IOT BASED LPG GAS BOOKING AND MONITORING SYSTEM

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Abstract - Booking a new LPG cylinder every month when the old cylinder gets emptied, has been a manual process for a very long time. This can be simplified by automating this process with the help of load cell and IOT technology. The idea is to have a gas cylinder on top of a load cell, the load get decreased as the gas cylinder is being used and when a particular threshold is met it will be detected and the message will be sent to the gas agency through IOT technology. Additionally a GPS will be fitted to the plate to detect the location. This automation will help in smooth coordination between the customer and the agency and also will help in reducing the manual process. This project also includes detection of gas leakage considering the safety and intimates the user through IOT system. If the temperature reaches a threshold value, exhaust fan is turned on and windows are opened using DC motor.

Key Words: **load cell, Internet of things (IOT), Global positioning System (GPS), DC motor**

1. INTRODUCTION

There are approximately 30crore LPG users in the country in which mostly 40% of the population. 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 a Gas leakage in the house and commercial premises. The objective of the proposed system is to continuously measure the weight of the cylinder and as soon as it reaches the minimum threshold it will automatically sends an SMS alert to the user as well as Authorized LPG agent so that they can act accordingly. This system also designed to detect LPG gas using MQ-6 sensor, by measuring the concentration of gas in air. If the temperature reaches a threshold value, exhaust fan is turned on and windows are opened using DC motor, and message will be sent to the user. Additionally a GPS will be fitted to the system to detect the location. This location along with the consumer code will be validated by the agency and based on this validation the new gas cylinder will be delivered to that location by the gas agency. This automation will help in smooth coordination between the customer and the agency and also will help in reducing the manual process.

2. DESIGN AND IMPLEMENTATION

This proposed method consists of gas leakage detection system, weight measurement module, microcontroller, GSM module and alert system. The main basic Arduino UNO micro controller requires the power supply ranging from 7-12 volts which can be build by using different components like step down transformer, rectifier, filter and regulator which are readily available as adapters these days. Supply can be either from an AC to dc adapter or battery. The board can operate on at 7-12 volts. If voltage<7V then board becomes unstable. If voltage>12V then board get damaged. The Main platform we are using to build the project is Arduino UNO which provides us the flexibility to write the code effectively in convenient way and also it will provides us features like Inexpensive, Cross platform, Simpler and clear programming environment, open source and extensible software, easy for beginners. The other main component we are using in our project is use of Load cell. A load cell is a transducer that is used to convert a force into electrical signal, which is used to measure of a LPG gas cylinder weight so that we can expect and alert the user with in how many days the cylinder is about to empty. There are different Load cells available in the market with different weight measurement capabilities. The Gas Sensor is also one of the components used to detect the leakage of the LPG Gas (Methane & Propane) which converts one form of the signal into other form. There are different type of sensors available in the market we make use of MQ-6 gas sensor. The MQ-6 gas sensor is used in gas leakage detecting equipment's are suitable for detecting of CH4, Natural gas and to avoid the noise of alcohol and cooking fumes and cigarette smoke. The MQ-6 can detect natural gas concentrations from 200 to 10000ppm.High sensitivity to CH4, Natural gas. MQ-6 has Fast response, Stable and long life. LCD (Liquid Crystal Display) is used to show the output of the results of Different sensor values and various results to show of size about 32 ASCII character in 2 lines commonly used one is 16x2 LCD modules.
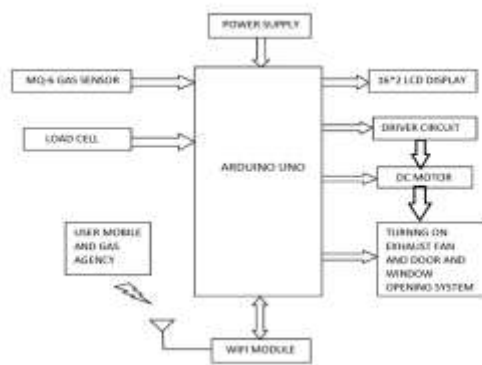
2.1 Methane gas sensor

MQ-6 is a Sensor for Natural Gases Sensitive material. MQ-6 gas sensor is SnO2, which has lower conductivity in clear air. When the target combined gas exist, the sensor's conductivity is heavier with the gas concentration rising. we used simple circuit to convert respective output signal according to concentration level. MQ-6 gas sensor has high sensitive to Methane, Propane and Butane. The sensor can be used to detect different combustible gas, especially Methane; it is with cost effective and useful for so many applications.

