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MICROCONTROLLER BASED LPG GAS DETECTION

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***Abstract**- Security system has been a major issue where accident is increasing and everybody wants to take proper measures to prevent accident. In addition there was a need to automate home or industry so that user can take advantage of the technological advancement. This research project 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 ares 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.*

Keywords: GSM, GAS Sensor, Gas leakage detection, Microcontroller, LPG

1. INTRODUCTION

GSM Based Security System is a security system to prevent fires or gas leak developed by applying GAS sensor and Temperature sensor. The system has mainly two units, GSM modem and microcontroller unit. GSM modem can be configured by standard GSM at command set for sending and receiving SMS and getting modem status. Depending upon the sensor output, microcontroller can send message to the authorized person and also depending upon the message received the microcontroller unit will control the devices and acknowledges the device status to the user as SMS[1].

The research project is aimed to developing the security of industry or home against LPG gas leak and fire. In any of the above two cases any one met while you are out of your home than the device sends SMS to the emergency no provided to it.

2. SYSTEM OVERVIEW

The hardware of the system includes LPG gas sensor, LM35 temperature sensor, 16F877A Microcontroller, [2] AT command supporting GSM mobile phone (Fig.1).

2.1 Microcontroller

It is the whole control of the project, continuously senses the LPG and it's level output. The input/output ports of the microcontroller is used for this.

2.2 Gas sensor

A sensitive, efficient gas sensor is required that senses only LPG gas contents that's why we used MQ-5 gas sensor. Which continuously senses the gas, if the concentration level goes above danger level it gives information to the microcontroller.
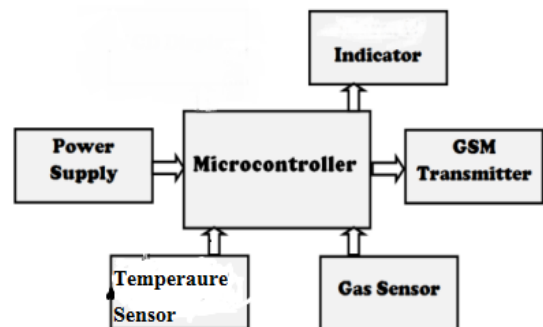

Fig. 1 System layout

2.3 GSM module

GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile), is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones.

In 1981, work began to develop a European standard for digital cellular voice telephony when the European Conference of Postal and Telecommunications Administrations (CEPT) created the Groupe Spécial

Mobile committee and later provided a permanent technical support group based in Paris. Five years later, in 1987, 15 representatives from 13 European countries signed a memorandum of understanding in Copenhagen to develop and deploy a common cellular telephone system across Europe, and EU rules were passed to make GSM a mandatory standard [3].

The GSM module is used to send message through SMS to the consumer, any GSM network operated SIM card can be used in GSM modem and it acts as a mobile phone with it's unique phone number. The GSM modem is connected to the microcontroller.

3. SYSTEM DEVELOPMENT

The proposed system characteristics involve remote controlling of appliances, intrusion detection, system security and automatic configuration such that system automatically adjusts the system settings. The user can get SMS through the GSM technology thus making the system location independent. The system contains low cost components easily available which cuts down the overall system cost.

The ease of deployment is due to wireless mode of communication. GSM technology provides the benefit that the system is accessible in remote areas as well.

3.1 Circuit diagram

Leakage of LPG senses gas sensor, and leakage of fire senses by temperature sensor. First of all sensors receive the signal, then signal goes to microcontroller with the help of ADC. After that microcontroller receive the signal, send by sensors. It sends activation signal to other external devices as like indicator light, then GSM module is activated, which send SMS to the user(Fig.2).
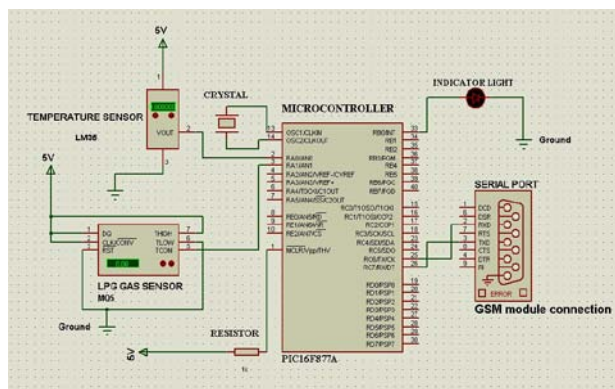

