ADVANCED LPG CYLINDER BOOKING, LEVEL MONITORING AND LEAKAGE DETECTION

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Abstract—**Natural gases are mostly used as fuel nowadays for domestic purposes. It burns to produce clean energy, however there is a danger about their leakage. When inhaled gas leads to throttle and gases do not disperse easily. Due to explosion of gas cylinder the number of deaths has been increasing nowadays. In this proposed system Gas leakage has been detected and prevented by automatic LPG leakage monitoring and control system. This system detects the leakage of LPG with the help of gas sensor and alerts the consumer about the leak by sending SMS using GSM module. LPG level is continuously monitored by the load cell and sends this information to the Hx711. Whenever the gas level goes below the set limit Arduino and also the agency to refill the cylinder by Calling through GSM.**

Keywords—**GSM (Global System for Mobile Communication), LPG (Liquefied Petroleum Gas), Gas Sensor MQ-6, LCD (Liquid Crystal Display).**

I.INTRODUCTION

The LPG gas is widely used in homes, industries and in automobiles as fuel because of its properties which include high calorific value, produces less soot, produces very less smoke and does not cause much harm to the environment. Natural gases are another widely used fuel in homes. Both burns to produce clean energy, however there is a serious problem about their leakage. When inhaled gas leads to throttle and the air is less than gas which does not disperse easily. When ignited the leaked gases may lead to explosion. To prevent and detect gas leakage there is necessity for a system and LPG cylinder can be booked automatically by sending text message. For the customer the petroleum companies have launched IVRS(Interactive voice Response) technique. The proposed system reduces the customer burden. Now-a -days, big problem in our houses are to reload the cylinder. People hand over the old cylinder to delivery person even before the gas become extinct without knowing the quantity of gas left in it. Load cell in this system will help to overcome this problem. It will continuously monitor the gas level in cylinder and once the gas level goes below threshold limit of around 2.5 kg it sends SMS alert to the consumer as well as make a call to gas refill agency.

It uses MQ6 gas sensor which detects various combustible gases with low cost, and it sends signal to the Arduino when gas level beyond safety limit and at the same time with the help of solenoid valve it will turn off the power supply, when the leakage is detect. The alert mechanism in the proposed system includes a solenoid valve, buzzer and with the help of GSM the consumer received the SMS.

II.BLOCK DIAGRAM

In this circuit, the MQ-6 sensor is used for gas leakage detection. It has a 6 pin, 2 pins are used for providing heating current, and 4 of them are used to fetch signals. When there is a gas leakage it will alert the user by sending message to the mobile number which is already stored in memory. With the help of the solenoid valve it will turns off the
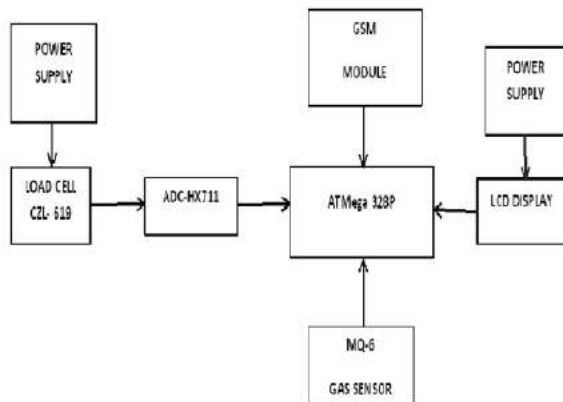
regulator when gas leakage is detected.

Fig.1Block Diagram of automatic gas leakage detection and booking

Relay will indicate the gas leakage and the Solenoid valve will be switched on or off. It is a two-port valve and control the flow of electric current .LPG level is continuously monitored by the load cell and when the gas level goes below 2.5 kg the old cylinder will be replaced and new cylinder will be booked automatically using GSM. The device ensures safety and prevents the problem due to explosion of gas leakage.

III. ARDUINO AND GSM MODULE

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz 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 Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega328p programmed as a USB-to-serial converter.
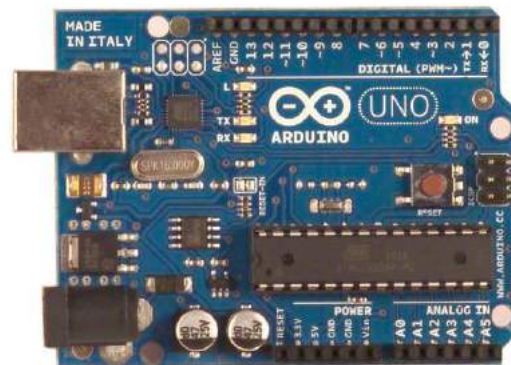

Fig.2 Arduino ATMega 328P

A GSM module which assemble the GSM modem, serial communication and power supply. A GSM modem is wireless modem looks like a mobile phone that works with a GSM network. AT commands are used to control the modem. Advantage of GSM modem is compact, low power consumption and high quality SMS function.

