GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

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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. Gas leakages results in a serious problem in households and other areas where household gas is used, therefore the proposed gas leakage detection and monitoring system is developed.The system will monitor flame and fire through a gas sensor.When a fire is detected, the piezoelectric alarm begins to sound.The system has been tested and it is able to monitor gas wastage, leakage and notify the user.

Keywords: LPG, Sensor, Internet of things, Arduino.

INTRODUCTION

As the population of our world is increasing day by day, simultaneously industrial and technological development are also rapidly increasing.In specific to the gas industry,homes,place of business and the various other industries using gas, there can be chances for various accidents occuring during the working but gas leakage is a high threat.Leakage of gas can cause a high hazard or a major explosion.

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So this proposed system is designed to overcome and prevent most of the issues that arise during those kinds of situations. The purpose of the proposed system is to monitor gas leakage and send alerts regarding the gas leakage to the respective person. For the implementation of the proposed system we use IOT. The components are interfaced with the Arduino.The intimation is carried through LCD,Led,buzzer and message. Buzzer provides an audible indication of LPG volume. The essence of propane, isobutane, LPG, and even smoke can all be detected with the sensors. Exhaust fan , LCD, gas sensor, wifi module, and arduino are the main components used.

LITERATURE REVIEW

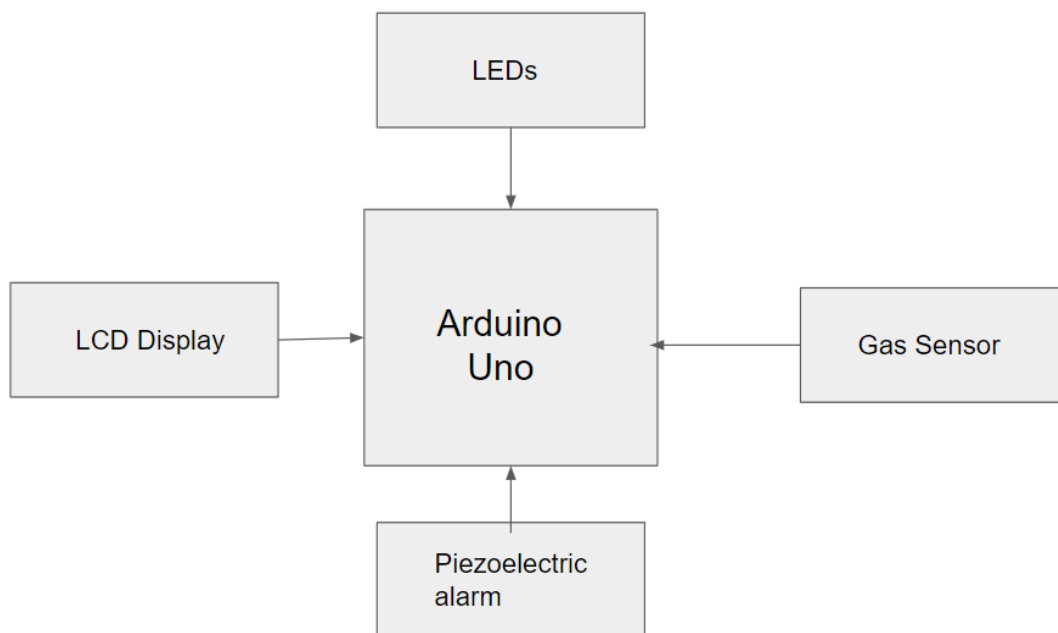| Paper	Author	Description
Gas Leakage Detection Based on IOT	V Suma; Ramya R Shekar; Kumar A Akshay	Detection of gas leakage and alert user through SMS Notification
Gas Leakage Detection System using IoT with integrated notifications using Pushbullet-A Review	M Athish Subramanian; Naveen Selvam; S. Rajkumar	Gas leakage detection system using MQ5 gas sensor and arduino uno controller is incorporated with a cloud storage for data collection and also used for storing and analyzing data
IoT Based Smart Gas Management System	Sony Shrestha; V. P. Krishna Anne; R. Chaitanya	IOT based Smart Gas Management System that will be able to detect gas leakage and fire and notify user for leakage, fire and low gas level

