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MQ6 SENSOR BASED LPG LEAKAGE DETECTOR

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Abstract:
This paper presents the liqid petroleum gas detector which applying the LPG gas on the MQ6 sensor the sensor easily detects the gas and with the help of Ht12e and Ht12d the signals are being send and received respectively. The Ht12d which recieves the signal decodes the code and give the signal to trip off main supply through the relay. This tripping off circuit is done in a fraction of seconds. Hence, this makes this system an efficient system. This system helps to detect the gas and helps the consumer to shut it down and save themselves from any incident. Since due to increasing number of fire accidents this type of circuit is essential at every place. It will ensure that no person will lose his life in future. This circuit is easy to use and reliable in nature. Its electricity utility is also low. So, its presence won't be seen in electricity tariff. It is also cost sufficient in nature. The range of the sensor can be increased by changing the potentiometer behind it. This circuit gives the trip signal to the main supply in a fraction of seconds. Due to this fast response, it is very effective in nature and can save many lives**.**

Key words: LPG, MQ6 sensor, Ht12e and Ht12d signal, electricity, nature.

1.1 INTRODUCTION

According to the ABS-CBN news 2017 from Jan. to June 2017, the BFP has recorded a total of 2522 fire incidents. It was traced that LPG is one of the major causes of fire during that year where half of the total which is 1,253 beside from the electrical causes. For this reason, we have made a project on LPG leakage detector which helps to detect the leakage and inform the customer through switching off the main supply. This project can be of great use as the fire incidents are increasing day by day. The volume of the LPG increases with the air. So, a person should have a LPG detector installed in his home to avoid major incidents.In this project instead of using Arduino we have made a simple circuit. In this we have wireless signal transmitter at both the ends. One system transmits the signal in a coded language and the other one catches the signal and decodes it. Then the decoded signal is sent to the relay to switch off the main supply of the home.

1.2 WORKING PRINCIPLE

In the circuit we have used gas sensors to detect the LPG gas. If gas is present Then the signal is sent from the radiofrequency transmitter which codes the signal and sent to the other radiofrequency receiver. The receiver decodes the decode and shut off the main supply. The transmitter sends the code in packages to the receiver.

2.1 Literature Review

- "LPG Leakage Detector using Arduino with SMS Alert and Sound Alarm" Rhonnel S. Paculanan, Israel Carino International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8, Issue-6C2, April 2019.

In this research paper LPG detector is with Arduino is used to provide SMS service to the customer. They had used sensor to to detect the smoke and to trip the circuit transmitter is used.

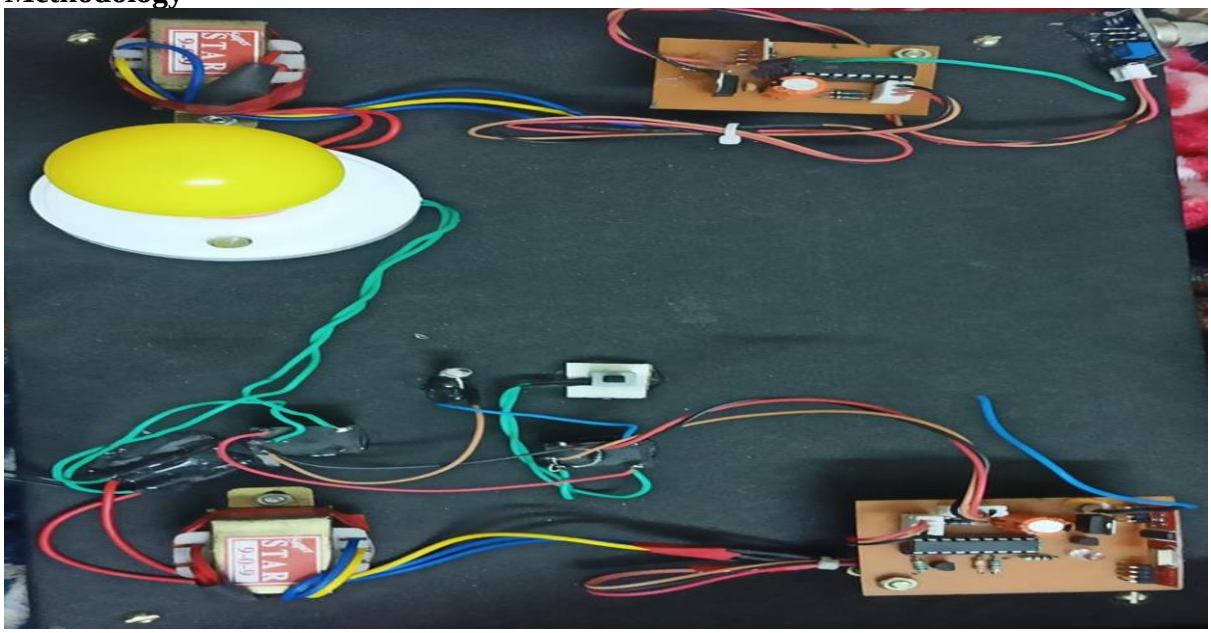
- LPG GAS LEAKAGE DETECTION USING IOT International Journal of Engineering Applied Sciences and Technology, 2020 Vol. 4, Issue 12, ISSN No. 2455-2143 Published Online April 2020 in IJEAST

