Iot based live human detecting robot for earthquake rescue operation

S.P. Vijayaragavan [1], M. Krishna Kumar [2] and T. Thirumoorthi[3] and R. Abenash [4]

Abstract

Natural calamities do occur and they are unstoppable. But humans are becoming increasingly aware in the concept of intelligent rescue operations in such calamities so that precious life and material can be saved though calamities cannot be stopped. Still there are lots of disasters that occur all of a sudden and Earthquake is one such thing. Earthquakes produce a devastating effect and they see no difference between human and material. Hence a lot of times humans are buried among the debris and it become impossible to detect them. A timely rescue can only save the people who are buried and wounded. Detection by rescue workers becomes time consuming and due to the vast area that gets affected it becomes more difficult. So the project proposes an autonomous robotic vehicle that moves in the earthquake prone area and helps in identifying the alive people and rescue operations. In this iot based live human detecting robot for earthquake rescue operation project, a new method for detecting surviving humans in destructed environments using simulated autonomous robot is proposed. The first level is a PIR sensor used with a temperature sensor that is used as the primary sensor in order to detect the existence of living humans in a scene. Wireless communication help to require the humans.

Keywords

Iot, earthquake.

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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. This PIR sensor is placed on a moving all direction robot that can man ever in the earthquake prone areas. The robot is driven on a geared dc motor for increased torque and low speed and stepper motor for increased turning accuracy hence the precise control of position is monitored. The robot consists of a three wheel geared drive with DC motors attached to perform forward and reverse movement. Earthquakes produce a devastating effect and they see no difference between human and material lot of times humans are buried among the debris and it become impossible to detect them Detection by rescue workers becomes easy. These people are visible to very dangerous situations caused by the destructed location they work in like distorted buildings, landslides, crater, etc. So, there is a coincidental for the rescuer to become a victim who needs to be rescues. It means the rescue operation imposes significant risk on rescue personnel themselves. Alive human detector uses PIR sensor to detect alive humans. As live human body emits thermal radiation it is received and manipulated by the PIR sensor to detect humans. PIR sensors are passive infrared sensors.

They detect change in the heat and this can be used to detect movement of people. It has digital output and can be directly given to the digital pins and no ADC is needed. It operates at 5V DC. The PIR (Passive Infra-Red) Sensor is a hydroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects.

1.1 Existing system

Earthquakes produce a devastating effect and they see no difference between human and material lot of times humans are buried among the debris and it become impossible to detect them Detection by rescue workers becomes time consuming and due to the vast area that gets affected it becomes more difficult.

1.2 Proposed system

The project proposes an autonomous robotic vehicle that moves in the earthquake prone area and helps in identifying the live people and rescue operations. Hence precious life can be saved by timely detection in natural calamities even without the help of large number of rescue operation.

1.3 Microcontroller

The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used in many pic microcontroller projects. PIC16F877A also have many application in digital electronics circuits.

PIC16f877a finds its applications in a huge number of devices. It is used in remote sensors, security and safety devices, home automation and in many industrial instruments. An EEPROM is also featured in it which makes it possible to store some of the information permanently like transmitter codes and receiver frequencies and some other related data. The cost of this controller is low and its handling is also easy. Its flexible and can be used in areas where microcontrollers have never been used before as in coprocessor applications and timer functions etc.

1.4 PIR sensor

As live human body emits thermal radiation it is received and manipulated by the PIR sensor to detect humans. PIR sensors are passive infrared sensors. They detect change in the heat and this can be used to detect movement of people. It has digital output and can be directly given to the digital pins and no ADC is needed. It operates at 5V DC The PIR (Passive Infra-Red) Sensor is a Hydroelectric device that detects motion Measuring changes in the infrared (heat) level emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load. Detection range up to 20 feet away. Some additional advantages of using PIR sensor are Single bit output Jumper selects single or continuous trigger output-Mode, 3-pin SIP header ready for bread board or through whole Project,-Small size makes it easy to conceal-Compatible with BASIC Stamp, Propeller, and many other.

