



CNG/LPG GAS LEAK DETECTION WITH GSM ALERT AND ITS PREVENTIVE MEASUREMENT

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Abstract—Gas leakage is a major problem with industrial sector, residential premises etc. One of the preventive methods to stop accident associated with the gas leakages to install a gas leakage detection kit at vulnerable places. The aim of this project is to present such a design that can automatically detect, alert and control gas leakage. In this project, after the leakage of gas is detected, the valve is automatically closed, thereby stopping the leakage. Then the electric power supply is also shut down to prevent fire accidents. In particular, gas sensor has been used which has high sensitivity to gases like propane and butane. Gas leakage system consists of GSM module, which alerts the user by sending SMS.

Keywords- GSM (Global System for mobile communications), LPG (Liquefied petroleum gas), Gas sensor M-6, Stepper motor driver, PIC Microcontroller, Relay.

I. INTRODUCTION

LPG consists of mixture of gases like propane and butane. These gases can catch fire easily. LPG is used as propellant, fuel and as a refrigerant. When a leak occurs, the leaked gases may lead to explosion. The number of deaths occurring due to explosion of gas cylinders has increased. So the leakage should be controlled to protect people from danger.

Bhopal gas tragedy is an example for accidents due to gas leakage. Gas leakage detections not only important but controlling the leakage is also important. Liquefied petroleum gas is generally used in houses and industries. In homes, LPG is used mainly for cooking purpose. This energy source is primarily composed of propane and butane which are highly flammable chemical compounds. LPG leaks can happen, though rarely, inside a home, commercial premises or in gas powered vehicles. Leakage of this gas can be dangerous as it enhances the risk of explosion. An odorant such as ethanethiol is added to LPG, so that leaks can be detected easily by most people. However, some people who have a reduced sense of smell may not be able to rely upon this inherent safety mechanism. In such cases, a gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage. A number of research papers have been published on gas leakage detection techniques. In this project advanced gas leakage detection

1.1 LITERATURE SURVEY

[1] Proposed the leakage detection and real time gas monitoring system. In this system, the gas leakage is detected and controlled by means of exhaust fan. The level of LPG in cylinder is also continuously monitored. K.Padmapriya et.al.. [2] Proposed the design of wireless LPG monitoring system. In this project, the user is alerted about the gas leakage through SMS and the power supply is turned off. Selvapriya et.al.. [3] Proposed the system in which the leakage is detected by the gas sensor and produce the results in the audio and visual forms. It provides a design approach on software as well as hardware. L.K.Hema et.al.. [4] Proposed the smart sensor technology. In this flexible reliable smart gas detection system is developed. In this, the leakage is detected and controlled by using Zexhaustfan. B. D. Jolhe et.al.. [5] Proposed the system in which two sensors are used for detecting the gas leakage and for monitoring the level of gas in the cylinder respectively. [6] et.al... proposed the system in which two types of gases namely LPG and CNG are detected for home safety as well for vehicles. R.Padmapriya [7] et.al... proposed the system which ARM7 processor and simulates using keil software to alert the user by sending SMS. V.Ramya [8] et.al... proposed the system that uses two different sensors for detecting the leakage and requires resetting manually after every situation. A.Mahalingam [9] et.al... proposed the system to meet UK occupational health and safety standards and also it alerts the user by SMS. M.B.Frith [10]. proposed the system that uses trace sensing technology and also detects the leakage.

