



## HOME PROTECTOR BY USING SMART GAS DETECTOR

<sup>1, 2, 3</sup> Miss. Aditi Lohar, Miss. Maitreyee Gurav, Miss. Swapnali Bandgar

<sup>4, 5</sup> Prof. S. S. Jadhav, Miss. M. M. Rajput

<sup>1, 2, 3</sup> ( Student, Department of Mechanical Engineering, Padmabhooshan Vasanttraodada Patil Institute of Technology, Budhgaon, Sangli, Diploma Wing )

<sup>4, 5</sup> (Lecturer, Department of Mechanical Engineering, Padmabhooshan Vasanttraodada Patil Institute of Technology, Budhgaon, Sangli, Diploma Wing)

**Abstract:** Gas is detecting innovation has among the topical research, ponder for rather now and then. With the reason for local gas chamber cooking turned out to be simple and settling them is moreover abbreviated. Be that as it may, at that point are likewise sick impacts of utilizing these barrels. Spillage of residential gas isn't just lethal to human and creature life, yet in addition aims colossal property misfortune.

In this way, location and essential advances are to be considered to forestall unfortunate mishaps. Many accidents tendencies due to short circuits, gas leakages, Etc. won't permit a normal person to enter the accident space, therefore on the scale back any harm. Such accidents are a unit, increasing every day, owing to lack of awareness, precaution measures and mental object. Multiple sensors were used for detection method. This paper presents an intelligent security system helpful for many of the house and business application.

Home fires have been taking place frequently and the threat to human lives and properties is growing in recent years. Liquid petroleum gas (LPG) is highly inflammable and can burn even at some distance from the source of leakage. Most fire accidents are caused because of a poor-quality rubber tube or the regulator is not turned off when not in use. Therefore, developing the gas leakage alert system is very essential. Hence, this paper presents a gas leakage alert system to detect the gas leakage and to alarm the people onboard.

**Keywords:** MQ5 Gas Sensor, Smart Alerting Techniques, Raspberry-pi3, Buzzer, Light Emitting Diode.

### I. INTRODUCTION

Nearly 62 citizens pass on reliably for the reason of fire disasters in our country. Out of nowhere 17 percentage passing's for the reason of Gas chamber/stove fire break open. The framework provides protection to the citizens the fire break open are not made easy in the livestock. The Framework will assist in allowing effective protection to human being and belongings. Internet of things is a gadget driver which is identified with varieties of sensors. Which is fit for exchanging data by utilizing Internet of things. Its purpose can be extended for expanding endures insurance models. It assists in making applications which are price productive. Internet of things stage takes an essential job around the security to the human life. LPG is an ignitable gas, which is basically connected to the family unit and business situations.

The greatest part of the humankind in our nation uses Liquefied Petroleum Gas is utilized as burnable for cooking use. The alarming framework can persistently decide the spillage of gas with the documentation of the sensors. Therefore, we have utilized the IoT connected sciences too Assemble a Gas cautioning framework for the residents that has canny cautioning systems, including sending an instant message to the bothered authority. This framework won't just ready to distinguish the spillage of gas yet in addition cautioning through perceptible alerts. The Proximity of excess proportions of frightful gas in condition then this structure can advise the customer. The system can encourage the public administration about the state before the danger occurs through a message. Cell interfaces are used to caution the whole concerning the people by sending SMS around gas spillage.

Internet of things based Gas Spillage Recognition Framework, Expectation and Shrewd Cautioning will recognize gas spillage using MQ sensor is used for recognizing LPG, vaporous oil, town gas, keep up a vital separation from the upheaval of alcohol and cooking vapor and smoke. Additionally, check the nearness of riches extents of ruinous gases and exhorted through alerts. With the help of IOT it'll caution as to in regards to the gas spillage condition through the SMS abuse gas application and elective texts send to gas association with individual areas and a ready SMS are sent through Email for explicit talented. Wi-Fi interfaces are utilized to caution the all-inclusive community by the light control structure and sound sign when gas spillage happens.

## LPG

Auto gas has a risky subject of 1.8 and 9.5 percentage container of gas in air. This is altogether smaller than other regular vaporous powers. Gas moreover with other oil determined can be joined with sustainable power sources to give more prominence unwavering quality while as yet accomplishing some decrease in CO<sub>2</sub> transmission.

