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RESEARCH ARTICLE OPEN ACCESS

Self Booking Cylinder

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ABSTRACT;The project SELF BOOKING CYLINDER is a system which changes the entire LPG gas booking procedures automated along with leakage detection without any human intervention.That means this system continuously measures the weight of the gas cylinder and books the next new refill automatically by sending an SMS to the gas agency as soon as the gas in the cylinder reaches to a threshold value. Along with the automated booking the system has an additional advantage as it alerts the consumer by raising an alarm when there is a leakage of gas from the cylinder.

Keywords:Introduction, Existing system, Components, Working, Conclusion.

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I. INTRODUCTION

LPG (Liquefied Petroleum Gas or Liquid) is one of the most important commodity in our house hold items. This LPG contains flammable hydrocarbon gases including propane, butane and mixture of these gases. There are approximately 30crore LPG users in which mostly 40% of the population. In our country it is not possible to supply LPG through pipes to each and every home as the production of LPG is very low. Hence the supply is done with the help of cylinders. Whenever we observe the LPG gas cylinder is empty, we give request for a new cylinder by using IVRS (Interactive Voice Response System), SMS (Short Message Service) or Mobile applications. There is a delay in providing the gas cylinder. The main reason behind this is a delay in informing to the gas provider at the last moment when the gas is empty. Most of the illiterate people can't even complete the booking and also most of the times these land line phonesare either busy due to congested calls or phones not working due to some technical issues. Another problem is that most of the times people book the refill with a prediction that the cylinder is going to be empty and hand over the old cylinder to the delivery men without knowing the exact quantity. To avoid all such complications we have implemented a project called "SELF BOOKING CYLINDER".

EXISTING SYSTEM

The several standards have been implemented for the gas leakage detection system. The existing system provides an alarm system which is mainly meant to detect the gas leakage in the house and commercial premises.

PROPOSED SYSTEM

In this proposed project "SELF BOOKING CYLINDER ", the system always monitors the level of the LPG gas cylinder with the help of a load cell and as soon as the gas in the cylinder reaches to a cutoff level, then it automatically sends an SMS alert using GSM module to the authorized LPG agent so that the refill will be booked. The additional advantage of this system is that it checks the leakage of the gas from the cylinder by using a gas sensor and alerts the user with a buzzer sound.

COMPONENTS

LOAD CELL

Load cell is a type of transducer which performs the functionality of converting force into an electrical output which can be measured. The load cell is found at the heart of any weighing machine or electrical scales. This is also used in load testing machines and flow meters. This type of device is highly accurate which provides the user with required information. These load cells are usually attached to support beam or structural bear-

ing of an application which endures pressures and stresses often with appropriate or superglue. In our system load cell plays a vital role.

Figure 1. Load Cell

LOAD CELL AMPLIFIER

The load cell amplifier is a small break out board for the HX711 IC that allows you to easily read load cells to measure weight. The HX711 uses a two wire interface (clock and data) for communication. Load cells use a four wire wheat stone bridge configuration to connect to the HX711. These are commonly colored RED, BLACK, WHITE, GREEN and YELLOW. Each color corresponds to the conventional color coding of load cells. By connecting the amplifier to your arduino, you will be able to read the changes in the resistance of the load cell.

Figure 2. Load Cell Amplifier

ARDUINO UNO

The Arduino UNO is a widely used open source microcontroller board based on the microchip ATmega328P microcontroller and developed by arduino.cc. The board is equipped with sets of digital and analog input and output (I/O) pins that may be interfaced to various expansion boards and other circuits. The board features 14 digital pins and 6 analog pins. It is programmable with the arduino IDE (Integrated Development Environment) via a type B USB cable.

Figure 3. Arduino Uno

GSM sim900a

GSM is an abbreviated form of Global System for Mobile Communication. It is used to establish a communication between a computer and a GSM system. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher date transmission rate. The board will also have pins or provisions to attach mic and speaker, to take out +5V or other values of power and ground connections. This GSM TTL modem has internal TCP/IP stack to enable user to connect with internet through GPRS feature. It is suitable for SMS as well as DATA transfer application in mobile phone to mobile phone interface.

Figure 4. GSM sim900a Module

GAS SENSOR

A gas sensor is a device which detects the presence of gas in the area. This sensor interacts with a gas to measure its concentration. Each gas has a unique breakdown voltage i.e the electric field at which it is ionized. Sensor identifies gases by measuring these voltages. The concentration of the gas can be determined by measuring the current discharge in the device. The gas sensor detects the presence of various gases such as hydrogen, carbon monoxide, methane and The detecting concentration of the device is 200-10000ppm. It gives both analog and digital output. The supply voltage for the gas sensor is 5V.

