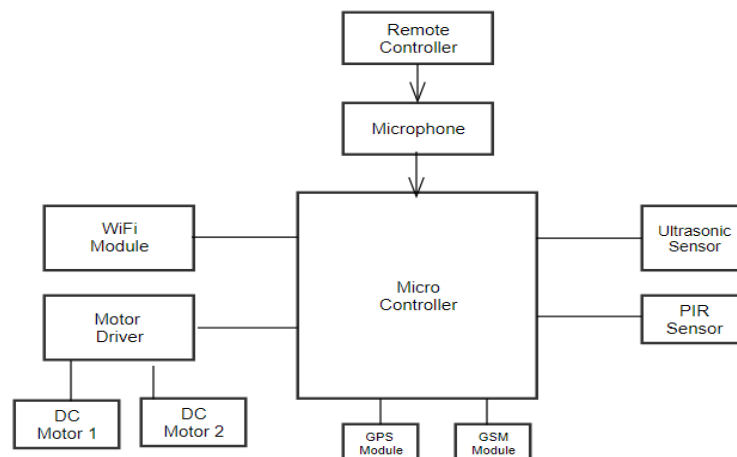
V.   EXPECTED OUTCOME

Human Rescue Robot In Natural Calamities tends to increase the number of detection of victims in uncertain areas in case of any environmental emergencies. Also it will cover the large distance so that larger areas can be scanned and as many victims can be detected from different locations. This robot will not only detect victims based on movements but also based on their voice i.e. noise or scream. It will record the surrounding and thus based on that it will detect the presence of human. Thus even if a victim is unconscious and unable to move, still its presence will be detected by the robot based on the voice. And also we will be getting the live stream of the current scenario. . We expect the following features should be provided by the system to the user:

- Detection of the presence of the victim.

- Real time location information of the Robot.

- Live stream of the current scenario.

- An alert message on the registered number if any object or motion detected.

- Avoiding the various obstacles in path.

B. **Circuit Diagram:**
The circuit is built around an ATmega328   controller, ultrasonic transceiver module HC-SR04, ESP8266 Wi-Fi module , motor driver L293D (IC1), DC motors M1 and M2, and a few common components. The circuit uses one 12V battery which supplies power to the whole circuit. Regulated 5V supply for the rest of the circuit is provided by the battery.
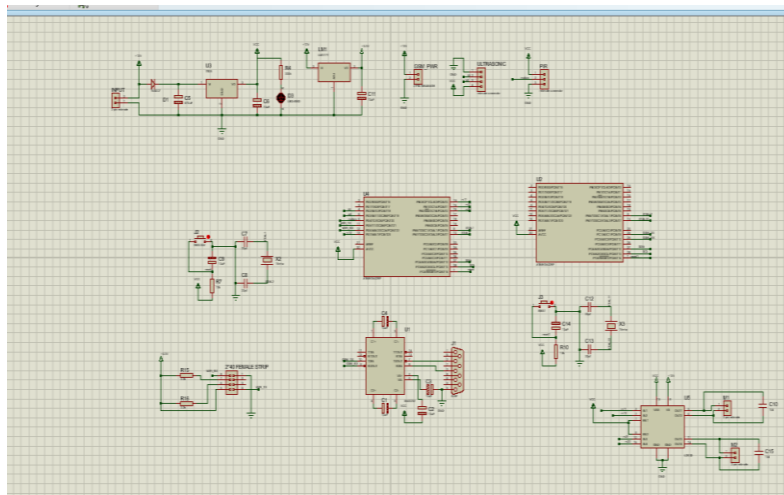
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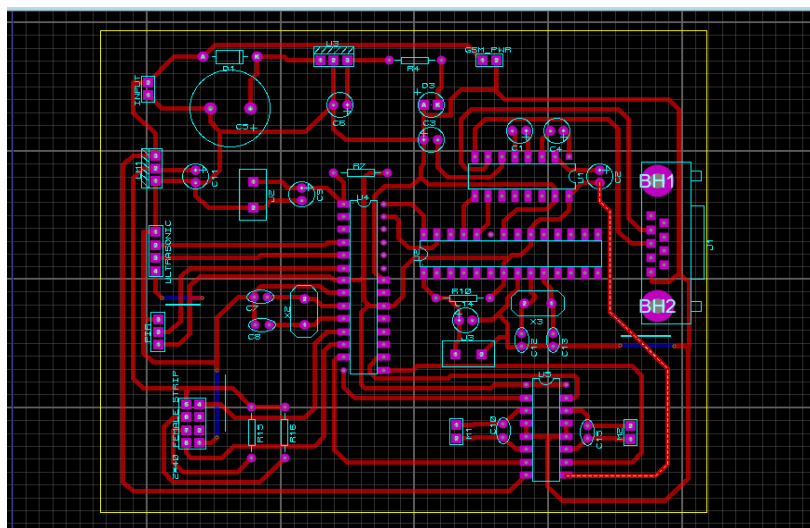
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