Gas Leakage Monitoring and Alerting System for Industry

Project Report

Project Name	Gas Leakage Monitoring and Alerting System for Industry
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Branch	Electronics and Communication Engineering

Abstract:

A gas spill alludes to a hole of petroleum gas or different vaporous item from a pipeline or other regulation into any territory where the gas ought not be available. Since a little hole may steadily develop a hazardous convergence of gas, spills are perilous. Notwithstanding causing flame and blast dangers, holes can slaughter vegetation, including huge trees, and may discharge amazing ozone harming substances to the environment. The presence of hazardous LPG gas leakage in a domestic, work place, also, stored gases container gas which exhibits ideal characteristic is use. For that sake, an alarm unit is used to vibrate an alarm which is buzzer. Buzzer gives an audible sign of the presence of LPG volume. The sensors are widely used to detect essence of propane, iso-butane, LPG and even smoke. The sensor has an advantage to combine a sensitivity response time. If the LPG sensor senses gas leak from work place or home, sensor output goes to active low (logic-0) condition. Arduino UNO is used in the project; low signals are overlooked by the Arduino and gas leakage is been noticed by the Arduino. The Arduino UNO turns on the LCD and buzzer. It even turns on the GSM modem after that, it continues to send messages SMS to mobile number specifically mentioned in the program of the source code for alerting danger to the people.

Introduction:

The usage of the gas brings great problems in the domestic as well as working places. The inflammable gas such as Liquidized petroleum gas (LPG),

which is excessively used in the house and at work places. The leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. So, by keeping it in the concept of the project we have determined to develop an examining system which finds the leak of LPG gas and protects the work places by taken correct precaution at correct time. This system provides the information such as when a gas leakage is noticed, sensors of in the project are used to notice the gas leakage and immediately turns ON the buzzer for the danger indication. Buzzer is a clear indication of gas leakage. By the detection of the hazardous gas the alerting message reached to the person who has control over it from the GSM. Detection of the gas leakage is important and halting leakage is important equally. The main objective of this project is that it is extremely accurate with a least cost, this project system is best to detect gas leakage and also warn people around by buzzer beep sound and an SMS is been send to the responsible person for preparatory safety calculations.

Methods and Material

System: Input, Output, Function, Success, Failure

Input: Sensor data signal which is not regular or Change in Signal

Output: End User get informed with alert buzzer and Display to LCD

Functions:

1. Access: - In this module we are going to access the feature provided by the module which Will include Sensor data access.
2. Control: -In this module we are controlling the Alert System by using System which is connected to hardware or sensor data.
3. Broadcast: -In this module we are going to broadcast the alert Display to LCD.
4. Success Conditions:

1. If such data which is received through sensors are not stable or are more than threshold it will predict that there is leakage situation

5. Failure Conditions: Desired output is not generated due to following failures.

1. Software Failure
2. Hardware Failure
3. Network Connection Failure

Proposed Method:

Figure represents the block diagram of the gas leakage detection and alerting system. Arduino UNO (Atmega-328) is the main unit of the system which performs the following tasks.

A signal conditioning of the Arduino UNO is done by output signal of the sensor, provided input to Arduino. The detection results displayed on LCD.

Indicates the people of danger in work place, factory, home. Buzzer activity with beep(siren) sound is made.

Also send alert SMS to the in charge of the plant whose number is saved in SIM card by using GSM modem. The SMS received depends upon the leak of gas in the detection area of the sensor.

