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IoT Based LPG Leakage Monitoring System by using myRIO-LabVIEW

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ABSTRACT:MQ gas sensors are used to monitor the presence of hazardous gases. In this paper, we use MQ-2 gas sensor to monitor the leakage of LPG and the data can be accessed from remote location using IoT. National instruments LabVIEW is used as a software for simulation and MQ-2 sensor is interfaced with the myRIO.

KEYWORDS:NI LabVIEW, myRIO, MQ-2 sensor, IoT.

I.INTRODUCTION

LPG leakage may cause fire accidents in home so it is very necessary to make safety precautions in home. The main constituent of LPG is butane and propane. MQ-2 gas sensor is more sensitive to butane, hence we use MQ-2 gas sensor to monitor the LPG leakage. The change in resistance changes the voltage across the sensor and this voltage can be read by myRIO. [1] "Monitoring of Industrial Process Parameters using LabVIEW" used MQ-6 and MQ-2 for measuring LPG, Smoke respectively. In our system, we use MQ-2 for monitoring Butane gas because it is more sensitive to Butane and MQ-135 for measuring smoke. [2] tells about the air pollution monitoring and forecasting system. [3] is the datasheet of MQ2 sensor. [4] tells about the LabVIEW Based Remote Monitoring and Controlling of Wireless Sensor Node for LPG Gas Leakage Detection. [5] tells about the IoT based Gas Leak Detection Device. [6] tells about the Gas Leakage Detection Based on IoT. [7] tells about the LPG Monitoring and Leakage Detection System. In our proposed system, We interfaced MQ2 sensor with myRIO for monitoring the LPG. The LED will glow according to the given limits like safe and hazard. We can also monitor the LPG value by using a LCD, Quickstart server.

II.METHODOLGY

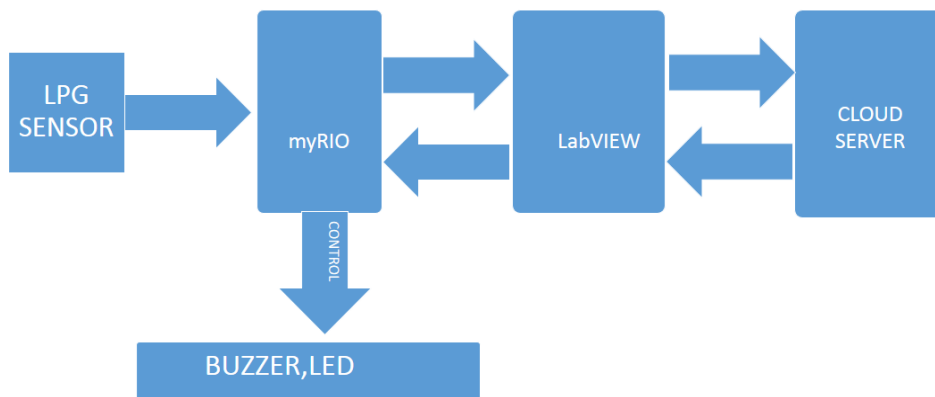
Input is obtained from the MQ2 sensor and then feed that value to the myRIO, which is interfaced with the LabVIEW and controls the output devices like buzzer, LED. LabVIEW and myRIO are then interfaced with the quickstart cloud server. The output can be obtained by using LED and buzzer and also obtained from remote location by using the Quick start server.

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III.SENSOR IDENTIFICATION

MQ-2 LPG SENOR

MQ-2 gas sensor is very useful in detecting LPG gas leakage detection in both home and industries .It simply uses a voltage divider network to detect the concentration of gases, The analog voltage provided by the sensor changes proportional to the concentration of the gas which is exposed to it, Greater the concentration of gas it gives higher output voltage ,lower the gas concentration it gives a lower output voltage. It has the range between 300 and 10,000 ppm (parts per million). The ppm range of the LPG gas and the butane gas is between 1600 and 10,000ppm.



Figure: 1 MQ2 LPG sensor



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IV. EXPERIMENTAL WORK

We use three conditions for LPG gas leakage namely 1) safe, 2) moderate, 3) hazard, according to which control elements like buzzer, LED are used. The concentration of butane is in the range between 1,600 to 10,000 which is estimated as IDLH (Immediate Danger to Life of Health) Value. The IDHL values are developed by the National Institute for occupational safety and Health (NIOSH) in terms of concentration in PPM (Parts Per Million).

Parameter	Safe	Moderate	Hazard
LPG GAS	0 to 300 ppm	301 to 1,600 ppm	1,600 to 10,000 ppm

TABLE 1: Different ranges of the LPG leakage.

From the table 1, if there is no presence of LPG then the green light glows and when there is a leakage in the LPG, red light glows and the buzzer gets activated. We are planning to fix the indicator LED and the buzzer to the next room of LPG container or cylinder. So, that we can eliminate the spark from the control devices. Otherwise, this spark during the presence of the LPG can cause a fire accident. The digital signals from the myRIO controller are used to control the LED and buzzer.

