IJCSE International Journal of Computer Sciences and Engineering Open Access
Survey Paper Vol.-7, Special Issue-18, May 2019 E-ISSN: 2347-2693

Auto LPG Leakage Security Using Arduino

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Available online at: www.ijcseonline.org

Abstract **-** Today in this present era where technological advances are at its vertex, there is not even a single sector which remains untouched by technology. Technology has not merely established our lives simpler, but also offers a high level of safety and security whenever required. In our day to day lives, we all use cooking fuel, that is LPG for cooking our daily meals, but if this fuel gets leaked due to some or the other way and then there is a large possibility of a calamity to occur around. Hazards due to gas leakage are dangerous and can become uncontrollable if quick actions are not taken. But this gas leak mostly remains unnoticed and there should be some means to observe them so that a quick action can be taken. This paper basically deals with the development of the detection of LPG cylinder leakage at home using a gas leak sensor called MQ-6 sensor at the initial stage, which when detects gas leakage, sets the buzzer on alarm which further displays an equivalent message on the LED display of Arduino UNO. For the safety part, we use a PIR motion sensor which can detect human presence. Here, Relay module is used as a circuit breaker which will be further discussed in this paper.

Keywords— Ardui no UNO, MQ-6 sensor, relay module.

I. INTRODUCTION

Now a days liquefied petroleum Gas is an important source of energy for millions people around the world. LPG consist mainly propane and butane. The LPG or propane is a flammable mixture of hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, vehicles. The numbers of major accidence are mostly due to explosion of LPG gas cylinders. It has been increasing in recent years. The reason for such explosion is due to substandard cylinders, old valves, worn out regulators and lack of awareness in handling gas cylinders. The risk of explosion, firing, suffocation are based on their physical properties such toxicity, flammability, etc. Gaseous fuels will only burn when mixed with air; being heavier than air these gasses do not disperse easily. To avoid this problem there is a need for a system to detect the leakage of LPG.

II. RELATED WORKS

An automatically Liquefied Petroleum Gas (LPG) leakage detection, monitoring and wirelessly alarming system that is proposed in [9]. The system is planned to work in vulnerable areas for gas leakage stopping. The system includes LPG sensor, microcontroller unit, LED and buzzer alarm. The system in [9] also works on doing alerting messages to the related customer's mobile phone through GSM module. MQ-2 and MQ-6 sensors are used to detect gas leakage in home security systems [1-6], if the gas level exceeds a predetermined threshold, the system will provide information using notifications in the form short message services (SMS), then the gas pressure can be lowered to avoid the occurrence of fire. Likewise, the MQ5 sensor is used to detect a variety of harmful gases such as propane, butane, carbon monixide (CO), cigarette smoke, alcohol and so on [7, 8], the resulting system can detect harmful gases and create an early warning system in the form buzzer. GSM Module and GPS module are also added to provide fire location information

III. DESIGN ISSUE AND CONSTRAINTS

A. ARDUINO UNO:

Arduino is an open source hardware and software company, that design or manufactures single board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. There are two type of Arduino , like single board and microcontroller. Arduino board design use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards or breadboards.

Fig(1).

B. GAS SENSOR MQ6

The MQ6 (LPG Gas sensor) is a simple to use liquefied petroleum gas (LPG) sensor. It can be used in gas leakage detecting equipment in consumer and industry applications, this sensor is suitable for detecting LPG, iso-butane, propane , LNG. Avoid the noise of alcohol, cooking fumes and cigarette smoke. The sensitivity can be adjusted by the potentiometer.

There are too many specification :

- Power supply needs: 5v
- Interface type: Analog
- Pin Definition : 1-Output 2-GND 3-VCC
- High sensitivity to LPG, iso-butane, propane
- Small sensitivity to alcohol, smoke
- Fast response
- Stable and long life
- Size: 40x20mm

Pin definition:

- Signal output
- GND
- Power

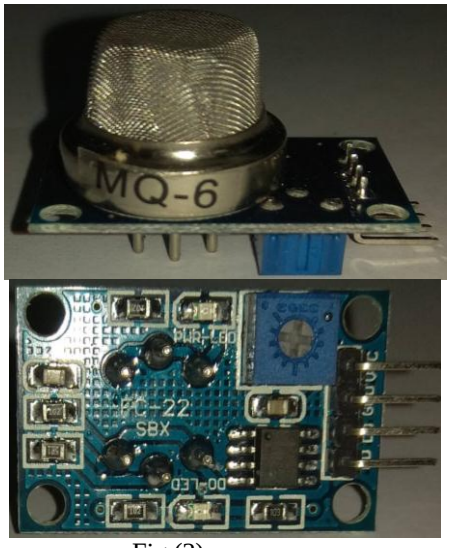

Fig.(2)

C . PIR SENSOR

A Passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often use in PIR based motion detector.

Fig.(3)

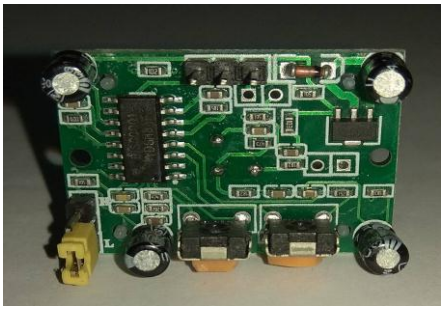

Fig.(4)

D. Buzzer

A buzzer is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Fig.(5)

E. Light Emitting Diode(LED)

A Light Emitting Diode is a semiconductor device which emits light while current is flows through it. . and its produce light on electrical and electronic equipment.

