Gas Leakage Monitoring and Alerting System

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Abstract: -

In recent years, gas leaks have become a problem in many places, including homes, shops, cafes, and restaurants. This article proposes the development of a gas monitoring, leak detection, and warning system based on the Internet of Things. This article presents suggestions for such intelligent systems that can help conserve gas and intelligently prevent accidents. The system must be integrated into the oven. The technology includes an ultrasonic sensor that detects if the stove is being used for cooking. When the oven is not in use, the system shuts off the gas supply via an automatic shut-off mechanism. The moment a gas leak is detected, users will be notified via SMS via GSM, allowing users to fix the problem as quickly as possible. The system uses flame sensors to monitor flames and fires. An alarm sounds when a fire is detected. The system also has cloud storage. This cloud storage solution allows you to track each user's daily gas consumption. Ultimately, this procedure will help determine your natural gas consumption. The system has been tested and is capable of tracking gas losses and leaks and sending its own SMS to the user. The resulting performance has been shown to be effective in reducing a significant portion of the exhaust gases emitted by homes. In recent years, gas leaks have become a problem in a variety of places, including homes, shops, cafes, and restaurants. This article proposes the development of a gas monitoring, leak detection and warning system based on the Internet of Things. This article presents suggestions for such intelligent systems that can help conserve gas and intelligently prevent accidents. The system must be integrated into the oven. The technology includes an ultrasonic sensor that detects if the stove is being used for cooking. When the oven is not in use, the system shuts off the gas supply via an automatic shut-off mechanism. As soon as a gas leak is detected, users will be notified via SMS via GSM so that users can fix the problem as quickly as

possible. The system uses flame sensors to monitor flames and fires. An alarm sounds when a fire is detected. The system also has cloud storage. This cloud storage solution allows you to track each user's daily gas consumption. Ultimately, this procedure will help determine your natural gas consumption. The system has been tested and is capable of tracking gas losses and leaks and sending its own SMS to the user. The resulting performance has proven effective in reducing a significant portion of residential exhaust emissions.

Introduction: -

Now a days the home safety detection system plays the important role for the security of people. Since all the people from the home goes to work on a daily bases, it makes it impossible to check on the appliances available at home specially LPG gas cylinder, wired circuits, Etc. Since last three years there is a tremendous hike in the demands of liquefied petroleum gas (LPG) and natural gas. To meet this access amount of demand for energy and replace oil or coal due to their environmental disadvantage, LPG and natural gas are preferred. These gases are mostly used on a large scale in industry, as heating, home appliances and motor fuel. To monitor this gas leak, the system includes an MQ6 gas detector. This sensor detects the amount of leaking gas present in the surrounding atmosphere. In this way, the consequences of an explosion or gas leak can be avoided.

Objective: -

The design of a sensor-based automatic gas leakage detector with an alert and control system has been proposed.This is an affordable, less power using, lightweight, portable, safe, user friendly, efficient, multi featured and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department but it will also lead to raise our economy, because when gas leaks it not only contaminates the atmosphere, but also wastage of gases will hurt our economy. The need for ensuring safety in workplaces is expected to be the key driving force for the market over the coming years.

Problem Formulation: -

A gas leak is nothing more than a leak of gas molecules from a stove, pipeline, cylinder, etc. This can happen intentionally or unintentionally. Because we know that such leaks are dangerous to our health and, when exploded, can pose a great danger to people, homes, workplaces, industry, and the environment. Major gas leaks include the Bhopal disaster and the Vizag gas leak.

The Bhopal disaster is considered the largest industrial disaster in history. About 45 tonnes of methyl isocyanate leaked from this pesticide plant. Methyl isocyanate is an organic compound and chemical that can be obtained from carbamate pesticides. People should stay away from this colourless, poisonous, and flammable liquid. The Vizag gas leak was the result of a long-neglected styrene leak. This colourless, oily liquid can be vaporized.

Therefore, the detector must be built in such a way that it can detect all kinds of gases, smoke, leaks, smoke, etc. No matter how harmful or dangerous, there is a problem with the detector**.**

However harmful and dangerous it can be, the detector could be attached with certain parameters that could help to prevent the issue.

