

REPORT

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Project Name	Gas Leakage monitoring and Alerting system

Abstract

Safety plays a major role in today's world, and it is essential that good safety systems are to be applied in places of education and work. This work modifies the existing safety model connected in industries and this system also be used in homes and offices. The foremost object of this work is to monitor gas leakage in any industries using gas sensor. The presence of hazardous LPG gas leakage in a domestic, workplace, 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 workplace 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 has 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 internet of Things is a developing topic of technical, social, and economic significance. 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 workplaces. The leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. Most of the societies have fire safety mechanism. But it can use after the fire exists. To have a control over such conditions we proposed system that uses sensors which can detect the gases such as LPG, CO₂, CO and CH₄. IoT technologies offer the possibility to transform agriculture, industry and energy production and distribution.

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

Gas leakage is nothing but the leak of any gaseous molecule from a stove, or a 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 an organic compound and a chemical that could come from the carbamate pesticides. This colorless, poisonous and flammable liquid is something that human beings have to be 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 must be 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 could help to prevent the issue.

List Of Components

S.NO	Name of the Component	Quantity
1.	Arduino UNO	1
2.	Breadboard	1
3.	LED	2
4.	Resistor	5
5.	Piezoelectricity	1
6.	Gas Sensor	1
7.	LCD 16*2	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

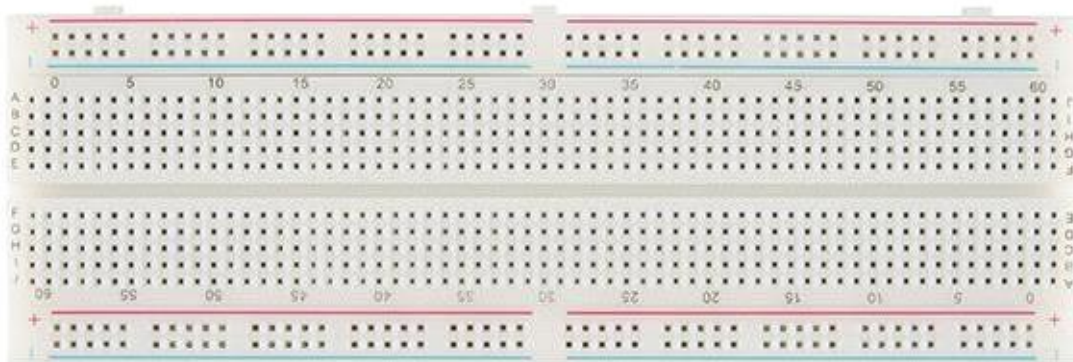


versions of Arduino and currently progressed to new releases. The Uno-board is the primary in a sequence of USB-Arduino Board, & the reference model designed for the Arduino platform.

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 consists of an array of conductive metal clips encased in a box made of white ABS plastic,

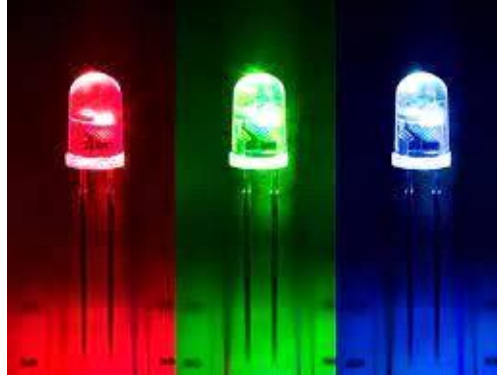
where each clip is insulated with another clips. There are several holes on the plastic box, arranged in a particular fashion.



A typical bread board layout consists of two types of regions 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.

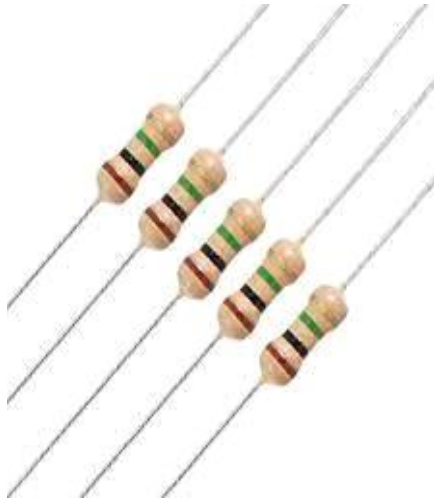
LED

Light Emitting Diode (LED) 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 symbolize the light radiated by the light emitting diode.

