GAS LEVEL DETECTION DEVICE FOR SEWAGE LINES

SATYAVRAT TRIPATHI[1], VIJAY KUMAR[2]

[1]*Student, Mechanical Engineering, ABES Institute of Technology, Ghaziabad*
[2]*Assistant Professor, Department of Mechanical Engineering, ABES institute of Technology, Ghaziabad*

---***---

Abstract - [1]There is an issue in India with workers dying while cleaning sewage lines. It occurs as a result of the accumulation of hazardous gases in sewage lines. "In India, 10 out of 100 cleaners either die or have an issue related to respiratory due to inhaling these dangerous chemicals during their working hours," according to a TOI study.

We create a gas measuring device that shows the level of these gases in the sewage system. It also has a buzzer and a red and green signal, which implies that if the signal is red, workers should not enter the sewage line, and if the signal is green, workers can enter the sewage line and clean it.

Keywords:- Sewage line, Toxic gases, Buzzer,LCD,LED lights, Gas Sensor

1. INTRODUCTION

[2]Toxic gases such as hydrogen sulphide and methane abound in sewage lines. Inhaling these gases for an extended period of time can cause major health problems. As a result of these gases, the fatality rate of sewage workers has increased in recent years, owing to the fact that most countries' drainage systems are still cleaned manually. It is critical that our drainage system functions effectively in order to maintain our surroundings clean, healthy, and safe.

[3]Explosions, fires, and asphyxia are caused by physical qualities like as toxicity and flammability. In recent years, the frequency of deaths and injuries caused by gas explosions or the leakage of hazardous gas cylinders has increased. Accidents caused by gas leakage have occurred before, such as the Bhopal gas tragedy.

[4]The system was built using a gas sensor and a microprocessor, and when tested, it provided appropriate visual information, as well as an audio and timely alert, when detecting a gas leak and the presence of dangerous gases in sewage lines.

[5]Gas leaks cause a variety of accidents, resulting in both financial and human losses. The environment has the greatest impact on people's health difficulties in their daily lives. Leakage, explosion, and suffocation from hazardous gases all have negative effects on human health.

[6]The Gas Leak Detector device has uses in sewage pipelines, as well as in households for LPG gas leak detection, and even in enterprises where LPG gas is used for several or different reasons.

[7]Pipeline leaks, regardless of their magnitude, are a huge worry since they can have significant consequences. These consequences, which can include human injuries as well as environmental disasters, surpass the costs of downtime and repair. External interference, corrosion, construction flaws, material failure, and ground movement are the most common causes of gas pipeline accidents. Because the conductivity of this sensor is proportional to the gas concentration, it can detect both dangerous gas and smoke.

[8]To avoid risking human life, the method is inexpensive and simple to apply in chemical industry and residential areas near chemical facilities.

[9]The Health Consequences In high concentrations, this toxic gas can irritate the skin and cause asphyxia. Because hydrocarbons produce unusually extended sleep, the leaking has serious health consequences. It also makes the respiratory tract, nose, and eyes inflamed..

In this research, we suggest a low-cost system for monitoring the state of these dangerous gases and alerting personnel in the event of a potential danger. A gas sensor determines the concentration of each gas and sends a warning through a buzzer and LED lights in the proposed system. When the buzzer is tuning, there is also an LCD display that says "ALERT."

If the buzzer does not tune, the LCD will display "SAFE." The major goal of this study is to limit the number of workers who die as a result of poisonous gases. These findings could be very useful for city governments in detecting trouble regions and adopting preventative steps. When there are harmful gases in the sewage pipe line, this mechanism sends out an alert.

An USB-powered gas leakage detection system is exhibited, and it provides early warning signals in less severe scenarios and activates a high-pitched alert in emergency situations to protect people.

This is an effective approach for detecting and controlling gas leaks automatically.

2. METHOD AND MATERIALS

We create a gas sensing device that detects the presence of these chemicals in the sewage stream. It also contains a red and green signal, which implies that if the signal is red, the worker should not enter the sewage line; if the signal is green, the worker should enter the sewage line and clean it. A buzzer was also utilized. The buzzer begins to tune when the sensor detects gas in the atmosphere, indicating the presence of dangerous gases in the sewage line. When tuning the buzzer, there is also an LCD display that shows "alerts." The LCD will display "SAFE" if the buzzer does not tune.

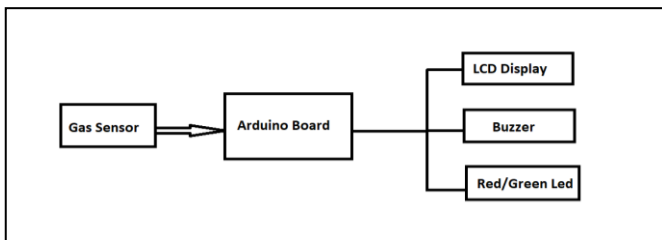For the design of a sensor-based gas Gas Level Detection Device the following hardware components are required.

