GSM BASED LPG GAS LEAKAGE DETECTION USING ARDUINO

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ABSTRACT

The usage of gas brings great problems in the domestic as well as working places. Inflammable gas such as Liquidized petroleum gas (LPG), which is excessively used in the house and at workplaces leakage of gas causes a destructive impact on the lives and as well as to heritage of the people. So, by keeping it in the concept of the project we have determined to develop an examining system that finds the leak of LPG gas and protects the workplaces by providing an instant alert. This system consists of a gas detection sensor that measures flammable gas in the surrounding and sends a signal to the Arduino nano board. Arduino displays reading on LCD. If the reading exceeds the limit, Arduino will turn on the buzzer and send an SMS and call to emergency services through the GSM module. The complete system will be powered through a 12V adapter.

Keyword: - *Gas leak, Arduino, GSM, SMS, Detection, Alert*

1. Introduction

Safety plays a major role in today's world and it is necessary that good safety systems are to be implemented in places of education and work. This work modifies the existing safety model installed in industries and this system also be used in homes and business premises. Humans cannot detect the presence of natural gases as fast as the sensor does. Thus, the use of gas sensing system is hugely needed to give real-time monitoring of the gas system. In certain cases, gas leakage can cause fire that will destroy human property. The large scale of fire also could contribute to serious injury or death. This is due to the fire station getting delayed information about the occurrence of fire .The current products that are in the market function as a gas detector. It will only detect a gas and trigger an alarm. The main problem is that even the alarm is triggered but if the user is not at home or premise, the user will not get to know about the leakage of gas.

One of the preventive measures to avoid the danger associated with gas leakage is to install a gas leakage detector at vulnerable locations. Gas leak accidents & air contamination is a major issue these days. These accidents are causing many life casualties. It is necessary to generate immediate alerts for situations like this. So that people can go at safer places on time. The usage of the gas brings great problems in the domestic as well as working places. The inflammable gas such as Liquidized petroleum gas (LPG), which is excessively used in the house and at work places. The leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. So, by keeping it in the concept of the project we have determined to develop an examining system which finds the leak of LPG gas and protects the work places by taken correct precaution at correct time. This system provides the information such as when a gas leakage is noticed, sensors of in the project are used to notice the gas leakage and immediately turns ON the buzzer for the danger indication. Buzzer is a clear indication of gas leakage. By the detection of the hazardous gas the alerting message reached to the person who has control over it from the GSM. Detection of the gas leakage is important and halting leakage is important equally. The main objective of this project is that it is extremely accurate with a least cost, this project system is best to detect gas leakage and also warn people around by buzzer beep sound and an SMS to the emergency services.

2. Literature Survey

2.1 Gas leakage detection and alerting system using Arduino Nano

Here authors[1] The sensors are widely used to detect essence of propane, iso-butane, LPG and even smoke. The sensor has an advantage to combine a sensitivity response time. If the LPG sensor senses gas leak from work place or home, sensor output goes to active low (logic-0) condition. Arduino NANO is used in the project; low signals are overlooked by the Arduino and gas leakage is been noticed by the Arduino. The Arduino NANO turns on the LCD and buzzer. It even turns on the GSM modem after that, it continues to send messages SMS to mobile number specifically mentioned in the program of the source code for alerting danger to the people.

2.2 LPG Gas Leakage Detection Using IOT

This paper[2] provides a brand new approach to discover LPG discharge supported microcontroller based Node MCU. To alert on Liquefied rock oil Gas (LPG) leakage and preventing any unwanted incident, we need to apply some cautions to discover the discharge. This paper aims to provide a solution to this problem by building a device which will do the area monitoring continuously. The gas sensor provides data to Node MCU, and then the results are displayed as a warning to the user via an Android-based smart-phone device. Other than LPG gas, Air conditioner and refrigerator leaked gases are also harmful in home. Using this device users will be able to prevent accidents that occur due to harmful gas leaks so that accidents can be avoided.

2.3 Microcontroller Based Lpg Gas Detection

This research project[3] is microcontroller based security system where a LPG gas sensor and fire temperature sensor are used to detect gas and fire leaks in the house and factory. This system is intended to provide security for houses and factory. Sensors are connected to 16F877A microcontroller circuit, which have program and circuit is connected to GSM modem. Once the sensor detects the leak of LPG or fire the circuit retrieves data from sensors and sends SMS to users mobile through GSM modem. Therefore improve the chances for reducing the risks of life and property and in order to make sure their properties is secure and take the necessary action against gas leak and fire as soon as possible, from anywhere and anytime through mobile communication.

