International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 12 | Dec 2022 www.irjet.net p-ISSN: 2395-0072

GAS LEAKAGE DETECTOR

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Abstract - *The technology of Internet of Things is nowadays automating all our lives in daily basis and also aims to make things work without human interference in it. Since we today use Internet of Things for variety of purposes in different fields we also try to bring the use of this technology in security field to make things simple and efficient. Our project is also an idea to bring the Internet of Things in protection of people and other beings from gas leakage, which is very harmful if leaked in closed or open space. Since the traditional Gas systems are very efficient are have low chances of gas leakage but they don't have a solution to warn people around them if gas is leaked by any chance. Therefore we have built this application for both the industry and society which will detect the gas leakage and alert the people around the gas system .To alert the people around and also sending a text message to the respective authorities about the gas leakage . Today gas leakage has become an important issue to tackle. Talking about Carbon pollution, it has become a need of an hour. Lpg gas is also considered very harmful if leaked and can manage to destroy people and properties surrounded. Hence to avoid such a problems some effective gas leakage systems are being proposed as solution and used. Out idea of this project is to create a gas detection hardware system and to make it available to household level. This can also be used in factories and industries to save the properties and worker lives if any gas get leaked in that area. This system monitors and warns about harmful chemicals in the air and surrounding at workplaces such as factories, and it can also be used in households by making them alert through an LCD display and sending a message to a registered phone number.*

Key Words*: *Liquid Petroleum Gas, LCD – Liquid Crystal Display, GSM- Global System for Mobile Communications, MQ – 2 sensor, Arduino, IoT – Internet of Things

1. INTRODUCTION

LPG is used in almost every household of our country and also in various establishments such as restaurants, hotels, offices, etc. Although something which we use daily, it can be hazardous and fatal at times.

We often forget to switch off the gas supply after we finish using the stove. This can lead to the leakage of the LPG gas, which is highly inflammable. Sometimes, the leakage can cause severe fires.

Therefore, through this paper, we propose a system to monitor the leakage of the LPG(Liquefied Petroleum Gas) and also to alert the user through SMS in case leakage is detected.

The main technology used here is the Internet of Things. The proposed system will use a gas sensor to detect the leakage, following which, the concerned authority will be alerted through a message using the GSM Module in Arduino Uno.

Thus, the system can help prevent a fire and in turn can prevent severe damage to property as well as humans.

2. COMPONENTS

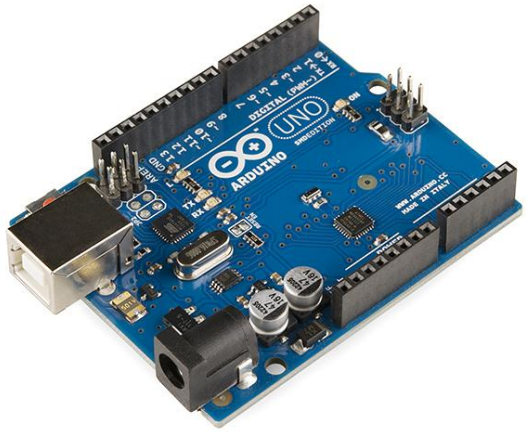
- Arduino UNO R3
- GSM Module
- LCD Display
- Buzzer
- Gas Sensor
- Connecting Wires
- Breadboard
- Power supply

ARDUINO

•The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by 'Arduino.cc'.

•A variety of expansion boards and other circuits can be interfaced with the board's sets of digital and analogue input/output pins.

•It is economical and simple to use.



SIM 900 GSM Module

SIM900 GSM module is used to send SMS, Data and Fax.

•SIM900 is designed with power-saving techniques so that the current consumption is low.

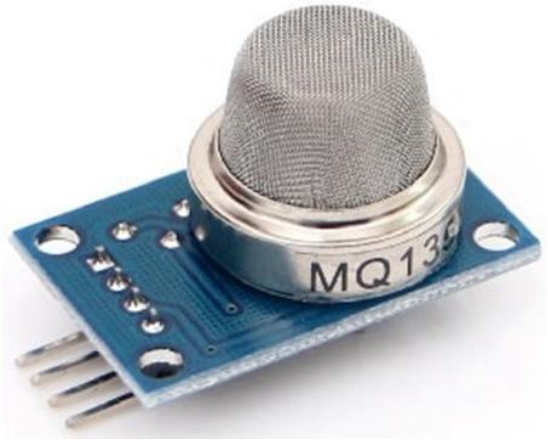
•Programmable general-purpose input and output. One SIM card interface. Support Bluetooth function.

MQ135 Gas Sensor

•MQ-135 gas sensors can be implemented to detect the smoke, benzene, steam and other harmful gasses.

•It is low cost and particularly suitable for Air quality monitoring applications.

•In the atmosphere we can find polluting gasses, but the conductivity of the gas sensor increases as the concentration of polluting gas increases.