Gas vapors can keep operating for long separations along the ground and can gather in the Channel or Cylinder can detonate whenever engaged in a fire. The state of being way this hazardous gas can make cool consumes the skin and it can go about as an unconsciousness at high focuses Break cause a negative impact to the state of being with the end goal that the hydrocarbons and different synthetic concoctions of the Gas causes long rest. It likewise causes bothered respiratory tract, nose and eyes.

## II. PROBLEM STATEMENT

To investigate Gas spilling and alarming the citizens about the spilling who are situated locally and remote location through this system Examinations by oil organizations found that numerous LPG customers are ignorant of security checks of gas chambers [10]. Another reason is unlawful filling of gas barrel likewise causes disasters. There is a requirement for a framework to identify and furthermore avert spillage of LPG

1. To detect the leakage of LPG system
2. By sending message through Email, text messages, light control system and audio indication (voice) to alert the people about the gas leakage.
3. To alert the gas office about the spillage of gas by instant messages with individual locations .

## III. OBJECTIVES

The main aim of this project is to monitor for liquid petroleum gas (LPG) leakage to avoid fire accidents, providing house/industry safety feature where the security has been an important issue. The system detects the LPG leakage using a gas sensor and flames by a flame sensor that alerts the consumer about the gas leakage by sending SMS with the help of GSM module which is connected preprogrammed microcontroller.

When the LPG concentration in the air exceeds the certain level, the Gas sensor detects the leakage and then it immediately alert the consumer by sending SMS to specified mobile phone and alert the people at home by activating the Buzzer alarm and display the message on the LCD display simultaneously to take the required action and switch on the exhaust fan to decrease the gas concentration in the air.

## IV. METHODOLOGY

The proposed framework is produced utilizing the Raspberry Pi 3. Raspberry Pi may be a digital computer which might created and adjusted completely different ways it permits us to run different projects and moreover bolster distinctive peripherals that are to ways in which it permits us to run different projects and moreover bolster numerous peripherals which are to be utilized in our framework MQ Sensors are introduced on the point of the LPG Supply to acknowledge the spillage of gas, Once the button edge is achieved it will send an alarm message to power versatile.

The message is send to Email. LED is cautioned while gas spillage takes places and furthermore. The sound sign is associated with the framework. This data is kept in webpage utilizing it. The whole working on the framework can be accomplished by executing a python code and by introducing the required sensor libraries.

## V. DESIGN AND DEVELOPMENT

A gas detector is invented to ease human on detecting the presence of those dangerous gases within an area to prevent disaster happen. Nowadays, the gas detector has been innovated into various ways of detection, for example infrared thermal imaging gas leak detection , gas leakage detection with monitoring system , and wireless gas sensor network.

This paper presents the design and development of a wireless gas leakage monitoring system by using Arduino In this project, the monitoring system is developed by using LabVIEW GUI. It is used to display the level of gas concentration in a place through another remote PC, and via internet server. Hence, it provides benefit to monitor the condition of a room in a safe distance.

### System traits

The distance measured is probably 0 units of measurement from the interior sensor. It does not use radiated or reflected spectral analysis. The distance to detect the gas is not easy to determine, but it has a detect range of 200 to 10000ppm. It depends on a few variables such as gas source, leakage rate, room size, air currents and sensor placement. Thus, this model is designed in portable and it can be placed near to the gas pipeline. In Fig. 1 shows the design of the sensor location which is place in the room.

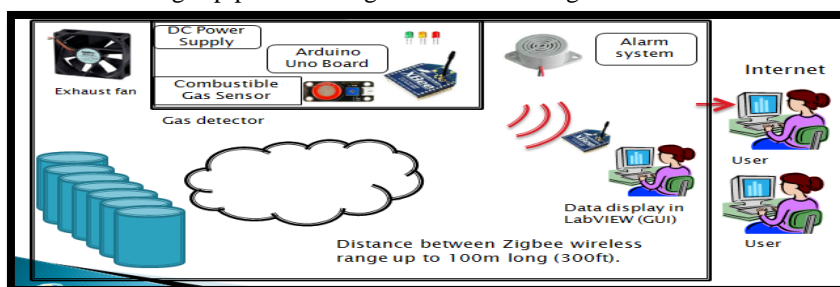


Figure.1. The design of sensor location

### Hardware approach

In this project there are two Arduino boards will be used as shown in Fig. 2. This microcontroller consists of built-in analogue-digital converter (ADC), which able to read the analogue signal from the combustible gas sensor MQ-2. Arduino (1) is connected to the alarm system, control system, display system (LCD) and Zigbee transmitter. On the other hand, Arduino (2) is