2.4 A Wi-Fi Enabled Indoor Air Quality Monitoring and Control System:

This paper[4] proposes an open platform of a Wi-Fi enabled indoor air quality monitoring and control system, which could be incorporated into such a 'smart building' structure. The complete software and hardware design of this system is presented, along with a series of control experiments. The proposed system operates over an existing WIFI wireless network utilizing the MQTT protocol. It is capable of monitoring the indoor air quality as well as controlling an air purifier to regulate the particulate matters concentration. Experiment results under a real world office environment demonstrate the effectiveness of the proposed design.

2.5 IOT Enabled Proactive Indoor Air Quality Monitoring System For Sustainable Health Management:

This paper[5] proposes an IoT based indoor air quality monitoring system for tracking the ozone concentrations near a photocopy machine. The experimental system with a semiconductor sensor capable of monitoring ozone concentrations was installed near a high volume photocopier. The IoT device has been programmed to collect and transmit data at an interval of five minutes over blue tooth connection to a gateway node that in turn communicates with the processing node via the WiFi local area network. The sensor was calibrated using the standard calibration methods. As an additional capability, the proposed air pollution monitoring system can generate warnings when the pollution level exceeds beyond a predetermined threshold value.

2.6 A Wireless System for Indoor Air Quality Monitoring:

This paper[6] describes the development of a wireless monitoring system which can be deployed in a building. The system measures carbon dioxide, carbon monoxide and temperature. The system developed in this paper can serve

as the monitoring component of a HVAC control system and function as an indoor air quality monitor independently.
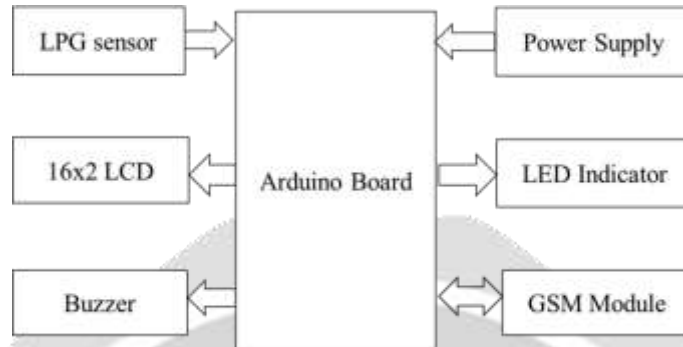
3. Block Diagram

Fig -1: Block Diagram of System

In this system, MQ2 gas sensor is used to detect LPG gas. It provides analog output between 0 to 5V proportional to the gas detected. This analog signal is given to arduino nano board. Arduino measures analog voltage and converts it into gas concentration. That measured gas concentration is displayed on 16x2 LCD display. If the gas detected is greater than the maximum limit, arduino gives a signal to buzer to generate sound alert. Similarly, an SMS will be send to emergency contact through GSM module. An indicator LEDs are used to indicate the 2 situations. Green LED turn on when situation is normal. Similarly red LED turns on when gas leak detected. Complete system is powered through power supply adapter of 5V DC.
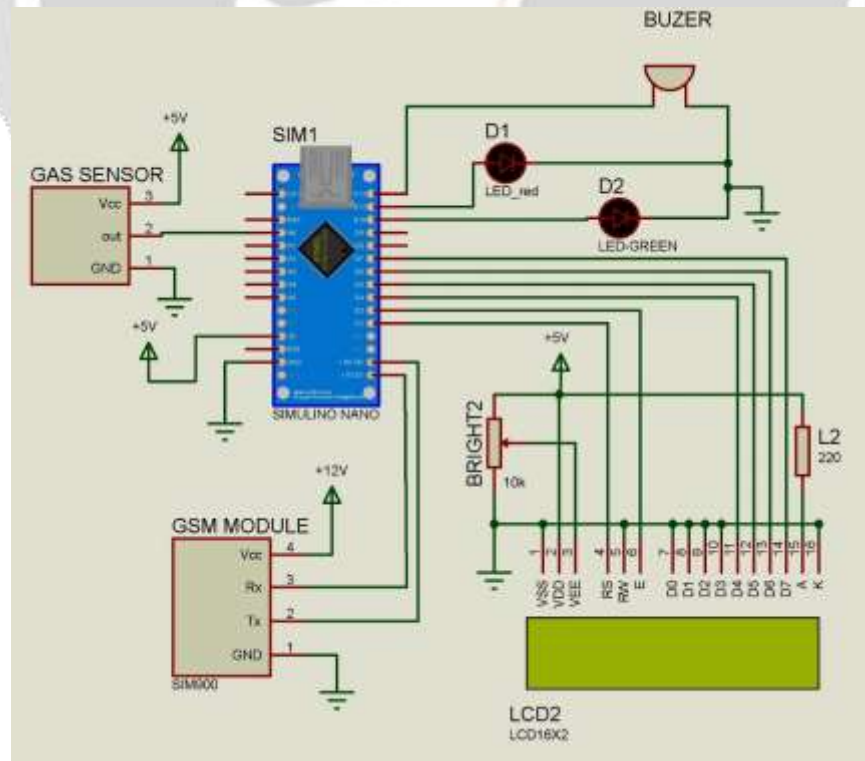
4. Connection Diagram

