

Hazardous Gas Detection and Alerting System using LCD

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Abstract— Hazardous gases detection became a concern after the effects of harmful gases on human health were discovered. Gas detectors can be used to detect combustible, flammable and toxic gases and oxygen depletion. This type of device is used widely in industry and can be found in locations such as oil rigs. They may be used in firefighting.

This device detects the amount of gas in the environment and displays the readings and alerts the user.

Index Terms—About four key words or phrases in alphabetical order, separated by commas.

OBJECTIVE OF PROJECT

The objective of the project is to ensure the worker safety by monitoring the environment where they work. The device senses the gases and displays on the L.C.D. This alerts the user and immediate action will be taken. The value of gases including temperature and humidity readings are displayed on LCD.

PROPOSED SYSTEM

In this project, gas sensors and temperature, humidity sensors are used to monitor the environment. The readings are continuously displayed on a LCD.

Hardware implementation has been done using Raspberry Pi Board. The proposed system architecture which has Microcontroller (Raspberry Pi) as the heart of the system with gas sensors, temperature humidity sensor are used to track the gases in the environment. In addition Analog to Digital Converter (ADC), LCD, GSM module and power regulators are used.

LCD DESCRIPTION

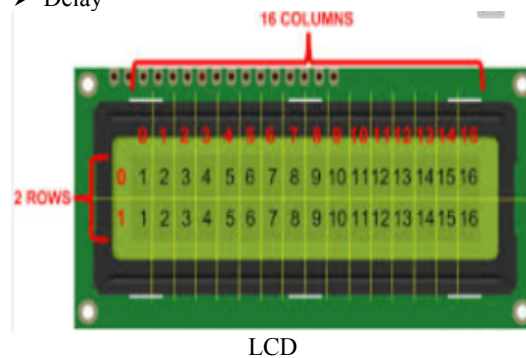
An LCD is a low cost small display. Interfacing LCD with a Microcontroller is easy because of an embedded controller (blob on the back of the board). Many Microcontroller boards have libraries that make message displaying as easy as a single line of code.

A liquid crystal cell consists of a thin (10µm) of a liquid crystal sandwiched between 2 glass sheets with transparent electrodes deposited on their inside faces. When glass has a reflecting coating and other is transparent, the cell is called reflective type. LCD does not produce its own illusion. It has to depend on an external source for its visual effect. In 16X2 LCD each character is displayed in 15X7 matrix. This LCD has 2 registers

1. Data Registers : Stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD

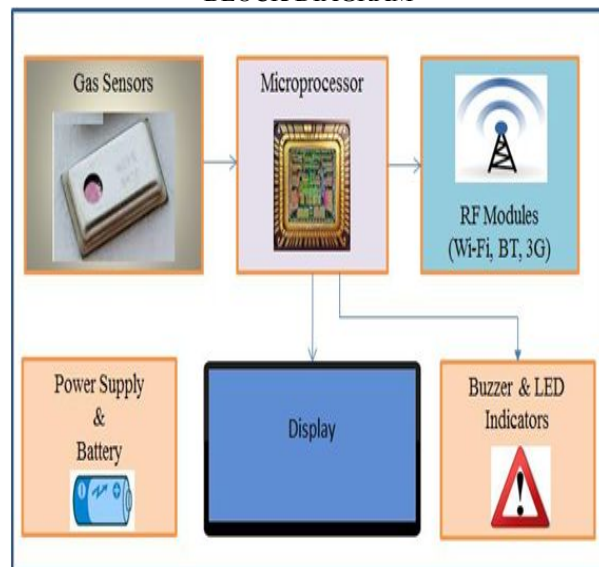
2. Command/Instruction Registers : Stores the command instructions and gives to the LCD

- RS - Register Select
- RW - Read Write
- E - Enable
- D0-D7 - Data lines
- To interface LCD with Microcontroller routines are necessary for
 - Command
 - Data
 - Delay



