Gas Leakage Detection Control and Weight Alert System

Aleena Joseph[1], Anies Babu[2], Athira S[3], Jerin Varghese[4] and Nithin Prince John[5]

[1234]BTech Scholar,Saintgits College of Engineering,Kottayam,Kerala
[5]Asst. Professor, Dept. of Computer Science and Engineering, Saintgits College of Engineering, Kerala, India

---***---

Abstract - *Today home security has been a major issue where everybody wants to take proper measures to prevent. So it is necessary to automatize home. Out of that gas leakage can cause massive destruction within seconds. So it is important to detect and control it as soon as possible to ensure the safety of the society. Our project aims at preventing from the disasters caused by gas leakage. The leakage is detected using MQ-2 gas sensor. If any leakage happens you will be alerted by a buzzer and SMS and the gas cylinder automatically get locked using a motor. This system measures the weight of the cylinder continuously using a load cell and send message to the user when the weight reaches a minimum threshold value.*

Key Words: **Arduino Uno, MQ-2 Gas Sensor, GSM, Load cell & HX711, Buzzer, Motor**

1.INTRODUCTION

In India approximately 33crore people of the population are using LPG. Now-a-days there is nothing to replace LPG. A small leakage of this gas can cause a high after effect. But if any disaster happens due to gas leakage there is no proper measure to control it. These explosions may cause loss of lives, wealth etc. The Bhopal gas tragedy was an incident in which neither the leakage was detected earlier nor was the leakage controlled in time.

[1]The aim of the proposed project is to detect and control the leakage of LPG at home. MQ-2 sensor is used to detect the leakage of the gas. When the system senses the LPG content in the air the buzzer alarms the user simultaneously until the knob gets locked. There is a motor welded near the knob of the cylinder which automatically locks the knob. The system also measures the weight of the gas cylinder continuously using load cell. When the weight of the cylinder reaches a minimum threshold it will alert the user by sending SMS. GSM module is used to deliver SMS to the user's mobile phone in case of intrusion. It will help in booking the cylinder. Arduino Uno microcontroller is used for the ease of programming and ability to prototype quickly.

2. LITERATURE SURVEY

In 2013,S.Nivedhitha,A.P.Padmavathy,U.S.Susaritha and M.Ganesh Madhan,"Development of Multipurpose Gas Leakage and Fire Detector with Alarm System". This project was developed to detect gas leakage and smoke giving indications using LEDs.In 2014, D. Hari Priya and Lalith Babu ,"Gas Leakage System". This project was developrd to detect the gas leakage and give an alert using audio and visual indications.In the year 2017, E. Jebamalar Leavline , D. Asir Antony Gnana Singh , B. Abinaya, H. Deepika," LPG Gas Leakage Detection and Alert System". This project detected gas leakage and alerted the people around by alarming them with the help of a buzzer

3.DESIGN AND IMPLEMENTATION

This system consist of gas leakage detection and controlling system, weight measurement module, Arduino Uno microcontroller, GSM module and alert system .

The MQ2 sensor, load cell and buzzer are connected to the Arduino Uno. A DC motor is attached to the regulator valve of the gas cylinder. A GSM Module is connected to the Arduino. The MQ2 sensor is activated at +5V.It senses the gas leakage and gives a signal to the Arduino which in turn on the buzzer. MQ2 sensor can sense a concentration of 300 to 10,000 ppm flammable gas. Whenever the buzzer alarms, the user is alerted about the leakage. The Arduino immediately send signals that turn off the relayed DC motor connected to the regulator to avoid further leakage.

The load cell continuously measures the weight of the cylinder. Whenever the weight goes below a predetermined value, the GSM module sends an alert message to the user regarding the refilling of the cylinder. It also sends a booking request to the gas agency. The gas agency will verify the details of the customer and will sent back an acknowledgement.
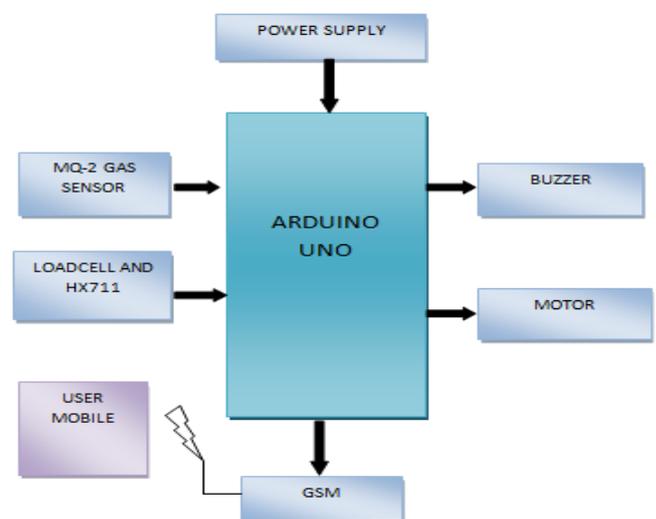