connected to monitoring system and When the gas leakage is detected by the combustible gas sensor MQ-9, the analogue signal is converting into digital signal with the ease Arduino (1) built-in conversion. Then the processing signal is transmitted.

#### Threshold value

Meanwhile, Arduino (2) will receive the data and compare to the threshold value of the gas concentration based on the standard value from Occupational Safety and Health Administration (OSHA) organization . Table I shows the threshold value for gas concentration of CO and CH<sub>4</sub> in parts per million (ppm). Whereas for Table II, represents the measured threshold value for the MQ-2 using Liquefied Petroleum Gas (LPG) .

Value of gas concentration (ppm)	
<i>Carbon monoxide CO</i>	<i>Methane CH<sub>4</sub></i>
20 - 2000	500 - 10000

#### Modified Light indicator

A part from that, the LEDs has been modifying into a reflected light indicator. The reflected light indicator acts as visual alert signal for the users, so that inhalation of dangerous gas can be avoided.

#### Microcontroller

Arduino Uno R3 is a device that acts similarly to a microcontroller unit. In this project, Arduino is the perfect microcontroller due to its high performance and special features. The Arduino is an open-source electronic prototyping platform based on flexible, easy-to-use hardware and software.

It has 14 digital input or output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The focus of the project is on the programming of Arduino. It is the open source software used to create the language programming in order to run the system. Therefore, make this microcontroller suitable for industrial control as compare to other microcontroller.

#### DESIGN CONSTRUCTION

The entire device is built around the Arduino pro-mini which utilizes the atmega 328p microcontroller.

The following steps were considered to complete the design construction of this research:

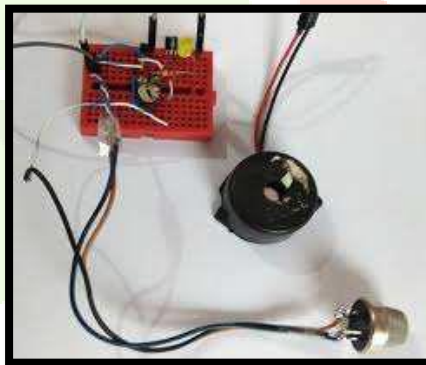
**Step 1:** The SIM800L GSM Module is connected to the RX, TX Pin.

**Step 2:** The motion detector sensor (PIR Sensor) is connected to the digital pin 4 of the microcontroller

**Step 3:** The IR flame sensor is connected to analogue pin 3 of the microcontroller.

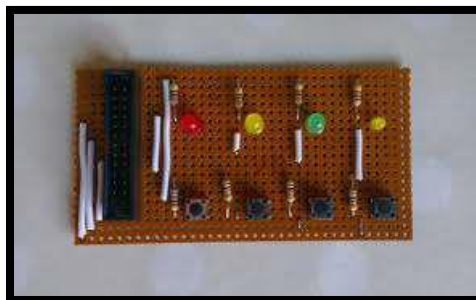
**Step 4:** The MQ2 Gas sensor is connected to the pin 2 of the microcontroller.

**Step 5:** The buzzer is connected to the digital pin 6 through transistor Q1.



**Figure 2:** Image of the buzzer

**Step 6:** The smoke detector LED is connected to the digital pin 5 of the microcontroller.



**Figure 3:** Connections of the LED

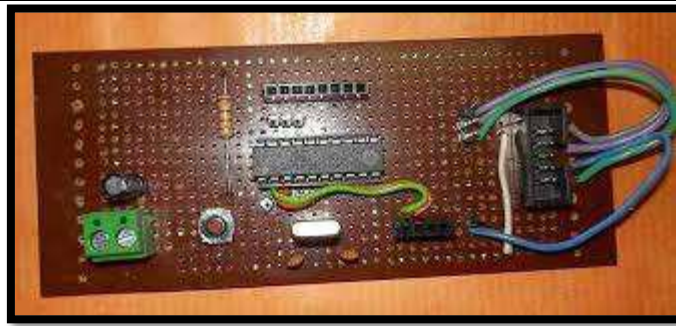
**Step 7:** The Gas indicator LED is connected to the digital pin 6 of the microcontroller.