1.5 DC gear motor

The relationship between torque vs speed and current is linear as shown left; as the load on a motor increases, Speed will decrease. The graph pictured here represents the characteristics of a typical motor. As long as the motor is used in the area of high efficiency (as represented by the shaded area) long life and good performance can be expected. However, using the motor outside this range will result in high temperature rises and deterioration of motor parts. A motor's basic rating point is slightly lower than its maximum efficiency point. Load torque can be determined by measuring the current drawn when the motor is attached to a machine whose actual load value is known.

1.6 Internet Of Things (IOT)

Internet of things (IOT) has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS) and the Internet. The concept may also be referred to as the Internet of Everything. The internet of things (IoT) is the internetworking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. A thing, in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network. Internet of Things (IoT) is an environment in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. IoT board featured with SIM900 GPRS modem to activate internet connection also equipped with a controller to process all input UART data to GPRS based online data. Data may be updated to a specific site or a social network by which the user can able to access the data.

1.7 MAX 232 IC

The Max-232 IC is started by the maxim integrated products in 1987. It is an integrated circuit which converts the signals from the RS232 serial port to the proper signal which are used

in the TTL compatible digital logic circuits. The MAX232 can convert the signals like RX, TX, CTS, and RTS and it is a dual driver/receiver. The driver increases the output voltage levels of TIA232 from a 5 volt supply to 7.5 volts by using the external capacitor and on chip charge pumps. The receiver reduces the input levels of the TIA232 from 25 volts to the standard voltage level, i.e. 5volts of TTL levels and there is a threshold of 1.3 volts and hysteresis of 0.5 volts for the receiver. Further the max232 IC is extended by the four receivers and transmitters simultaneously with eight receivers and transmitters which are MAX238 and MAX248 and there are many combinations of receivers and transmitters. The MAX-232 IC is an integrated circuit which consists of 16 pins and it is a resourceful IC mostly used in the voltage level signal problems. Generally, the MAX-232 IC is used in the RS232 communication system for the conversion of voltage levels on TTL devices that are interfaced with the PC serial port and the Microcontroller. This IC is used as a hardware layer converter like to communicate two systems simultaneously.

1.8 SIM Card

One of the most interesting innovations of GSM is that the subscriber's data is not maintained in the mobile phone. Rather a "smart card," called a subscriber identity module (SIM) card, is used. The SIM is inserted in the phone to allow the communications. A user may thus make telephone calls with a mobile phone that is not his own, or have several phones but only one contract. It is for example possible to use a SIM card in a different mobile when travelling to a country that has adopted the GSM on a different frequency band. A European can therefore rent a PCS1900 phone when travelling to the United States, while still using his own SIM card, and thus may receive or send calls. The SIM is used to keep names and phone numbers, in addition to those that are already kept in the phone's memory. The card is also used for the protection of the subscriber, by means of a ciphering and authentication code.
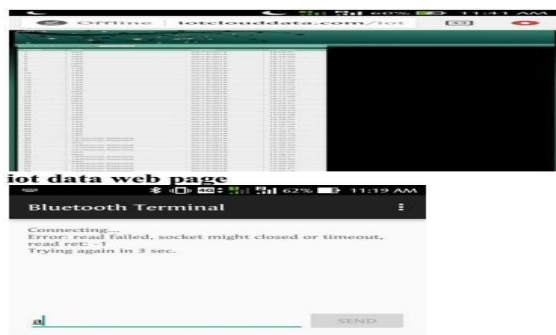
2. Conclusion

Hence many life's can be saved by using this autonomous vehicle during an earthquake disaster in a short duration which becomes time consuming and unaffected if done manually.

This vehicle can be improved by using high range sensors and high capacity motors. Some more sensors like mobile phone detector, metal detector etc. can be implemented to make this vehicle more effective. This System is an effective and a safe system to ensure that there are no humans left behind in a rescue operation. The System is safe even for the user because of the use of robotics and no manual work The system uses Bluetooth and this makes the system both accurate and reliable. Battery backup for camera is weak which can be overcome by using a solar panel. The initial cost may be high if very high range sensors are being used in commercial usage. Net work problem time we use in iot based live human detection.

2.1 Hardwarekit

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