3. LITERATURE SURVEY

This system of device which detects the gas is already present in the market and the idea was given well back as the importance for this device is much now in many fields for example in industries where there is an huge chance of gas leakage and massive destruction can be caused due to it, not only to the workers but also the property. Also in homes this device will play an important role as the safety of family

members and the property is at stake if any cylinder is leaked. This device can also be used in cars where the leakage can put the car on fire. Dr. Walter Snelling came up with the idea of LPG gas in the year of 1910. It is a composition of butane and some amount of commercial propane. It is known to be very volatile, and there have been many accidents reported due to LPG leakage. Therefore for safety concerns it becomes need of an hour to introduce the gas leakage detection system. Ga detector devices are of man types it depends on which type of gas they are detecting ,which type of gas sensors are being used also the other components of it makes it different. In our day-to-day life we come across a variety of IOT devices and most of them have the capacity to emit as when operated in air. To a human eye it becomes quite difficult to look upon the concentration level of gas being blown out of the device also sometimes to notice it. If by chance the gas is leaked and there is some small spark around or any other harmful gas which can combine and make sever destruction in the surround and also can cause serious health problems to living being inhaling that gas. There have been a lot of work in this domain but the researchers are still finding a way to make the use of advanced technology upcoming and make the device more effective and try to reduce its cost to make it feasible.

The authors of reference [1] have elaborated the idea of a system that has detection and monitoring of the LPG gas and have used MQ – 5 sensors. The functionality of this system is detecting LPG gas leak and hence the buzzer will buzz and a message will be sent on to the required person on their mobile phone. Also during monitoring the gas being based on the cylinder weight, that has been decided by the load sensor, after that the message will be sent to the owner of the application .

Talking about the authors of reference [2] proposed the idea of using the pushbullet for the fast transfer of data of a given message using the Wi-Fi module which gets activated when a gas is leaked that is connected to Arduino UNO.

Authors of [3] has elaborated the idea of sensing multiple gasses and using multiple sensors for that for example, the LPG gas will be sensed by sensorMQ – 6, for methane gas, the sensor used is MQ – 4, and benzene is detected using the sensor using MQ – 135 respectively. Now, talking of output it will be given in the form of PPM. For the text to be sent on the mobile of owner ESP32 is being used.

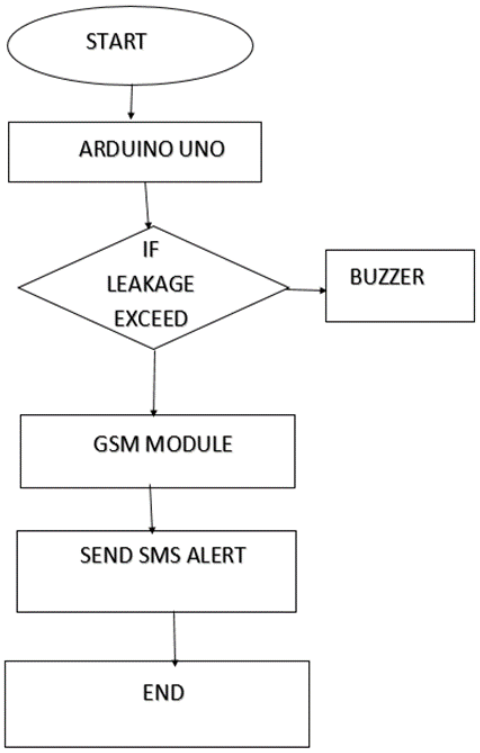
Authors of reference [4] propose a system for monitoring the gas and sending text messages. NodeMCU is a powerful platform being used in their system for monitoring the messages sent and load of the system. If the weight is less, then it will be displayed using ubidots.

Authors of [5] proposed a system, where the LPG gas management is proposed for the minimum cost which has to be low. Along with the detection and monitoring of the gas, the system also has a functionality of calculating the temperature and humidity concentration.

4. METHODOLOGY

Flowchart

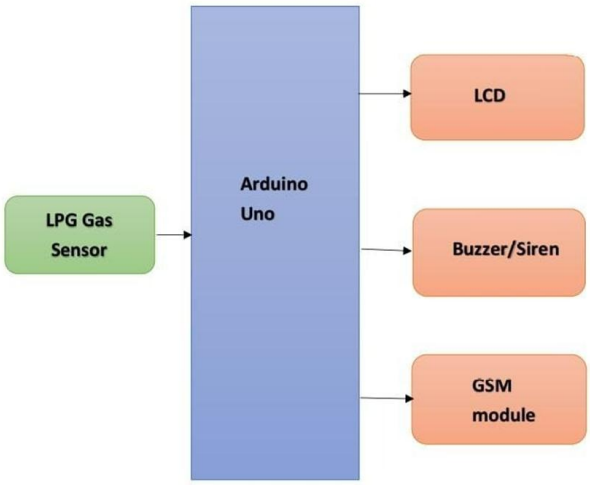
Flowchart is the overall rough idea of what types of processes a project goes through. Below is the flowchart of our project demonstrating processes such as starting with the Arduino UNO and checking if gas leakage is there or not, if yes then the signal is sent to buzzer and the other signal is sent to GSM module which in turn sends the SMS alert to the predefined phone numbers.



