Gas Leakage Monitoring and Alerting System

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Abstract :-

Leakage of any kind of gas has been a concern in recent years, whether it is in a residential setting, a business, a cafe, or a canteen. In thispaper development ofan IoT based gas wastage monitoring, leakage detecting and alerting system is proposed. This paper elaborates design such an intelligent systemthat will help save gas and smartly prevent accidents. The system needs to be integrated with the cooker. The technology includes ultrasonic sensors that determine if the cooker is being utilizedfor cooking purposes or not. If it is discovered that the cookeris not in use, the system uses an automatic switching off mechanism to cutoff the gas supply. The moment gas leakage will probably be recognized, users will be informed via SMS through GSM, and so that user can solve the issue as soon aspossible. The system will monitor flame and fire through flame sensor. When a fire is detected, the buzzer begins to sound. Aside from that, the system also has a cloud storage capability. The usage of gasfor each user each day may be tracked with the aid of this cloud storage solution. At the end of the day, this procedure will assist in detecting per- user natural gas usage. The system has been tested and it is able to monitorgas wastage, leakageand send a SMS to the user. The resultingperformance indicated its effectiveness toward saving a significant portion of the wasted gas in domestic.

Introduction :-

Now a days the home safety detection system plays the importantrole for the security of people. Since all the people from the home goes to work on daily bases, it makes 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 thisaccess amount of demand for energy and replaceoil or coal due to their environmental disadvantage, LPG and natural gas are preferred. These gases are mostly used on large scale in industry, heating, home appliances and motor fuel. Soas to track this leakage gas, the system includes MQ6 gas sensor. This sensor senses the amount of leak gas present in the surrounding atmosphere. Through this,explosion or getting affectedby the leakage of gas could 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 featuredand simple system device for detecting gas. Gas leakagedetection will not only provideus 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 thekey driving force for the marketover the coming years.

Problem Formulation:-

Gas leakage is nothing but the leak of any gaseous molecule from a stove, ora pipeline, or cylinder etc. This can occur either purposefully or even unintendedly. As we are aware that these kinds of leaks are dangerous to our health, and when it becomes explosive it could cause great danger to the people, home, workplace, industry and the environment.

Few of the major incidents that took place due to gas leakage include the Bhopal Disaster and the Vizag Gas leak. The Bhopal disaster is known to be the worst industrial accident ever. Approximately 45 tons of Methyl Isocyanate was leaked from this insecticide plant. Methyl Isocyanate is anorganic compound and a chemical that could come from the carbamate pesticides. This colorless, poisonous and flammable liquid is something that human beings have tobe away from.

Vizag Gas leak was a resultant of the escape of styrene that were unattended for a long period. This colorless oily liquid can spread in fumes.So, a detector mustbe made in such a way that could detect any kind of gas, fume, leak, smoke etc. However harmful and dangerous it can be, the detector could be attached with certain parameters that couldhelp toprevent 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 16*2	1

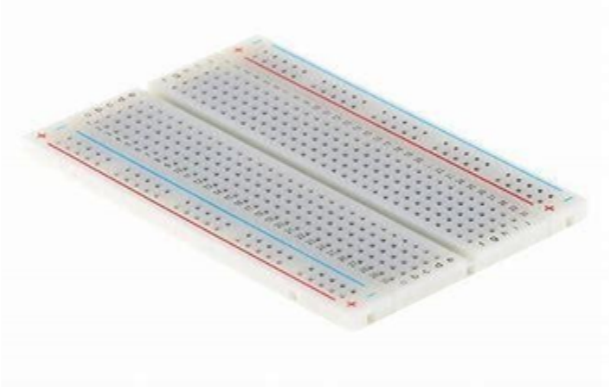
Arduino UNO R3 :-

Arduino Uno R3 is one kindof 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 selectedfor 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. Arduinoboard and IDE software are the referenceversions of Arduinoand currently progressed to newreleases.

The Uno-board is the primaryin a sequence of USB-Arduino Board, & the reference model designed for the Arduino platform.

Breadboard :-

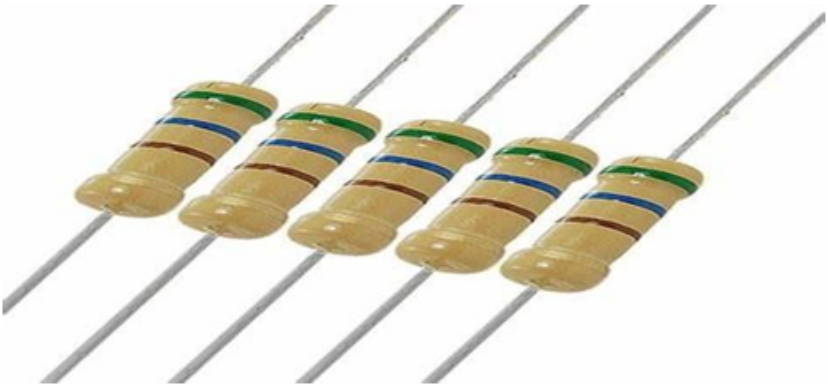


A breadboard is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a breadboard. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. It consist of an array of conductive metal clips encased in a boxmade of white ABS plastic, where each clipis 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 usedto 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 ofthe components in a circuit. Generally it consists of two sections each with5 rows and 64 columns. Every columnis electrically connectedfrom inside.