Fig -2: Connection Diagram of System

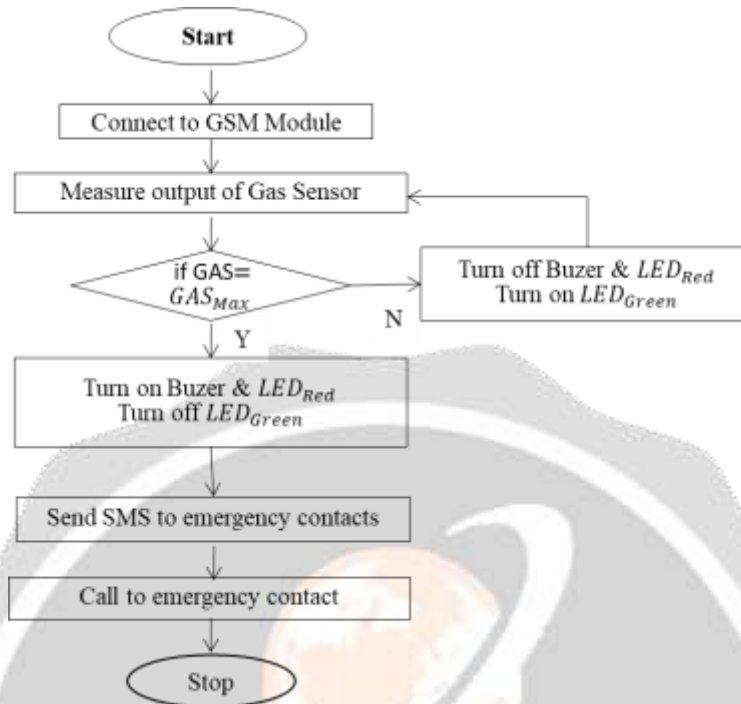**5. System Flowchart**

Fig -3: Flowchart of the System
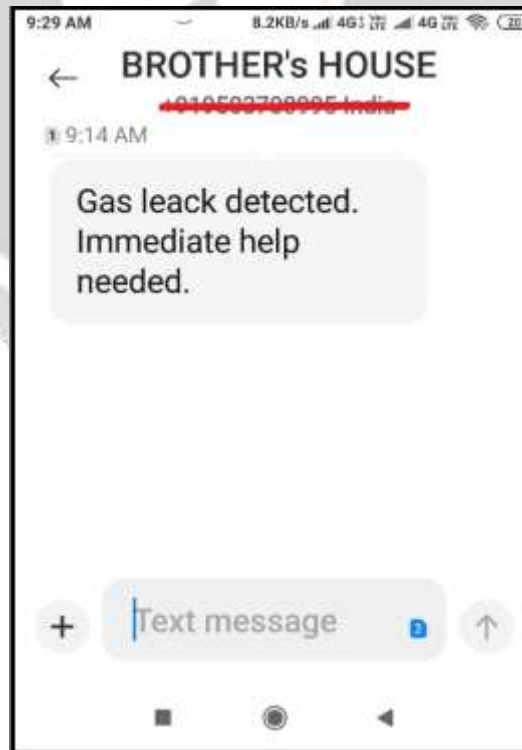
6. Results

Fig -4: SMS send by the system to emergency contact

Sensitive material of MQ-2 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exist, The sensor's conductivity is more higher along with the gas concentration rising. MQ-2 gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different applications. In presented system, MQ2 plays an important role. When gas concentration detected is greater than 300ppm, alert situation is detected and buzer is turned on. Similarly, an SMS is triggered to emergency contacts one by one and a call initiated to 1st emergency contact. With GSM module we can send SMS to multiple contacts as programmed. The SMS process takes around 10-12 seconds to send where as calling takes around 22 seconds to dial a call.

7. CONCLUSIONS

Project is successfully implemented and able to detect the gas leaks and sends alert via SMS and call. Similarly sound and visual alerts are generated using buzer and LED respectively. We believe that this project will be helpful to detect gas leak and can save the many life by providing alert on time so that people can go to safer places and rescue operation can be start immediately. Likewise it can help to contaminate gas leaks within time before the small gas leak become major accident.

8. REFERENCES

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