**Step 8:** The Fire indicator LED is connected to the digital pin 7 of the microcontroller.

**Step 9:** The Motion indicator LED is connected to the digital pin 8 of the microcontroller

**Step 10:** The Power indicator LED is connected to the digital pin 9 of the microcontroller

**Step 11:** The Vcc terminals of the microcontroller and sensors were connected to the 5V terminal of the power supply.



**Figure 4:** connection of the Vcc terminal

**Step 12:** The GND (Ground) terminals of the microcontroller and sensors were connected to the GND terminals of the power supply.

**Step 13:** The C Program is loaded into the microcontroller.

**Step 14:** The final step was to couple the circuit.

## VI. WORKING

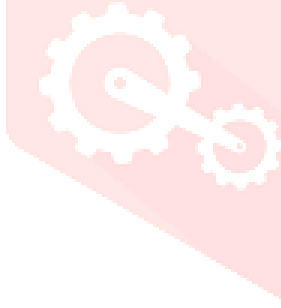
A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as human or animals.

It can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting.

Gas detection is a process of identifying potentially hazardous gas leaks by sensors. Additionally a visual identification can be done using a thermal employ an audible alarm to alert people when a dangerous gas has been detected.

The system provides control action by closing the regulator knob, after that the system sends a alert message to the user and fire station within short time of leakage. Then open the window automatically and start exhaust fan. It has more advantageous function than the existing system thus the real-time automatic approach is proposed in case of rebooking of cylinder. This monitoring and detection system is proposed mainly to meet the safety standards and to avoid fire accidents because of leakage.

Monitoring and detection system is proposed and when a small leak occurs, the system sensor detects the leakage (the range is between 400-600 ppm) and sends the alert SMS to the user and activates the alarm, open the window automatically and start exhaust fan. provides the protection circuitry (Exhaust fan).controls the knob of cylinder using relay DC motor. Alternatively the system monitors the LPG level of cylinder, automatically books the cylinder when it reaches the lower weight 0.5kg.



