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ARDUINO Based LPG gas Monitoring & Automatic Cylinder booking with Alert System

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Abstract— The world has seen rapid development of technology in various field due to fast modernization of this world. However, all of that is basically to make human life more easy and hassle-free in every sphere of life. it isn't conceivable to supply LPG through Pipes to every single home in a country like India, as creation of LPG is too meager. At the moment we are having a framework Advance LPG gas booking through IVRS or online which is most troublesome for the uneducated and busy working individuals to book the gas cylinder. Another Major issue clients confront is that we can't predict the precise status of LPG gas culmination, which makes significantly more deferral in booking the cylinder which is awkward the greater part of the circumstances. Presently we are having an IVRS framework in which client needs to experience few stages as per the Programmed voice which likewise incorporates choosing alternatives. The greater part of the uneducated individuals can't finish the booking because of this reason and furthermore the majority of the circumstances the telephone lines are either occupied because of congested calls or telephones not working because of some specialized issues. Our paper proposes a framework that will make whole LPG cylinder booking system robotized without human intercession. This framework constantly measures the weight of the cylinder will consequently sends message to the approved LPG Agent with the goal that they can convey the LPG chamber in time. Alongside the automated booking we additionally composed element identified with the wellbeing of the client in which it consistently screen the spillage of LPG gas and alarms the client in regards to spillage to evade real mishaps which costs human lives for the most part.

Keywords—Arduino , Gas Sensor, GSM Module, LPG Booking, Alert system

I. INTRODUCTION

There are roughly 30crore LPG clients in the nation in which for the most part 40% of the populace. There are few guidelines that have been executed for the gas spillage recognition framework. The current frameworks gives a caution framework which is for the most part intended to distinguish a Gas spillage in the house and business premises.
The goal of the proposed framework is to persistently gauge the heaviness of the barrel and as soon as it achieves the base edge it will naturally sends a SMS caution to the client and in addition Authorized LPG operator with the goal that they can act as needs be. This framework likewise intended to distinguish LPG gases, for example, propane and butane. The permitted level for butane is 600ppm above which it is thought to be of abnormal state and represents a peril. The edge level of weight of the barrel is utilized for programmed chamber booking. The principle point of this undertaking is to screen for fluid oil gas (LPG) spillage to maintain a strategic distance from significant fire mishaps and furthermore encouraging wellbeing insurances where security has been an essential issue and programmed chamber booking without human intercession. The proposed framework utilizes the GSM Modem to caution the individual about the gas spillage by means of SMS and status of programmed barrel booking. At the point when the framework distinguishes that LPG fixation noticeable all around achieves the predefined level then it alarm the buyer by sending SMS to enlisted cell phone and caution the general population at home by actuating the alert which incorporates Buzzer at the same time and furthermore show a similar message on LCD to make the vital move.

II. LITERATURE SURVEY

In the year 2011, a paper: "Design and Implementation of an Economic Gas Leakage Detector" was written. This undertaking created framework to identify the gas spillage and giving prompt caution or insinuation to the client.

Later in 2013, a plan was proposed for home wellbeing. The framework identifies the spillage of the LPG and cautions the purchaser regarding the spill using GSM. This venture was produced utilizing microcontroller ARM version 7 and utilizing Keil programming.
In the year 2014, Hitendra Rawat, Ashish Kushwah, Khyati Asthana, Akanksha Shivhare, composed a project, they gave security issues against cheats, spillage and fire mischances. In those cases their framework sends SMS to the crisis number gave to it.

III. IMPLEMENTATION OF DESIGN

The Main platform we are utilizing to manufacture the undertaking is Arduino Uno which gives us the adaptability to compose an easy code in advantageous way and furthermore it will gives us highlights like Inexpensive, Cross stage, Simpler and clear programming condition, Open source and extensible programming [9].

The other principle part we are utilizing as a part of our undertaking is the usage of a load cell. A load cell is utilized to gauge the weight of the cylinder, so that the consumer can be alerted when the weight reaches the lower threshold weight value [4].

