Automatic Gas Control Unit

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ABSTRACT: LPG cylinders have been an indispensable element in our daily life. These LPG cylinders that help us to make delicious food can also become dangerous and threatening to life. Therefore one needs to be alert in order to lessen the destruction caused by the cylinders. This paper aims at providing a safety assuring system that will detect the LPG leakage and the valve of the cylinder turns off automatically. The proposed system with its weighing sensor helps to measure the cylinder weightand continuously updates the user about the concentration of gas left in the cylinder. Thus the users can replace the cylinder with new in time. As an additional advantage, the proposed system includes a timer controlled knob which automatically turns off the burner after the specified cooking time provided. so hereby the system ensures safety before allowing the gas to leak thereby leading to accidents like explosion and suffocation. Hence the automatic gas stove controller is a solution for this.

KEYWORDS: Arduino Uno, Gas Sensor, Load cell, LPG leakage, Timer controlled knob.

I. INTRODUCTION

Gas is a leading source of energy used for heating and cooking purposes in our homes. The two major types of gas which serves these purposes are liquefied petroleum gas (LPG) and natural gas. These two gases are hydrocarbon gases. Natural gas is basically methane gas while LPG gas is a blend of butane and propane gas or purely butane or propane gas. Gas leakage detection is a method of identifying dangerous gases in the surrounding environment by the use of sensors, thereby leading to prevent further consequence. LPG is the most commonly used gas that serves the purpose of cooking. LPG is a highly flammable gas and if leaked it can lead to major destruction to life and property. The major characteristic of LPG is that the gas being heavier than air, it does not easily disperse and when inhaled ileads to suffocation. The ignition of these leaked gases may lead to explosion. The number of death reports caused by gas leakage explosions has been enlarged in recent years. The reason behind such explosions is mainly due to the old cylinder valves, drained out regulators, shortage of substandard cylinders, and lackof knowledge of using gas cylinders add to the danger. This paper aims at proposing an automatic gas controller unit using arduino uno which detects the gas leakage and thereby closing the cylinder valve, a timer Controlled knob which automatically turns off the burner and also detects the weight of the gas cylinder.

II. **METHODOLOGY**

Fig1: Block diagram of the system
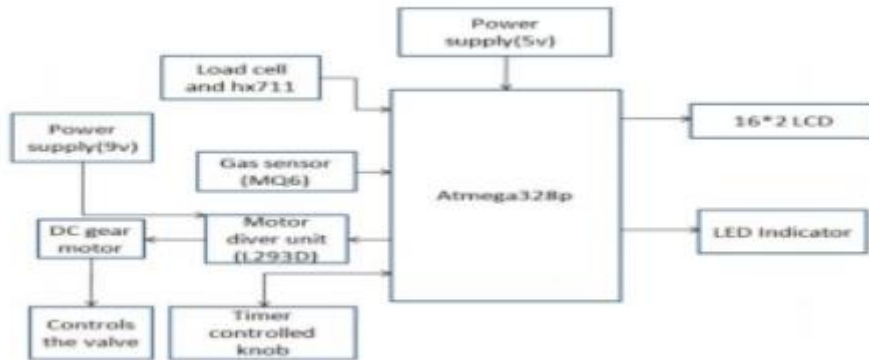
Arduino Uno:

The main component of the proposed system is Arduino Uno microcontroller which works on
ATMega328P. It needs a 5V power supply which can be build by different components like step down transformer, rectifier, filter and regulator. Arduino controls the major three sections of our proposed system. When there is a gas leakage, Arduino informs the motor driver regarding this
and thereby closing the cylinder valve.
The load cell sensesthe cylinder weight and informs Arduino regarding the threshold values and indicates the user accordingly.Finally it controls the burner knob for different specified cooking times.
MQ6 Sensor: Gas sensor MQ-6 has higher sensitivity to LPG, isobutene and propane and avoids the noise signal of alcohol, cooking fumes and smoke. When the sensor detects the gas, it gets ionized into its constituent particles and is thereafter adsorbed by the sensing element. This adsorption produces a potential difference which is informed to the microcontroller through the output pins in the form of current. Thus when the concentration of gas detected exceeds the predetermined value, leakage of gaswill be detected.

Fig2:MQ6 Gas Sensor

The MQ6 gas sensor is used which is highly sensitive to LPG, isobutene and propane gases. When a leakage of gas occurs, the sensor sends a signal to the microcontroller. LPG regulator fitted to the cylinder will be automatically turned off using a DC motor to avoid more leakage from cylinder.Cylinder Weight Indication: For determining the weight of the cylinder, a load sensor is used. It continuously checks the LPG level present in the cylinder and if the level of gas goes below the threshold limit, the user is alerted by a led indication. So it is possible for the user to exchange the old cylinder with new in time.Timer Set for Cooking: The time for cooking can be set with the help of microcontroller. When the timer count is completed, the servo motor inside the knob automatically turns off the flame or burner. In this way the stove accidents can be reduced to a greater extend.