The main constituent of LPG is butane and propane. The butane concentration is between 1,600 to 10,000, if the MQ-2 detects the concentration from these ranges LPG leakage is confirmed. It is programmed in such a way that if the concentration in PPM increases above the 1,600 value, the hazard case will get activated and the red LED and buzzer will be set to be "ON" thus indicating the presence of LPG gas.

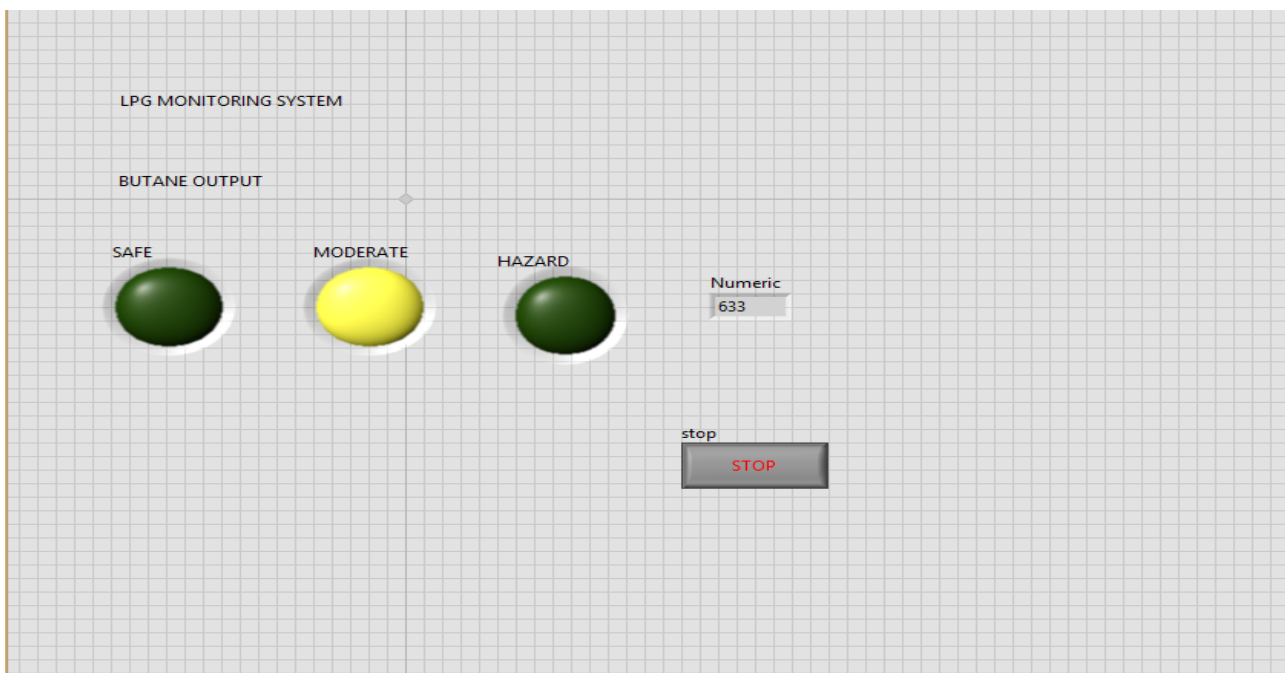


Figure: 2 LabVIEW Front panel diagram

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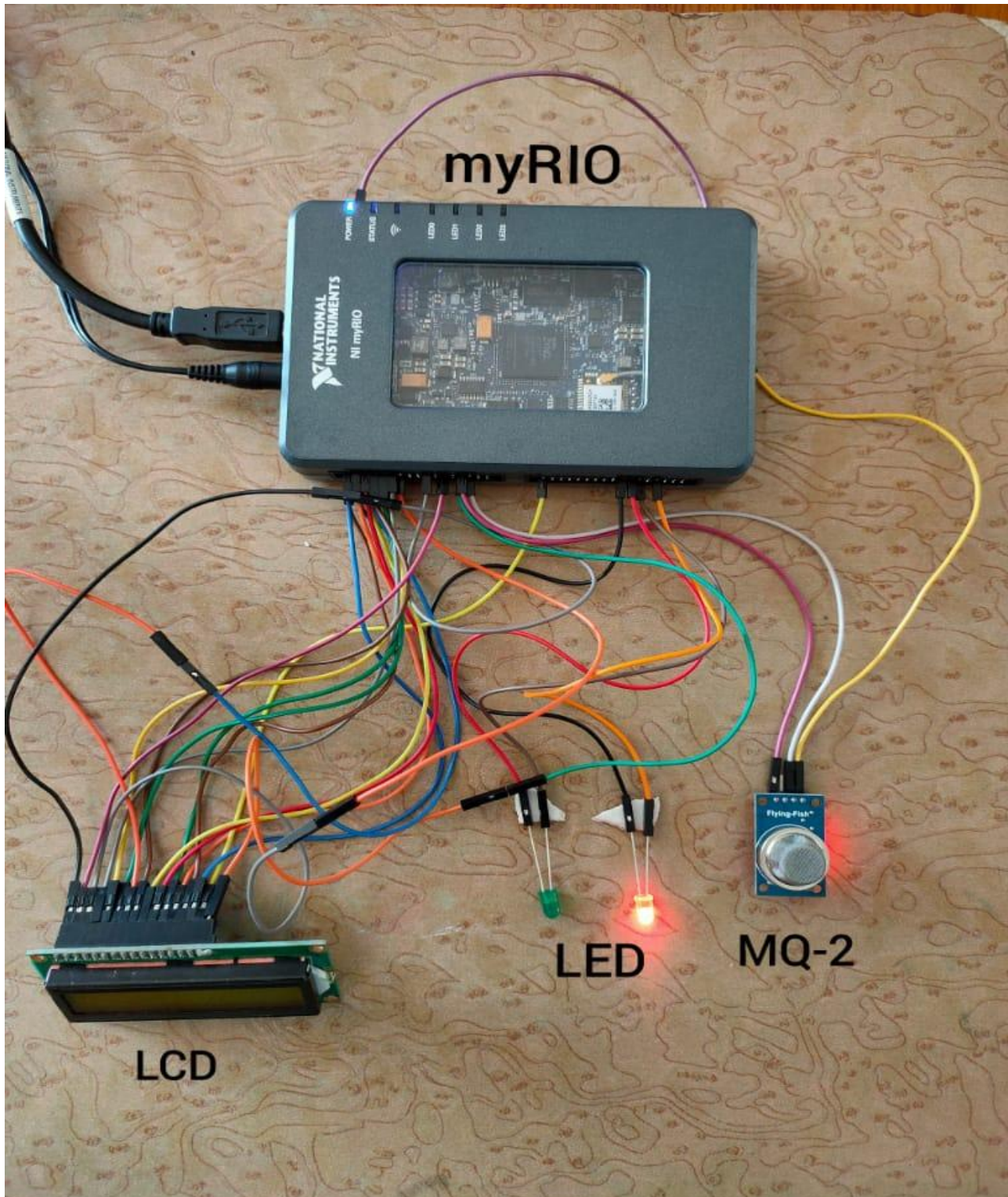


Figure: 3 Experimental setup of the LPG monitoring system.



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V. RESULT AND DISCUSSION

In the fig 4, it shows the graph of time Vs ppm.

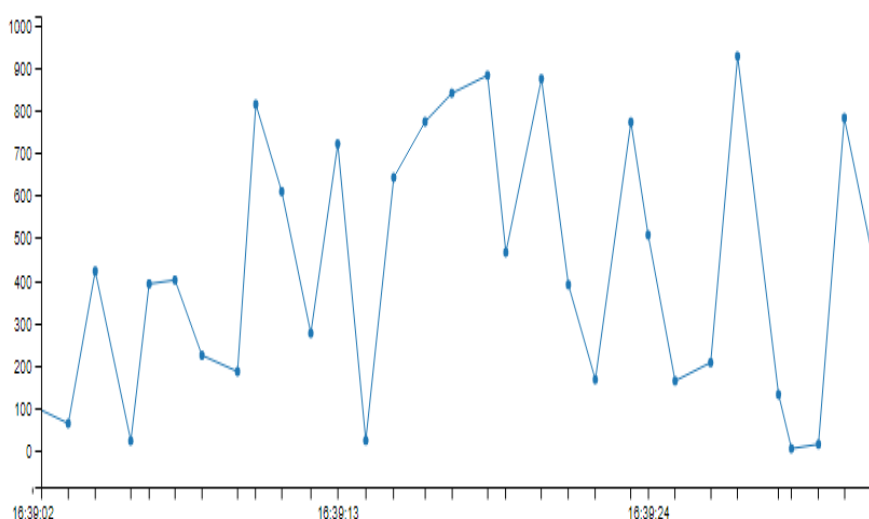


Figure: 4 LPG output obtained in the Quickstart server.

The output is obtained with help of LED, buzzer and LCD. In order to receive the data from a remote location Quick start server is used. We use a device id for the myRIO device. By entering that device id in the Quickstart server, we can obtain the LPG leakage monitored from the myRIO in the Quick start cloud server at any time. Both Graphical and numerical value can be obtained from the Quick start

VI. CONCLUSION

We have developed a system in which LPG leakage is monitored by using LabVIEW. We have set a limit to the LPG value. If the value exceeds the given limit, then there is an alert. So, that we can reduce the fire accidents. We can also monitor the LPG leaked value from the server.

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