

Combustible Gas Detection with GSM Alert Using PIC Microcontroller

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Abstract - Combustible gases are very common reason for blasts and fire accidents causing large damages to life and property. To address the problem like leakage of gas in home and other industries, an automated gas detection and alerting system is proposed to alert users by sending SMS and alarm. To overcome the problem of gas leakage, the implementation of gas leakage displaying on LCD, detecting and alerting by SMS to the user. PIC microcontroller, combustible gas sensor, LCD display, GSM modem, and buzzer are used in the suggested system. If any gas leakage is detected by the gas sensor, it produces an equivalent voltage and the signals is given to microcontroller. In existing system, the buzzer intimation is alone used. But in the proposed system it displays the status of gas leakage it alerts the user by producing buzzer sound and also sending the SMS, also here the SMS can be sent to more than one user. The gas sensor in the system constantly detects the leakage of gas. As soon as the gas is detected at the sensor, it produces an equivalent voltage and signals the microcontroller. The amount of gas detected is checked by the microcontroller after it receives the signal. On detecting gas above the certain level, it then goes into alert mode. The system now displays the status of the event occurred on an LCD display and also sound a buzzer to alert. It now uses a GSM modem to send an SMS message to the user inform about the situation so that required action can be taken for that.

Key Words: Gas Leakage, GSM SIM900A, Alert system, Detection and Sending Message.

1. INTRODUCTION

Gas leakage detectors are particularly effective in detecting gas or fire in buildings, and they are crucial safety measures to avoid disasters. The Bursting cylinders and accidental fires have caused lots of harm to economies in the past. This circuit triggers that alert system when gas leakage is detected. The circuit mainly uses the gas sensor and GSM to detect gas leak. This gas sensor is sensible to the LPG, Alcohol, and Methane etc. It detects the presence of a LPG leak in your home or in a service station, storage tank environment. The sensor has an excellent sensitivity with the quick response time. The sensor can also sense some of the gases they are; iso-butane, propane, LNG, etc. If LPG gas sensor senses any gas leakage from the storage of output and this sensor goes low. This low signal is monitored by the pic microcontroller and sends the signal to GSM module to send messages as "Gas Leakage" to a mobile number written in the code.

2. Body of Paper

2.1 Existing System

LPG gas leakage sensor detector used to detect the presence of gas leakage in the gas sensor that may be source of risk to help them avoid information sent to fire station being delayed if any gas accident happened. It will detect the presence of gasses using gas sensor, the sensor detects the level of gasses is exceeding to the normal level it will be send an information through the phone apps Internet of Thing (IOT).

Gas sensor is used sensor that detects gases, specifically hydrogen (H₂), Liquid Petroleum Gas (LPG), lithium, Methane (CH₄), Carbon Monoxide (CO), Alcohol, Propane, Smoke at the atmosphere. Temperature sensor is use to detect an increment of temperature if the fire happens, it will send an alert message through android apps and location via GPS through IOT to the nearest fire station. It used to sense high temperature or positive temperature change and it send a pulse to the microcontroller.

The temperature sensor not only contains calibrated digital outputs of temperature but it also contains calibrated digital signal of humidity. The sensor is coupled to a high-performance 8-bit microcontroller and features resistive sense of wet components as well as Technical Standards for Construction NTC temperature measurement devices.

2.2 Proposed System

The proposed module used a safe wireless module to detect a gas leakage. The module is household use application or Liquefied Petroleum Gas (LPG) are classified as the reason of the disasters. The LPG is considered as most inflammable gas that can be ignite fires even in far distances where gas leak exists. The project can be applied in many places particularly in homes, industry, fabrications and depend mainly on the LPG gas to manage their works.

This project had been performed in the order to achieve objectives of this project. The design and build of a prototype of an LPG gas leakage detector controlled by using gas sensor to detect the presence of gas leakage. To give the real time response, GSM was used as Wi-Fi module and LCD display to display all the reading. The Figure 1 shows that proposed system of block diagram.

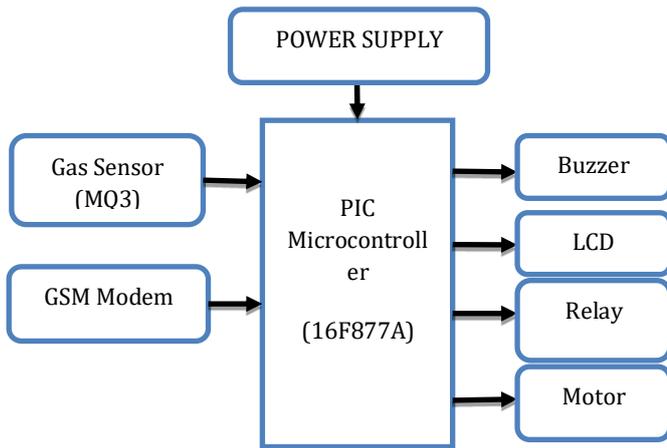


Fig -1: Block diagram

2.3 Methodology

LPG is the heavier than air, therefore it can flow along the floor and the settle in a low point which makes it difficult to disperse. If a leak happens, the LPG and natural gas boil into air and can replace oxygen which cause suffocation for more peoples. Moreover, the ignition may happen in cause an explosion. The Figure 2 shows that proposed system of flow diagram for gas detecting and alerting system.