List of Components: -

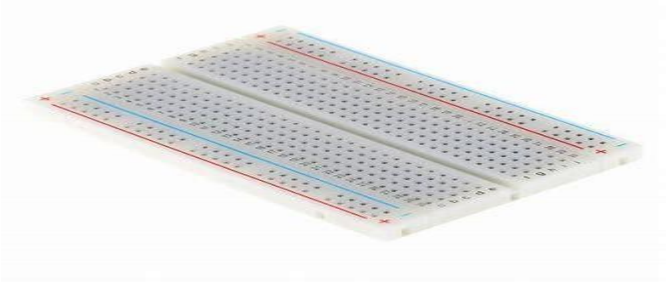
S. No.	Name of the Component	Quantity
1.	Arduino UNO R3	1
2.	Breadboard	1
3.	LED	2
4.	Resistor	5
5.	Piezo	1

6.	Gas Sensor	1
7.	LCD (16x2)	1

Arduino UNO R3:-

Arduino Uno R3 is one kind of ATmega328P based microcontroller board. It includes the whole thing required to hold up the microcontroller; just attach it to a PC with the help of a USB cable, and give the supply using AC-DC adapter or a battery to get started. The term Uno means “one” in the language of “Italian” and was selected for marking the release of Arduino’s IDE 1.0 software. The R3 Arduino Uno is the 3rd as well as most recent modification of the Arduino Uno. Arduino board and IDE software are the reference versions of Arduino and currently progressed to new releases. The Uno-board is the primary in a sequence of USB-Arduino Board, & the reference model designed for the Arduino platform.

Breadboard: -



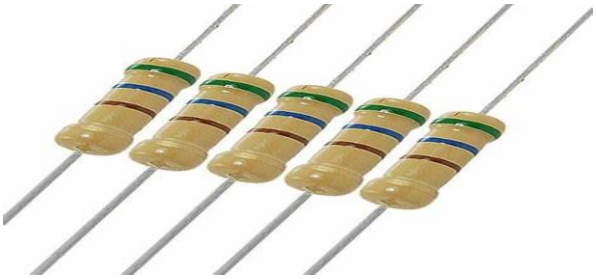
A breadboard is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a bread board. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. It consist of an array of conductive metal clips encased in a box made of white ABS plastic, where each clip is insulated with another clips. There are a number of holes on the plastic box, arranged in a particular fashion. A typical bread board layout consists of two types of region also called strips. Bus strips and socket strips. Bus strips are usually used to provide power supply to the circuit. It consists of two columns, one for power voltage and other for ground. Socket strips are used to hold most of the components in a circuit. Generally it consists of two sections each with

5 rows and 64 columns. Every column is electrically connected from inside.

LED: -

LED (Light Emitting Diode) is an optoelectronic device which works on the principle of 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 outward arrows. These outward arrows symbolise the light radiated by the light emitting diode.

Resistor: -



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

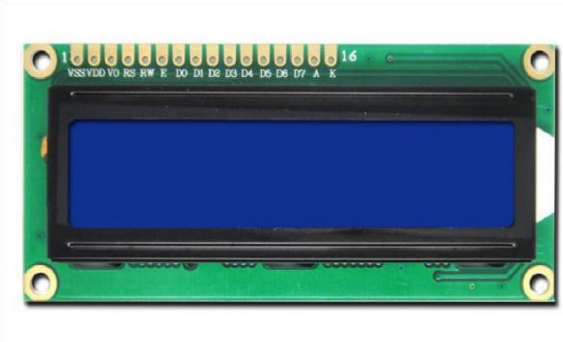
Piezo: -

A piezo is a device that generates a voltage when force is applied or becomes deformed when voltage is supplied.

Gas Sensor: -

A gas sensor is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated.