2.2 LCD Display

LCD stands for Liquid Crystal Display. They have become very common with industry by clearly replacing the use of Cathode Ray Tubes (CRT). CRT consumes more power than LCD and also bigger and heavier. We all know about LCD"s, but no one knows the exact working of it. LCD is finding wide spread use replacing LEDs (seven segments or other multi segment LEDs) due to the following reasons:

- The declining prices of LCDs.
- The ability to display numbers, characters and graphics related data. This is in contrast to LEDs, which are limited to numbers and a few characters.
- Incorporation of a controller into the LCD, thereby making the CPU to keep displaying the data.
- Ease to program for characters, strings and graphics related data.
- These are specialized for being used with the microcontrollers, which makes that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

2.3 Load cell

As per dictionary, a load cell is described as a "weight measurement device necessary for electronic scales that display weights in digits." However, load cell is not restricted to weight measurement in electronic scales.

Load cell is a passive transducer or sensor which converts applied force into electrical signals. They are also referred to as "Load transducers".

Load cells use different operating principles, viz.,

- Load Cells based on fluid pressure
- Load Cells based on elasticity
- Load Cells based on magnetostriction effect or piezoelectric effect

However, the only load cells which are prevalent are the load cells based on strain gages. Hence, the term load cell means strain gage-based load cells. The reason behind the wide adoption of strain gage-based load cells is their characteristics

- Highly precise and linear measurements
- Little influence due to temperature changes.
- Small size compared with other types of load cells.
- Long operating life due to lack of moving parts or any parts that generate friction.
- Ease in production due to small number of components.
- Excellent fatigue characteristics.

Strain-gauge load cells convert the load acting on them into electrical signals. The measuring is done with very small resistor patterns called strain gauges - effectively small, flexible circuit boards. The gauges are bonded onto a beam or structural member that deforms when weight is applied, in turn deforming the strain-gauge. As the strain gauge is deformed, it's electrical resistance changes in proportion to the load. The change to the circuit caused by force is much smaller than the changes caused by variation in temperature. Higher quality load cells cancel out the effects of temperature using two techniques. By matching the expansion rate of the strain gauge to the expansion rate of the metal its mounted on, undue strain on the gauges can be avoided as the load cell warms up and cools down. The most important method of temperature compensation involves using multiple strain gauges, which all respond to the change in temperature with the same change in resistance. Some load cell designs use gauges which are never subjected to any force, but only serve to counterbalance the temperature effects on the gauges that measuring force. Most designs use 4 strain gauges, some in compression, and some under tension, which maximizes the sensitivity of the load cell, and automatically cancels the effect of temperature. It is often easy to measure the parameters like length, displacement, weight etc. that can be felt easily by some senses. However, it is very difficult to measure the dimensions like force, stress and strain that cannot be really sensed directly by any instrument. For such cases special devices called strain gauges are very useful. There are some materials whose resistance changes when strain is applied

to them or when they are stretched and this change in resistance can be measured easily. For applying the strain you need force, thus the change in resistance of the material can be calibrated to measure the applied force. Thus the devices whose resistance changes due to applied strain or applied force are called as the strain gauges.

2.4 Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip A Tmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer.

2.5 Wifi module

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.

2.6 DC motor

We are using DC motor for exhaust fan. It has 2 pin one for ground and other for input signal. Ground is connected to GND of arduino and input pin is connected to arduino D7 pin number.

3. CONCLUSION:

Hence, from the above discussion we can conclude that the paper is absolutely ethical for the application of the users who use gas in their daily life. It not only helps in making the work easier but also plays a major role in the security or avoidance of accidents to the user and helps in leading an easy life.

4. REFERENCES

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