IV. LOAD CELL MEASUREMENT

Strain-gauge balance is a method used for weighing with low resolution. A strain gauge is a (often zigzag shaped) conductor, etched out of thin metal film. It uses the effect of change in the electrical resistance when it is subjected to mechanical stress, caused by change in length, cross section and specific resistance. Usually, four strain gauges are glued to a "spring body" (flexural component), which is manufactured from a single part, as shown below with its electrical circuit:
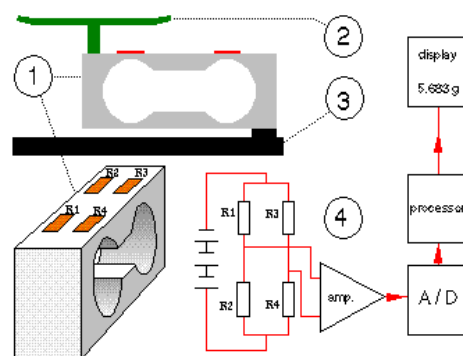
Fig.3 Load cell Diagram
(1, spring body (side view and in perspective) 2, weighing pan 3, mounting plate (housing) 4, placing and wiring of the strain gauges (R3 and R4 can also be placed on the underside of the beam)

The strain gauges are wired as a Wheatstone-bridge to compensate for temperature changes. When the system is not loaded all four resistors are the same and the input of the amplifier is zero. When an object is placed on the pan R1 and R4 are compressed and their resistance decreases, R2 and R3 are strained and their resistance is increased. This causes a voltage difference at the input of the amplifier. The shape if this spring body is comparable with the basic construction of the electronic balance with two guides.

The strain-gauge method of measurement has its limitations for high resolution weighing machines, which are primarily due to creep in the spring material and the adhesive between the spring body and the strain gauges. The moisture sensitivity of the adhesive and the low output signal also cause difficulties. The major advantages of this method are the compact design cost and its easy adaptability to various maximum capacities.
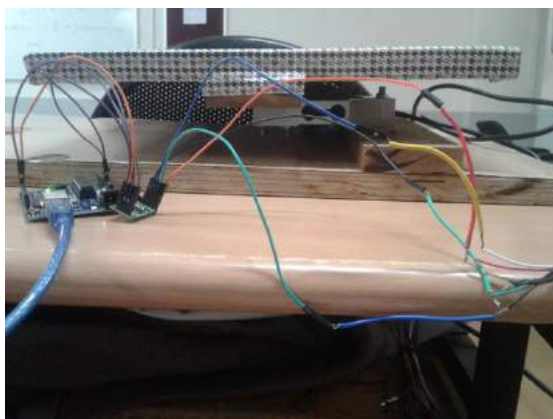
V.HARDWARE SETUP

Fig.4 Hardware setup

HX711 is a precision 24-bit analog to-digital converter (ADC) designed for weight scales and industrial control applications to interface directly with a bridge

sensor. The input multiplexer selects either Channel A or B differential input to the low-noise programmable gain amplifier (PGA). Channel A can be programmed with a gain of 128 or 64, corresponding to a full-scale differential input voltage of ±20mV or ±40mV respectively, when a 5V supply is connected to AVDD analog power supply pin. Channel B has a fixed gain of 32.Onchip power supply regulator eliminates the need for an external supply regulator to provide analog power for the ADC and the sensor. It can be from an external clock source, a crystal, or the on-chip oscillator that does not require any external component. On-chip power on- reset circuitry simplifies digital interface initialization
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VI. RESULT AND DISCUSSION

This GSM module consists of five terminals. The first terminal is used for reset, second key is for moving to next position, third and forth key is for increment and decrement, and the last key is used to enter the numbers. Load cell and gas sensor are connected with microcontroller.

A mobile number is fed by the keys and is stored which is displayed in LCD. When there is a gas leakage and also when gas level falls below the threshold limit ATMega microcontroller will send alert to the mobile number. When the gas leakage goes beyond safety limit it will be turned OFF and for gas level in the cylinder going below threshold limit it will be automatically booked.
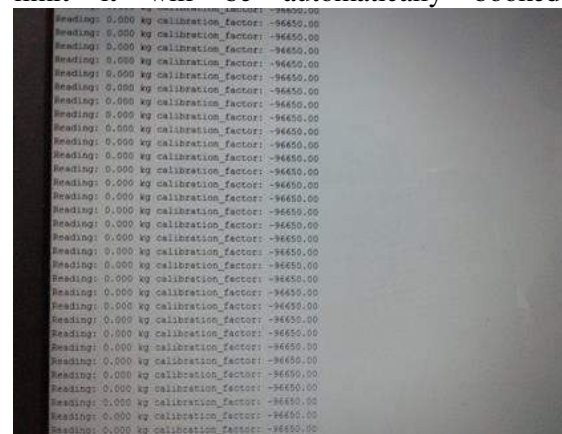

Fig.3 Model output of load cell

VII. CONCLUSION

As we shorted out the problems faced by LPG gas consumers so we come up with some solutions to meet the few requirements of them, as we made our system is completely automate the process of refill booking without human intervention. Our system is also reasoned to help customers to upgrade their safety norms, act in accordingly with minimum requirements on environmental issues and mostly the basic function being prevented by major disasters and protect life and property from reputed Accidents. The primary objective of our project is to measure the gas present in the cylinder when weight of the cylinder is below the fixed load, this can be done using the weight sensors. The gas retailer gets the order for a new cylinder and the house owner (consumer) receives the message regarding the status and the secondary objective is to provide any malfunction in gas servicing system in order to prevent damage or explosion of LPG. Thus the system developed by us will somehow help the LPG Gas Consumers to lead a comfortable life.

VIII. REFERENCES

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