

LPG Gas Leakage Detection and Prevention

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Abstract: The use of various kind of gases like LPG, Co, Co₂, ammonia in industries, hotels, canteen etc leads to the risk of leakage accidental leakage of these gases. Accidental leakage of these gases can cause severe accidents leading to claiming human lives. This creates the requirement of the automated system which can detect, measure and control or stops the gas leakage thus preventing accidents due to gas leakage. In this paper an embedded system is proposed capable of measuring the gas leakage using electrical sensor. The measure value by the proposed system is also notified to the user using IoT connectivity. System has actuator which automatically shuts off the regulator in case the gas leaked value surpasses a threshold value programmed into the proposed system

Keywords: gas detection, leakage, alert, prevention.

Introduction

The system presented in [1] is for monitoring the carbon mono oxide (CO) level and oxygen level in vehicle cabin. The system presented monitors by measuring and displaying the value of CO and oxygen concentration in vehicle cabin after every second. If the measured value for CO and oxygen concentration is above the threshold, system developed generates alarm, provides ventilation and sends SMS to authorized user via GSM. 89C51, CO sensors, oxygen sensor, Analog to Digital converter unit and GSM modules are the various components used in the designed system presented in [1].

In [2] real time monitoring of carbon mono oxide (CO) gas in industries using Wireless Sensor Network (WSN) is presented. In [2] low frequency modulation technique is used to reliably measure the CO concentration at various locations in industry. CO sensor along with WiFi form a wireless sensor node. Many such sensors are deployed to measure CO level at various physical locations in an industry. To determine the location of specific sensor triangulation method is used. Authors have claimed that good accuracy and stability is obtained even after the long-term continuous monitoring.

Importance of air quality measurement due to growing transportation and increased population density is emphasized in [3]. Here the authors have provided solution to air quality monitoring name ISSAQ – Integrated Sensing System for Real Time Air Quality Monitoring. The system presented in [3] is designed to measure Carbon mono oxide (CO), Ozone (O₃), Nitrogen oxide (NO₂), Sulphur dioxide (SO₂), Carbon dioxide (CO₂), particulate matters and volatile organic matters.

In [4] a wireless sensor – actuator system is proposed which aims to detect gas leakage and isolate gas leakage source immediately. The proposed system in [4] consists of gas sensor, micro processing unit and wireless transceiver unit. The result has shown that the system is able to work for longer duration while maintaining the performance requirements, quickly the gas leakage quickly with fast actuation.

Design of the proposed system

There have been many incidents that have resulted into many deaths and the loss of property due to leakage of gas. In order to minimize these incidents, we have come to an idea to build a system which can sense the gas and switch the regulator off with the conformation of the user. The system is developed using MQ2 gas sensor and NodeMCU as main processing unit.

LPG gas sensor

Sensitive material of MQ-6 gas sensor is SnO₂, which has lower conductivity in clean air. When the target combustible gas exists, the sensor's conductivity is higher along with the gas concentration rising. MQ-6 gas sensor has high sensitivity to Propane, Butane and LPG, also response to Natural gas.



Figure 1 Gas sensor

NodeMCU

NodeMCU is an open source IoT platform with firmware running on the ESP8266 WiFi. The term or the name "NodeMCU" refers to the firmware. The firmware uses the Lua scripting language. IoT connectivity of the proposed system makes it possible and conformable to monitor the gas leakage situation from remote location.

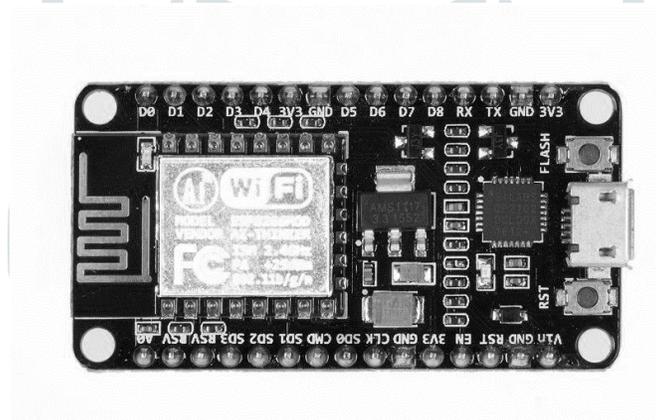


Figure 2 NodeMCU

Figure 3 below gives the block diagram of the proposed system

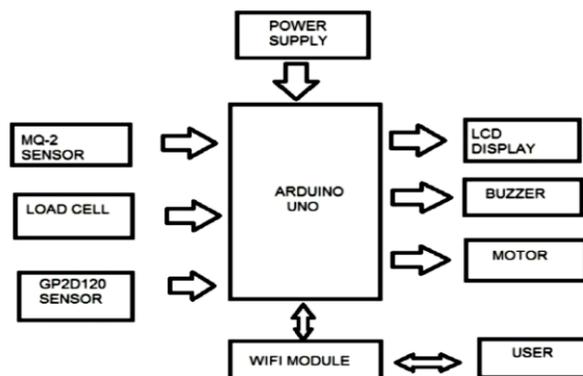


Figure 4 Proposed system

Results and Conclusion

A gas monitoring and regulator control unit is proposed which is able to measure the gas leakage. When the gas leakage is detected the system shuts off the regulator to prevent further gas leakage and associated accidents.

References

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