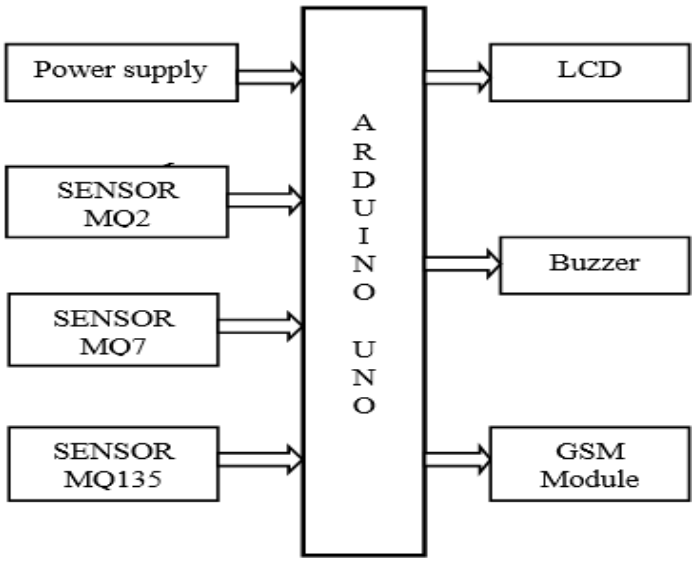

Figure A. Block Diagram of gas leakage detecting and alerting system

Hardware Information:

Arduino Uno:

Microcontroller Arduino UNO is employed is shown in fig.1. The central unit of the system is Arduino board, where all the components are interfaced externally on the board and programmed as per their functionality to work in synchronization. it's an electronic prototyping platform/ board supported Atmega-328 which is of 8-bit, 16 Mhz. during this serial communication is enabled and has 14 digital input /output pins (out of which 6 are PWM) and 6 analog input pins. It operates at 5v. every pin contains a specific function to control.

The storage is non-volatile storage and EEPROM. The key comparison of a non-volatile storage with the EEPROM is that the incontrovertible fact that non-volatile storage contents are erasable. In contrast to a EEPROM, the entire device is erased. where one can erase and judge on bases of Byte and section. The availability of the non-volatile memory during which the blocks of the contains are divided and therefore block by block the portion is erased, where an no erased option is provided for the EEPROM byte. thanks to the actual fact that the programming of the non-volatile storage performed while it's on the system board socket. BIOSROM of the PCB is the new upgrade which is immensely used.

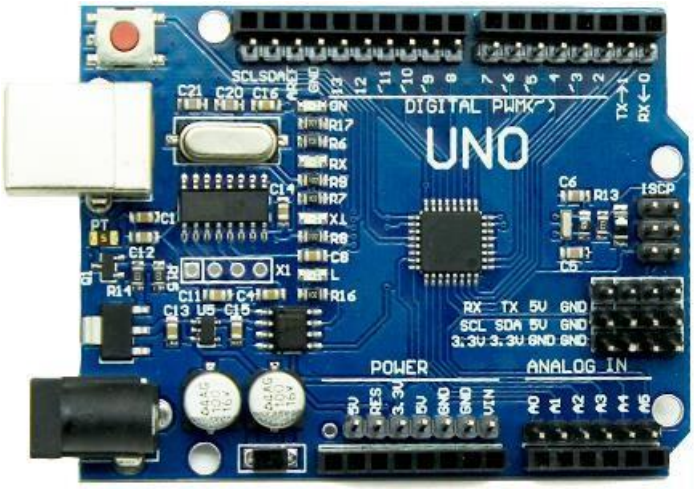

Figure 1 Arduino Uno

MQ2 Sensor:

MQ-2 gas sensor module is shown in fig.2. It is a sensor detector used to detects the flammable gas and smoke concentration of the combustible gas in the air, and output is read in the analog voltage and digital value output. Supply input voltage is 5v. it is very sensitive to H2, LPG, CH4, CO, SMOKE, PROPANE. It has three pins for transmitter, receiver, ground and sensitivity can be adjust by the potentiometer. Detects LPG from 200ppm to 10000ppm.

Figure 2 MQ-2 Gas sensor

LCD:

LCD is employed for displaying the message indicating that" gas detected at zone" into the display, which is initially coded in program to display the danger. The message been displayed on the LCD, data and command both are register of LCD and it's shown in fig.4. The register selects are employed to modify the registers. data register RS=1, whereas for the command register RS=0 is employed.