Fig.1. Block Diagram

The device is portable, light weight, user friendly and efficient with multi-functional features.

3. Proposed Model

[10]Methane, Hydrogen Sulphide, Carbon Di Oxide, and Ammonia are the four major gases found in large quantities in sewage pipes, with Hydrogen Sulphide being the most dangerous. We installed four different types of gas sensors to detect and sense the quantity of these pollutants in the sewage line.

[11]These sensors are connected to an Arduino Uno board with a green and red LED. If the gas level is below the danger limit, the green LED will light up; otherwise, the red LED will remain dark.
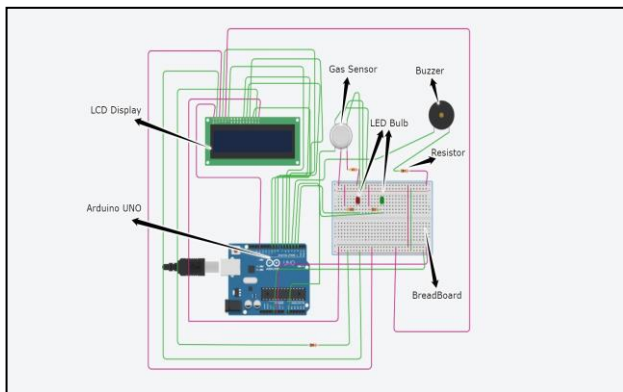

Fig.2.Circuit Diagram

4. Components Used

[12]**Arduino:-** Arduino is an open-source platform that is used to create electronic creations. Arduino is made up of a hardware programmable circuit board (commonly referred to as a Micro controller) and software (called an IDE) that runs on your computer and is used to create and upload computer code to the physical board.

Gas Sensor :-.A device that detects the presence or concentration of gases in the atmosphere is known as a gas sensor. The sensor produces a corresponding potential difference based on the gas concentration by changing the resistance of the material inside the sensor, which may be detected as output voltage. The type and concentration of the gas can be calculated using this voltage value.

Breadboard:-A breadboard is a device that is used to create temporary circuits for testing or prototyping. It is used to connect electronic components such as transistors, resistors, and chips.

Resistor:- A Resistor is an electric component that is used to create the resistance in the flow of electric current.

LCD Display:- An LCD (Liquid Crystal Display) is an electrical display module that produces a visible image using liquid crystal.

Buzzer:- A buzzer is a mechanical, electromechanical, or Piezoelectric device that emits an audible signal. When the sensor detects gas in the atmosphere in this project, the buzzer begins to tune, indicating the presence of dangerous gases in the sewage line.

Led Bulb:- Small, powerful led lights are employed in a variety of applications. We utilise a red and green signal, which means that if the signal is red, the worker should not enter the sewage line; if the signal is green, the worker may enter the sewage line and clean it..
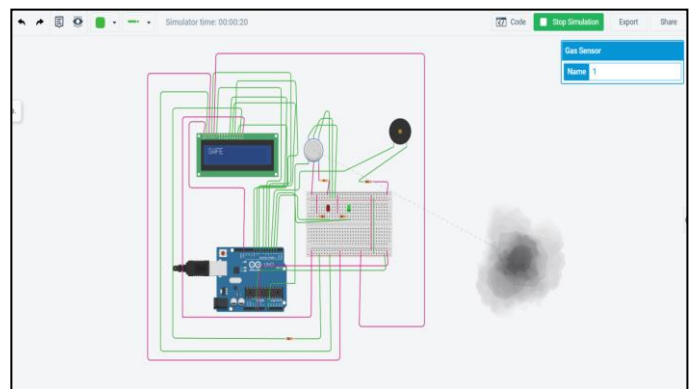
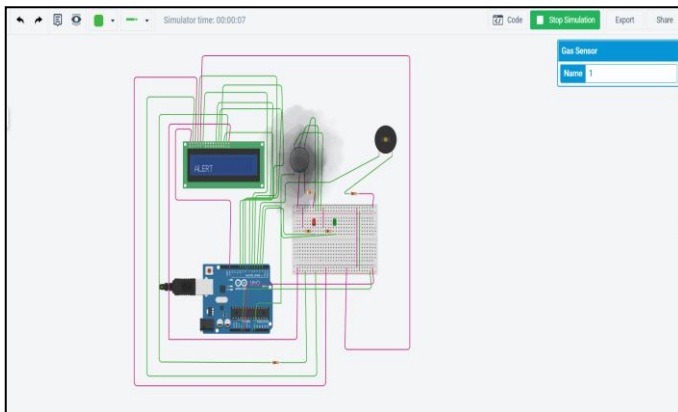### 4.1. Simulation and Result

Fig. 3(a)

Fig. 3(b)

In the above simulation Image it is clearly shown that when the harmful gas is far away from the sensor then the LCD display shows SAFE as an output and the green light is on. But as soon as gas goes near the sensor , the LCD display gives ALERT as an output ,then the red lights turn on and Buzzer starts buzzing.