IV. BLOCK DIAGRAM

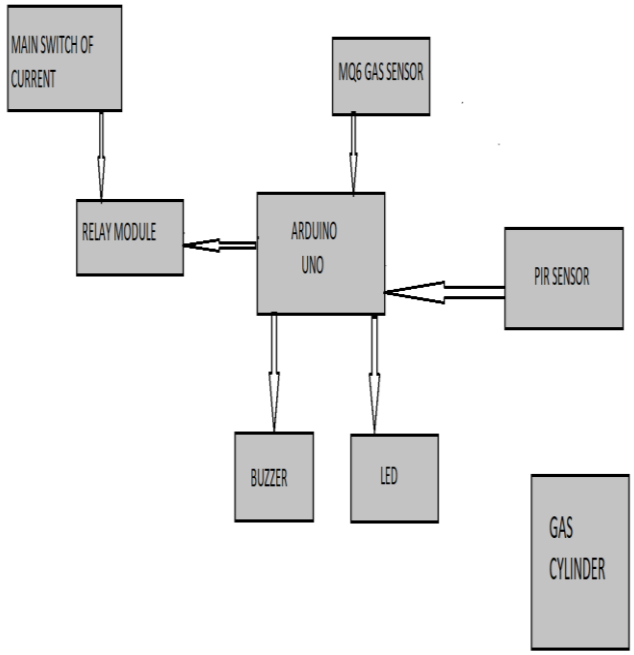

Fig. 6.Block Diagram of System Architecture

V. WORKING PRINCIPLE

The working of this device depends on the situation occurred. It can devided into following cases:

Case 1:

MQ6 STATUS	PIR STATUS
Inactive or Active low i.e., 0	Inactive or Active low i.e., 0

In this case no detection of gas leakage and any living being does not present nearby, both MQ6 sensor and PIR sensor remains inactive which results in no sound of buzzer and also relay do not work .

Case 2:

MQ6 STATUS	PIR STATUS
Inactive or Active low i.e., 0	Active High i.e., 1

In this case no detection of gas leakage and there is present of any living being nearby,MQ6 sensor remains inactive and PIR Sensor became active high which result in no sound of buzzer and relay do not work.

Case 3:

MQ6 STATUS	PIR STATUS
Active High i.e., 1	Inactive or Active low i.e., 0

In this case gas leakage is occur and any living being does not present nearby, MQ6 sensor became active high and PIR sensor remain active low , then buzzer will be activated and relay will start working.

Case 4:

MQ6 STATUS	PIR STATUS
Active High i.e., 1	Active High i,e.,1

In this case gas leakage is occur and there is present of any living being nearby, both MQ6 sensor and PIR SENSOR became active high , then the buzzer will be activated and relay will start working after 10 minute**.**

VI. CIRCUIT DIAGRAM

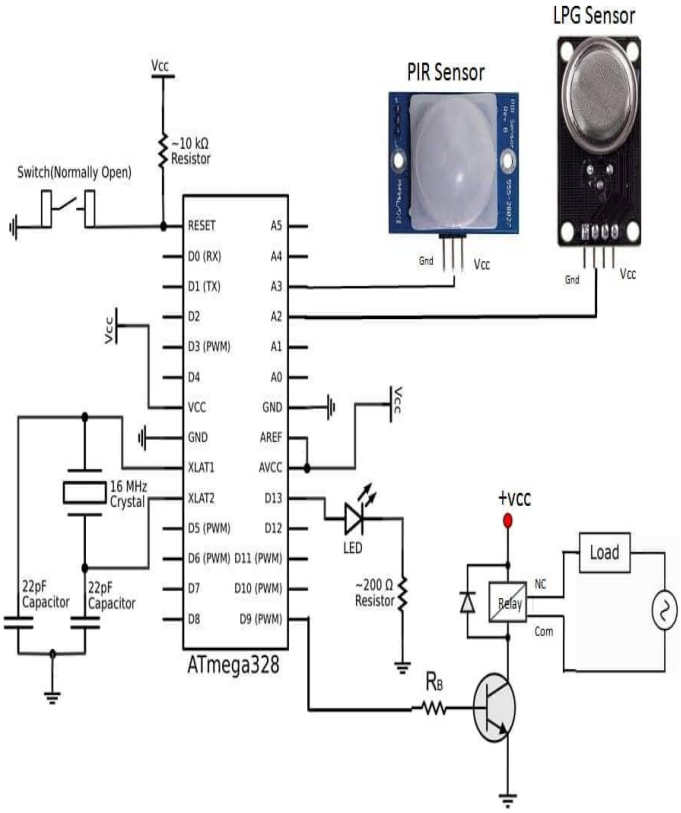

Fig.7. Diagram of Proposed Circuit

VII CONCLUSION

In this paper we have introduced design and implementation of a low cost, flexibility to the home automation. The development of the detection of LPG cylinder leakage at home using a gas leak sensor called MQ-6 sensor which when detects gas leakage, sets the buzzer on alarm which

further displays an equivalent message on the LED display of Arduino UNO. Safety part is done by PIR motion sensor which can detect human presence.

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