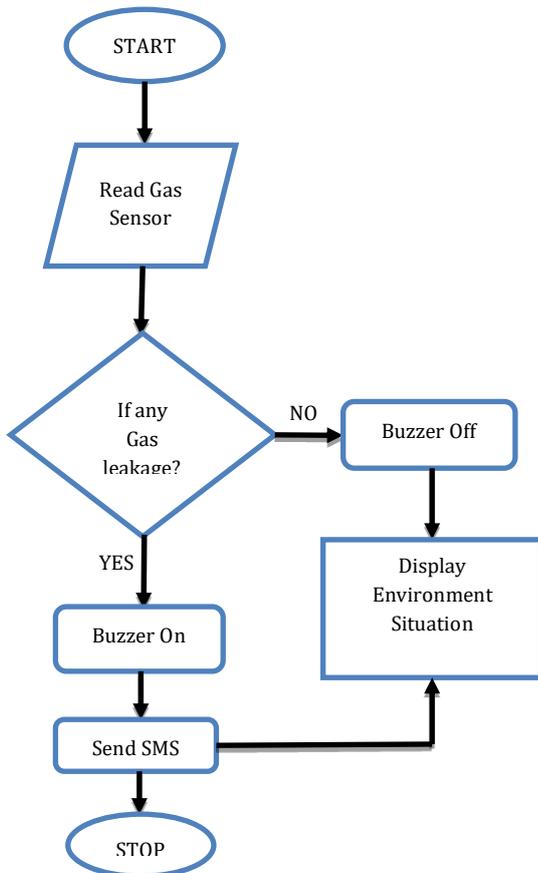


Fig -2: Flow Diagram

Therefore, the detection of the gases has gained more interest in the recent years especially in fields of safety, industry, environment, and emission control. The household safety and industrial safety is becoming an issue due to increase in use of LPG and natural gas for a heating and home appliances and industrial appliances. In Jordan the huge use of the LPG in industry, most of the cooking is done using LPG gas, and more than 50% of heaters use LPG. As result, the accidents from the gas leakage increase each and every day. In 2007, number of the gas bottles that were destroyed as result of the gas leakage or fire exposure in houses was 142 gas bottles.

4. RESULTS AND DISCUSSION

The whole module is functionally segregated to conduct two jobs indicated by the leakage of gas monitoring and safeguards taken correspondingly, according to the work's facilities. The project reads the gas sensor in the suggested environment system to see whether the gas concentration reaches a certain threshold. When the project detects a change in gas concentration, the system is active, and the control action switches on the buzzer system and the air puller device, as well as sending a warning SMS to a user-specified recipient via the GSM module. The Figure 3 shows that simulation of gas detecting system.

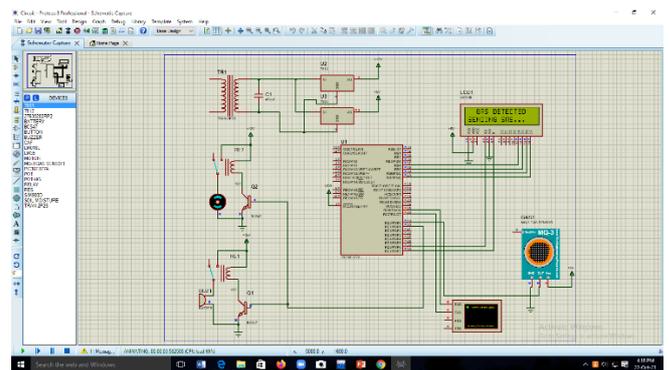


Fig -3: Simulation of Gas Detecting System

Gas leakage is major problem in industrial sector and household sector, residential premises that gas-powered vehicles like CNG (compressed natural gas) buses, cars etc., Thus, the Figure 4 shows that prototype model of the Project. One of the preventive methods to stop the gas accident associated with the leakage of gas to install gas leakage detection kit at the vulnerable places.



Fig -4: Prototype of the Project

The aim of this project is to present such a design that can be automatically detect and stop the gas leakage in vulnerable premises. The Gas leakage consists of GSM module (Global System for mobile communications), which can warn by sending SMS to the user. This project used in safe wireless module to detect a gas leakage. The Figure 5 shows that gas detected and sending the SMS which is displayed on the LCD.



Fig -5: SMS Alert send to the User.

The project is used in industrial application where home fires or Liquefied Petroleum Gas (LPG) are classified as reason of the disasters.

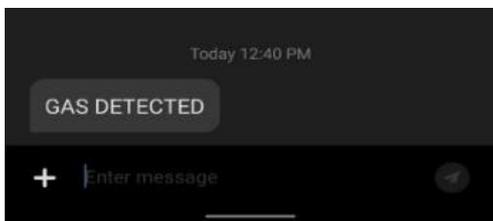


Fig -6: Alert message to the User.

The above Figure 6 shows that which displays the message that will be sent if the Gas has been detected. The pic microcontroller communicates with the GSM module and the alert is made by sending a message.

4. CONCLUSIONS

The work exhibits a robust friendly organized system design with low-cost limitation. The project enchants the universe since it may be implemented in homes, buildings, factories, and other enclosed spaces. This system applies the triple impact authority on corresponding location due to the dependency on having three parts precautions specified by turning both the air puller alongside with buzzer ON and sending an SMS to a specific phone number. Finally, the control system covers all the larger areas depending on the GSM module works domination of the mobile communication network. The proposed system to monitor and to detect the leakage of LPG gas is simulated and to developed which is to detects the leakage of gas in the presence of air and it exceeds the safety level then it activates the buzzer and sends the SMS to the specified numbers by using GSM. Using this, the user can gets alerted in hazardous and abnormal condition to take a necessary action. It can avoid the accidents caused by the gas leakage with the help of the system.

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