

Estimation of LPG Exhaustion and Detection

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Abstract— The main aim of this project is to monitor the leakage of liquefied petroleum gas (LPG) and to indicate it with the help of an indicator. Whenever there is any leakage, it is detected with the help of a sensor called MQ-6 sensor and its output can be obtained with the help of indicating device such as buzzer, LED's. With this sound signal, the necessary control action of closing the valve can be done to prevent the hazards.

Key words: MQ-6 Sensor, Buzzers, LPG

I. LITERATURE SURVEY

Some of the literature survey which has been used for this paper is listed below:

“A survey of gas leak detection & localization techniques”.

“Modeling improvements for leak detection in pipeline of LPG”.

In the above mentioned papers the measurement of LPG and its detection part has been given. The measures to overcome this techniques and the easy way of sensing the leakage in LPG using the sensor is given in this paper and the future outcomes are can also be found.

II. INTRODUCTION

LPG is one of the important commercial fuel. It is being widely used in variety of applications such as domestic applications for the purpose of cooking, in industries as working fuel, in automobiles as working fuel for the purpose of transport as auto gas .It can burn with less smoke and soot and has the higher calorific value when compared to other gases. The gas being highly dense do not disperse easily when mixed in air and leads to many hazards such as suffocation when inhaled and dangerous explosion and fire accidents that may even lead to deaths at worse conditions. To overcome this condition we go for detecting the leakage of LPG and rectify it. This can be done with the help of MQ-6 sensor. With the help of this sensor an audible alarm can be generated to give an alert or message to people in the surrounding when gas leakage has been detected.

A. MQ-6 Sensor Description:

The main feature of MQ-6 sensor is that they have high sensitivity to LPG, Isobutene and propane and has the less sensitivity to alcohol and carbon dioxide. It is highly stable and is the simple drive circuit. The response when compared to other sensor has long life and gives the fast response .The application of this sensor is that they are used in gas leakage detecting equipments in family and industry, and are suitable for detecting of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

B. Specifications:

At standard work conditions:

Parameter name	Technical conditions
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Circuit voltage	5V+/-0.1
Heating voltage	5V+/-0.1
Load resistance	20kohms
Heater resistance	33ohms+/-5%

Take 1: Parameter

Structure and configuration of MQ-6 gas sensor is shown as Fig. 1, sensor composed by micro AL₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current.

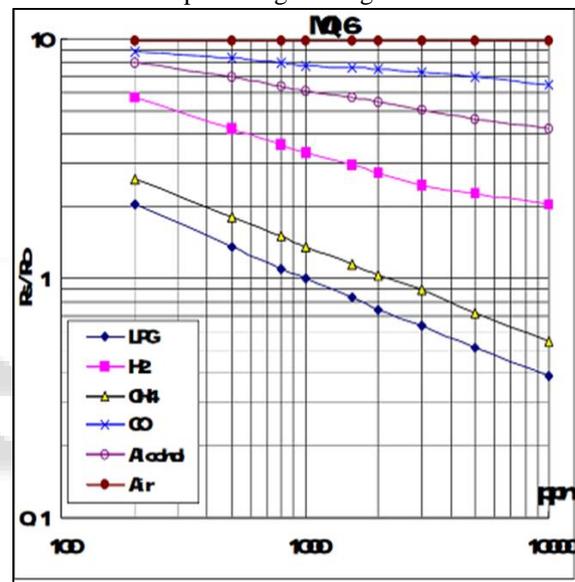


Fig. 1: Sensitivity characteristics of MQ-6 sensor

C. Pin Configuration of MQ-6 Sensor:

MQ-6 sensor as described in the above passage is a six pin sensor



Fig. 2: MQ-6 sensor



Fig. 3: Pin description of the sensor

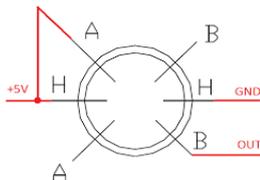


Fig. 4: Connection details of the sensor

As mentioned fig2, fig3, fig4 gives the detailed description of the pin details of the sensor. From fig 4.the connections for the sensor can be obtained. The A and H pins are used to give the supply to the sensor while the H pin on the other side is used for grounding connections. The output of the sensor is obtained from the B pin of the sensor.