Fig-1: Block Diagram

[1]The main component is the Arduino Uno microcontroller which requires power supply. The supply can be either by DC or AC battery or adapter. Arduino is connected to the computer via USB cable or power it with suitable power supply. The microcontroller provides flexibility to code in a convenient manner. MQ2 gas sensor is connected to the Arduino. It detects the leakage of LPG Gas.MQ2.Buzzer produces an alarm to the user. Whenever the gas is sensed, the GSM sends alert to the user's phone by SMS. For measuring the weight of the cylinder, load cell is used. It is a transducer that converts force into electrical signal. If the weight reaches a minimum threshold it will alert the user by SMS to refill the cylinder

4. COMPONENT DESCRIPTION

1. Arduino Uno

    It is a micro controller board based on the ATmega328. It has 14 digital input/output pins, 6 analog inputs, 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button[1].

Fig- 2: Arduino Uno

2. MQ2 Sensor

    The MQ-2 sensor is a gas and smoke sensor. It detects the concentrations of combustible gas in the air and outputs the reading as an analog voltage. The sensor can measure concentrations of gas of 300 to 10,000 ppm. The MQ-2 gas sensor is sensitive to LPG, i-butane, propane, methane, alcohol, Hydrogen and smoke.


Fig -3: MQ2 Sensor

3. Buzzer

    Buzzer, an audio signalling device is used for the purpose of alerting. It converts electrical energy into sound energy producing high frequency for hearing purpose.

Fig -4: Buzzer

4. Load cell & HX711

    There are four wires in loadcell: red, black, green and white. To get a measurable data from a load cell, an HX711 load cell amplifier is used. It is having an accuracy of +/-5% because of the factors like drift, temperature, vibration etc.
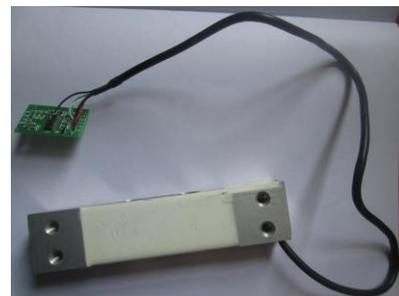
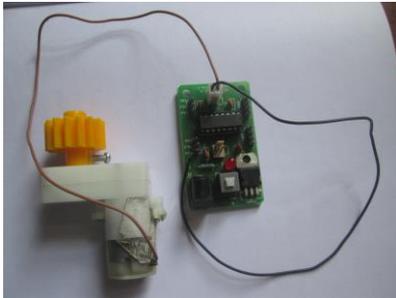**Fig- 5:** Load Cell

5. GSM Module

    [4]It is basically a modem highly flexible plug based on SIM 900 which means that it supports communication in 900MHz band. With the help of GSM modem which is connected to the Arduino board the user receives SMS alert.

Fig- 6: GSM Module

6. Motor

DC motors normally have positive and negative leads. When these leads are connected to a battery the motor will rotate. The motor will rotate in the opposite direction if the leads are switch

Fig- 7: Motor

5. FUTURE SCOPE

This project can be modified as a large system that can be used in industries .It can also be used to provide automatic delivery of refilled cylinders as soon as the cylinder is empty. Fire extinguisher can be automated so as to extinguish fire due to gas leaks without any human aid

6. CONCLUSIONS

The purpose of the system is to provide safe, reliable, simple and cost effective LPG leakage detection and control system is simple. The aim of the system is to provide simple, secure, decisive and cost effective LPG leakage detection and control system. It helps us to modify the existing safety models in the house. The components used here are of less cost and are cheaply available. The major advantage over the conventional human- based system is that it provides quick response and precise detection and control and thus helps in appropriate handling of a critical situation.

REFERENCES

[1] R.Naresh Naik , P.Siva Nagendra Reddy, S.Nanda Kishore, K.Tharun Kumar Reddy, "Arduino Based LPG gas Monitoring & Automatic Cylinder booking with Alert System", IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834, p- ISSN: 2278-8735.Volume 11, Issue 4, Ver. I (Jul.-Aug .2016), PP 06-12.

[2] Aravinda Beliraya, "GSM Based Gas Leakage Detection System Using Arduino", International Journal of Engineering Technology Science and Research IJETSR, Volume 4, Issue 10 October 2017.

[3] Mr. Mahesh S. Kholgade, Ms. Puja S. Dukare, Ms. Vaishanavi R. Deshmukh, Ms. Sneha V. Pathak, Ms. Minal P. Mahajan, "LPG Leakage Detection and Control System by Using Microcontroller", International Journal of Research in Advent Technology (IJRAT)(E-ISSN: 2321-9637) Special Issue National Conference "CONVERGENCE 2017", 09th April 2017.

[4] Halavva Patil, Shreedhar Niradi, Jyoti D.T, Seema J.S, Shweta D.G, "Smart Gas Booking and LPG Leakage Detection System", IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661, p-ISSN: 2278-8727 PP 09-13.