Fig.2. Circuit Diagram

3.2 Security System Development

Here microcontroller 16F877A is brain of whole the research which provides intelligence to security system. The output of each sensor is connected to port of microcontroller 16F877A. GSM module is connected to pins for receive and transmits signal. When any one of sensors senses alarm condition its output varies from ideal condition and this output goes to microcontroller. These signals from sensors work as input signal for microcontroller, which generates output according to program fed in its memory. For connection, connect receiver pin of microcontroller to transmit pin of microcontroller to receive pin of GSM module. Also

connect ground pin of both. Then GSM module is activated, which send SMS to the user(Fig.3).
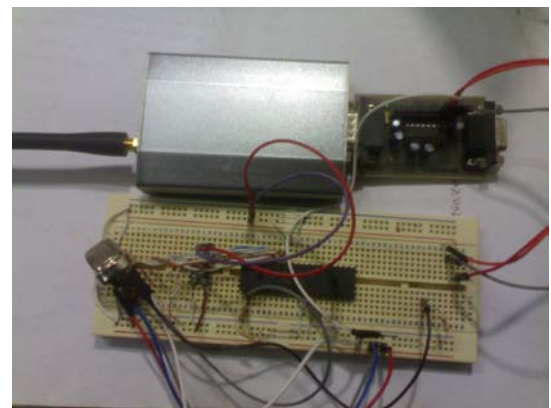

Fig.3 working model of the proposed system.

4. WORKING PRINCIPLE OF SYSTEM

4.1 Flow Chart
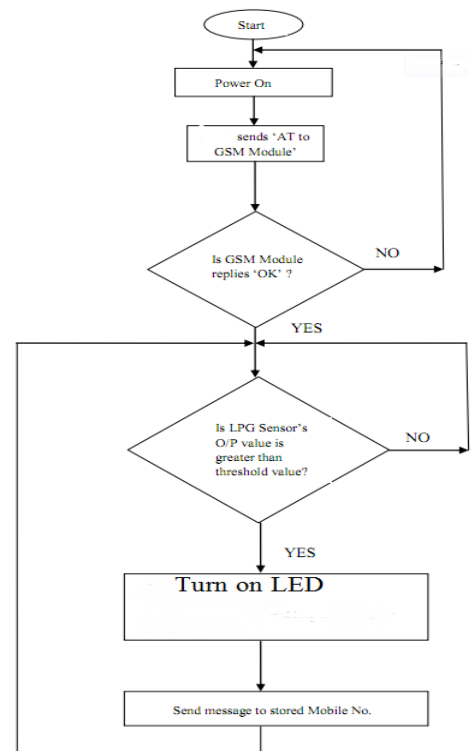The action flow chart is shown in Fig.4

Fig.4 Flow diagram of the system

The main function of MQ-5 gas sensor is to detect the LPG gas within the specified concentration and alerts the consumer through SMS. MQ-5 gas sensor composed by tin dioxide sensitive layer. The conductivity of the sensitive layer tin dioxide is lower in clear air. When the target gas is exists the conductivity of tin dioxide increases along with rise in gas concentration which results into lowering the resistivity due to which signal is generated at the output pin of the sensor. The output of the sensor is connected to the microcontroller. According to the output of the sensor microcontroller performs the necessary operation. When the sensor detects the gas

within it's specified range it gives signal to microcontroller, the microcontroller immediately activates the LED. Simultaneously it sends message to specified number through SMS(Fig.4).

5. RESULT AND DISCUSSION

The research project is aimed to developing the security of industry or home of LPG authorized user as well as the LPG storage center against LPG gas leak and fire. The model of the security system has constructed perfectly and tested by introducing small amount of LPG near the sensor module. The system could detect the gas and send SMS to the authorized user person mobile number which was setting in the microcontroller program. This security system of gas leak and fire dictator has very low cost and required less maintenance

By implementing this security system we can improve the chances for reducing the risks of life and assets. In order to make sure their asset is secure and take the necessary action against leak of gas and fire as soon as possible, from anywhere and anytime through mobile communication .

6.CONCLUSION

From the above results and discussion the flowing conclusion can be drawn

1. This microcontroller based security system can be used in the home of LPG authorized user as well as the LPG storage center.
2. This security system of gas leak dictator of low cost and less maintenance can improve the chances for reducing the life risks and property.
3. Necessary action can be taken against gas leak and fire as soon as possible, from anywhere and anytime through mobile communication.

7. REFERENCES

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