1.2 Problems by this project

- Relay fails to Trip
- Microcontroller fails to received
- Signals from gas and fire sensor
- Gas and fire sensor fails to sense gas and temperature by fire
- Pump fails to spray water

1.3 solution by this project

- By providing regular power supply
- Higher accuracy.
- Safer working condition

1.4 BLOCK DIGRAM

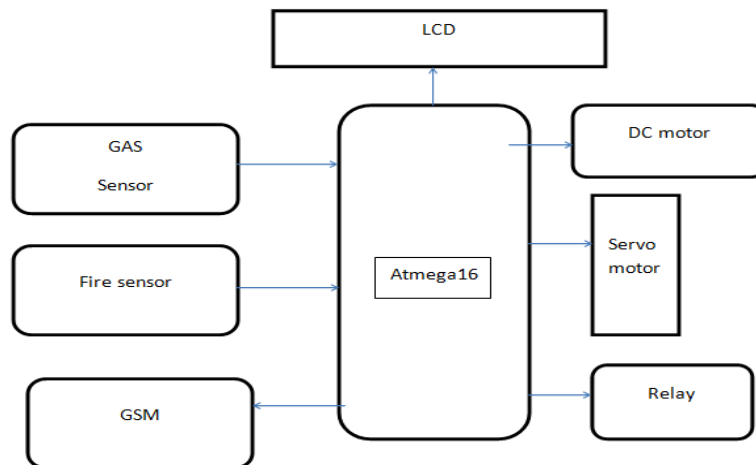


Fig-1: Block diagram

1. Block diagram description

- 1 **GAS SENSOR:** Generally, semiconductor sensors are used to detect LPG gas. MQ6 semiconductor sensor is used in this project. Sensitive material of MQ-6 gas sensor is SnO₂, which with lower conductivity in clean air. When the target combustible gas exist. The sensor conductivity increases along with the rising gas concentration. MQ-6 gas sensor has high sensitivity to Propane, Butane and LPG, also response to Natural gas. The sensor could be used to detect different combustible gas, especially Methane; it is with low cost and suitable for different application. The MQ-6 can detect gas concentrations anywhere from 200 to 10000 ppm. The sensor's output is an analog resistance.



Fig-2: Gas Sensor

- 2 **MICROCONTROLLER:** Microcontrollers are popular process developed by microchip technology with built-in RAM, memory, internal bus and peripherals that can be used for many applications. output from the gas sensor is converted to digital format. The programmed instructions are fed into the microcontroller. It is connected to relay, GSM module, motor driver, buzzer. When the gas leakage is detected. the stepper motor connected to the mechanical handle, closes the valve of the cylinder. So, the gas leakage is stopped. The relay is switched to shut down the electric power supply of the home or industry. The buzzer produces an alarm to indicate leakage. Through the GSM, a SMS is send to the user for alerting.

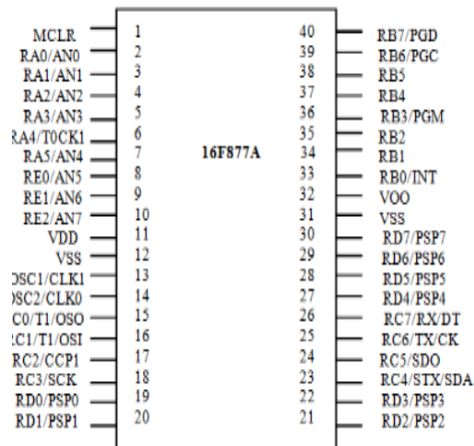


Fig-3:Microcontroller

- 3 **RELAY:** A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (change over) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first.



Fig-4: Relay

- 4 **BUZZER:** It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound



Fig-5: Buzzer

- 5 **GSM MODULE:** The term GSM stands for Global System for Mobile. It is mainly used for communication purpose. In this project, the GSM system is used to communicate with the user. When the gas leakage occurs, the microcontroller stops the leakage and alerts the surroundings. Then, the information about the leakage has to be informed to the user. For this purpose, GSM is used. Using GSM, a warning SMS is sent to the user.



Fig-6: Gsm Module

2. WORKING:

The leakage of LPG gas is detected by the MQ6 gas sensor. Its analog output is given to the microcontroller. It consists of predefined instruction set. Based on this, the exhaust fan is switched on. So, the concentration of gas inside the room gets decreased. Then, the stepper motor is rotated thus closing the knob of the cylinder. Because of this process, the leakage of gas is stopped. The relay is switched to off the power supply of the house. The buzzer produces an alarm to indicate the gas leakage. Then the user is alerted by SMS through the GSM module.