Working flow chart

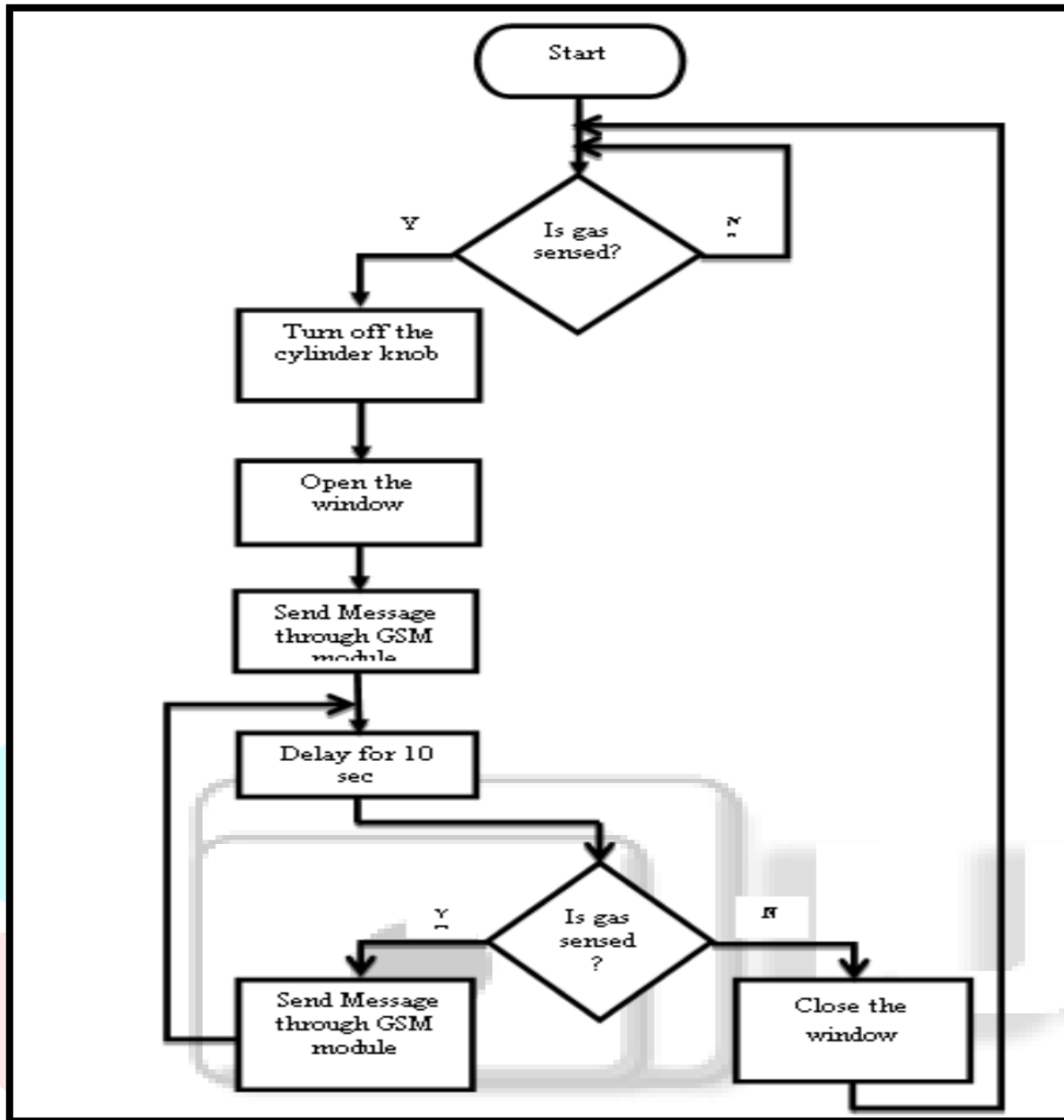


Figure 5. Working flow chart

VII. WORKING

Monitoring and detection system is proposed and when a small leak occurs, the system sensor detects the leakage (the range is between 400-600 ppm) and sends the alert SMS to the user and activates the alarm, open the window automatically and start exhaust fan. provides the protection circuitry (Exhaust fan).controls the knob of cylinder using relay DC motor. Alternatively the system monitors the LPG level of cylinder, automatically books the cylinder when it reaches the lower weight 0.5kg.

Here the MQ5 sensor is assigned in this channel. The figure below shows the demonstrates the trial setup of the framework.. The setup gives brief data about the interfacing of segments to the Raspberry pi. We guarantee you that the planned technique will fulfill the client's prerequisites. It gives the sign in less time contrasted with the best strategies. demonstrates the general equipment setup and associations in relating port pins. When gas discharge is on the far side the edge worth LED glow and Buzzer rings. An Alert message is sent to Gmail, user mobile.

### Output for Gmail When Gas is Detected

```

Python 2.7.9 Shell
File Edit Shell Debug Options Windows Help
Python 2.7.9 (default, Sep 17 2016, 20:26:04)
[GCC 4.9.2] on linux2
Type "copyright", "credits" or "license()" for more information.
>>> ===== RESTART =====
>>>
smtp.gmail
ehlo
starttls
reading mail & password
from
successfully sent the mail
>>> |

```

Figure 6: Message is sent

### Received Message to the Gmail.

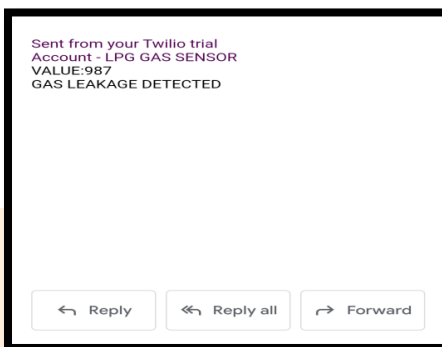


Figure 7. Received Message to the Gmail

The Fig 1 and 2 speaks to yield when the sensor recognizes gas past a breaking point the alert message is sent to Gmail

