

Multi-Sensor Home Security System

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Abstract: In this project, we have made an attempt to deal with problems like trespassing, gas leaks, and fires. Multi-sensor Home Security System is a system that gives a warning to the user if any of the above threats occur. The project uses three sensors; IR proximity sensor, Gas/Smoke detector and Glass Break detector. IR proximity sensor is used to detect trespassing through the door. Gas/smoke detector detects both gas leakage and presence of smoke (fire). Glass break sensor is attached to the glass windows. It detects violent vibrations in the glass. When either of these sensors detects the respective hazard, it gives a high output to the microcontroller. The microcontroller is programmed to detect which of the sensor is activated. It then displays the name of the activated sensor(s) and the said possible hazard(s). It also activates the buzzer alarm to alert the user.

Keywords: Multisensor, Home Security System, IR proximity sensor Gas/Smoke detector and Glass Break detector

1. Introduction

Home security system project consists of four basic modules. First is IR transmitter and receiver module which works for the safety of doors. When the IR sensors are interrupted, a buzzer is turned on indicating someone has entered into the house. Second module is LPG gas sensor. It is provided to detect LPG gas leakage. A buzzer is turned on when gas is detected by the sensor. The third module is a fire detector, which will detect if there's a fire. When it detects fire, the sensor will activate the buzzer. The last module will be a glass break sensor, which will activate the buzzer when it detects violent vibrations (caused by breaking glass).

2. Methodology

Following is the block diagram of our project:

Proximity sensor: Proximity sensor is used to detect the presence of any intruder or person. (Refer Fig 1.1)

Gas leak/smoke detector: This block is used to detect the presence of smoke or LPG. (Refer Fig. 1.1)

Glass Break Detector: This block is used to detect the glass break using vibrations.

8051 Micro-controller: All the inputs are processed by the microcontroller.

LCD display and buzzer: The output of the project is displayed on the LCD and buzzer buzzes as we receive any output.

Power supply: This block is essential for the functionality of the entire project as it provides with the 5v supply.

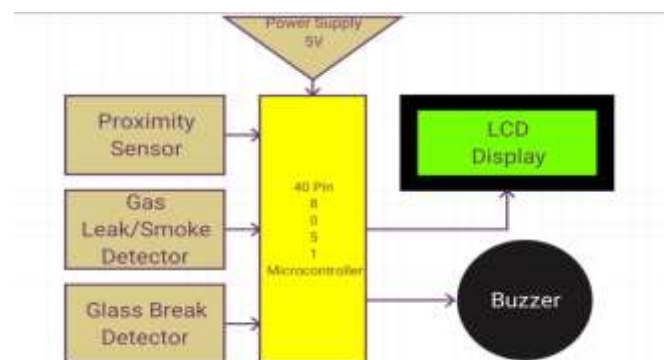


Figure 1.1: Block Diagram of the project

3. Circuit Diagram

- 1) IR proximity sensor consist of IR333C sensor, PT333C sensor & LM348 Op-amp. IR 333C acts as an infraredtransmitter and PT 333C will receive it by reflection.LM358 is a differential OPAMP acting as a comparator.
- 2) The glass break sensor consist of NE555 timer IC, PIEZO PLATE and BC548 transistor. Ne555 acts as a Monostable vibrator with one stable state.Piezo plate will convert vibrations to electrical energy. If piezo plate feels vibrations, the output of piezo plate will be high which will be given to the transistor.The output of Ne555 will go high which will be given to the microcontroller 8051.
- 3) LPG gas sensor consist of MQ6 sensor & LM348 Opamp.MQ6 sensor is used to detect alcoholvapour, LPG gas and fire.The sensitive material of the MQ-6 gas sensor is SnO₂, which has the lower conductivity of clean air. MQ6 input voltage is 0-5V DC and output voltage is 0-5V.LM358 is a differential OPAMP acting as a comparator. Input range of LM358 is 3V-32V and low supply drain current is 0.7mA.
- 4) Microcontroller 8051 takes input from 3sensors.The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set. The operating range is 4V-5.5V.