LED :-

LED (Light EmittingDiode) 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 lightemitting diode.

Resistor :-



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

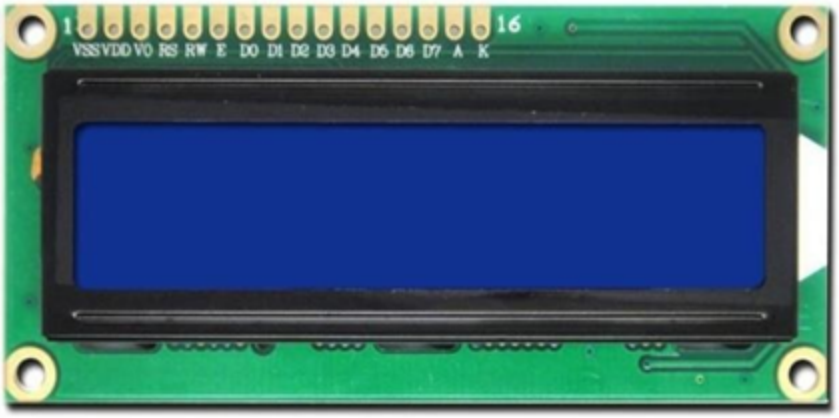
Piezo :-

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.

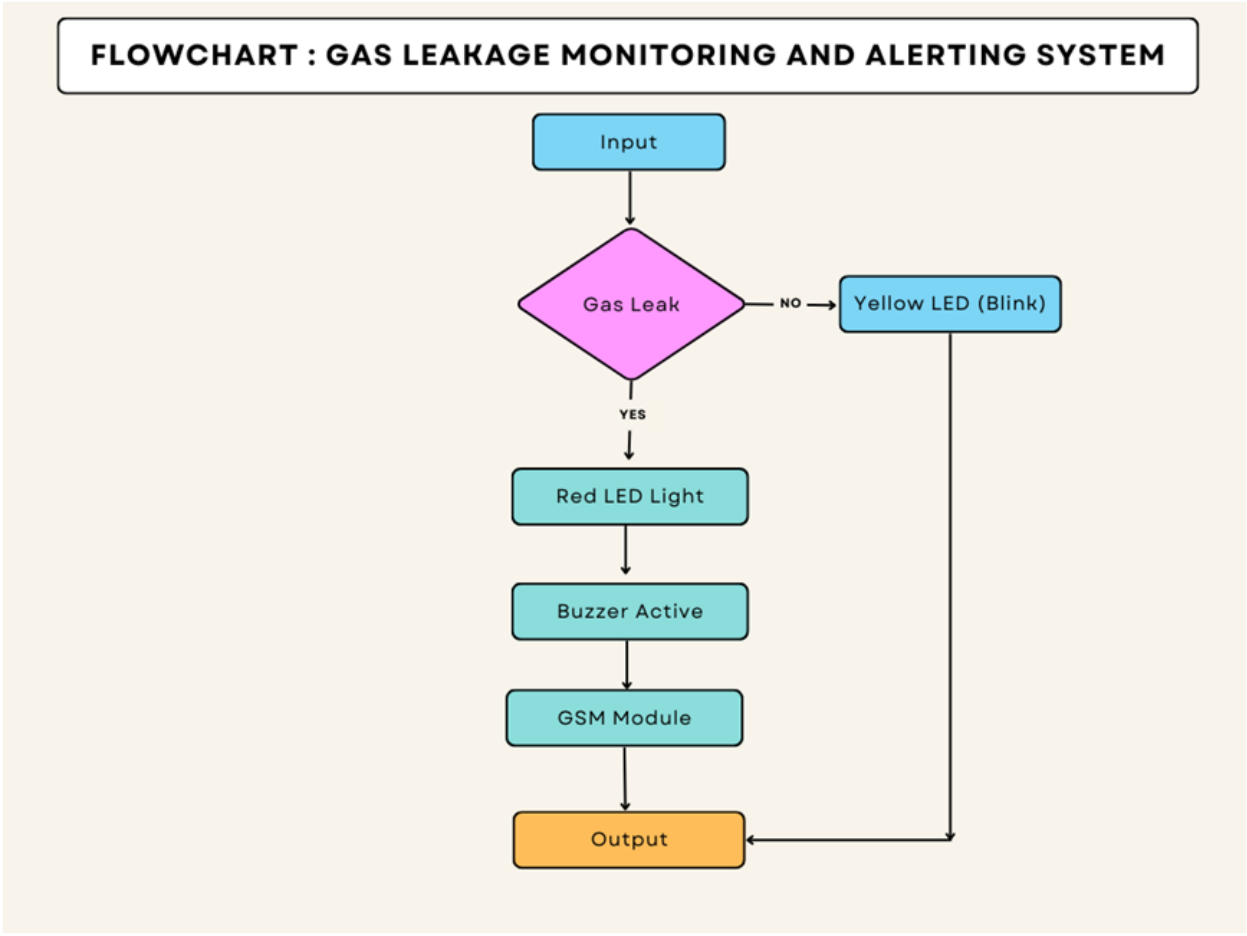
LCD 16*2 :-

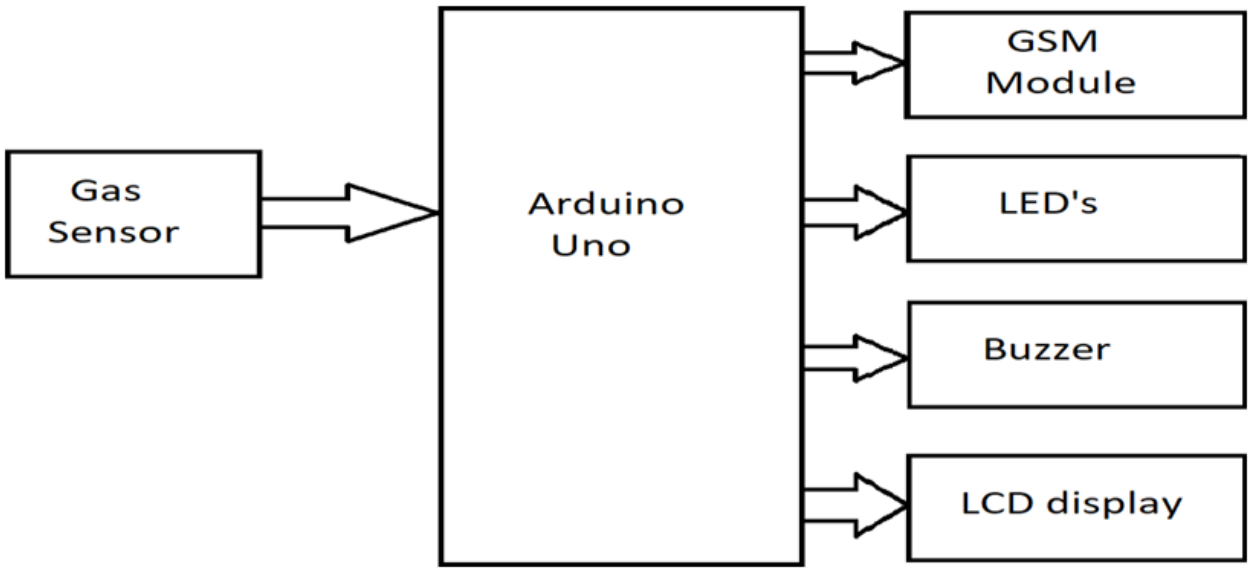


16×2LCD is one kind of electronic device used to display the message and data. The term LCD full form is Liquid Crystal Display. The display is named 16×2 LCD because it has 16 Columns and 2 Rows. it can be displayed(16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots. These displays are mainly based on multi-segment light- emitting 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 modulesare low cost, and programmer-friendly, therefore, is used in various DIY circuits, devices,and embedded projects.

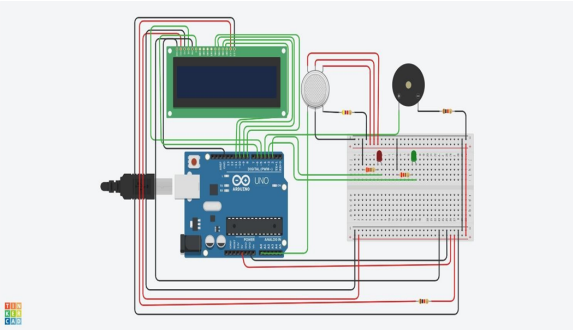
Proposed method :-

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 detectionarea of the sensor.


FLOWCHART : GAS LEAKAGE MONITORING AND ALERTING SYSTEM
Input
Gas Leak
NO
Yellow LED (Blink)
YES
Red LED Light
Buzzer Active
GSM Module
Output


Gas Sensor
Arduino Uno
GSM Module
LED's
Buzzer
LCD display

Circuit Diagram :



Solution Statement :-

The system can be taken as a small attemptin connecting the existingprimary 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 storageof toxic gases like hydrogen sulphide also creates problemsfor testing the assembled hardware. As the system operatesoutside the pipeline,the complication of system maintenance and material selection of the system in case ofcorrosive gases is reduced. Thus the system at this stage can only be used as a primaryindicator of leakageinside 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 sensesgas 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.