LCD: -

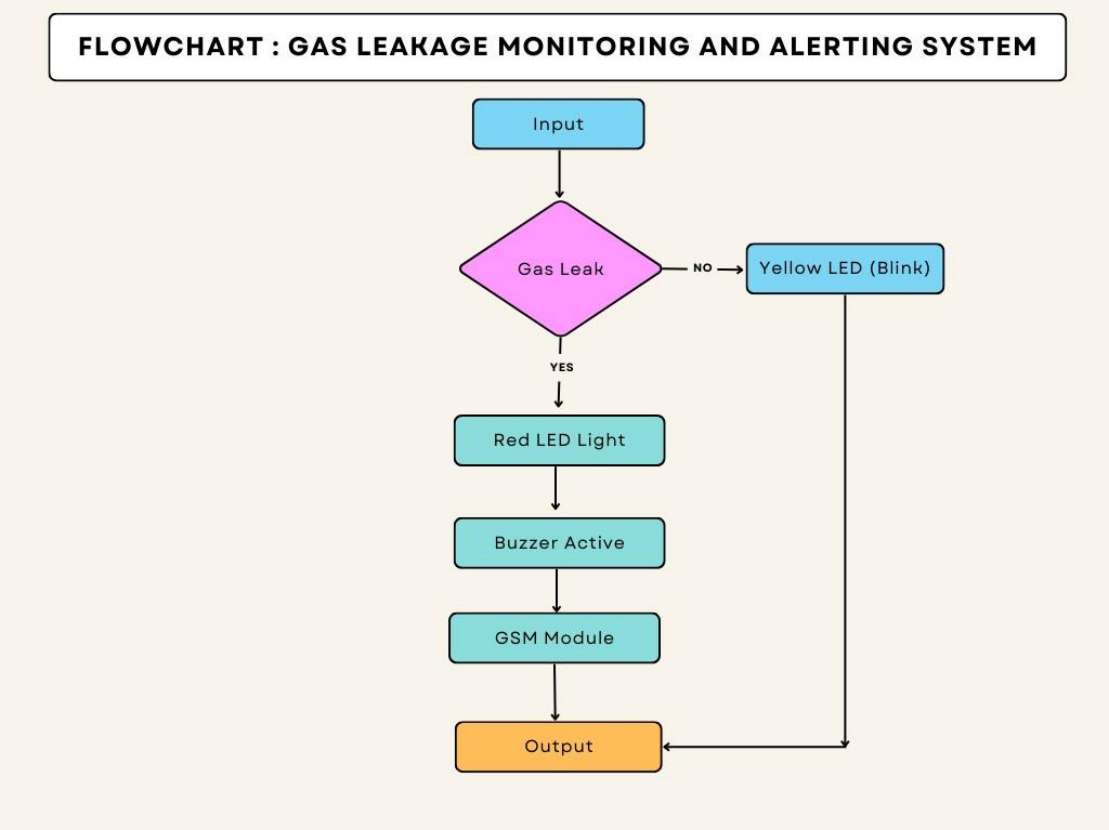


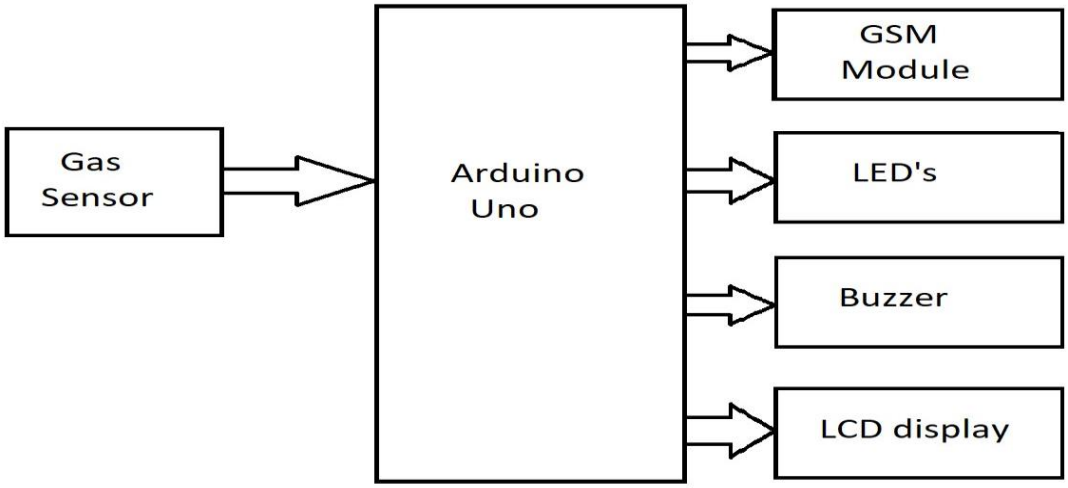
16×2 LCD is one kind of electronic device used to display the message and data. The term LCD full form is Liquid Crystal Display. The display is named 16×2 LCD because it has 16 Columns and 2 Rows. it can be displayed (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots. These displays are mainly based on multi-segment lightemitting diodes. There are a lot of combinations of

display available in the market like 8×1, 8×2, 10×2, 16×1, etc. but the 16×2 LCD is widely used. These LCD modules are low cost, and programmer-friendly, therefore, is used in various DIY circuits, devices, and embedded projects.

