

GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

Team ID : PNT2022TMID51764

EBIN SEBASTIAN

JOB ALEX

BAVIN KUMAR B

SUBHASH S

ABSTRACT

The Internet of things (IoT) is the system of gadgets, vehicles, and home machines that contain hardware, programming, actuators, and network which enables these things to interface, collaborate and trade information. IoT includes broadening Internet network past standard device, for example, work areas, workstations, cell phones and tablets, to any scope of generally stupid or non-web empowered physical device and ordinary articles. Installed with innovation, these gadgets can convey and connect over the Internet, and they can be remotely observed and controlled. The meaning of the Internet of things because of union of numerous innovations, ongoing examination, AI, wearables, sensors, and implanted frameworks. Conventional fields of installed frameworks, remote sensor systems, control frameworks computerization (counting home and building mechanization), and others all add to empowering the Internet of things. 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.

INTRODUCTION

The Internet of Things is a developing theme of specialized, social, and monetary centrality. Customer items, tough goods, cars and trucks, modern and utility segments, sensors, and other regular articles are being joined with Internet availability and amazing information systematic capacities that guarantee to change the manner in which we work, live, and play. Projections for the effect of IoT on the Internet and economy are amazing, with some foreseeing upwards of 100 billion associated IoT gadgets and a worldwide financial effect of more than \$11 trillion by 2025. The Internet of Things (IoT) is an essential theme in innovation industry, strategy, and designing circles . This innovation is encapsulated in a wide range of arranged items, frameworks, and sensors, which exploit headways in processing power, gadgets scaling down, and organize interconnections to offer new capacities. The expansive scale usage of IoT gadgets guarantees to change numerous parts of the manner in which we live. For shoppers, new IoT items like Internet empowered machines, home mechanization parts, and vitality the executive's gadgets are pushing us toward a dream of the "savvy home", offering greater security and vitality effectiveness. IoT frameworks like arranged vehicles, savvy traffic frameworks, and sensors implanted in streets and scaffolds draw us nearer to "brilliant urban areas", which help limit clog and vitality utilization. IoT innovation offers the likelihood to change horticulture, industry, and vitality creation and dissemination by expanding the accessibility of data along the esteem chain of generation utilizing arranged sensors.

HARDWARE INFORMATION

Name	Quantity	Component
Arduino uno	1	Arduino Uno R3
U1	1	LCD 16 x 2
GAS1	1	Gas Sensor
M1, M2, M3, M4	4	DC Motor
R1, R2	2	1 k Ω Resistor
Rpot1	1	250 k Ω Potentiometer
PIEZO1	1	Piezo
D1	1	Red LED
D2	1	Green LED

1.Arduino UNO



The Arduino Uno is an open source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards(shields) and other circuits.¹ The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE Integrated Development Environment), via a type B USB cable It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board

comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

2. BUZZER



A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. The first electric buzzer was invented in 1831 by Joseph Henry. They were mainly used in early doorbells until they were phased out in the early 1930s in favor of musical chimes, which had a softer tone. Piezoelectric buzzers, or piezo buzzers, as they are sometimes called, were invented by Japanese manufacturers and fitted into a wide array of products during the 1970s to 1980s. This advancement mainly came about because of cooperative efforts by Japanese manufacturing companies. In 1951, they established the Barium Titanate Application Research Committee, which allowed the companies to be "competitively cooperative" and bring about several piezoelectric innovations and inventions.

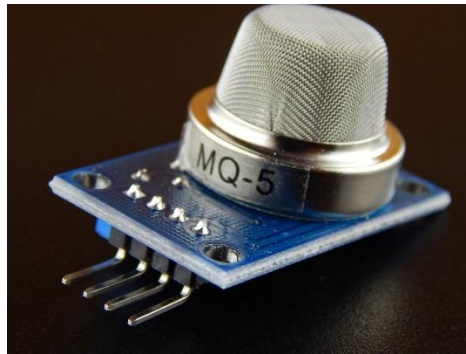
3.LCD Display



A **liquid-crystal display (LCD)** is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are

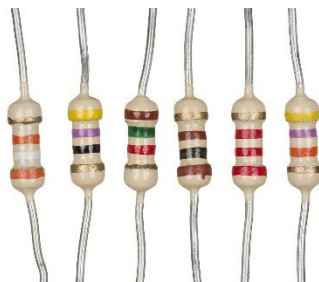
available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden. For instance: preset words, digits, and seven-segment displays, as in a digital clock, are all good examples of devices with these displays. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.

