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AUTOMATIC CYLINDER BOOKING AND GAS LEAKAGE ALERT SYSTEM

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ABSTRACT

In this era of automation and artificial intelligence (AI), the society is busy upgrading their gadgets and lifestyle. With the rapid advancements in technology we are moving towards machine life, where every task has been computerized. One of the key aspects to be considered under home automation is LPG. Though the booking process is open to people but still it is not convenient to most of them. This paper proposes a solution for this problem wherein the booking process is automated. This system constantly monitors the cylinder weight and once a threshold value is reached, a SMS is send to the supplier. Our system also detects gas leakage and alerts the user. Also this system can be further extended by payment deduction from the existing linked bank account

Keywords: artificial intelligence (AI), LPG, Internet of Thinogbsje(cItOivTe)is to provide any malfunction in gas system in order to prevent damage or explosion of LPG.

I. INTRODUCTION

In India the supply of LPG through pipelines is not possible due to shortage of LPG production. In this era of growing technology, many gas agencies and distributors have implemented IVRS system these days. some customers though find it incovenient to book a new cylinder due to busy schedules, and also it is very hazardous when a LPG gas leakage occurs in any domestic usage, industry or in any other applications[2]. The IVRS system which involves interactive direction on call for booking a cylinder is borne with a problem that some people who are illiterate find it difficult in handling the call. So our project provides automatic booking of LPG cylinder and gas leakage detection to overcome the problem of LPG leakage. The primary objective of this project is to continuously measure the weight of the cylinder (i.e., gas present in the cylinder) using a load cell and as soon as it reaches a threshold value it will automatically send SMS alert to the consumer as well as to the distributer. The further process would be completed by the distributer as soon as he receives the SMS and after the refilling of the cylinder, the consumer will again receive the SMS. And the secondary

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II. BLOCK DIAGRAM

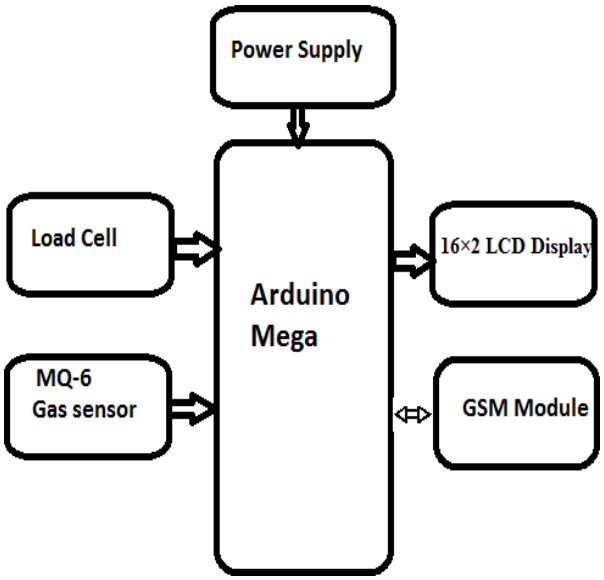
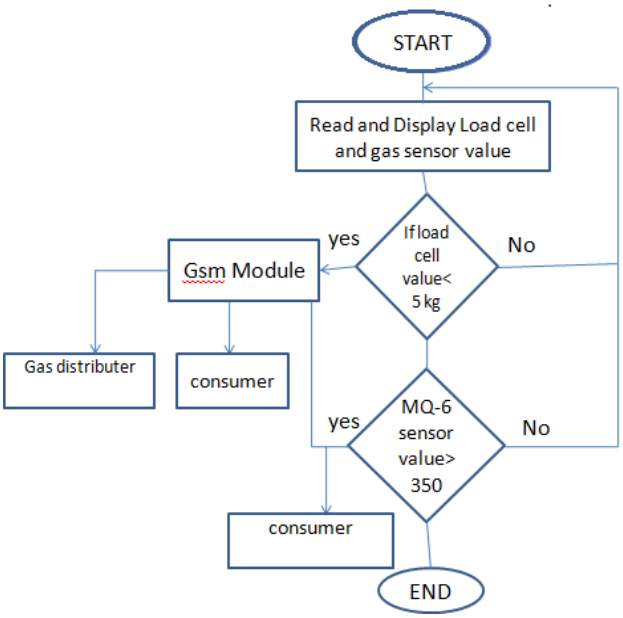


Fig no.1: Block diagram of Cylinder Booking System and Gas Leakage Detection

III. FLOWCHART



IV. IMPLEMENTATION

A. Software aspects

The program written is Arduino programming language. The code is well commented and is easy to understand. Compile the autowatering.ino code and upload it to the microcontroller, Arduino MEGA.