Block diagram

The block diagram below demonstrates the working states and direction of processes. In the start the GSM is asked to check if the connection with the microcontroller is done correctly or not. It is done by sending a signal to microcontroller. The monitoring part starts where if there is any gas leakage in the surrounding it is detected by the sensor MQ-5.Then it immediately sends signal to the

Arduino UNO about the leakage and Arduino in turn sends the signal to the other connected secondary devices that are the Buzzer , LCD and the GSM unit.



Working Principles

Here the direct connection is between the microcontroller Arduino UNO and the gas sensor which detects the gas in surrounding is MQ-5 unit. Also the signal after gas is detected is sent to Arduino UNO through comparator because it converts the signals where MQ-5 sends analog signals and the Arduino UNO needs to receive digital signals.

A 16x2 LCD is also one of the peripheral devices connected to Arduino UNO which turns on the display when the signal is received from Arduino UNO.

Apart from MQ-5 and LCD display the other peripheral device connected to Arduino UNO is the buzzer which on receiving signals from the Arduino UNO buzzes and hence the surrounding gets to know about the gas leakage.

When the gas is leaked and detected by the MQ-5 sensor the signal is sent to the Arduino UNO which in turn sends signal to other secondary divides connected to it which are the buzzer which after receiving the signal starts to buzz, next is the LCD display which is also set to on after receiving signal from microcontroller then the last is the GSM unit which also receives the signal from Arduino UNO and then starts to function and sends the message as "The gas leakage has been detected!!!!!" to the phone numbers already defined in the code.

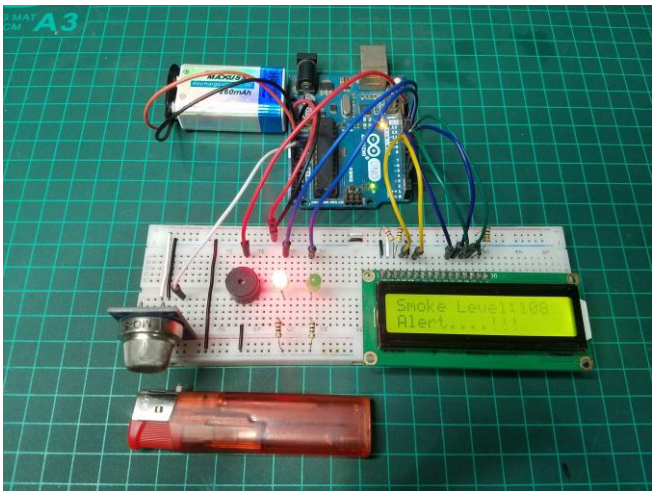
The system is started when Arduino UNO receives the power supply and then instantly the MQ-5 is set on and starts to monitor the air around in surrounding. Whenever the gas leakage is not detected until then the LCD displays "No gas leaked ,everything normal".

Once any leakage of gas is detected then the given below steps are being followed:

Step 1: At the start, the system is set to on and then whenever the gas is detected by the MQ-5 sensor it sends a signal to Arduino UNO which in turn sends the signal to LCD display and hence LCD is set to on.

Step 2: After completion of the first step the Arduino UNO sends a signal to the buzzer which in turn starts to buzz after receiving the signal.

Step 3: In the end, the Arduino UNO sends the power signal to the GSM unit which starts to work and sends the message on the phone numbers already written in code about the leakage, making them alert.



Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipment and inadequate awareness of the people. Hence, this project aims at the detection of gas leakage to prevent accidents and to save human lives.

- This system can be used in home security - to prevent accidents in the kitchen due to gas.
- Industrial Security - this system can be very useful in industry where gas can cause lot of damage or accidents
- Enhancement - can be Enhanced to automate specific gas levels.
- Automation - can be enhanced to automate the electric cutoff process to prevent short circuits.

5. CONCLUSIONS

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6. FUTURE SCOPE

The future scope of the project is to add more software intelligent features with this system.

It is an automatic gas detection, control and warning system. In the future, this system will have a function where it can

In the event of an accident, notify the emergency services. Real-time mobile app and web app monitoring will also be added. Many smart functions will be added in the user application for this system. Total features will make the system more secure for users. The system will be optimized for use in many places such as cars, homes, industry and many other places. After designing the final prototype with a smart multifunctional function, the system will be implemented in a real-life scenario.

ACKNOWLEDGEMENT

WE WOULD LIKE TO THANK VISHWAKARMA INSTITUTE OF TECHNOLOGY FOR PRESENTING US THIS OPPORTUNITY. I WOULD ALSO LIKE TO THANK OUR TEACHER PROF. PUSHKAR JOGLEKAR FOR HIS GUIDANCE.

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