PROBLEM STATEMENT

Gas leakage prompts different mishaps coming about into both monetary misfortune as well as human wounds. In human's everyday existence, the environment gives the main effect on their medical problems. The risk of firing, explosion, suffocation all depend on their actual properties such as combustibility, harmfulness and so on. The number of deaths because of The blast of gas cylinders has been expanding as of late. The justification behind such explosions is because sub standard cylinders, old valves, worn out regulators and absence of mindfulness utilizing gas cylinders add to the dangers. Inspections by oil organizations observed that numerous LPG buyers know nothing about security checks of gas cylinders. Another explanation is that unlawful filling of gas chambers additionally causes mishaps. There is a requirement for a framework to identify and furthermore forestall leakage of LPG.
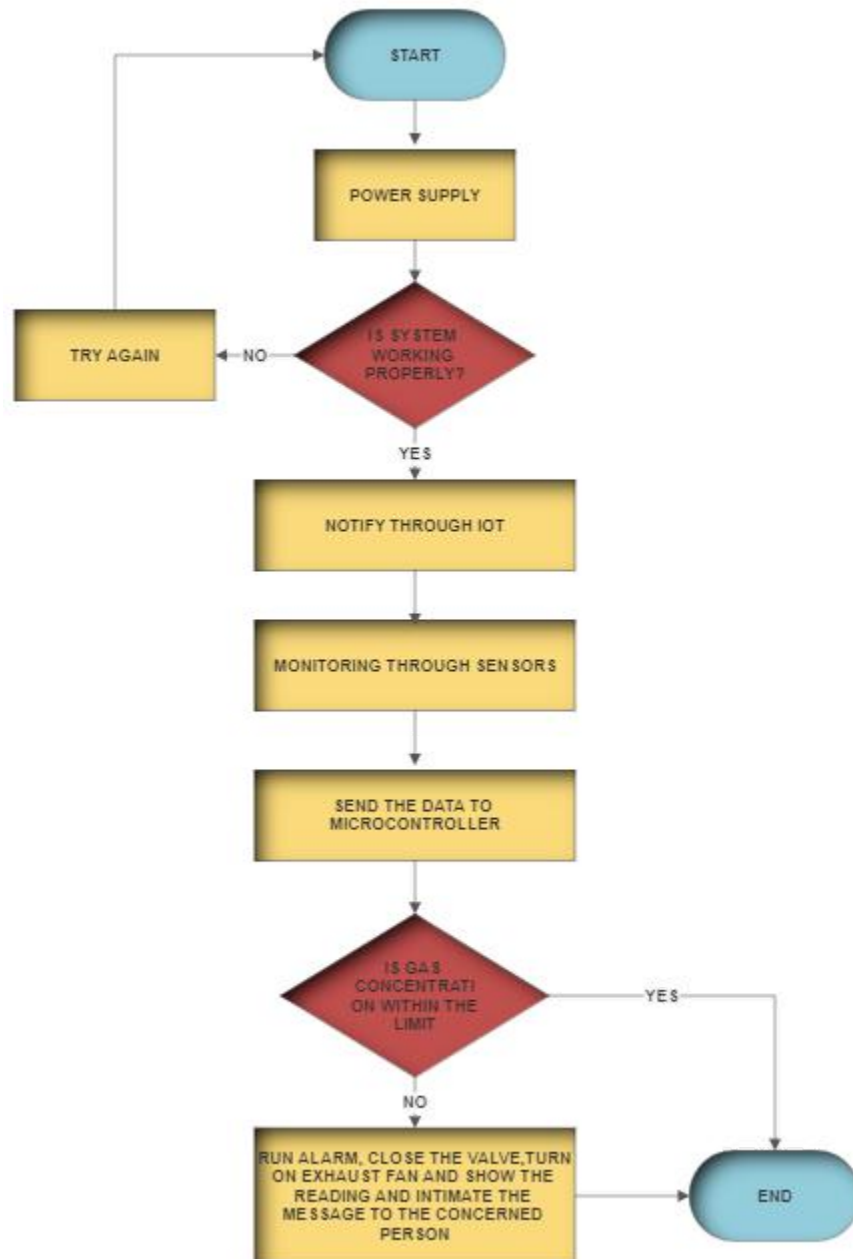
PROPOSED SOLUTION

❖ There is always a risk of leakage whenever gas is used, threatening human lives and property. Therefore, designing a low-cost gas leakage detector can help in minimizing this risk over a span of several years. There have been several accidents caused by gas leakages in homes and in industries (mainly oil and gas industries). These leakages have led to the loss of several lives and properties through fire outbreaks and explosions.