Load Cell: When the weight of the cylinder is applied as load to the sensor, there occurs a change in the resistance, which thereby leads to a change in output voltage. If the weight is less than the threshold value, it informs the microcontroller and alerts the user through an indication.
The values from the load cell sensor are in milli-volts, so it needs a HX711 amplifier which amplifies these voltages before giving it to the Arduino board.

Fig3: Load Cell Sensor

Fig4: LCD Display:
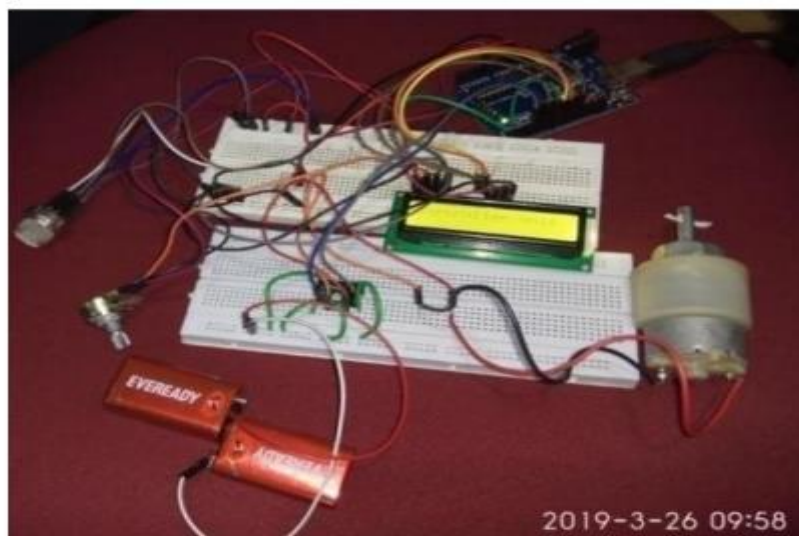
The 16x2 LCD is used to display various status of the system. When the system is turned on,"Controller Unit" is displayed. If any gas leakage has been detected, it shows "gas leakage detected". It shows the status of the gas cylinder whether it is below the threshold level or not. It also displays the time we have provided with the timer controlled knob. DC Motor: When gas leakage is detected, the DC motor rotates to close the cylinder valve. Also after the specific cooking time provided, the motor turns to close the burner knob. A motor driver IC L293D is used to drive the motor in both directions. It can control a set of two dc motors at the same time. It works on H- bridge concept.

Software tools: the proposed system is designed on

ExpressSCH software.The software platform used for Arduino is Arduino ID

III. AUTOMATIC GAS CONTROL UNIT STRUCTURE

- Arduino Nano.
- MQ6 Gas Sensor.
- Load Cell.
- LCD Display
- Wires.
- Battery
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IV. RESULTS

The testing of the proposed system was carried out using a lighter as a replicate of LPG gas source. The lighter was held closer to the gas sensor to detect high levels of gas concentration. When the concentration reached above the predetermined value, the gas leakage was detected and the motor rotates to close the valve.When the weight of the cylinder is full, the proposed system showed a green led indication. When the gas level is below the threshold value, it alerts the user by a

glowing a red led.Two push buttons were used to set the cooking time. After the predetermined time, the knob controlled by a dc motor, automatically turned off the burner.

Thus the proposed system showed an excellent performance and provides satisfactory results during the period of testing.

Fig5: final prototype of proposed system

V. CONCLUSION

In the modern scenario the usage of LPG has increased in a greater manner. As a result of this, the damages and accidents caused by the leakage of gas are increasing every day. The shortcomings on the existing systems include security measure during the gas leakage, rebooking facility without the awareness of the user, excess usage of gas after the usual time. All these shortcomings are headed to serious damages to the household belongings and human. These can be overcome by our proposed system which has an automatic gas valve controller. It updates the gas cylinder status, and the usage of timer controller unit for the better usage of LPG.

Thus "Automatic Gas Controller Unit" is mainly designed for the safety of people and property. It has many other applications in automobiles, aircrafts, etc.

REFERENCES

[1] V. Abishek and M. Aierselvam, "Wireless Auto Power Trip during Gas Leakage," Advance in Electronic and Electric Engineering, vol. 3, no. 3, pp. 327–332, 2013.

[2] S. P. S. Selvapriya C, A. M, and A. K. C, "LPG Leakage Monitoring and Multilevel Alerting System," Int. J. Eng. Sci. Res. Technol., vol. 2, no. 11, pp. 1–4, 2013.

[3] A. Shrivastava, R. Prabhaker, R. Kumar, and R. Verma, "Gsm Based Gas Leakage Detection System," International Journal of Emerging Trends in Electrical and Electronics, vol. 1, no. 2, pp. 42–45, 2013.

[4] S. S. K. S. Senthilkumar, "A Wireless Gas Leakage & Level Detection with Auto Renewal System," IJAREEIE, pp. 2095–2100, 2015.

[5] R. N. Naik, P. S. N. Reddy, S. N. Kishore, and K. T. Kumar Reddy, "Arduino Based LPG gas Monitoring & amp; Automatic Cylinder booking with Alert System," IOSR J. Electron.

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