- **Calibration**

MQ-6 SENSOR:

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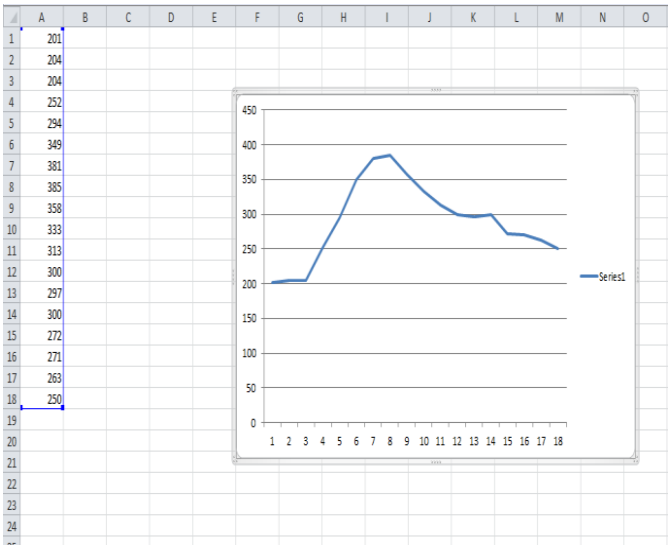
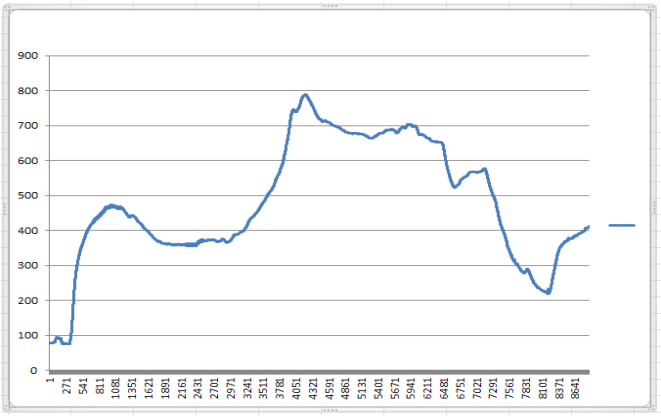


- **Interfacing with arduino:**



B. Hardware aspects

1. Arduino Mega

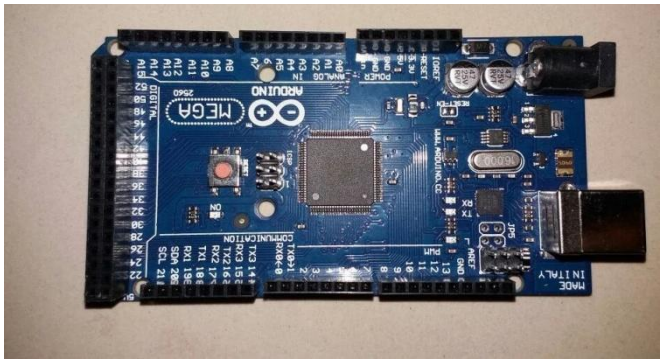


Fig.1. Arduino Mega

Arduino Mega is a microcontroller based on Atmega 1280. It has 54 pins for input and output connections, crystal oscillator, power jack and USB connection jack. It can be used to program for embedded software and

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used for interfacing with various hardware. In our project we have used Arduino Mega to program LCD, load cell and MQ6 sensor.

We used Arduino mega to interface all the components like LCD, load cell, GSM module and MQ6 sensor. The following table (table.1) shows the basic operating conditions of Arduino mega.

Table 1

Microcontroller	ATmega1280
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	40 Ma
DC Current for 3.3V Pin	50 Ma
Flash Memory	128 KB of which 4 KB used by bootloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz

2. MQ-6 Gas sensor:

MQ6 is a gas sensor which is sensitive to LPG, iso-butane and propane gas only. It is least sensitive to other gases such as alcohol, cooking fume and cigarette smoke. It is useful in applications of gas detection in industries and domestic use. It has maximum operating voltage of 3.3V. It can sense concentration of gas having a range of 200- 1000ppm

Fig.2. MQ6 sensor

3. Load Cell

Load Cell is a transducer which converts mechanical energy to electrical energy. It operates on principal of piezo-electric gauge. In our project we are using load cell to measure the weight of cylinder. It converts mechanical weight into electrical values by converting the voltages. It will sense the weight of cylinder kept on it and feed this value to the amplifier. The amplifier will be discussed in the further section.