In this research paper leakage detection is used using the iot device that is Arduino.
In this different component are used such as buzzer, BC 547 transistor.

- A SURVEY PAPER ON GAS LEAK DETECTION USING IOT Manichandana,Simrah UmmeRuman, Harshavardhini Biderkota, Ms. Pr Anisha, Dr.B V Ramana Murthy, And Mr.C Kishor Kumar Stanley College of Engineering and Technology for Women Chapel Road, Abids, Hyderabad-500 001

In this survey paper gas leakage detection is measured using iot. Different research paper are shown in which different methods to detect leakage are shown. Example- GSM based LPG leakage detection and controlling system, automatic unified system for LPG using microcontroller and gsm module.

3.1 Methodology



For the design we have ht12e and ht12d. Ht12e is the encoder part which helps to encode the code in the packets. Then we have ht12d which helps to decode the code. We have used radiofrequency transmitters to transmit and receive the signal. Firstly, the sensor is attached to the ht12e and the transformer supply. We have used step down transformers. When the signal is sent from ht12e to ht12d then the signal to operate relay is sent which helps to trip down the circuit. To show that circuit has tripped down we have used 0-watt bulb. 0-watt bulb switches off when the circuit trips. After the tripping of circuit we have used LED to show that circuit has tripped down. instead of LED we can also use alarm. This system helps to detect the gas and helps the consumer to shut it down and save themselves from any incident.

3.2 COMPONENTS

To make this circuit we have used different components. These are as follows-:

- **MQ6 sensor**

MQ6 sensor is LPG gas sensor. It is used to detect the LPG gas when it is leaking. There are other sensors also which are used to sense different things.

- **HT12E AND HT12D**

HT12E is used to encode the data for RF transmitter and HT12D is used to decode the data for RF transmitter. They are capable of Encoding 12 bit of information which consists of 8 address bits and 4 data bits.

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- **RADIOFREQUENCY TRANSMITTERS**

The radiofrequency (RF) transmitter is the generator of the radiofrequency current which is delivered to the transmitting coil. This creates a signal which is used to excite protons in the imaging field.

- **RELAY**

Relay is an electrically operated switch that open and closes the circuits by receiving the electrical signals from outside. It is used where there are chances of faults.

- **TRANSFORMER**

Here we have used step down transformer to step down voltage. Basically, transformer is a static device which is used to convert voltage from one value to another without affecting the frequency. In the circuit we have used two transformers.

- **BULB**

In the circuit we have used zero-watt bulb to show it as the main supply. When there is a leakage of gas the main supply will trip that is the zero-watt bulb switches off.

- **CONNECTING WIRES**

Connecting wires are used to connect the different parts of the equipment.