The gas sensor is likewise one of the segments used to distinguish the spillage of the LPG Gases such as Methane and Propane. The MQ4 is utilized as a part of gas leakage identifying part and are appropriate for distinguishing of CH4, Natural gas and to keep away from the clamor of liquor and cooking exhaust and tobacco smoke [8]. The MQ-4 can recognize flammable gas fixations from 200 to 10000ppm. MQ-4 sensor has high sensitivity to CH4, Natural gas. It is fast and stable and at the same time very durable.
The use of the GSM Module is to caution the client by sending a SMS(Short Message Service) about Gas Spillage and also a status update when the LPG gas cylinder is about to be empty [10]. The GSM modules can work at two frequencies: 800 MHz or 1800 MHz recurrence band.

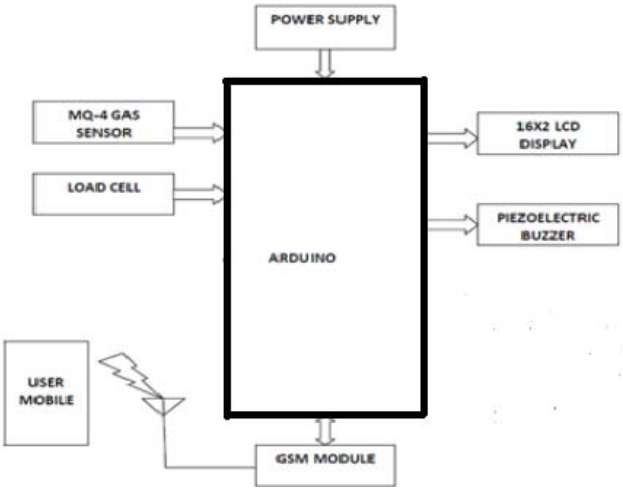

Fig 1: Block Diagram Of Proposed System

1) **MQ-4 Sensor**: The sensors in the MQ series have a small heater fixed inside alongside an electro-chemical sensor, which helps in measuring different gases and their combinations. MQ-4 is a Sensor for Natural Gases Sensitive material. The sensitive material of this sensor is SnO_2 which is more conductive in clean air. The conductivity of the sensor is higher when a gas leakage is detected [1].
The output of the MQ-4 sensor is in analog form. The connection of the sensor is also very easy. Connect the output through an ADC, heat the coil with 5V and also add on a load resistance [2].
2) **LCD**: LCD stands for Liquid Crystal Display. It is a flat display screen which uses liquid crystals and its light modulation properties. LCDs have beat cathode ray tubes in today's world. The following table shows the circuit connections of a LCD to an Arduino board.

LCD	Digital Pin Number
RS pin	12
Enable pin	11
D4	5
D5	4
D6	3
D7	2

Table 1: LCD connections

On pins 15 and 16, a 220Ω resistor is connected which powers the display backlilght.
The LCD in overall consumes very low power as well as fixes issues regarding flickers. It is compact and very light-weight as compared to CRT.

- **Load Cell**: A load cell is a tranducer which converts the measure of force applied to electrical signals. The most commonly used load cell id the strain gauge load cell which is comparatively stiff with good resonance values [11]. These load cells are also durable and have long lives in application
  An amplifier—HX711, is used to get measurable data values from the load cell and strain gauge[3].

3) **Piezoelectric Buzzer**: A piezoelectric buzzer or a tone generator is a sound producing transducer. They are small, compact and light weight which can produce a very high

sound even with the smallest energy input. The working of the buzzer is fairly simple. A thin piezoelectric ceramic material is attatched to an equally thin diaphragm made of metal. On application of a constant or recurring voltage, the piezo material starts vibrating at the same frequency as the applied voltage and hence creates a sound.
A buzzer may be used to alert people when an event occurs. For example, smoke alarm, battery operated alarms, time alarms etc.[7].

4) **ATMEGA328 microcontroller**: In this proposed system Arduino Uno is used as a controller.

Parameters	**Values**
Central Processing Unit type	8 bit AVR microcontroller
Speed performance	20 million instructions per second
Flash memory	32 kB
SRAM	2 kB
EEPROM	1 kB
No of pins	60 pins
Maximum frequency allowed	20 MHz

Table 2: Microcontroller parameters

5) **GSM Module**:
The GSM module or the GPRS module is basically useful to communicate between a computer and a GSM modem. Global system for mobile communication is used widely all over the world [12]. The GSM modem cannot work by itself. It needs a SIM card(subscriber information module). The GSM module also has a IMEI number like all of our mobile cell phones [5].
The GSM module runs on AT commands and can do the following works:

- Send and receive SMS or short message service.
- It can initiate, receive or even reject a call from another GSM module.
- The modem has to power to save numbers and contacts of SIM cards in other GSM modules.