Working of a load cell: Load cells works on a weight conversion principle i.e. weight reading into a signal that is then read by a computer or the terminal. This technology of load cell can be easily integrated into many

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kinds of instruments, machines, vehicles and other devices. As the load cell sensor experiences the pressure made, it will sense the weight and give the output

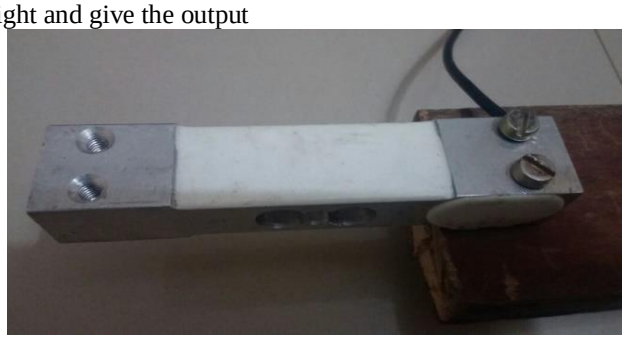

Fig.3. Load cell

Working of Sensor: A weight sensor works by converting a force that is applied on it into a signal. When a load is applied to a sensor, the resistance is changed, which leads to a change in output voltage.

4. Load Cell Amplifier:

The values from a load cell are in mile-volts. Hence we need an amplifier to amplify these voltages before giving it to the Arduino board. We are using HX711 amplifier in this project. The data sheet for the same can be obtained from the internet. The HX711 amplifier has an excitation voltage of 3-4 volts. Various libraries have been already interfaced with the amplifier. So as the libraries are readily available it becomes easy to be used in multiple applications.

It consists of a Wheatstone bridge having four to five wires. In our case we had four wires. They are usually RED, BLACK, WHITE, and GREEN. The Red wire stands for A+, Black for A-, White stands for E+ and Green stands for E- . We can measure the excitation voltage across red and black wires i.e., A+ and A-. The output voltages are measured across the white and green wire i.e., E+ and E-.

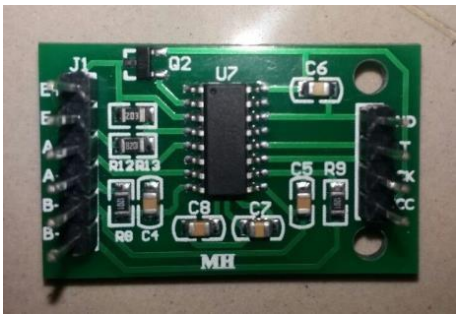

Fig.4. HX711 amplifier

5. GSM module

A GSM module is used to communicate between a computer and GSM system. A GSM system is widely used for mobile communication. Global system for mobile communication (GSM) consists of GSM modem. The gsm modem requires a sim card to send and receive messages. A gsm module can make a call, reject a call, receive and transmit messages over the network. It can also search entries in the phonebook of the sim card. Different AT commands are used to perform various tasks / processes in gsm. There are two modules available in the market: SIM800 and SIM900. We used SIM800 in our project. Gsm 800 has inbuilt FM and Bluetooth

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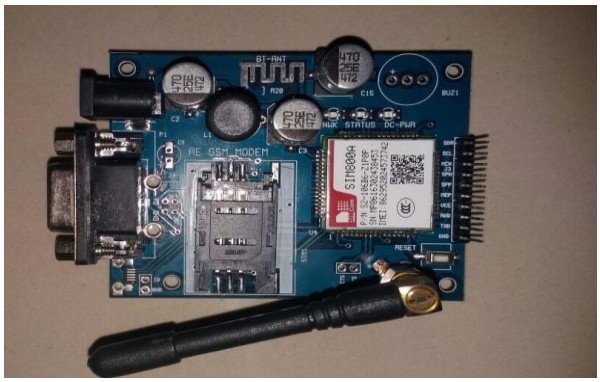

Fig.5. GSM module

6. LCD:

We are using 16x2 LCD for the project. The libraries for LCD are available in the Arduino. We are using LCD to display values of cylinder weight and gas leakage alert message

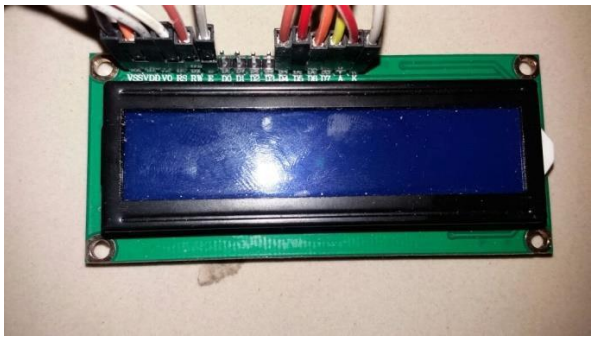

Fig.6. LCD display

V. CONCLUSION

Till now, we did the complete study of topics related to our project and also studied about the components that we are using in our project. In implementation part, we have completed the calibration, testing of MQ-6 sensor and also interfacing of MQ-6 sensor with GSM, Arduino and LCD. Also load cell calibration and interfacing with LCD and Arduino is completed. 80% of project work has been completed. Now, we are working on the interfacing of load cell with GSM. Also we are working on making a commercial product of this project.

This system can be further enhanced by linking the bank account with the agency number so that the deduction of money will be automatically done from the bank account which will reduce the problem of consumer of keeping cash with them at each time of delivery of cylinder

VI. ACKNOWLEDGMENT

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