4. 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.

5. Resistor



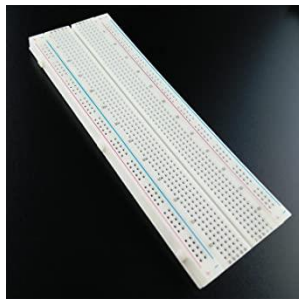
A passive electrical component with two terminals that are used for either limiting or regulating the flow of electric current in electrical circuits.

6.LED



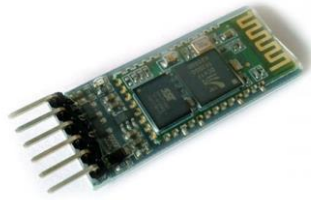
LED (Light Emitting Diode) is an optoelectronic device which works on the principle of electro-luminance. Electro-luminance is the property of the material to convert electrical energy into light energy and later it radiates this light energy. In the same way, the semiconductor in LED emits light under 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.

7.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.

8.Bluetooth Module



Bluetooth is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances and building personal area networks (PANs). It employs UHF radio waves in the ISM bands, from 2.402 GHz to 2.48 GHz. It is mainly used as an alternative to wire connections, to exchange files between nearby portable devices and connect cell phones and music players with wireless headphones. In the most widely used mode, transmission power is limited to 2.5 milliwatts, giving it a very short range of up to 10 metres (33 ft).

Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 35,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE standardized Bluetooth as **IEEE 802.15.1**, but no longer maintains the standard. The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks. A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device.[[] A network of patents apply to the technology, which are licensed to individual qualifying devices. As of 2009, Bluetooth integrated circuit chips ship approximately 920 million units annually.[[] By 2017, there were 3.6 billion Bluetooth devices being shipped annually and the shipments were expected to continue increasing at about 12% a year. In 2021, shipments reached 4.7 billion units, with 9% growth forecast.

PROPOSED SYSTEM

We design and develop an propose system which include some safety factors. A safety has been a major issue today's day to day life. LPG is a petroleum gas are the most commonly used in residential and commercial places. For industrial plants it has been used fuels like petrol, diesel. These gases are filled in cylinders which are easily un-damageable. But leakage can takeplace through pipes or regulators or knobs which may cause accidents like suffocation, uneasiness or sometimes 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 an alert SMS and the gas supply knob of cylinder will be switched off automatically.

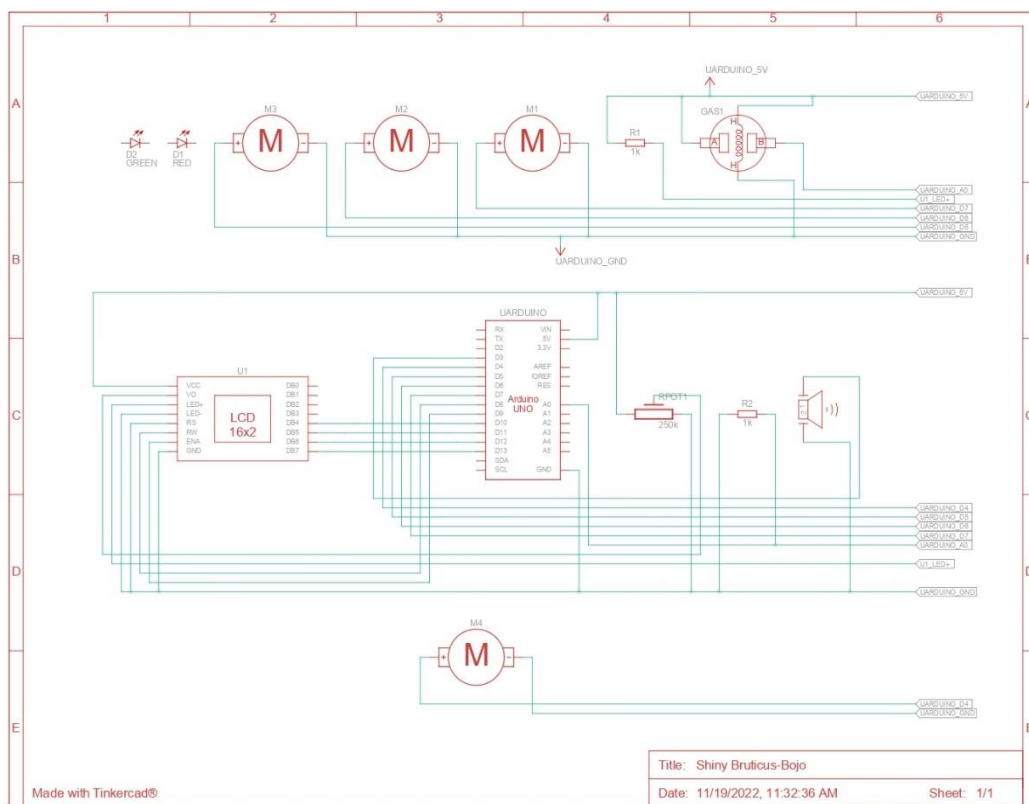
The system can be taken as a small attempt in connecting the existing primary gas detection methods to a mobile platform integrated with IoT platforms. The gases are sensed in an area of 1m radius of the rover and the sensor output datas are continuously transferred to the local server. The accuracy 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.

