Smart LPG Cylinder Monitoring System

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Abstract- *The gas presence was detected with a chemically infused paper that changed its colour when exposed to the gas, before the development of electronic house hold gas detectors. Since then, many technologies and devices have been developed to detect & monitor, and alert the leakage of a wide array of gases. Today, booking an LPG cylinder is now just a text SMS away. The design and development of smart monitoring of LPG cylinder in real time is very important. The detection of leakage and monitoring of gas level in LPG is a part of smart kitchen. The project aims to monitor LPG gas level and leakage. This system detect gas level and leakage and send e-mail and SMS through IoT. The weight of LPG cylinder is measured using strain gauge, the pic microcontroller is placed on the stand to indicate the weight. A database is created using java program and it is maintained by server. The user information is inserted into database by sending information through the database in IoT cloud network by this data it takes the information form the database and send booking sms to booking system and also send alert sms to the user. The booking system is user friendly because user con change the booking setup. This will help the customer according to the usage purpose level.*

Keywords- IoT (Internet of Things), LPG (Liquefied petroleum gas), SMS (Short Message to be sent), IVRS (Interactive voice Response)

I. INTRODUCTION

LPG is made up of Commercial Propane and Commercial Butane having saturated as well as sun saturated hydrocarbons. Because of its versatile nature of LPG it is used in many needs such as domestic fuel, industrial fuel, auto-mobile fuel, illumination etc. and the demand for LPG is continuously increasing day by day. The liquefied petroleum gas is used widely in homes, industries and in auto-mobiles as fuel because of its desirable properties which include high calorific value. It creates very less smoke and does not cause much harm to the environment. The gases being 5 times heavier than air do not disperse easily and may The number of deaths due to the explosion of gas cylinders has been increasing in recent years. There is a need for a system to detect and also prevent leakage of LPG. Before the development of electronic house hold gas detectors in the 1980s and 1990s, gas presence was detected with a chemically infused paper that changed its colour when exposed to the gas. Since then, many technologies and devices have been developed to detect & monitor, and alert the leakage of a wide array of gases.

In INDIA gas distributer uses IVRS, SMS or ONLINE booking for LPG which are time consuming methods in fast running life.

With the development of the technology of the Internet of Things (IoT), various IoT-based monitoring systems have been used in diverse fields, such as smart homes, public security, logistics, and the intelligence industry. IoT-based monitoring systems, in particular, can effectively and quickly provide useful information that existing systems are unable to deal. Consequently, demand for these monitoring systems has dramatically increased. However, in the gas industry, research and development of IoT-based monitoring systems have progressed only slightly.

II. HARDWARE DESCRIPTION

The functioning of the device starts from measuring of weight of LPG gas cylinder. This is measurement gives the level of gas in the cylinder, this value is displayed in LED display. When this value reaches the specific fixed range due to consumption it gives alert message to the user and send booking message to the consumed authority. This process also includes detection of leakage of gas using gas sensor.

Microchip's powerful PIC architecture into a 28pin package. The PIC16F886 features 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, Universal Asynchronous Receiver Transmitter (USART). All of applications in automotive, industrial, appliances and consumer applications.

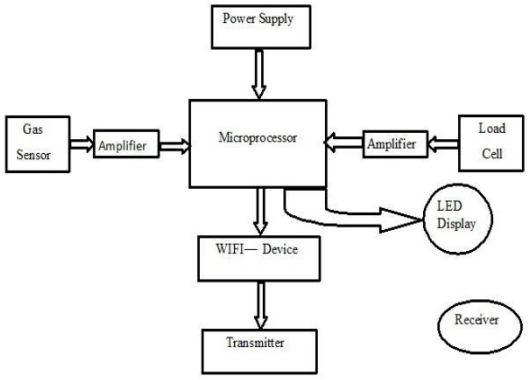

Figure 1. Block Diagram for Monitoring System

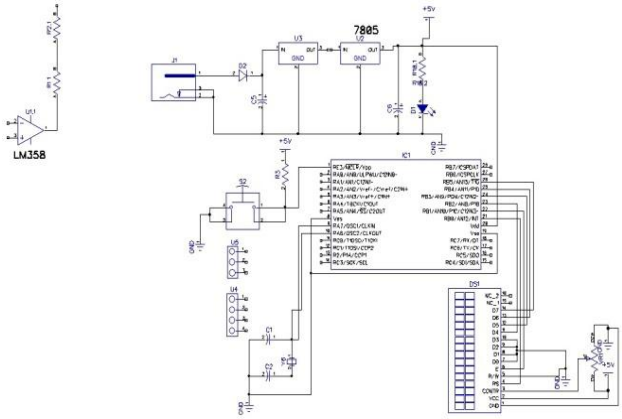

Figure 2: Circuit Diagram

The power supply for operation of the D.C motor and electronic components is obtained from a 12V battery and 5V battery is provided for PIC16F886. The battery is also used to run sequence of operations of sensors and display unit.

PIC16F886 is a Harvard computer model. It has separate memories for program and data each with its own buses. The major advantage with this architecture is that while an in struction is being executed the next one can be fetched. The execution speed is doubled the memory of this chip which was referred to earlier be its data memory. Its program has 14 bits in each location .All instructions fit in one program memory location. An instruction is in other words completely defined with a number between 0x0000 and 0x3FF. Data memory data bus has 8 pins and address bus has 9 pins. Program memory data bus has 14 pins and address bus has 13 pins. Every instruction in PIC16F886 is represented by a 14 bit binary number. The PIC16F886 has 35 different instructions.