❖ There is always a risk of leakage whenever gas is used, threatening human lives and property. Therefore, designing a low-cost gas leakage detector can help in minimizing this risk over a span of several years. There have been several accidents caused by gas leakages in homes and in industries (mainly oil and gas industries). These leakages have led to the loss of several lives and properties through fire outbreaks and explosions.

❖ This system is designed in such a way that it can withstand most of the harsh environmental conditions. The system's detecting range is also quite high and can detect gas efficiently. Placement of components in it are in such a way that they are resistant to the hazardous gases.

BLOCK DIAGRAM

```
                    ┌──────────────┐
                    │     LEDs     │
                    └──────┬───────┘
                           │
                           ▼
┌──────────────┐    ┌──────────────┐    ┌──────────────┐
│  LCD Display │───▶│   Arduino    │◀───│  Gas Sensor  │
└──────────────┘    │     Uno      │    └──────────────┘
                    └──────▲───────┘
                           │
                    ┌──────┴───────┐
                    │ Piezoelectric│
                    │    alarm     │
                    └──────────────┘
```

FLOW CHART

START

POWER SUPPLY

IS SYSTEM WORKING PROPERLY?

TRY AGAIN

← NO

YES

NOTIFY THROUGH IOT

MONITORING THROUGH SENSORS

SEND THE DATA TO MICROCONTROLLER

IS GAS CONCENTRATION WITHIN THE LIMIT

YES

NO

RUN ALARM, CLOSE THE VALVE,TURN ON EXHAUST FAN AND SHOW THE READING AND INTIMATE THE MESSAGE TO THE CONCERNED PERSON

END

COMPONENTS REQUIRED

ARDUINO UNO

One of Arduino's standard boards is the UNO. The Italian word UNO here is for "one." To identify the initial release of the Arduino Software, it was given the name UNO. It was also the first USB board that Arduino had ever released. It is regarded as a strong board that is employed in many projects. The Arduino UNO board was created by Arduino.cc. The ATmega328P microprocessor is the foundation of the Arduino UNO. Compared to other boards, like the Arduino Mega board, etc., it is simple to use. The board is made up of shields, various circuits, and digital and analogue Input/Output (I/O) pins.

GAS SENSOR
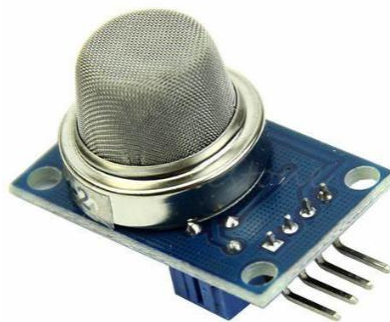
A device that detects the presence or concentration of gases in the atmosphere is called a gas sensor. By altering the resistance of the material inside the sensor, the sensor generates a corresponding potential difference based on the gas concentration, which may be recorded as output voltage. The type and concentration

of the gas can be inferred from this voltage value. The sensing substance that is contained inside the sensor determines the sort of gas that it is capable of detecting. These sensors are typically sold as modules with comparators, as was demonstrated above. These comparators can be configured for a certain gas concentration threshold value. The digital pin swings high when the gas concentration surpasses this level. The analogue pin is functional.

LCD

An LCD screen has two electrodes on glass substrates, two polarizers on each side, and a thin layer of liquid crystal material in between them. An optical filter known as a polarizer allows just certain polarizations of light to pass through while blocking all other polarizations. ITO is the most widely used substance since the electrodes must be transparent (Indium Tin Oxide). Since LCD screens can't produce light on their own, a backlight is typically positioned behind them to make them visible in low light. Backlight light sources include CCFL or LED (Light Emitting Diode) (Cold Cathode Fluorescent Lamps). The most common backlight is LED. Of course, a layer of colour filter is necessary if you like a colour display.

RESISTOR

A passive electrical device that has two terminals and is employed in electrical circuits to limit or regulate the flow of current. A resistor's primary function is to lower the voltage and reduce current flow in a specific area of the circuit. It is constructed with copper wires that are wound tightly around a ceramic rod, and the resistor's outside is painted with insulating paint.