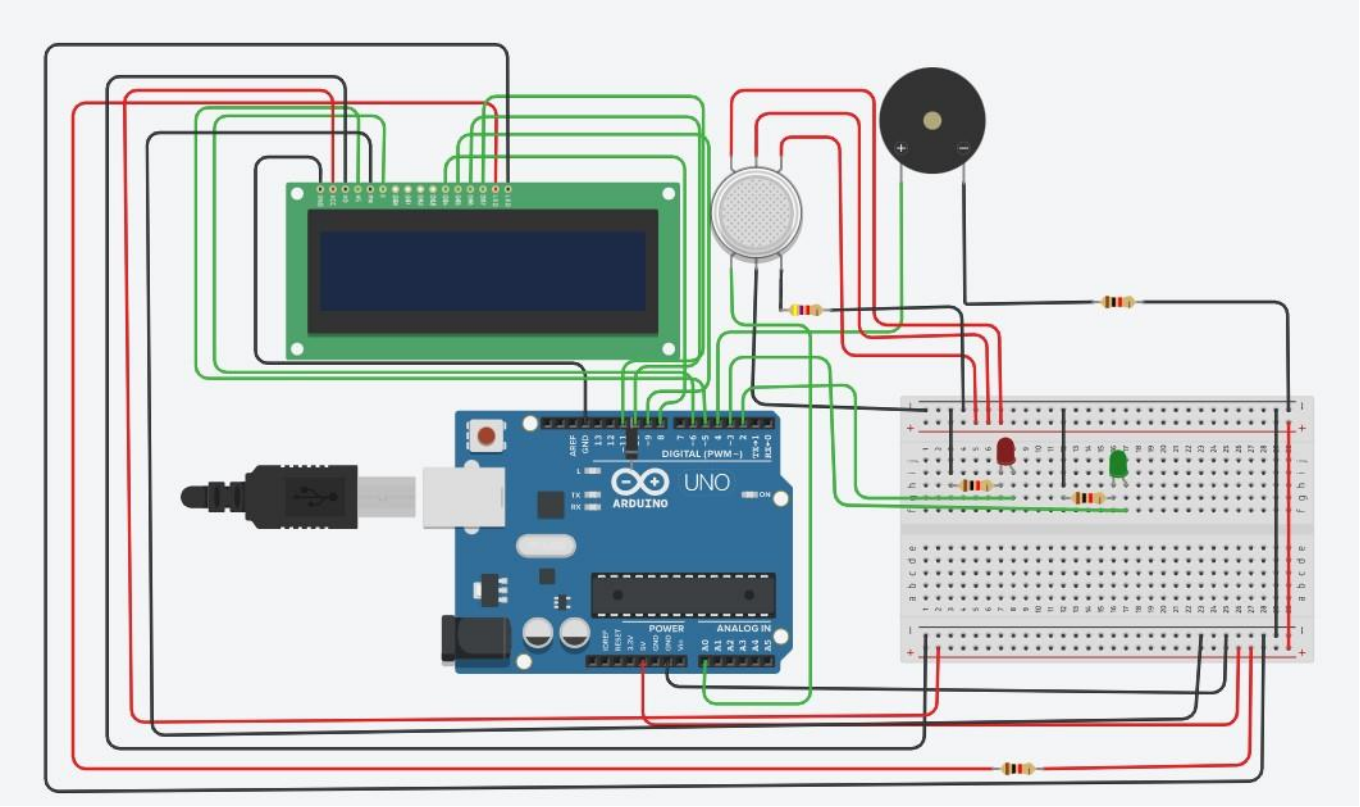
Proposed method: -

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.





Circuit Diagram: -



Solution Statement: -

The system can be taken as a small attempt in connecting the existing primary gas detection methods to a mobile platform integrated with IoT platforms. The gases are sensed in an area of 1m radius of the rover and the sensor output datas are continuously transferred to the local server. The accuracy of sensors are not upto the mark thus stray gases are also detected which creates an amount of error in the outputs of the sensors, especially in case of methane. Further the availability and storage of toxic gases like hydrogen sulphide also creates problems for testing the assembled hardware. As the system operates outside the pipeline, the complication of system maintenance and material selection of the system in case of corrosive gases is reduced. Thus the system at this stage can only be used as a primary indicator of leakage inside a plant.

Conclusion: -

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.