PRINCIPLE OF OPERATION

BLOCK DIAGRAM

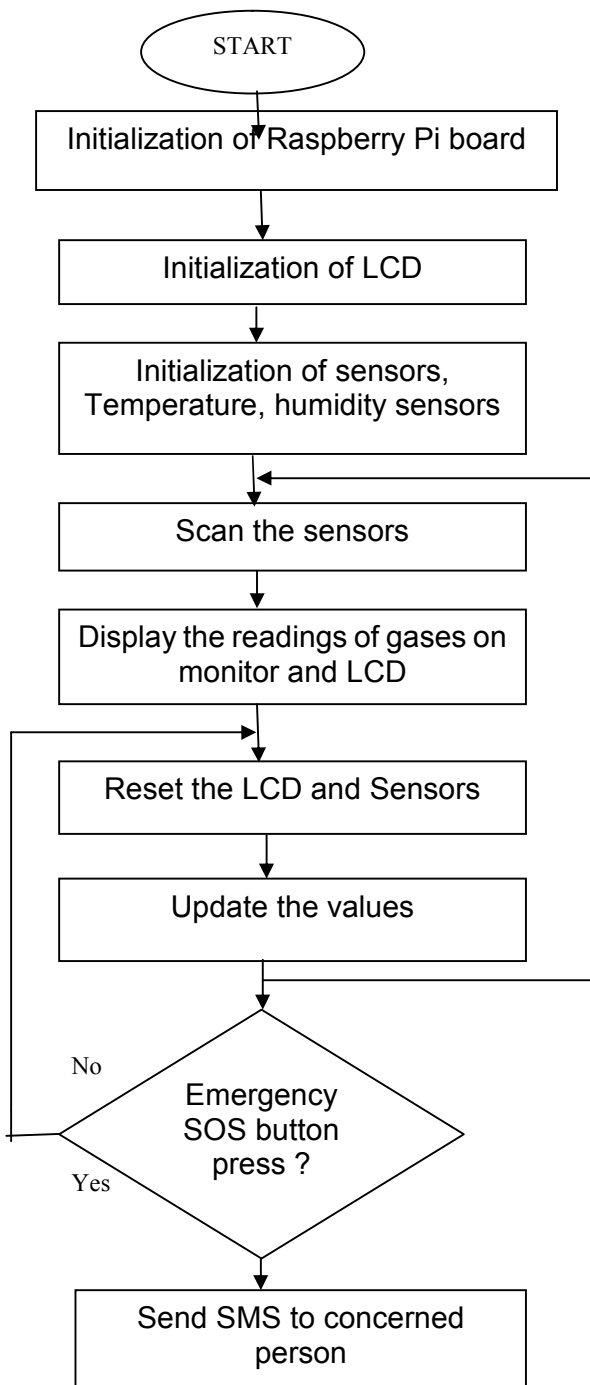


The block diagram explains the main components used in the project. Gas sensors are used to sense the gases in the environment and Temperature Humidity sensors are used. These sensors are integrated on a microcontroller board(Raspberry Pi Board). The values that the sensors sense are displayed on a LCD16X2. The entire project is done through a power supply battery.