LED

When current passes through a light-emitting diode (LED), a semiconductor device, light is released. Recombining electrons and electron holes in the semiconductor results in the release of energy in the form of photons. The energy needed for electrons to pass through the semiconductor's band gap determines the hue of the light, which corresponds to the energy of the photons. A layer of light-emitting phosphor or several semiconductors can be used to create white light on a semiconductor device.

PIEZO BUZZER

The reverse piezoelectric action is the basis for the piezo buzzer's sound production. The core idea is to apply electric potential across a piezoelectric material to generate pressure fluctuation or strain. These buzzers can be used to notify a user of a situation related to a sensor input, counter signal, or switching action. In alarm circuits, they are used.

WORKING

❖ Even though there are numerous solutions to the problem of identifying gas leakage, this proposed system demonstrates a novel solution to gas detectors based on a microcontroller. It is a cheap but incredibly effective gas leak detection tool that could be crucial in preventing Gas leakage exploration.

❖ The required data is collected from the sensors. This sensor used here is able to track, identify, and notify the end user about the pressured gas leakage.

❖ The central process Arduino Microcontroller continuously monitors the gas level using a gas sensor.

❖ If in case the gas level reaches above a certain threshold value which is already set by the end user, an intimation is given.

❖ This device can be readily integrated into an alert system and displaying the same using a Liquid crystal display indicator. The intimation is sent to the end user via LCD, piezo buzzer beeps, exhaust fan turns on and RED LED turns on depicting that the surrounding is in a danger zone.

❖ If there is no gas leakage then a green LED will be turned on indicating that the surrounding is in a safer zone.

❖ The system comprises a wifi module which is responsible to intimate the gas status.

❖ The piezo buzzer beeps, LCD displays alert message, red Led turns on, exhaust fan turns on, the gas valve closes, and all indications for safety take place simultaneously.

❖ Once the gas value subsides, the gas valve opens and the regular process takes place.

❖ The fundamental goal of this work is to preserve security, make it easier to store gases, and find leaks to stop catastrophes brought on by negligence.