In the smart world the monitoring of LPG gas is very less. These occur lots of wastage of gas. Due to wastage of gas there occur pollution. The LPG is five times heavier than air. So it is important to detect the leakage of LPG. The LPG gas has very flammable property. When the gas is leaked there occur major accident. Many accident also occur due to the leakage. In order to prevent many life from the danger the management of level of gas in tank is very important. There is no proper automatic process to measure level of gas. The device not only measure the leakage of the gas but also in the process of automatic booking of LPG cylinder when it is empty.

Features

- High-performance RISC CPU. This Processor has Lead-free RoHS-compliant Its Operating speed is 20 MHz, 200ns instruction cycle and Operates at a voltage of 4.0-5.5volts.
- It has 15 Interrupt sources and 35 single word instruction.
- Special Microcontroller Features includes Flash memory of 14.3KB(8192 words) It has an main configuration on Data SRAM of 368 bytes and Data EEPROM of 256 bytes.
- PIC16F877A is Self-reprogrammable under software control. Specially has Watchdog timer with on-chip RC oscillator.

III. PG Specification

S.No	Characteristic	Requirement for commercial
1	Vapour pressure at 65 deg. C kgf/cm.g.	16.87 Max
2	Volatility: evaporation temperature in deg. C, for 95 percent by volume at 760 mm Hg pressure, Max.	2
3	Total volatile sulphur Percent by mass, Max.	0.02
4	Copper strip corrosion at 38 deg.C for 1 hour	Not worse
5	Hydrogen Sulphide	Absent
6	Dryness	No free entertained

		water
7	Odour	Level 2

IV. PROPOSED SYSTEM

The functioning of the device starts from measuring of weight of LPG gas cylinder. This is measurement gives the level of gas in the cylinder, this value is displayed in LED display. When this value reaches the specific fixed range due to consumption it gives alert message to the user and send booking message to the consumed authority. This process also includes detection of leakage of gas using gas sensor.

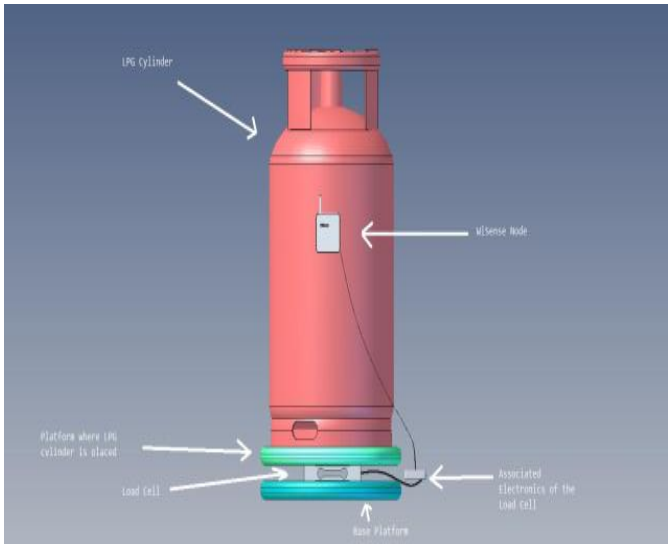

Figure 3: proposed model of smart cylinder

Load Sensor

Through a mechanical construction, the force being sensed deforms a strain gauge. The strain gauge measures the deformation (strain) as a change in electrical resistance, which is a measure of the strain and hence the applied forces. A load cell usually consists of four.

Figure 4: Load Cell

Through a mechanical construction, the force being sensed deforms a strain gauge. The strain gauge measures the deformation (strain) as a change in electrical resistance, which is a measure of the strain and hence the applied forces. A load cell usually consists of four in a Wheatstone configuration. Load cells of one strain gauge (Quarter Bridge) or two strain gauges (half bridge) are also available.

The output of the transducer can be scaled to calculate the force applied to the transducer. Sometimes a high resolution ADC, typically 24-bit, can be used directly. Strain gauge load cells are the most common in industry. These load cells are particularly stiff, have very good resonance values, and tend to have long life cycles in application. Strain gauge load cells work on the principle that the strain gauge (a planar resistor) deforms/stretches/contracts when the material of the load cells deforms appropriately. These values are extremely small and are relational to the stress and/or strain that the material load cell is undergoing at the time. The change in resistance of the strain gauge provides an electrical value change that is calibrated to the load placed on the load cell.

Gas sensor

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

Figure 6: Gas Sensor

Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting.

Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a

dangerous gas has been detected. Common sensors include infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use.

V. CONCLUSION

Thus we aimed at a solution the leakage of gas with IoT instance monitoring by indicating the weight of LPG cylinder. A concept of self-monitoring of LPG has been represented along with the design and development of low cost stand along with the IoT monitoring. New technology of IoT monitoring is used instead of GPS. It is enormous advantage by using IoT which user interaction is easy. Smart LPG cylinder monitor system work on the basis of weight analysis method with weight transmission.

FUTURE SCOPE

In the future phase of world we are scoping on development of industrial gas cylinder monitoring system with IoT instant monitoring of industrial gas cylinder monitoring is done by the IoT. Thus industries also prevent from accidents.

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