Resistor



A resistor is a passive two terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltage, bias active elements, and terminate transmission lines, among other uses.

Piezoelectricity



Piezoelectricity is the electric charge that accumulates in certain solid materials-such as crystals, certain ceramics, and biological matter such as bone, DNA, and various proteins-in responses to applied mechanical stress. The piezoelectricity means electricity resulting from pressure and latent heat.

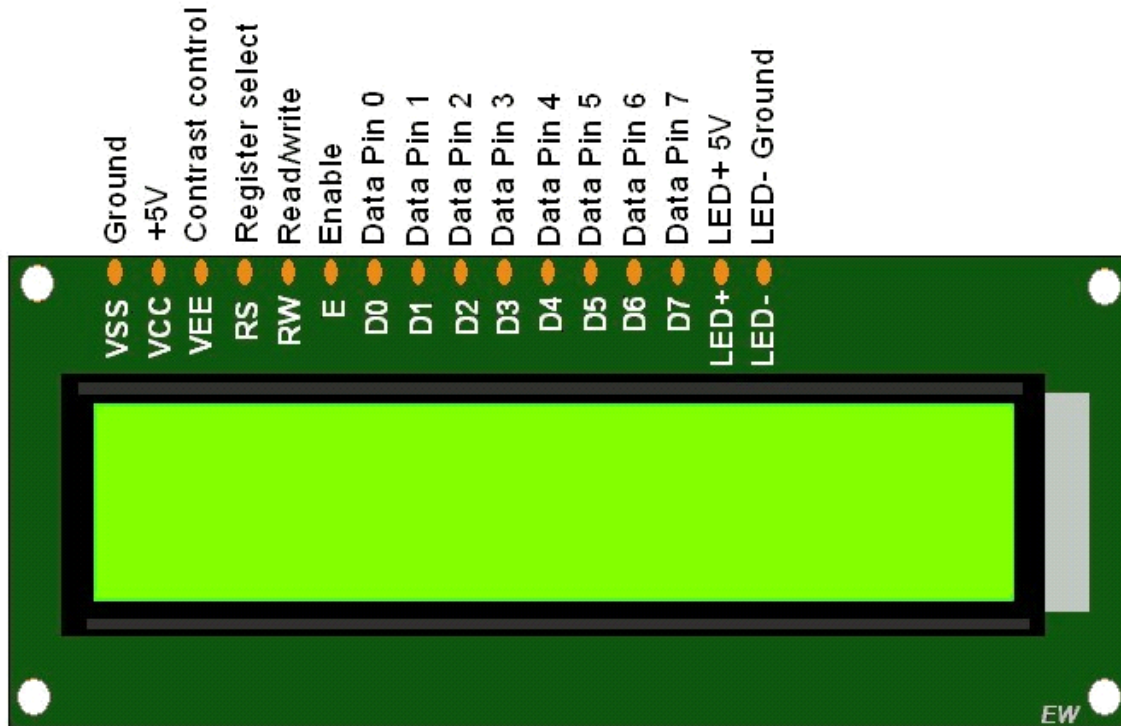