Manuscript received Sep 09, 2016

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FLOW CHART

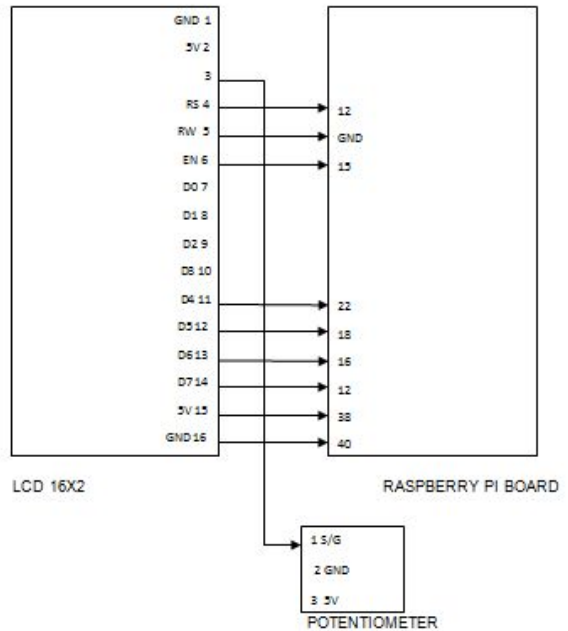


The flow chart explains the procedure of the project. Initially the Raspberry Pi Board is initialized by switching on the Pi board and monitor. Initialization of LCD and sensors is done. Once the hardware is ready the sensors start sensing the gases present in the environment and start displaying on the monitor and LCD. If no issue is caused the sensors reset and update the values and display on the LCD by resetting the display and monitor. This loop continues until and unless some issue is caused. If there is an emergency regarding the values of gases, that is, if the reading is high then message is sent to the concerned authority.

Again the LCD and sensors are reset and updated values are displayed on the monitor and the loop continues.

INTEGRATION OF LCD

LCD CONNECTION



EXPERIMENTAL RESULTS



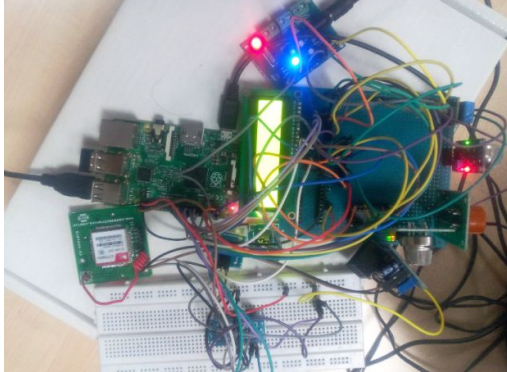
LCD DISPLAY

Once the hardware is initialized the sensors start sensing the environment and starts displaying the values on LCD as shown in Figure.

- G1 is gas sensor 1 which is MQ 2 which senses methane, butane and LPG smoke.
- G2 is gas sensor 2 which is MQ 9 which senses carbon monoxide and flammable gases.
- G3 is gas sensor 3 which is MQ 135 which senses benzene, alcohol and smoke.
- H is humidity which senses the range of humidity in the environment.
- T is temperature which senses the degree of temperature in the environment.

- The raspberry Pi board, Sensors(MQ 2, MQ 9, MQ 135, Temperature Humidity), GSM module, Power regulators and LCD are connected as shown in Figure (final connection) using bread board.
- When the power is on all the sensors and LCD are on as shown in the figure and the procedure starts.

CIRCUIT CONNECTION



Final Connections

MERITS AND DEMERITS

MERITS

- Worker safety : The main objective of the project is worker safety. The workers who work in mining area are in threat with respect to the air present around them. Hence this device mainly concentrates on the worker safety by continuously monitoring the environment and alerting the user.
- Continuous monitoring of environment: One of the main advantages of the device is that it senses the environment continuously and displays the readings on the LCD by updating the values and resetting the sensors
- Communicated through SMS: information is sent to the concerned authority immediately through SMS.

DEMERITS

- Wrong signals may cause alarm: The device is portable and the person using this will carry along with him, hence by any chance the button is pressed in the working period then wrong signal may be caused.
- More space and more connections: Since this is a Proof Of Concept(POC) it occupies more space and more connections.

APPLICATIONS

- Industries
- They may be used in mining area.
- Found in locations such as oil rigs.
- They may be used in firefighting

CONCLUSION

- Effect of harmful gases on human health were discovered and accordingly the solutions are being discovered through "HAZARDOUS GAS DETECTION AND ALERTING SYSTEM USING LCD".

- To achieve the requirements of the project, detailed study of different types of Microcontroller Boards, types of sensors was done by considering various parameters and detailed study on each parameter was done. Based on study a comparison was conducted and Bill Of Material was prepared. Based on the result obtained procurement of components is done and integration of gas sensors to Microcontroller Boards is done.

FUTURE SCOPE

- This project is a Proof Of Concept (POC), hence further this project can be modified with integrating the components on one board with less connections hence the product can be portable

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