The messages that are displayed in LCD as shown in figures below

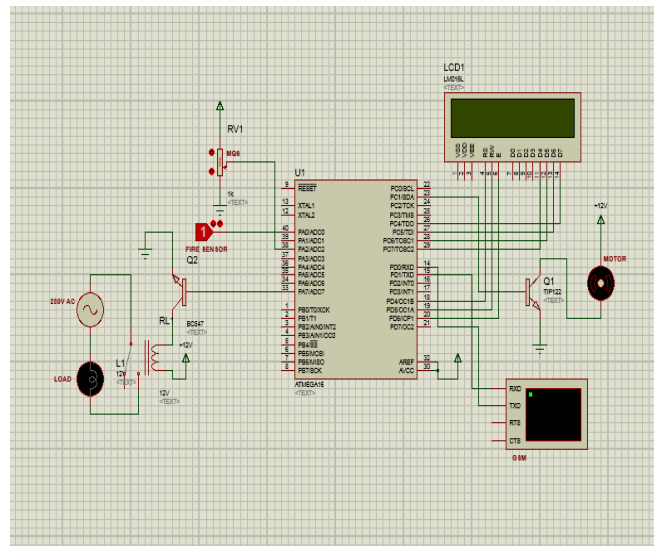


Fig-7 Normal Simulation

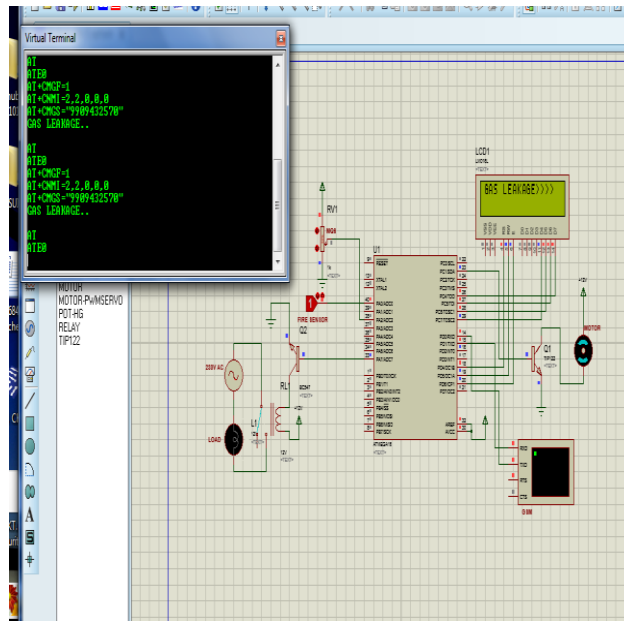


Fig-8:GAS LEAK OCCURE SIMULATION

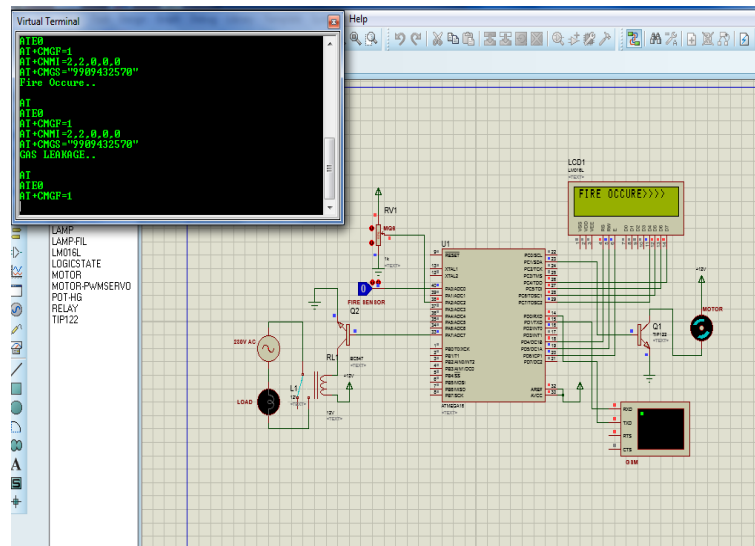


Fig-9:Fire occur and Motor Simulatio

3. HARDWARE

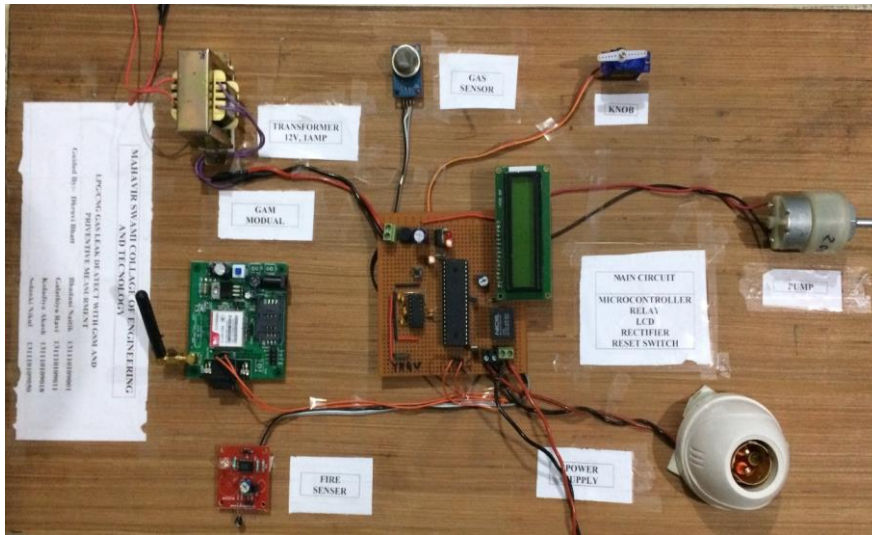


Fig-10: HARDWARE

4. HARDWARE RESULT

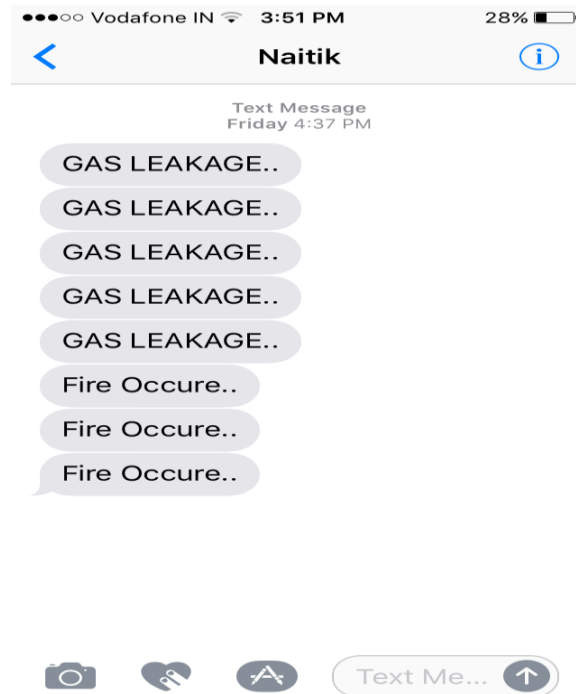


Fig-11: Hardware Result

8. FUTURES SCOPE

- Safety from gas leakage in cooking gas fired appliances like stoves.
- Provide protection in industries.
- Provide protection in Car.

9. CONCLUSION

In recent households, the use of LPG is taking a big roll. From the use of cylinder up to the use of petroleum pipelines. The biggest threat in using this technology is security. And our project will prove to be boom for households and industries.

10. REFERENCES

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