5. CODE

https://drive.google.com/file/d/1cL6Q0IayWFJck3CXxVkNLlZY4MJ1ARz_/view?usp=sharing

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(5,6,7,8,9,10);


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);

  }

   }
```

6. FUTURE WORK

This system can be improved further by attaching it to mobile robots in order to obtain the gaseous concentration of any site, or by attaching it to drones to give it more capabilities. To obtain more data, we can combine the pressure and temperature sensors with the gas sensors.

7. CONCLUSIONS

This system offers several advantages, including low cost, ease of use, a wide range of applications, component availability, efficiency, compatibility, portability, and durability. The building is constructed in such a way that it is both user-friendly and repairable. The gas sensors should be identified, as well as the critical level of the individual gas, so that the system can send an alert if the concentration of toxic gases exceeds particular thresholds. When toxic gases are detected in a sewage pipe line or any other enclosed space, this system notifies all people who work in these regions. In terms of response time and awareness, this one outperforms the preceding one. This is a gas detection system that is low-cost, low-power, lightweight, portable, safe, user-friendly, efficient, multi-featured, and easy. Gas leak detection will not only benefit us in the health department, but it will also benefit our economy, because gas leaks not only pollute the atmosphere, but they also waste gas, which is bad for our economy.

This endeavour is critical for our society's workers who deal with this hazardous gas on a daily basis. It's also critical in the huge gas business, where it can go a long way towards preventing tragedy.

REFERENCES

1. Mohammad Monirujjaman Khan Department of Electrical and Computer Engineering, North South University , Bashundhara, Dhaka1229, Bangladesh; monirujjaman.khan@northsouth.edu; Tel.: +880-1779006296

2. Falohun A.S., Oke A.O., Abolaji B.M. "Dangerous Gas Detection using an Integrated Circuit and MQ-9" in International Journal of Computer Applications (0975 – 8887) Volume 135 – No.7, February 2016

3. Fraiwan, L.; Lweesy, K.; Bani-Salma, A.Mani, N, "A wireless home safety gas leakage detection system", Proc. of 1st Middle East, Conference on Biomedical Engineering, pp.11-14, 2011

4. Soundarya, T.; Anchitaalagammai, J.V.; Priya, G.D.; Karthickkumar, S.S. C-Leakage: Cylinder LPG Gas Leakage Detection for Home Safety. IOSR J. Electron. Commun. Eng. 2014, 9, 53–58.

5. V.Ramya, B. Palaniappan "Embedded system for Hazardous Gas detection and Alerting" International Journal of Distributed and Parallel Systems (IJDPS) Vol.3, No.3, May 2012

6. Pal-Stefan Murvaya, Ioan Sileaa. A survey on gas leakdetection and localization techniques

7. A REVIEW ON MICROCONTROLLER BASED LPG GAS LEAKAGE DETECTIO & CONTROLLING SYSTEM USING IOT & GSM MODULE Vasudev Yadav1 Akhilesh Shukla2, Sofiya Bandra1, Vipin Kumar1,Ubais Ansari1, Suraj Khanna U.G. Scholar, Associate Professor2 , Deptt. of E&C Engineering, MIT Moradabad, Ram Ganga Vihar, Phase-II, Moradabad (244001), India

8. Soundarya T., Anchitaalagammai J.V, Deepa P., and Karthick Kumar S.S. (2014) -leakage: Cylinder LPG Gas leakage Detection for home safety. IOSR Journal of Electronics and Communication (IOSR-JECE).

9. Ramya V. and Palaniappan B. (2012) Embedded system for Hazardous gas detection and alerting. International Journal of Distributed and parallel systems (IJDPA).

10. Efficient Gas Leakage Detection and Control System using GSM Module A. Anurupa[1], M.Gunasekaran[2], M. Amsaveni[3] Students[1] [2] ,Assistant Professor[3] Department of Electronics and Communication Engineering RVS College of Engineering and Technology Coimbatore-641 402, Tamilnadu, India.

11. Mahalingam, A.; Naayagi, R.T.; Mastorakis, N.E. Design and implementation of an economic gas leakage detector. In Recent Researches in Applications of Electrical and Computer Engineering; 2012; pp. 20–24.

12. Attia, H.A.; Halah, Y.A. Electronic Design of Liquefied Petroleum Gas Leakage Monitoring, Alarm, and Protection System Based on Discrete Components. Int. J. Appl. Eng. Res. 2016, 11, 9721–9726.

BIOGRAPHIES

Student Of Mechanical Engineering from ABES institute of technology

Assistant Professor in Department
of Mechanical Engineering.