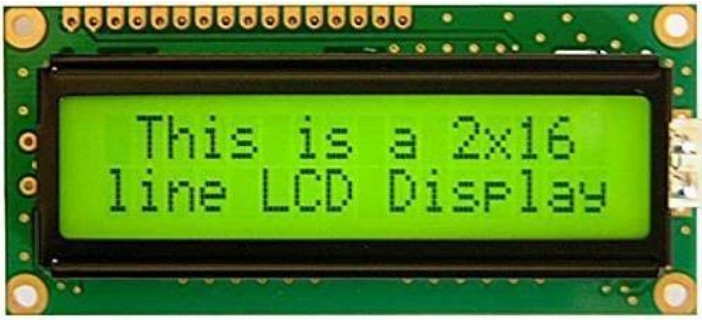

Figure 3 16x2 LCD display

Buzzer:

Buzzer is used to alarm the beep sound to indicate and warn the danger to the people working around. The buzzer is the output of the system. The sound of the buzzer is beep-beep, which indicates the danger.

Figure 4. Buzzer

LED:

LED (Light Emitting Diode) is an optoelectronic device which works on the principleof electro-luminance. Electro-luminance is the property of the material to convert electrical energy into light energy and later it radiates this light energy. In the same way, the semiconductor in LED emits light under the influence of electric field. The symbol of LED is formed by merging the symbol of P-N Junction diode and outwardarrows. These outward arrows symbolise the light radiated by the light emitting diode.

Figure 5. LED

GSM Module:

SIM900 GSM module is employed to send SMS alerting on gas detection. GSM is meant as a device used for exchanging the information. SIM card is recovered from the GSM to control the wireless node 5 volts of the DC supply is required by the GSM for functioning. The modem needs only three connections (transmitter, receiver, ground) to interface with Arduino controller Atmega-328 the excess power supply is used. Arduino microcontroller is connected with the receiver pin to the device. The Arduino provide information to the GSM device [2]. The GSM will send an output to through the SIM inserted into its SIM slot to number written into the code to alert about the leakage of the LPG gas or the other gas sensed by the sensor. AT commands are accustomed communicate with GSM module and it's shown in figure 6.

Figure 6. SIM900A Quad Band GSM/GPRS Module with RS232 Interface

Resistors:

A passive electrical component with two terminals that are used for either limiting orregulating the flow of electric current in electrical circuits.

Software Implementation:

Figure 7 shows the chart flow of implementation of the software proposed system. This system monitors the gas, smoke by sensor 1, sensor 2, sensor 3. If any gas is detected the signal of sensors goes low and activate the Arduino UNO. Which send signals to the LCD ("GAS DETECTED AT ZONE), where sensor 1 is for zone 1, sensor 2 for zone 2 and sensor 3 for zone 3 respectively, Buzzer and GSM to alert the people about danger and if no gas is detected then LCD displays "NO GAS DETECTED" in its 16x2 display.