Method:

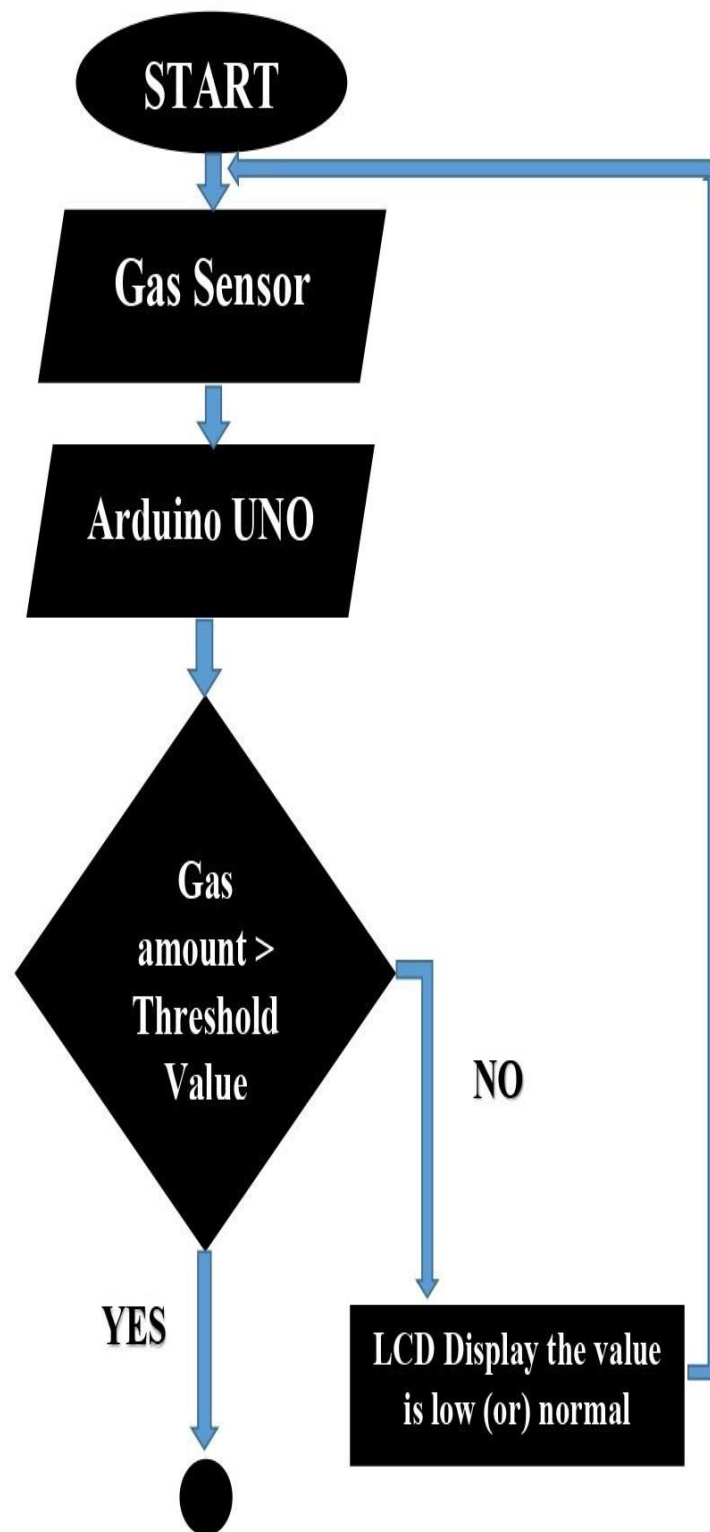
Arduino UNO (Atmega-328) is the main unit of the system which performs the following tasks. A signal conditioning of the Arduino UNO is done by output signal of the sensor, provided input to Arduino. The detection results displayed on LCD. Indicates the people of danger in work place, factory, home. 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.

