

Fire and Rescue Robot

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ABSTRACT

The fire and rescue robot is an embedded system used to help the rescue team in disaster environment to detect living things and to know the status inside the area to take proper precaution. This robot detects poisonous gas amount of temperature and motion inside the room. This robot has a roller wheel to climb the stairs and obstacles and also have a 360 degree rotating fire and smoke resistant camera for covering huge area. The data is send to the android application through wi-fi.

General Terms

We are using socket algorithm for blue tooth connection establishment.

Keywords

embedded system, 360 degree fire resistant camera , wi-fi, rescue.

1. INTRODUCTION

The system proposed in this paper integrates the use of affordable instruments, connectivity and wireless communication. The proposed fire and rescue robot that detects the poisonous gas the amount of temperature inside the room also detects the motion inside the room. Here introduced a roller robot that has an ability to climb in stair cases and house hold obstacles. This helps the fire and rescue department for knowing the secure condition for entering to the fired room. This robot can be easily accessed with a remote monitor by an external user. We put this robot inside a fired room and controls the direction using the remote monitor with the help of 360 degree fire resistant camera. The embedded system sense the amount of temperature, density of poisonous gas and motion inside the room. Then this information and data will send to the android application. This application will provide the accurate measurements of the value of the temperature and poisonous gas density if it occurs. When motion is detected, the application will send an emergency alert message to the user. The connection between the embedded system and user application through wi-fi.

2. RELATED WORKS

[1] This robot is designed with thermostat to sense temperature and camera used to detect living things who is stuck in the disaster situations using the real time video transmission. The aim of the system is directing people among debris, this robot can lift a weight of 200 to 300 grams. Here we use viola jones algorithm for face detection. The GPS is send a data to PC. In the system it gives more priority to detect the location we where the robot send via Bluetooth from sender to receiver and it is controlled by MC and driven via the feedback of the real time camera into picture but the system can get the situation with in hours which can aid in giving priority to people alive ,it is fast, cost efficient and easy to use the use of heavy machinery is prohibited because they

would describe the structure, risk in the lights of rescue and victims buried in the rubble. Only by hand should pulverized concrete, glass, furniture and other debris be removed. Rescue specialist used trained search dogs, camera and listening devices to search for victims from above ground though the search dogs are effecting in finding human underground, they are enables to provide a general description of physical environment the victims locates.[2] In the system is used video surveillance so it also requires a static camera and working is same as CCTV surveillance system.so there is no additional expenses on conventional fire sensors. Here fire detection is possible by identify the features of the fire like color, motion, shape and that is powered with fuzzy logic for more accuracy so it will reduce the fault assumptions. Here compare these fire features and generate fire alarm [3] The system consisting transmitter and receiver, The transmitter with smoke sensor, flame sensor and it is guided by ultrasonic sensor mounted on receiver (robot) to avoid obstacles on path here a motor is used for locomotion and a pump is used to sprinkle the water, tank can contain water up to 4L. The system pump out the water when it detects any fire feature it contains a LED cluster used to know where the fire mishap has occurred the corresponding LED glows when there is fire in that area for which the LED associated

[4] The robot is powered by solar it is used to detect alive people in disaster situation using a camera installed inside it and it is controlled by rescue the remote of control contains the directions to control this vehicle. the communication between the remote and robot via zigbee module . it also detect fire and it contains battery to charge the robot by using electric current also it helps to work even in the absence of charge by solar .

[5] The robot is used to detect alive human body in disaster environment by using set of sensors and low cost camera which helpful for rescue operations. This is a mobile robot works in disaster conditions and here a PIR sensor for detect motion of the body and IR sensor to detect obstacles on the way of the robot and temperature sensor to find the amount of temperature. This sensor move in all directions to convert physical quantities like radiation from human body if any character of living detected, then it produce a buzzer and also capture a radio scene using camera. It also send the information about current status and location. RF technology for control the robot, the receiver consist of PC it communicates with robot via RF communication.

3. SYSTEM ARCHETECTURE

3.1 PIR sensor (motion)

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view, they are most often used in PIR based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation isn't visible to the human eye because it radiates at

infrared wavelengths, but it can be detected by electronic devices designed for such a purpose.

The term passive in this instance refers to the fact that PIR devices do not generate or radiate energy for detection purposes. They work entirely by detecting infrared radiation emitted by or reflected from objects. They do not detect or measure “heat”.

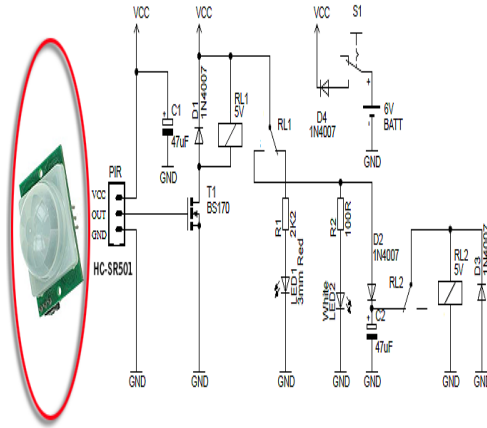


Fig 1: Pin diagram for PIR sensor

3.2 MQ3 sensor (gas)

The grove- gas sensor(MQ3) module is useful for gas leakage detection (in home and industry).it is suitable for detecting alcohol, benzene, CH₄, hexane, LPG, CO. due to its sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer. The output voltage from the gas sensor increases when the concentration of gas increases. Sensitivity can be adjusted by varying the potentiometer. “The best preheat time for the sensor is above 24 hours”.