CIRCUIT DIAGRAM
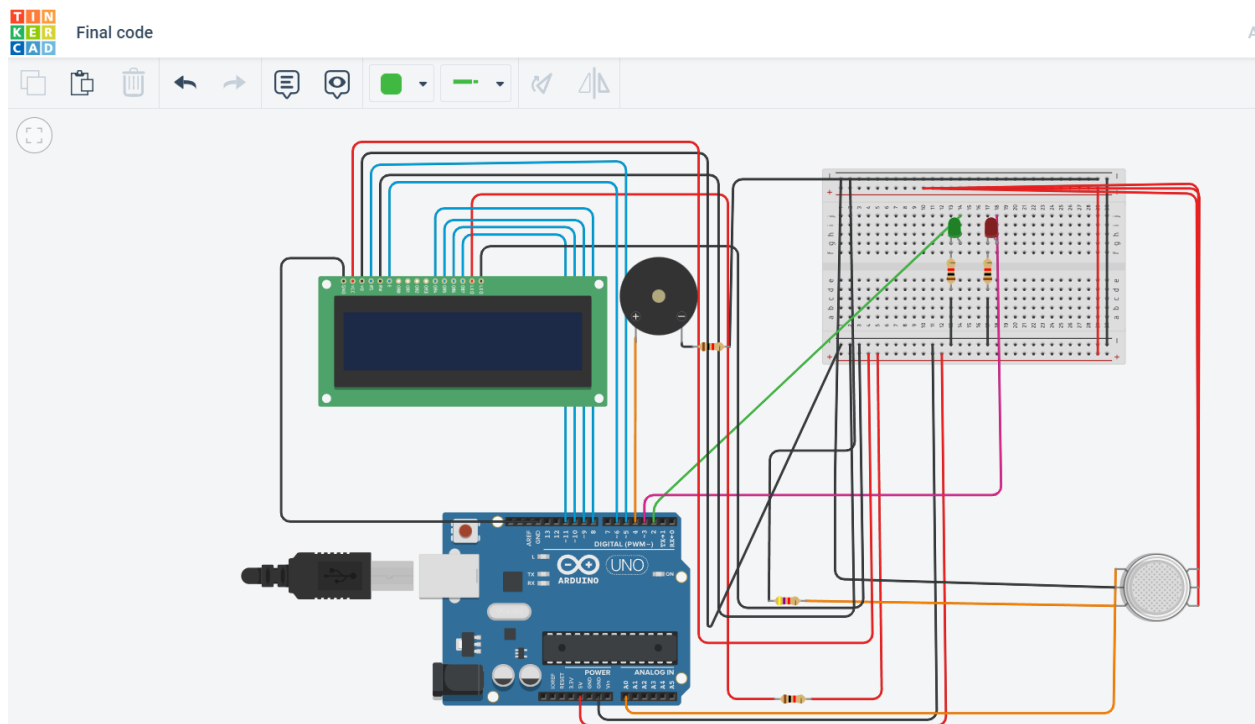
CODE

```
#include <LiquidCrystal.h>

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

int redled = 3;

int greenled = 2;

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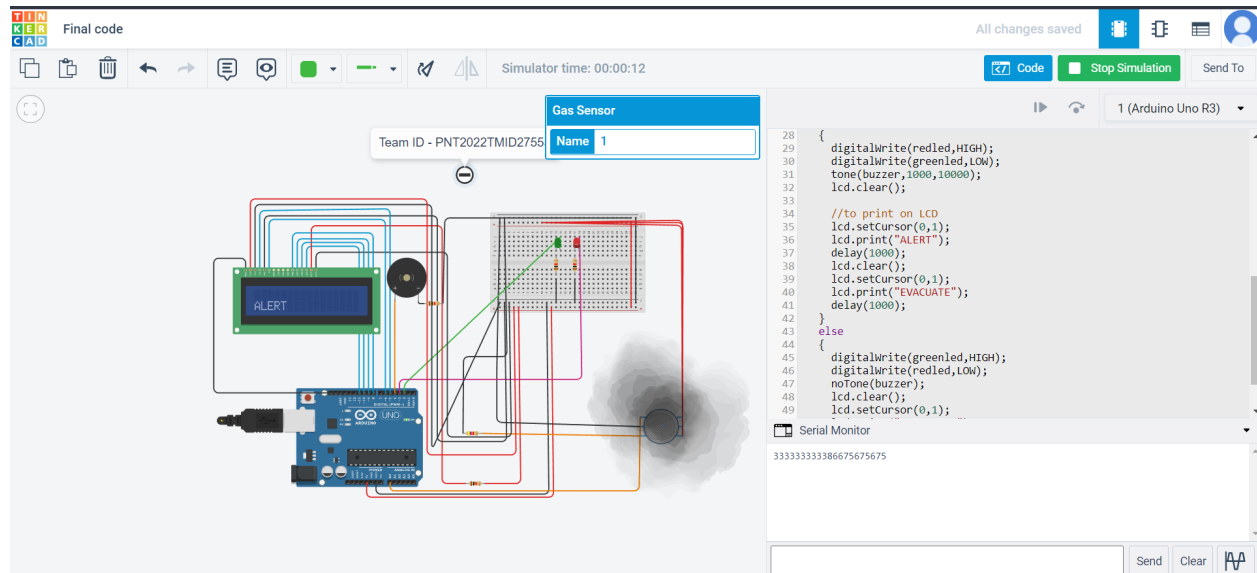
```
digitalWrite(greenled,LOW);

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(0,1);

lcd.print("ALL

CLEAR"); delay(1000);

}

}
```

SIMULATED OUTPUT

CONCLUSION

The Internet of Things has recently gained widespread recognition. Thanks to its numerous sources of applications, which have made it possible for people to live comfortably, healthily, and more conveniently. The suggested gas leak detector in the field of security appears promising. Making this model was always intended to bring in a revolution in safety, reducing and ultimately eliminating any potential risk brought on by the leakage of harmful and dangerous gases. Monitoring gas reservations and leaks for both domestic and commercial uses is one of these application areas. Every time gas is utilized, there is a risk of leakage, endangering both human life and property. Therefore, over the course of several years,

developing a low-cost gas leakage detector can aid in reducing this danger. Gas leaks in homes and industries have resulted in a number of accidents. Through fires and explosions, these leaks have caused the destruction of several properties and lives. A system for alerting and monitoring gas leaks has been developed to stop this. A gas sensor will be used by the system to keep an eye on gas levels, flame and fire. The piezoelectric alarm starts to beep when the gas levels reach beyond a threshold or when a fire is detected. It also displays information on an LCD and provides indication through LEDs. The system has been tested and it is able to monitor gas wastage, leakage and notify the user.