Figure 5. Gas Sensor

PIEZOELECTRIC BUZZER

A buzzer is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. A piezoelectric element may be dri-

ven by an oscillating electronic circuit or other audio signal source, driven with piezoelectric audio amplifier. Piezoelectric buzzer is based on the inverse principle of peizo electricity. It is the phenomenon of generating electricity when mechanical pressure is applied to the certain materials and vice versa. Such elements are known as piezoelectric materials. When an alternating electric field subjected to the material they stretch or compress accordance with the frequency of the signal there by producing sound.

Figure 6. Piezoelectric Buzzer

BLOCK DIAGRAM

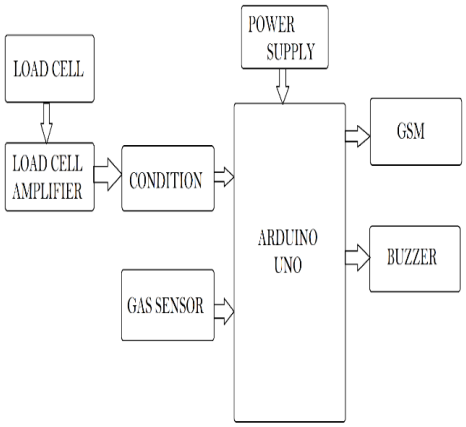

Figure 7. Block Diagram

WORKING PROCEDURE

The project "SELF BOOKING CYLINDER"consistsof three major modules. The first one is to continuously monitor the level of the gas in the cylinder. Secondly, the system automatically books the refill as soon as the gas reaches to a threshold level. And finally it avoids the accidents due to gas leakage.

The main basic Arduino uno microcontroller requires the power supply ranging from 7-12 volts which can be built by using different components like step down transformer, rectifier, filter and regulator. This board provides us the flexibility to write the code effectively and clear programming environment. It acts as a controller between the load cell and GSM module.

In the proposed project, a load cell is used as a weight sensor. This sensor will be placed below the LPG gas cylinder. Output of the weight sensor is given to the arduino uno. This will continuously monitor the weight of the LPG gas. The actual weight of the gas cylinder is approximately 29.5 kg. By excluding the tare weight that is the weight of the metal, the weight of the gas present in it is 14.2 kg. This is calculated by total weight received by weight sensor minus the weight of the empty gas cylinder.

We will give a threshold value say for example 2 kg which is 15% of the total gas present. Whenever the difference between the total weight measured by the weight sensor and the weight of the empty gas cylinder, is less than or equal to 3kg, then automatically a new refill will be booked by sending a message to the LPG agent with the help of the GSM SIM900a. As now a days the LPG gas cylinder booking in most of the cities is done by sending SMS. We have to send the SMS from a registered number to the gas booking agency or the agent. Then our request is taken down which means we don't have to dial or call or we don't have to visit the agency personally.

Another additional function is to detect the presence of the gas in the air. Whenever there is an increase in the concentrations of the gas in the atmosphere then automatically the system will activate an alarm that is buzzer in order to alert the consumer. LCD (Liquid Crystal Display) is used to show the output of the results of the readings of the load cell about 32 ASCII characters in 2 lines.

II. RESULT

The proposed system is used to continuously monitor the level of the gas and to send the message to the gas agent in order to book a new refill as soon as the weight of the gas cylinder is below the threshold level.

Whenever the gas in the cylinder is above the threshold level say for example 2kg, the LCD display shows only the weight.

But in case whenever the weight is below the threshold level say for instance 1.0kg, the GSM module will send the SMS and the LCD shows the message "SMS ALREADY SENT".

When the gas sensor detects the concentration of the gas in the air, the LCD display will show the message that "LPG GAS LEAKAGE DETECTED" and it activates the buzzer.

III. CONCLUSION

As we have sorted out the problems faces by the LPG gas consumers, we come up with the solutions to meet the requirements of them. The primary objective of our project is to measure the gas present in the cylinder. Next the refill should be booked whenever the gas goes below a threshold value. The gas agent gets the message to place a new order. The secondary objective is to provide any malfunction in gas servicing system in order to prevent damage or explosion of LPG. Thus the proposed system will help the gas consumers to lead a comfortable life.

Advantages

1. The project is easy to use and as it is fully automated so no human attention is required.
2. It avoids the problematic situation caused due to the unavailability of the gas cylinders.
3. This project avoids the accident or the fire which is caused due to the leakage of LPG gas.

Application

1. In our day to day bias we use LPG gas cylinder for house hold purpose.
2. Hotels are one of the largest areas where LPG gas is used. As there are many number of gas cylinders, our project finds it as a suitable application.
3. In industries where the gas cylinders are used for the purposes like welding or heating, the industry owner can be intimated about the gas weight or the gas availability.

Future Scope

Voice feedback system can be included. So that the user will get an intimation through pre-recorded voice messages. The monitoring system can be further enhanced by using Bluetooth in place of GSM to send an alert messages to the user.

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