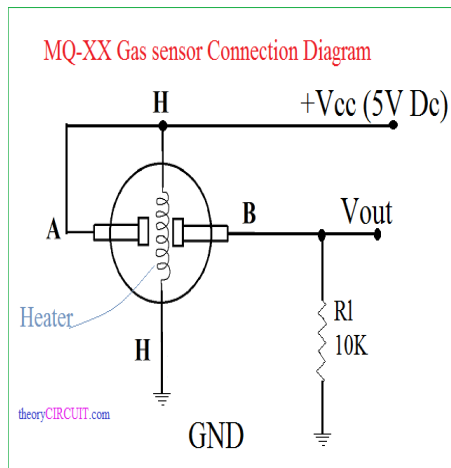


Fig 2: Pin diagram of MQ3 Sensor

3.3 LM35 sensor (temperature)

The LM35 series are precision integrated circuit. Temperature devices with an output voltage linearly-proportional to the centigrade temperature. The LM35 device is rated to operate over a -55degree C to 150degree C temperature range. While the LM35C device is rated for a -

40degree C to 110degree C (-10degree with improved accuracy). It is a Semiconductor based sensor. LM35 temperature sensor is basically a very low cost and easily available sensor. It also an integrated analog temperature sensor. LM35 sensor does not require any external calibration or trimming to provide typical accuracies. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

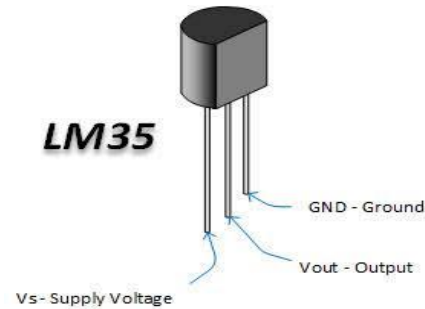


Fig 3: Pin diagram of LM35 Sensor

3.4 PIC micro controller

PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller, then it was corrected as Programmable Intelligent Computer. The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems. Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash

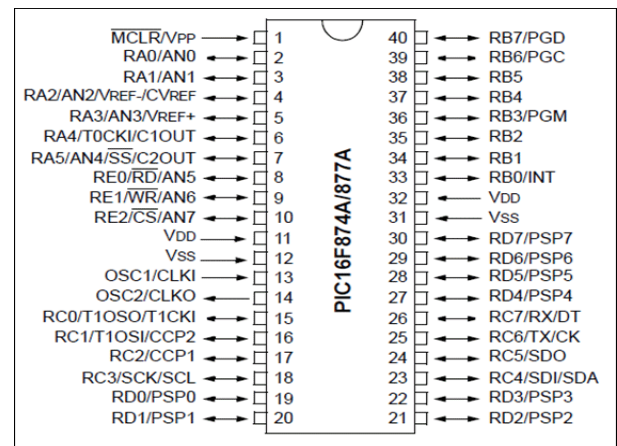


Fig 4: Pin diagram of PIC

memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions

3.5 Power supply

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power

supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power.

Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power.

3.6 Indicators

Indicators are used to represent the critical conditions for alerting the fire mans. Some sort of indicators are LED lights, sound alarm's etc. these alarms are helps to giving attention to the fire man and the other people.

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4. FIRE AND RESCUE ROBOT

The proposed fire and rescue robot that detects the poisonous gas, the amount the temperature inside the room also detects the motion inside it. We are introduced a roller robot that have an ability to climb in stair cases and house hold obstacles. This helps the fire and rescue department for knowing the secure condition for entering the fired room. This robot can be easily accessed by a remote monitor by an external user. We put this robot inside a fired room and control the direction using the remote monitor with a help of a fire resistant camera. The embedded system senses the amount of temperature, density of poisonous gas and the motion inside the room. then this information and data will send to the android application. This application will provide the accurate measures of values of temperature and poisonous gas density if it occurs. When motion is detected the application will send an emergency alert message to the user. the connection between embedded system and android application done by using wi-fi.