### Output for User Mobile When Gas is Detected

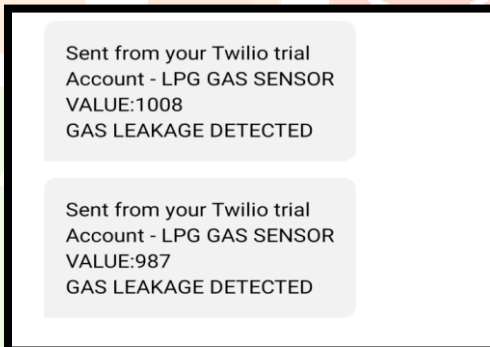


Figure 8: SMS indication on user mobile phone

The Fig3 speaks to yield once the sensing element acknowledges gas past a snapping point the alert message is distributed to users.

### Gas Leakage Detection Displayed through Webpage

The LED and Buzzer ON/OFF procedures is worked through the web page and show "LPG Gas Detected Value" in cellular phone and computer.

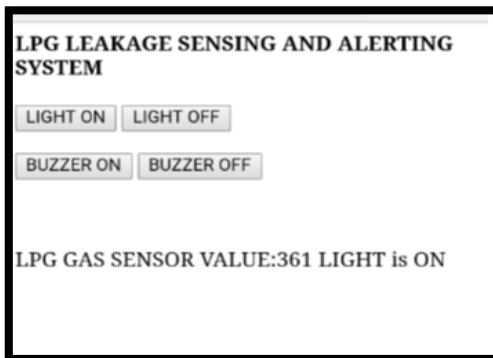


Figure 9: Gas Leakage Detection Displayed through Webpage.

The Figure speaks to yield Gas Leakage Detection Value is Displayed and LED, Buzzer ON/OFF procedures can be operated through the web page.

### VIII. CONCLUSION

Having come to an end of the construction of gas, smoke, fire and motion detectors with SMS alert, we can now say that we have acquired a great wealth of experience in the field of electronics. We now understand how a circuit is designed using data sheets for specification and calculations. Acquainted with the knowledge of electronic components and identifying them using a multitude of test for values, building a circuit, soldering and assembling a circuit.

The Developed prototype won't solely offer safety to the users against harmful gases. However, this system provides alert information to the Gas agency and other mobile when gas spilling occurs. It also gives an alert indication to buzzer and LED. And also the operation of Buzzer/LED through webpage takes place. When comparing to the other system, it creates a less expensive and safety to the citizens also provide fast alerting Techniques compared to the other prototype

The system provides control action by closing the regulator knob, after that the system sends a alert message to the user and fire station within short time of leakage. Then open the window automatically and start exhaust fan. It has more advantageous function than the existing system thus the real-time automatic approach is proposed in case of rebooking of cylinder. This monitoring and detection system is proposed mainly to meet the safety standards and to avoid fire accidents because of leakage.

### IX. FUTURE SCOPE

The conduct of the gases is reliant on the Temperature and Humidity of the air around. A gas at certain focus probably won't be combustible at low temperature yet may have touchy nature at high temperature. Therefore expansion of a Temperature and Humidity Sensor will be exceptionally useful. The other alteration which can be actualized in this gas spill locator is utilizing a tripped circuit which will trip off the principle supply once the gas spill is distinguished. During a gas spill it is unsafe to switch any apparatuses as it might start and this tripper circuit helps to reduce the electrical risks that can be caused because of a gas release. Alongside the stumbling off of the primary supply it is especially important to kill the gas controller so no further spillage of the gas happens. A robot has been utilized in trading human for taking care of different errands in a risky and perilous working environment where human life may in danger. A portable gas detecting robot can be built to detect the spillage of gas through pipelines as the robot can proceed onward a track which is arranged along the length of pipeline.

The main aim of this project to monitor for liquid petroleum gas (LPG) leakage to avoid fire accidents, providing house/industry/industry safety feature where the security has been an important issue. The system detect the LPG leakage using a gas sensor and flames by flame sensor that alerts the consumer about the gas leakage by sending SMS with the help of GAS module which is connected preprogrammed microcontroller.