- 5) Buzzer and LCD displays the output. Buzzer requires a supply of 12V and A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.
- 6) The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. Supply range is 4.7V – 5.3V and has 8 data pins.

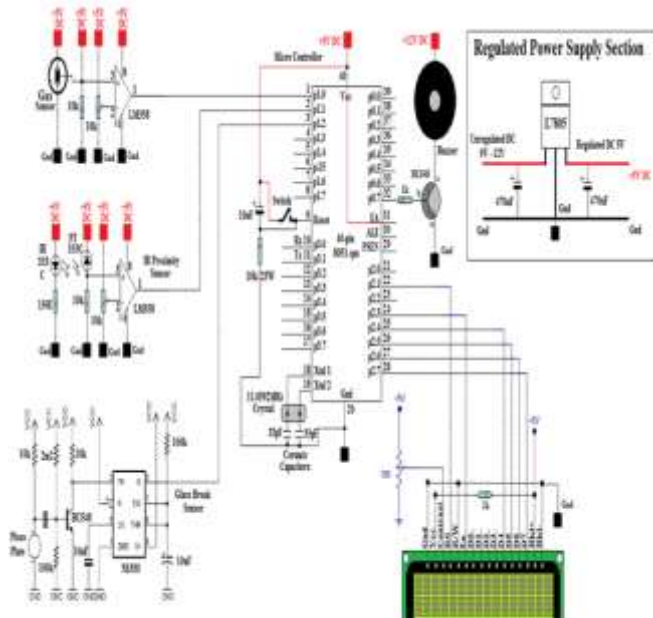


Figure 1.2: Circuit Diagram

4. Result

- 1) After connecting the components as per the circuit diagram, the results were as follows: When we were placing our hands in front of the IR proximity sensor, the buzzer starts buzzing and status was displayed on the LCD screen as ON. As soon as we used to move our hands or any obstacle away from the sensor, the buzzer stops and the status on the LCD screen is updated to 'OFF'.
- 2) .When we used to tap on the glass break sensor, the buzzer starts buzzing and status was displayed on the LCD screen as ON. As soon as the vibration stops, the buzzer stops and the status on the LCD screen is updated to 'OFF'.
- 3) When we spray butane/propane in front of the Gas sensor, the buzzer starts buzzing and status was displayed on the LCD screen as ON. As soon as the concentration of the gas reduces the buzzer stops and the status on the LCD screen is updated to 'OFF'.

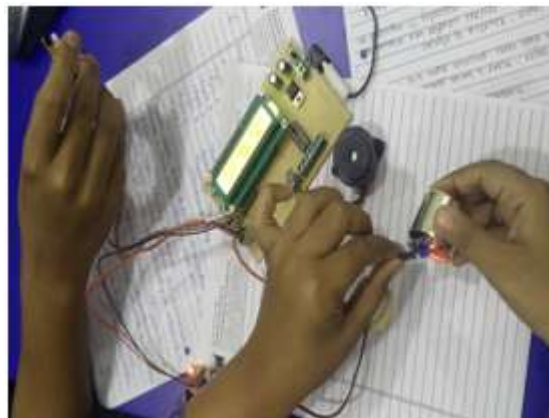


Figure 1.3: Result

5. Conclusion and Future Scope

- 1) This project is capable of detecting fire, gas leakage, glass break and unauthorized movement at any place.
- 2) Same project can be implemented in industry or educational institutes for solving out problems listed above.
- 3) Implementation of this system will enable us to ensure safety at home/ industry etc.
- 4) Necessary action can be taken in a quick span of time without causing more damage.
- 5) We can send this data to a remote location using GSM module or WIFI.
- 6) Tracking the location of any such accident reported on mobile using GSM module.
- 7) We can add the module of voice alarm system to indicate unauthorized entry or gas leakage.

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