The following conditions must be prohibited while using the sensors:

1) *High Corrosive Gas:*

If the sensors exposed to high concentration corrosive gas (such as H₂Sz, SOX, Cl₂, HCl etc), it will not only result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

2) *Touch Water:*

Sensitivity of the sensors will be reduced when spattered or dipped in water.

3) *Freezing:*

Do avoid icing on sensor's surface, otherwise sensor would lose sensitivity.

4) *Applied Voltage Higher:*

Applied voltage on sensor should not be higher than stipulated value, otherwise it cause down-line or heater damaged, and bring on sensors' sensitivity characteristic changed badly.

5) *Voltage on Wrong Pins:*

For 6 pins sensor, if apply voltage on 1,3 pins or 4,6 pins, it will make lead broken, and without signal when apply on 2,4 pins.

D. *Block Diagram*

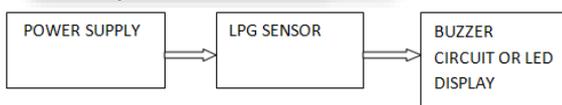


Fig. 5: Block diagram of LPG sensor

1) *Process Description:*

In this process the major component which is employed is MQ-6 sensor. This sensor has the capability of sensing the amount of LPG when it mixes with the air from 100 to 1000 ppm. When the concentration is above 100 ppm the sensor produces an output which can be obtained by connecting buzzer or LED's at the output terminal of the sensor. The power supply to this sensor can be given with the help of 9V power supply, which is necessary for the circuit or sensor to run. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

E. *Circuit Diagram:*

The above circuit consists of MQ-6 sensor which forms the major part along with that it also contains many components like zener diode(5.1V 400mW), capacitor(100uF 25V), transistor(BC547), 12V battery, buzzer, LED and resistors of different specifications as given in the circuit diagram.

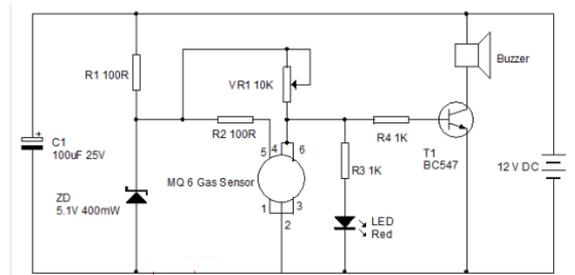


Fig. 6: Circuits implementation of LPG leakage and detection

The zener diode is used to limit the voltage supply to sensor to 5V as the input voltage to the sensor is only 5V.The transistor is used as the driver circuit, the output from the sensor is given to the base of the transistor which is given to the buzzer for the purpose of indication.

F. *Hardware Implementation:*

Fig.7 shows the hardware implementation of LPG leakage and detection.

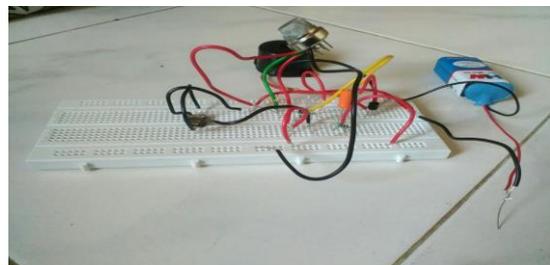


Fig. 7: Hardware implementation of LPG leakage and detection

III. RESULT

Thus, the amount of leakage can be detected with the help of MQ-6 sensor through which the concentration and proportion in air can be found out. When the concentration exceeds to a greater extent it is notified with the help of buzzer. When the concentration increases in air the level of sound gets increased to a greater extent while when there is a decrease in the concentration the sound level is decreased.

IV. CONCLUSION

With this we can get to know the amount of concentration in air and the necessary preventive measure can be taken to avoid the accidents. The further processing can also be implemented in the mere future which will be helpful in avoiding the accidents.

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