When the LPG concentration in the air exceed the certain level, the Gas sensor detects the leakage and then it immediately alert the consumer by alert people at home by activating the Buzzer alarm and display the message on LCD display simultaneously to take the required action and switch on the exhaust fan to decrease the gas concentration in the air. A simple flow chart to understand the working procedure of the system giving below:

Increasing demand for gas leak detectors across oil and gas chemical industry is a key factor expected to drive growth of the globe market over the forecast period. In addition, rising gas storage facility network across the globe is another factor.

Expected to future fuel growth of the target market for safety system. Furthermore, rising adoption of gas leak detector on residential and commercial infrastructure in various countries across the globe is another factor expected to boost growth of this market in the another factor expected to propel growth of the target market over the forecast period.

(i) The configuration will discover the extraordinary use of a domain where anyone is, or individuals are deaf and dumb of the red LED shine with extreme danger signs.

(ii) In the instance of the blind, the buzzer ready will offer a method for advising the previous of an approaching danger.

### References

- [1] K. M. c. Chet Sandber, Jim Holmes and H. koppitsch, "The application of a continuous leak detection system to pipelines and associated equipment," IEEE Transactions On Industry Applications, Vol. 25, 2018.
- [2] S. K. K. T. K. R. R. Naresh Nuke, P. Siva Nagendra Reddy, "Arduino based LPG gas monitoring, automatic cylinder booking with alert system," IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Vol. 11, 2016.
- [3] S. K. D. P. S. R. . Abid Khan, Neju K. Prince, "GSM based automatic LPG ordering system with leakage alert," IJRET, Vol. 3, 2014.
- [4] A. Gupta, "LPG leakage detector and auto shut-off system using Arduino UNO ATmega328," International Journal of Innovative Research in Science, Engineering and Technology, Vol. 6, 2017.
- [5] A. M. B. Denis Spirjakin, "Internet connected wireless combustible gas monitoring system for apartment buildings," Proceedings of the Conference on Computer Science and Information Systems, Vol. 11, 2018
- [6] V. Pruthvi M.R, "Centralized LPG cylinders theft detection system with security alerts," International Journal of Computer Science and Information Technology Research 8, , vol. 4, 2016.
- [7] P. K. P. Avinash M, Sathwik Rai M.S, "Smart home for elder care," IJARCET, vol. 6, 2017.
- [8] C. M. Raju and N. S. Rani, "An android based automatic gas detection and indication robot," International Journal of Computer Engineering and Applications, Vol. 8, 2014.
- [9] L. K. S. Rohan Chandra Pandey, Manish Verma, "Internet of things (IOT) based gas leakage monitoring and alerting system with MQ-2 sensor," International Journal of Engineering Development and Research, Vol. 5, 2017.
- [10] V. N. N. K. Chaitali Bagwe, Vidya Ghadi, "IOT based gas leakage detection system with database logging, prediction and smart alerting- review," International Conference on Innovative and Advanced Technologies in Engineering, Vol. 1, 2018.

- [11] S. B. V. K. U. A. S. K. Vasudev Yadav, Akhilesh Shukla, "Microcontroller based LPG gas leakage detector,"Microcontroller based LPG Gas Leakage Detector, Vol. 2, 2016.
- [12] M. B. M. B. B. P. e. Pooja Bhamare, Shivanjali Davy, "Gasbo for LPG gas detection and controlling using mobile app,"International Journal of Advance Research and Development, Vol. 2, 2017.
- [13] B.V.Prasanth, "Cloud connected smart gas leakage detection and safety precaution system,"International Journal of MC Square Scientific Research, vol. 6, 2014.
- [14] S. H. Kumar Keshamoni, "Smart gas level monitoring booking gas leakage detector over IOT,"International Journal of MC Square Scientific Research, Vol. 1, 2017.
- [15] C. R. LIU Zhen-Ya, WANG Zhen-dong, "Intelligent residential security alarm and remote control system based on the single chip computer,"IEEE, Vol. 1, 2008.

#### Website References

[http://edugreen.teri.res.in/explore/n\\_renew/lpg.htm](http://edugreen.teri.res.in/explore/n_renew/lpg.htm),

<http://barabanki.nic.in/bbkgas/aboutlpg.asp>. <http://www.pipelineandgasjournal.com/>

<http://playground.arduino.cc/>

[www.indane.co.in](http://www.indane.co.in)

[www.hpgas.co.in](http://www.hpgas.co.in)