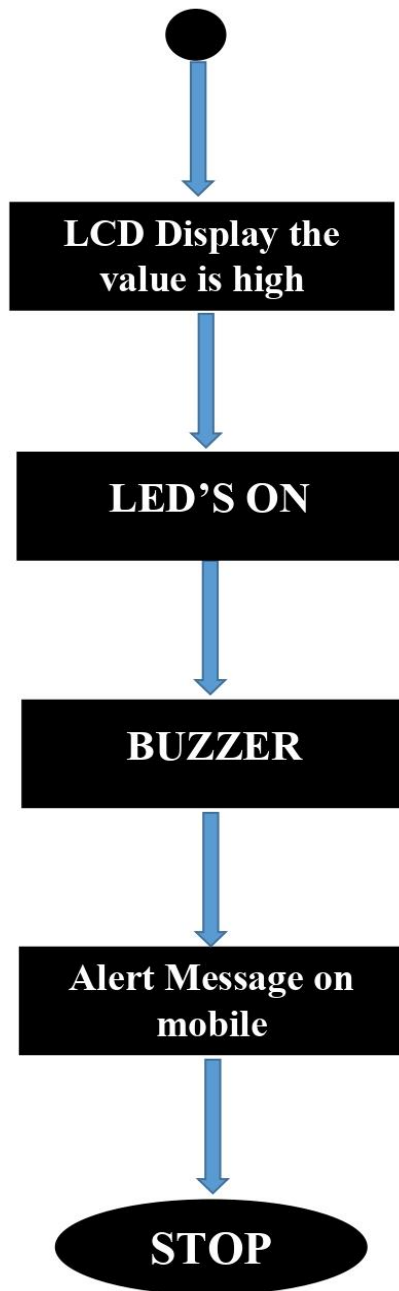
The diagram illustrates a digital circuit project. An Arduino Uno microcontroller is connected to an LCD display, a motor, a buzzer, and four LEDs. The circuit is implemented on a breadboard with various components like resistors and jumper wires. The connections are as follows:

- Arduino Uno:** The microcontroller is connected to the LCD display, the motor, the buzzer, and the four LEDs.
- LCD Display:** The display is connected to the Arduino Uno via a ribbon cable.
- Motor:** The motor is connected to the Arduino Uno via a motor driver module.
- Buzzer:** The buzzer is connected to the Arduino Uno via a transistor.
- LEDs:** Four LEDs are connected to the Arduino Uno via current-limiting resistors.



FLOWCHART





FINAL CODE

```
#include <LiquidCrystal.h>
```

```
LiquidCrystal lcd(5,6,8,9,10,11);
```

```
int redled = 2;
```

```
int greenled = 3;
```

```
int buzzer = 4;
```

```
int sensor = A0;
```

```
int sensorThresh = 400;
```

```
void setup()
```

```
{
```

```
pinMode(redled, OUTPUT);
```

```
pinMode(greenled,OUTPUT);
```

```
pinMode(buzzer,OUTPUT);
```

```
pinMode(sensor,INPUT);
```

```
Serial.begin(9600);
```

```
lcd.begin(16,2);
```

```
}
```

```
void loop()
```

```
{
```

```
int analogValue = analogRead(sensor);
```

```
Serial.print(analogValue);
```

```
if(analogValue>sensorThresh)
```