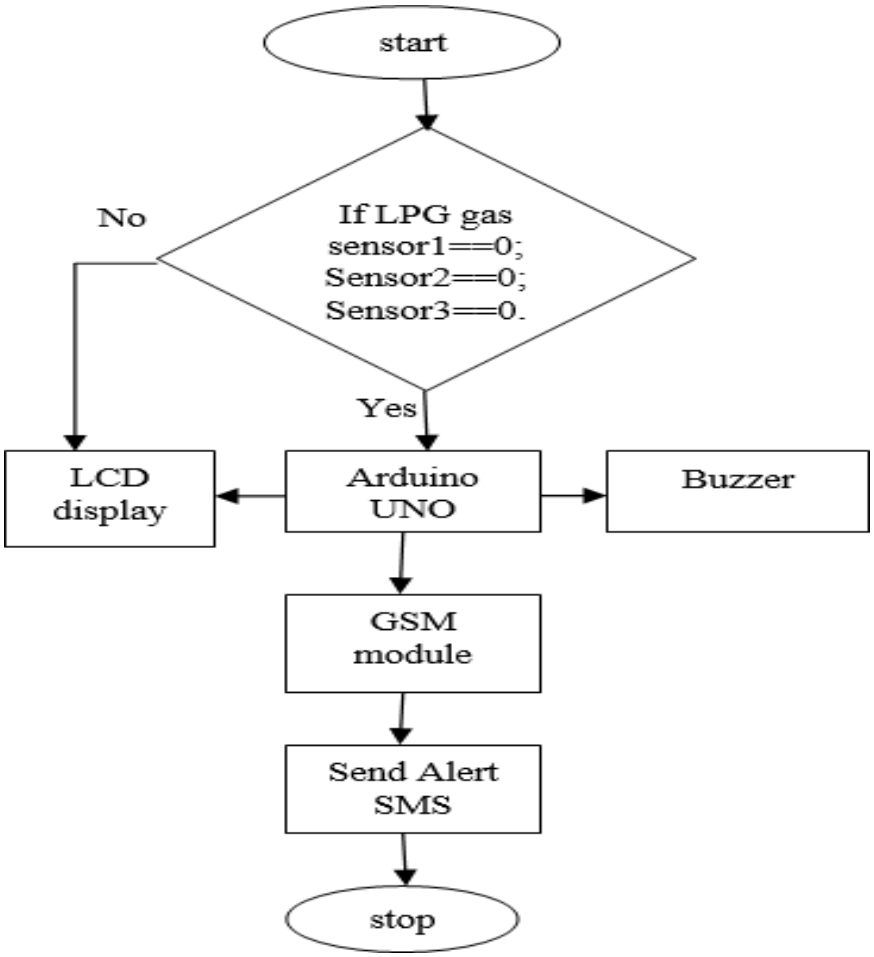

Figure 7 Flow Chart of Proposed System

Literature Survey:

S.NO	Paper Title	Author Name	Year	Result
1	Internet of Things (IOT) Based Gas Leakage Monitoring and AlertingSystem with MQ-2 Sensor	Rohan Chandra Pandey, ManishVerma, LumeshKumar Sahu	2017	This paper choice of using a real time gas leakage monitoring and Sensing the output levels of gas has been clearly observed by the help of this system.
2	Gas Leakage Detection and Smart Alerting and Prediction Using IoT	Asmita Varma, Prabhakar S, Kayalvizhi Jayavel	2017	The proposed gas leakage detector is promising in the Field of safety.
3	IOT Based Gas Leakage Detection System with Database Logging, Prediction and Smart Alerting	Chaitali Bagwe, Vidya Ghadi, Vinayshri Naik, Neha Kunte	2018	The system provides constant monitoring and detection of gas leakage along with storage of data in database for predictions and analysis. The IOT components used helps in making the system much more cost effective in comparison with traditional Gas detector systems.
4	Internet of Things (IoT) Based Gas Leakage Monitoring and Alerting System with Mq-6 Sensor	Rohan Chandra Pandey, Manish Verma, Lumesh Kumar Sahu, Saurabh Deshmukh	2018	A discussion on how the aims and objectives are met is presented. An overall conclusion IOT based toxic gas detector is it has become more efficient, more applicable to today's applications and smarter.
5	Gas Leakage Detection and Smart Alerting System Using IoT	Shital Imade, Priyanka Rajmanes, Aishwarya Gavali	2018	In this paper we use IOT technology for enhancing the existing safety standards. While making this prototype has been to bring a revolution in the field of safety against the leakage of harmful and toxic gases

Circuit Diagram:

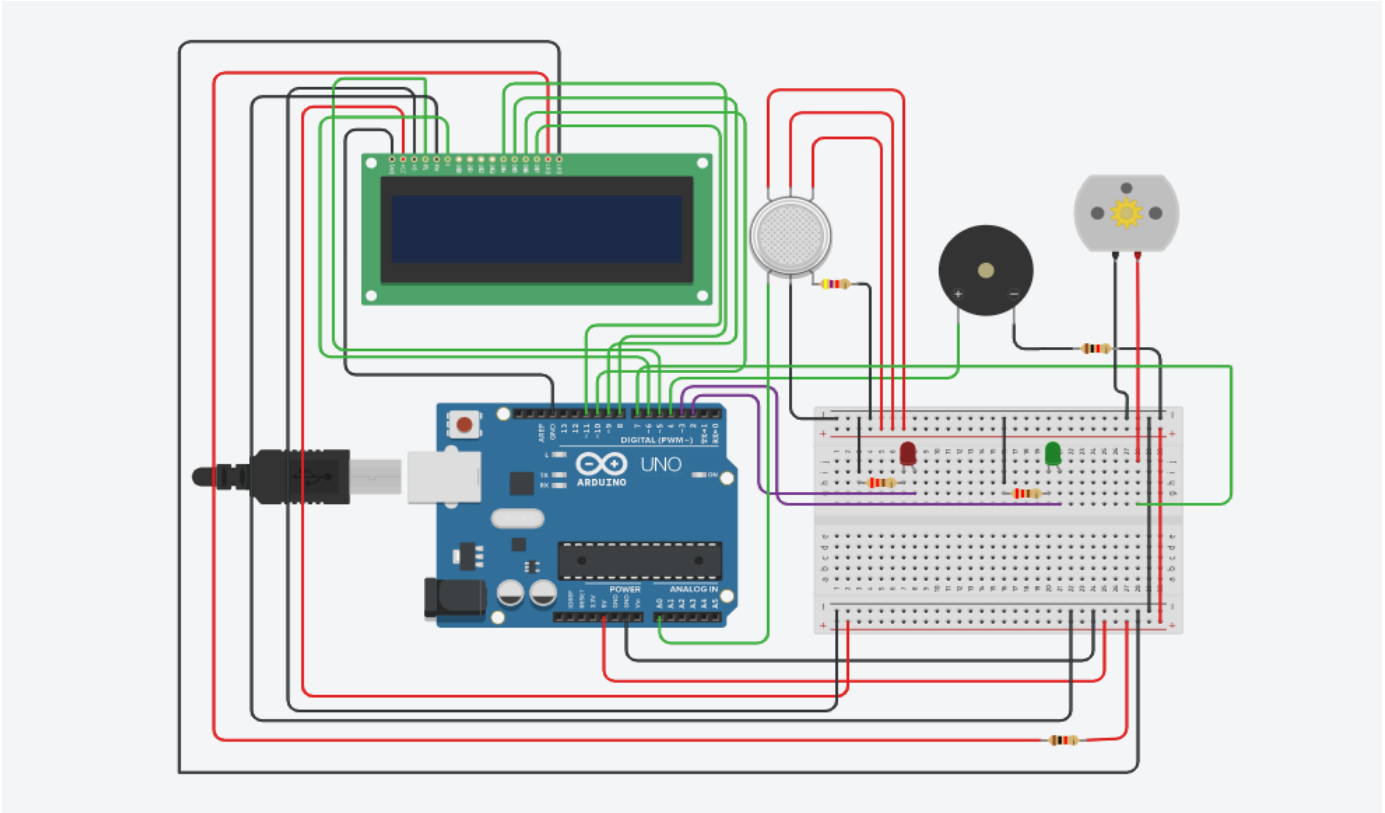

Figure 8 Schematic diagram of Proposed System

Results:

Figure 8 shows the schematic diagram of our project. This technique has been tested by leak of gas almost about sensors, MQ2 gas sensor sends the signal to the Arduino UNO after detecting the gas leakage. Arduino to other externally connected device such as LCD, buzzer and Motor send vigorous signals. In practice, results for are noticed by the people surrounding by the area are displayed in the LCD and buzzer sound indicate the danger to the people by making beep sound.

Conclusions:

After this project performance, can conclude that detection of the LPG gas leakage is incredible in the project system. Applicable usefully in the industrial and domestic purpose. In danger situations we are able to save the life by using this system. An alert is indicated by the GSM module. A sensor node senses gas like CO2, oxygen, propane. The estimated range of transmission and consumption of power is obtained. The simple procedures and Arduino UNO Micro controller area used to build the sensor.

References:

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