Fig 2: GSM 800 Module

IV. WORKING OF THE MODEL

i) The GSM module has an adapter which needs to be connected to a power source. The LCD switches on.
ii) The voltage regulator gets power and converts the electric potential from 12V to 5V.Now the whole circuit has 5V power.
iii) Our cylinder is placed in the load cell. The load cell module is converts the weight into analog data and sends it to the ATMega 328 microcontroller chip.
iv) The crystal oscillator generates a frequency less than 20 MHz.
v) The microcontroller sends the data to the 16x2 LCD screen.
vi) We faced a problem where in the event of an alert, messages were sent constantly through the GSM modem. We used a manual checker which can be used to send only one booking request by the consumer himself.
vii) When the gas sensor senses any leakage, the buzzer starts ringing and a sms is automatically sent to the consumer number saying “Leakage Alert”[6].

V. RESULTS AND DISCUSSIONS

Fig 3: Output Showing Status Of LPG Gas Cylinder

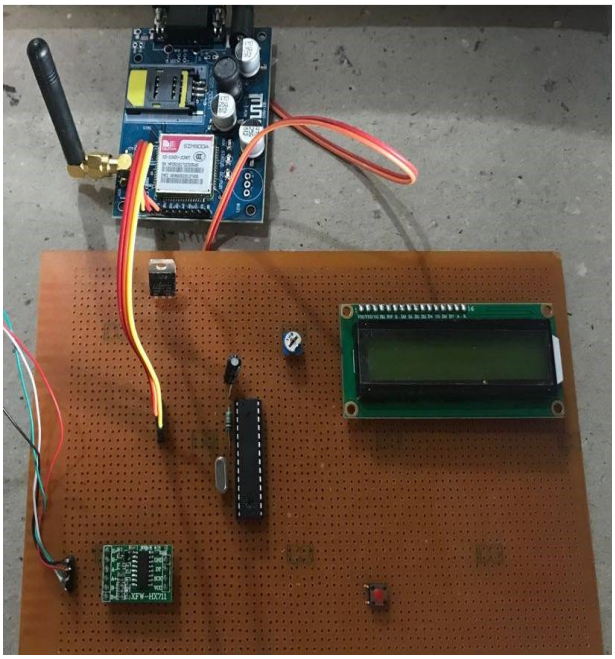

Fig 4: Design Of Project

VI. CONCLUSION

As we shorted out the issues looked by LPG gas shoppers so we think of a few answers for meet the couple of prerequisites of them, as we made our framework is totally computerize the procedure of refill booking without human mediation. Our framework is additionally contemplated to help clients to update their wellbeing standards, act in as needs be with least necessities on ecological issues and for the most part the fundamental capacity being forestalled by significant debacles and shield life and property from accidents. The essential target of our venture is to gauge the gas display in the cylinder when weight of the barrel is beneath the settled load, this should be possible utilizing the weight sensors. The gas retailer gets the request for another cylinder and the house proprietor (customer) gets the message with respect to the status and the auxiliary target is to give any breakdown in gas adjusting framework to counteract harm or blast of LPG. Consequently the framework created by us will by one means or another assistance the LPG Gas Consumers to have an agreeable existence.

VII. FUTURE SCOPE

In the future, a temperature sensor can be fitted. Along with that an exhaust and a driver circuit may be fitted in case there is a fire and the user is not able to get to the location in time. This monitoring system can be additionally upgraded by utilizing Bluetooth set up of GSM to send the alarm messages to client, which bolsters the another ongoing application. For industrial purposes portable robot can be produced for distinguishing various gas focuses. Expansion of load cell can likewise be utilized as weight sensor which recognizes the measure of gas in the barrel and furthermore identifies high weight gas in chamber pipe, showing the alarm messages by means of SMS and LCD shows.

VIII. ACKNOWLEDGEMENTS

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