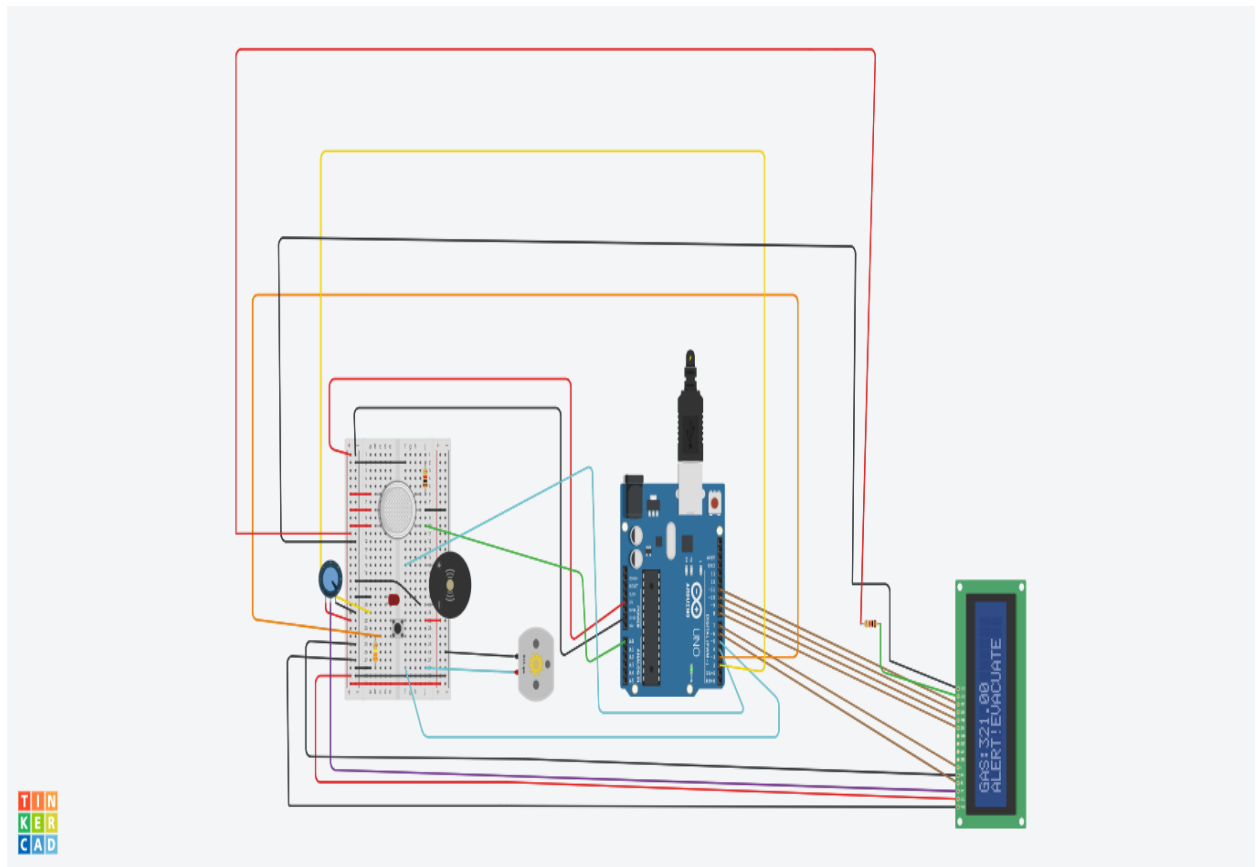
```
{
```

```
digitalWrite(redled,HIGH);
```

```
digitalWrite(greenled,LOW);
```

```
tone(buzzer,1000,10000);  
lcd.clear();  
lcd.setCursor(0,1);  
lcd.print("ALERT");  
delay(1000);  
lcd.clear();  
lcd.setCursor(0,1);  
lcd.print("EVACUATE");  
delay(1000);  
}  
else  
{  
digitalWrite(greenled,HIGH);  
digitalWrite(redled,LOW);  
noTone(buzzer);  
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print("SAFE");  
delay(1000);  
lcd.clear();  
lcd.setCursor(0,1);  
lcd.print("ALL CLEAR");  
delay(1000);  
}  
}
```

FINAL OUTPUT



CONCLUSION

An advantage of this simple gas leak detector is its simplicity and its ability to warn about the leakage of the LPG gas. This system uses GSM technique to send alert message to respective person if no one is there in the house and then gas leaks occurs, GSM module is there to send immediate messages to the respective person regarding the gas leak. The main advantage of this system is that it off the regulator knob of the cylinder automatically when gas leakage detected. It can conclude that detection of the LPG gas leakage is incredible in the project system. Applicable usefully in the industrial and domestic purpose.