Gas Sensor



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

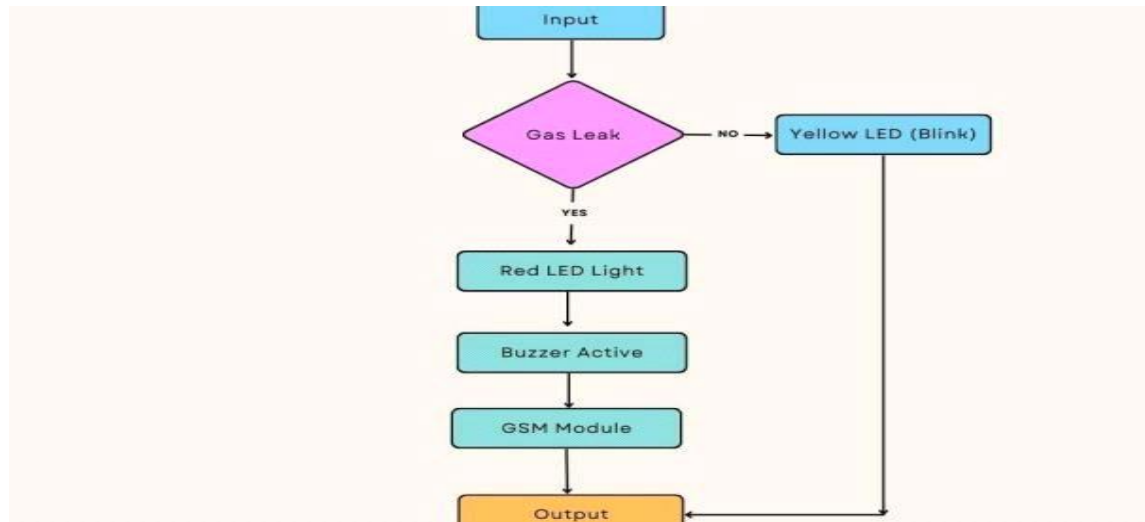
can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated

LCD 16*2

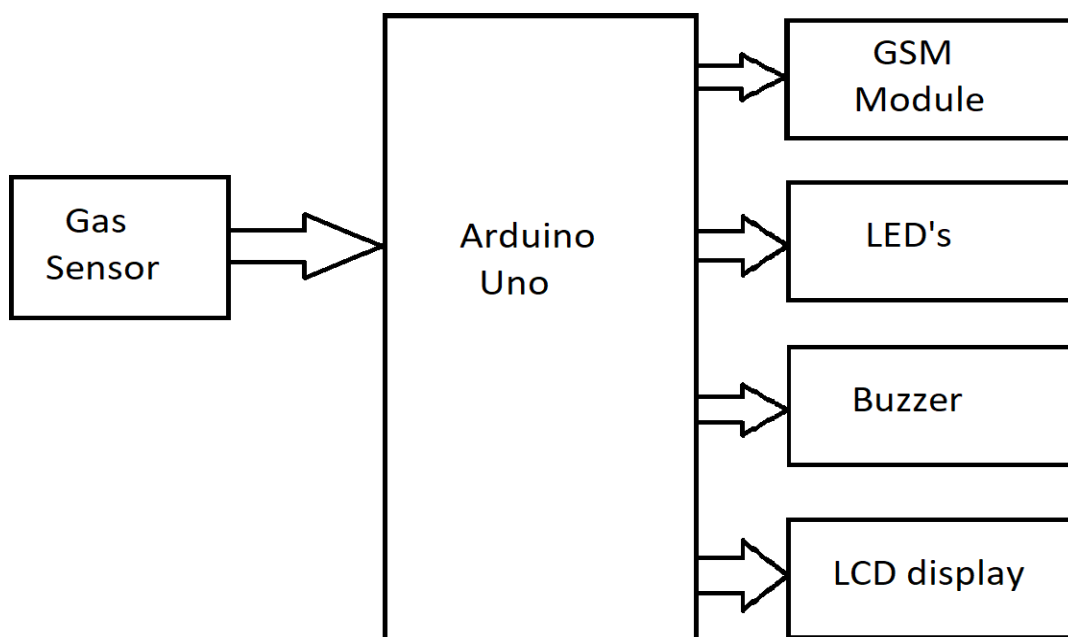


16×2 LCD is one kind of electronic device used to display the message and data. The term LCD full form is Liquid Crystal Display. The display is named 16×2 LCD because it has 16 Columns and 2 Rows. it can be displayed (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots.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

