

Microcontroller Based Smart ROBO Using GSM

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ABSTRACT

Security is the basic concern in today's date. Whether it is the matter of providing safety to small places like homes, banks etc. or it can concern the security on the borders. While keeping this factor in mind, the system designed here is prepared.

The system designed can be used in any of the above stated places; as it consists of equipments of modern electronics. Thus it is named as "SMART ROBO".

The paper prepared is capable of detecting leakage of hazardous gases, metals as well as unexpected human presence in the area where it is installed. The paper based on the interfacing between GSM module and AT89s52 microcontroller.

The system can be moved to various places by making call to the system or it can be initialized or left at the place where security is required.

Due to the presence of GSM technology, the system is also capable of sending alert to the user about any unexpected incident. It also shows the message on the LCD screen attached to the surface.

1. INTRODUCTION

GSM technology and embedded system technologies have seen a major boom in the electronics world in the recent past. The combination of these two technologies can lead to many alliances. Generally robots are made to decrease the human working or human efforts in a given task or the task performed by that Particular machine. Any danger that happens, generally occurs due to the human negligence and because of this reason, the robots are made and developed to such a high level that in today's date, a large number of important activities are performed by the robots only.

Almost all the robots that are present in today's scenario have only one or two sensors and thus this robot can be of great use by various institutions as it can perform 3 tasks simultaneously as well as individually.

The paper is made by interfacing the GSM module with AT89s52 microcontroller. The microcontroller is also interfaced with all the three sensors (gas sensor, PIR sensor, metal sensor) installed in the system. A number is burned in the microcontroller to which the alert will be send by the robot during any unexpected activity. Whenever the sensors sense anything, the GSM module will send the message to the number and a proper action will be taken accordingly.

Thus to sum up, it is appropriate to say that, smart Robo is a machine to handle any dangerous event that can happen due to the negligence of humans. A sensory network in our paper detects the parameters like harmful gases, metal or moving object. Whenever these parameters come within the range of robo a signal is transmitted to the user side, displayed on LCD and mobile phone.

- Here the connections are made in serial communication, so the DTMF signals coming from the GSM module will be converted by the DTMF IC.
- When the microcontroller receives a call, it sends command to the relays about the movement of the robot.
- If the sensors are active and they sense anything like hazardous gases or smoke, metals or unforeseen human activity, they will send a message to the microcontroller which further sends a command to the GSM module.
- The command transmitted by the microcontroller is in the form of serial communication which will be converted to a parallel signal by the DTMF IC.
- After receiving the command from the DTMF IC, the GSM module sends an alert message to the operator to let him know about the unexpected activity/activities in the premises.

4. DESCRIPTION OF THE SYSTEM

DTMF DECODER (8870)

The 8870 DTMF's internal architecture consists of a band-split filter section which separates the high and low tones of the received pair, followed by a digital decode (counting) section which verifies both the frequency and duration of the received tones before passing the resultant 4-bit code to the output bus. While the external components are minimized by arrangement of a latched tractate interface bus, clock generator and an on chip differential input amplifier.

GSM

This device is used to send alert messages to the user as well as to receive the calls from any mobile number by the SIM that is attached to the robot. This process is done because of the interfacing of GSM module with AT89s52 microcontroller (which will be explained below).

AT89S52 MICROPROCESSOR

All the components on the machine are connected with the microcontroller. The interfacing of microcontroller is done with the GSM module, DTMF IC, IC8870 and the four relays. When the sensors sense any of the three components, they will send a signal to the microcontroller which further sends command to all the devices of the system and the system takes an action accordingly.

RELAYS

A relay can be called as an electrically operated switch which is used to control where various circuits are controlled by one signal or to control circuits with low power signal. The relays used here are Single Pole Double Throw relays. The main difference between a switch and a relay is that a relay is operates on an electrical input while a switch operates on a mechanical input.

PIR SENSOR

PIR stands for passive infrared sensor. It is used to measure infrared light, radiating from objects in its field of view. The radiations that are invisible to human eye and are present at infrared wavelengths emitted from all the objects with a temperature above than absolute zero are detected by this sensor.

GAS SENSOR

The gas sensor used here is to detect the leakage of hazardous and combustible gases. This sensor is used to prevent the building or area from any fire accident. The sensor is connected with a buzzer which will be activated as soon as the sensor senses the gas.

METAL DETECTOR

This device is used to detect the metal in the areas where it is not expected. The detector used here will detect ferrous (iron, steel, stainless steel) as well as non ferrous (copper, tin, gold, lead, silver aluminum) as well as alloys (brass, cupro-nickel, pewter etc.).

RESISTORS

These are the two terminal devices and are used to reduce the current flow as well as to lower down the voltage level in the circuit.

CAPACITORS

The main aim of capacitors is to block the direct current and to store energy electro statically in an electric field.

TRANSISTORS

The transistors are a part of semiconductor materials family. These are used to switch and amplify electronic signals and power.

VOLTAGE REGULATOR

A voltage regulator is designed to automatically maintain a constant voltage level

SOFTWARE USED

KEIL, a cross compiler is used to burn the coding in 8051.

5. FUTURE ASPECTS

- The temperature sensor can be integrated in future which can measures the temperature of outside environment.
- Presently our ROBO can just move forward and backward we can integrate it proper system so that it can also climb terrain at certain angles.
- A wireless camera can be integrated so that user could watch the surroundings through and gives directions to change the path accordingly.
- In addition to above a microphone can be attached with camera so that user could hear the talk of humans in areas like bank and borders.
- An ultrasonic sensor can be integrated which can be use for distance measurements from the obstacles.
- An obstacle sensor can be integrated to increase the range of sensing obstacle.

6. APPLICATIONS

- Gas detection in houses, hotels etc.
- Human detection in banks, houses, borders during isolated time.
- Detection of hazardous metals.



Fig: FUTURE MODEL

8. CONCLUSION

The main objective of this paper is to provide a brief overview of the advanced working of the “SMART ROBO” which can be used anywhere in the world to provide a secure environment by detecting the hazardous conditions present in the area. These conditions can be of combustible or hazardous gas leakage, harmful metals present in the region or any unexpected human activity.

Thus, as the name suggests, this robot can be used smartly in the form of advanced security system in homes, banks, hotels, borders or anywhere in the world.

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