5. FIGURES/CAPTIONS

Block diagram: The block diagram will consist of these 7parts. The temperature sensor, LM3 and motion sensor PIR and the gas sensor MQ3 are connected to a PIC micro controller and the data of sensors and send via a wifi module to an android application

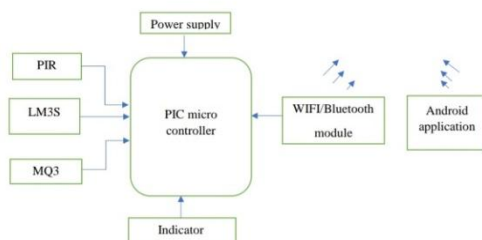


Fig 5: Block diagram

ii. **Flow diagram:** If the connection is established between the robot and user smartphone then the user can control the movement of device and also get the information given by sensor and camera. The user initially set a temperature value if the value is lesser than of the temperature inside it and no poisonous gas is identified then it will send a secure condition for user otherwise the condition is unsecured. If any motion is detected then the application shows a pop-up message

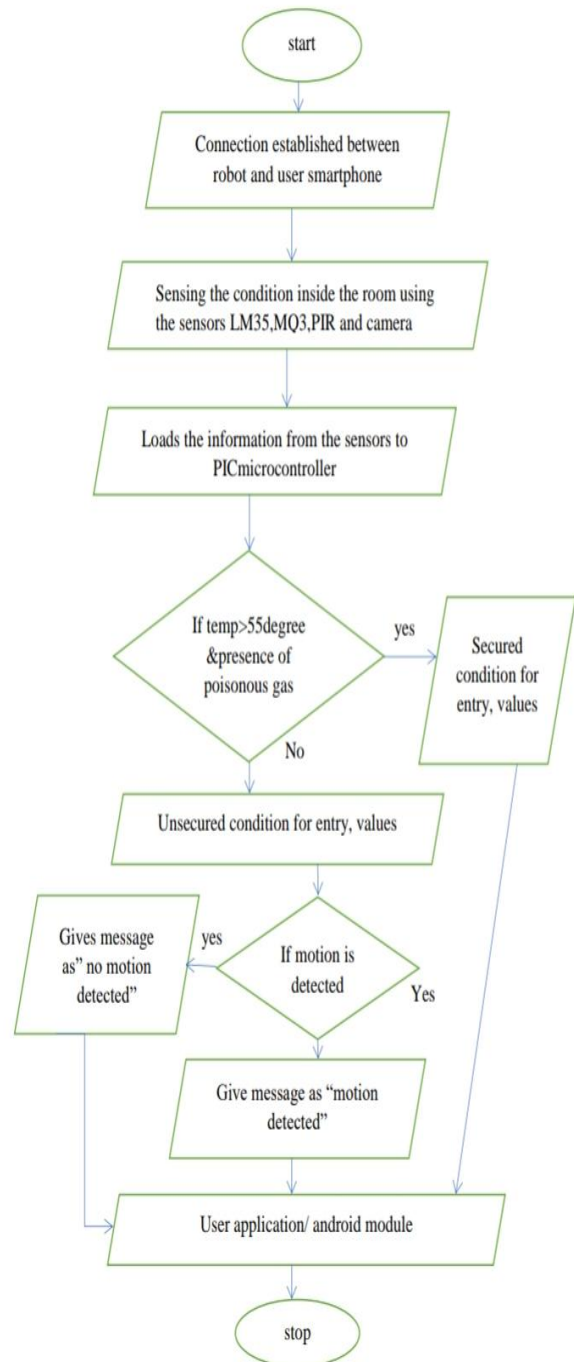


Fig 5: Flow Chart

6. EXPECTED OUTPUT

The proposed system is an asset for the fire and security department. It will monitor the temperature, poisonous gas and also motion, Motion detector will detect the human or any living things inside the fire area and will also continuously monitor the temperature, when it will detect the poisonous gas, The camera will have a 360 degree rotation camera so it will monitor the all around room and it will help the fire man to give the robot to sudden action. 360 degree rotating camera will cover a huge area and it will send to the smart phone a live video

6.1 CONCLUSION

The proposed system will help to the fire and rescue team to easily rescue the people. The system is less expensive than the other robot in this field. It will accurately detect the values and every time it will be updated so the fireman can update the condition inside the room. When any living things trapped inside the room the motion sensor sense it and give an emergency alert message. So the fire man can easily reach the people and time delay will not take place

7. REFERENCES

- [1] <http://www.ijiet/rescue robot /ISSN: 2319-1058/Vol.2 Issue:3 June 2013>
- [2] <http://www.ijser.net/A Methodological survey for Fire detection in camera Surveillance /ISSN:2319-7064 Vol.5, Issue 1, January2016>
- [3] <http://www.irjet.net /Automatic Fire Extinguisher Robot ISSN:2395-0056 /Vol4, Issue5, May 2017>
- [4] <http://www.irjet.net / Solar Rescue Robot /e-Issn:2395-0056/Vol:4, Issue 5, May 2017>
- [5] <http://www.irjet.net /A new approach for detecting alive human beings in devastating environments using a low cost autonomous robot/ Vol 4, Issue 4, April 2017>
- [6] <http://arduino.cc/en/Reference/Homepage>
- [7] <http://www.ijcter.com/ automated fire detection surveillance system /June 2016, Vol 2, Issue 6, June 2016>
- [8] Dr. A.R.Kondelwar, Mukesh Kumar “Designing of smart rescue robotic system” www.irjet
- [9] <http://www.irjet /Need for Wireless Fire Detection Systems using IoT, Vol:4, Issue :1, Jan-2017>
- [10] <http://www.ijritcc.org /Fire Fighting Robot, ISSN:2321-8169, Vol:4, Issue:4>