Proposed method

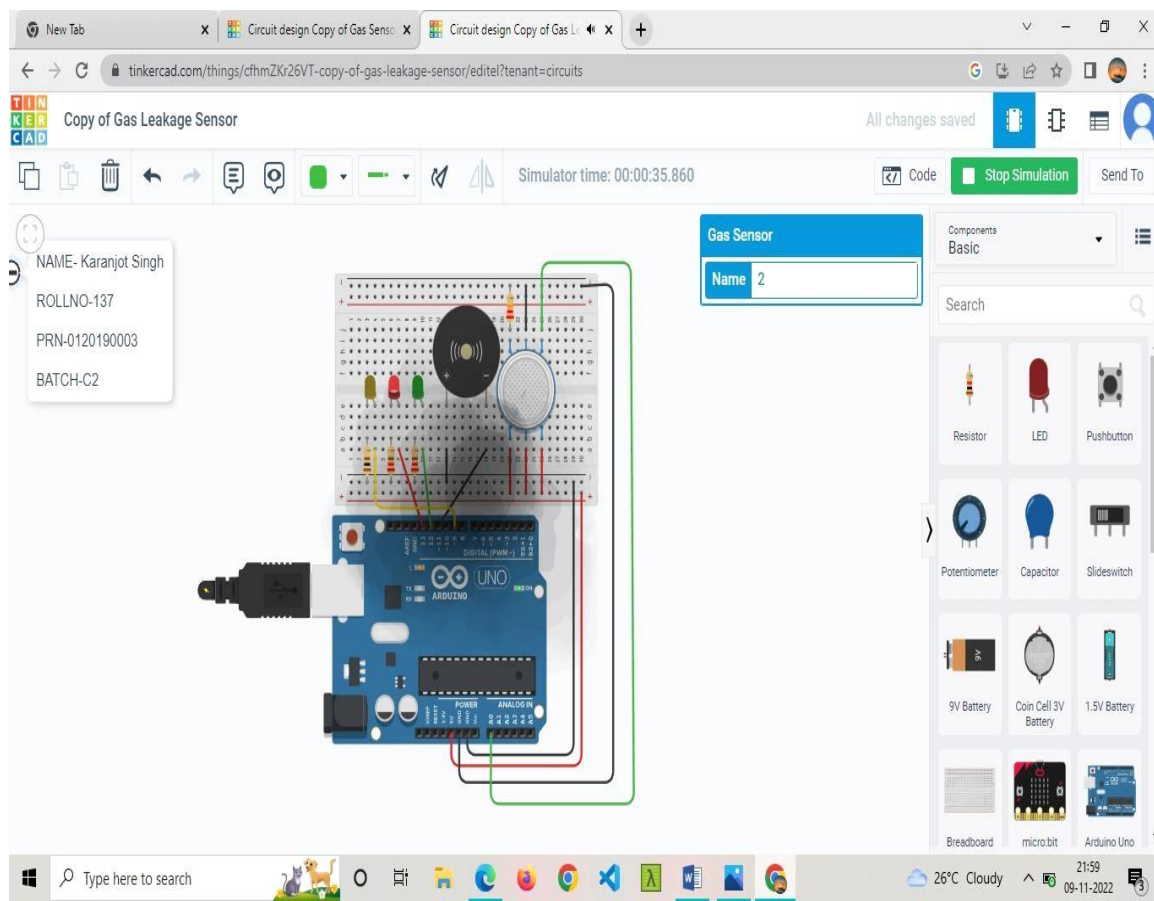


We design and develop a proposed system which include some safety factors. A safety has been a major issue in today's day to day life. LPG and CNG. Petroleum gas and compressed natural gas are most used in residential and commercial places may catch fire and short circuit as well.



The main aim of this project is developing a system that can detect gas leakage. On detection it will send a for cooking purpose and in various vehicles as a replacement for costly fuels like diesel, petrol. These gases are filled in cylinders which are easily un-damageable. But leakage can take place through pipes or regulators or knobs which may cause accidents like suffocation, uneasiness or sometimes alert though buzzer and through SMS and the gas supply knob of cylinder will be switched off automatically.

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 data are continuously transferred to the local server. The accuracy of sensors is not up to 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.