4- Results and Discussion

4.1 RESULTS

On applying the LPG gas on the MQ6 sensor the sensor easily detects the gas and with the help of Ht12e and Ht12d the signals are being send and received respectively. The Ht12d which receives the signal decodes the code and give the signal to trip off main supply through the relay. This tripping off circuit is done in a fraction of seconds. Hence, this makes this system an efficient system.

4.2 Discussion and Conclusion

In this leakage detector we can use some hi tech also. Like Arduino which will make the user to control the circuit through his phone. We can also add some SMS services in the system for the easiness of the consumer. In the circuit we can place alarms, sending response to sprinklers and other sensors. Since due to increasing number of fire accidents this type of circuit is essential at every place. It will ensure that no person will lose his life in future. This circuit is easy to use and reliable in nature. Its electricity utility is also low. So, its presence won't be seen in electricity tariff. It is also cost sufficient in nature. The range of the sensor can be increased by changing the potentiometer behind it. This circuit gives the trip signal to the main supply in a fraction of seconds. Due to this fast response, it is very effective in nature and can save many lives

5. Conclusion

So, after gathering all the data and performing different experiments it has been concluded that this system is very efficient in nature. It will help a lot in terms of preventing any danger caused by the gas leakage and useful as part of safety to avoid the gas leak that can cause harmful results. It will also help the consumers which uses LPG gas. This system is very fast in nature as it takes only fraction of seconds to trip the main supply. Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipment's and inadequate awareness of the people. Hence, LPG leakage detection is essential to prevent accidents and to save human lives.

6. Future scope

This leakage detector can be used with hi-tech. As by using Arduino SMS service can be provided to the consumers. It can be used in the various places for the safety of people.

Example – in schools, hospitals, hostels. This leakage detector can be upgraded by connecting sprinklers, alarm with the circuit. When the system detects the leakage gas alarm get turned on. With the use of smoke sensor, the sprinkler can also be activated to extinguish the fire.

REFERENCES

[1] B. Sonkar, A. Sood, A. Ranjan, and A. Faisal, "Microcontroller Based LPG Leakage Detector Using GSM Module," International Journal of Electrical and Electronics Research, vol. III, pp. 264-269, 2015.

[2] G. Arturson, "The tragedy of San Juanico—the most severe LPG disaster in history," Burns, vol. 13, pp. 87-102, 1987. 7 1234567890‘’“” ICESW IOP Publishing IOP Conf. Series: Materials Science and Engineering 413 (2018) 012008 doi:10.1088/1757-899X/413/1/012008
[3] KHK, "Annual Report on Liquefied Petroleum Gas," The High-Pressure Gas Institute of Japan, Tokyo2013.
[4] P. Petlee and R. Deepa, "Fires from LPG leaks on the rise; police cite negligence," in The Hindu, ed: The Hindu, 2015.
[5] S. Eno-Abasi and G. Akutu, "Stemming cooking gas-related accidents/deaths," in The Guardian, ed: The Guardian, 2017.
[6] G. Akhras, "Smart Materials and Smart Systems for The Future," Canadian Military Journal, 2000.
[7] Paul Fanning. (2012, March 15). Smart systems bring benefits to industrial applications. Available: http://www.eurekamagazine.co.uk/design-engineeringfeatures/technology/smart-systems-bring-benefits-to-industrialapplications/40993/
[8] E. Adel and L. Micheal, "Smart cities: safety, security and privacy," Journal of Advanced Research, 2014.
[9]O. Osemwegie, S. John, K. Okokpujie, and I. Shorinwa, "Development of an electronic fare collection system using stationary tap-out devices," in Proceedings - 2016 International Conference on Computational Science and Computational Intelligence, CSCI 2016, 2017, pp. 234-236.
[10] V. O. Matthews, A. O. Ajala, S. I. Popoola, and A. A. Atayero, "Smart vehicular traffic management system using RFID technology," in Lecture Notes in Engineering and Computer Science, 2017, pp. 414-417.