Wireless Sensor Node to Detect Hazardous in Gas Pipeline

Prof. Madane Mugdha R.

Assistant Professor,
Department of Electronics and Telecommunication,
Dr.Daulatrao Aher college of Engineering,
Karad Dist-Satara;
Maharashtra, India

Miss. Suryawanshi Ashwini A.
Miss. Mane Reshma S and. Miss. Mulla Heena K.
U. G.Student,
Department of Electronics and Telecommunication
.Dr. Daulatrao Aher College of Engineering,
Karad. Dist.Satara Maharashtra India.

Abstract - **To detect a presence of a dangerous LPG leak in a service station, storage tank environment ideal gas is used. For that purpose we use an alarm unit, to sound an alarm. Alarm give a visual indication of the LPG concentration. The sensor has sensitivity to combined a response time. The sensor can be used to sense propane, iso-butane LNG and cigarette smoke. If the LPG sensor senses gas leakage form storage the output of this sensor goes low. Micro controller is used here to monitor the low signal and it will identify the gas leakage. Now micro controller is turn on LED and buzzer. It also turn on exhaust after some delay for thronging gas out and it continue send massages to mobile number written in c code.**

Index terms - **Microcontroller89C51, MQ6 Gas Sensor, GSM Module, LM339N Sensor, Electromagnetic Valve.**

I. INTRODUCTION

In Domestic and industries application gas leakage is a problematic issue. Liquidized Petrolium Gas (LPG) is the inflammable gas which is used in excess in home and industries. The gas is filled under pressure is called as liquidized. If the gas leaks it may cause destruction to the lives and as well as the property. So keep this concept in project group has decided to build a detector system which detects the leak of LPG gas and protect the plant by taking the correcting action. This system provided that if gas leakage is the detected then LPG sensors are used to detect the LPG gas leakage then buzzer (siren) turns ON. Buzzer is used for indication of gas leakage . After detection, three phase supply will be disconnected. Alert message will be send to the concerned persons by using GSM modem. Gas leakage detection is important as well as stopping leakage is also important. Main aim of this module, it is low cost as well as highly accurate system which is detect gas leakage but also alert (Beep) and turn off main gas supply, and sends an SMS to advisory for preliminary precautions.

II. LITERATURE REVIEW

By referred papers From "International Journal of Tech. Research and Applications e-ISSN: 2520-8163" Named as,"GSM Based Gas leakage Detection System" by Ashish Srivastava, Ratnesh Prabhukar Ass. Prof. Galgotias Collage of Engg. Greater Noida, India. This paper provided a cost effective and highly accurate system, which not only detect Gas leakage but also alert and turn off main power and Gas supplies, and send SMS. In order to provide high accuracy gas sensor MQ6 has been used [1]. "Embedded System for Hazardous Gas Detection and Altering" by V. Rammaya, B Palaniappen Ass. Prof. Dep. Of CSE Annamalai University Chidamburam India. In this paper they developed system to detect Gas leakage & control using embedded system. It will detect Gas leakage and alerts by buzzer. Send SMS to an authorized person [2]. "WSN based Smart system for detection of LPG and Combustible Gases" by L.K. HEMA Dr. D. MURUGAN, M. CHITRA Faculty, Aarupadai Veedu Institute of Technology, OMR, Paiyanoor-104, INDIA. In this paper they developed a system which identify potentially hazardous Gas leak within an area by means of various sensors based electronic systems. These systems also employ an audible alarm to alert people whenever a dangerous gas is detected. These gas detection systems are of immense use because they can be used to detect a wide range of combustible, flammable and toxic gases which have hazardous effects on human health [3]. "Design Implementation of an Economic Gas Leakage Detector" by A. MAHALINGAM, R. T.NAAYAGI, N. E. MASTORAKIS Department of Engineering Systems School of Engineering, University of Greenwich (Medway Campus) Chatham Maritime, Kent ME4 4TBUNITED KINGDOM. This paper provided a cost effective audio-visual solution for LPG leakage detection in homes and commercial premises and audibly alert the users of those premises in case of a hazardous situation and provide warning signals (beeps) in case of low risk scenarios – in particular, when the appliances maybe left unattended in a premises or there is a risk of gas flames blowing out or being forgotten to be lit [5].

Taking reference from this paper we are proposing a system which not only detect Gas leakage but also Controlling Pressure of Gas pipeline, also it alerts by buzzer and send an SMS.

III. PROPOSED SYSTEM

Figure 1 shows the block diagram of wireless sensor node to detect hazardous gas pipeline. The main unit Microcontroller performs following tasks:
1. The input is given from sensor to signal conditioning to controller.

2. It displays the result on LCD.
3. It alerts the peoples in industry, lab, mill, by starting buzzer.
4. It give instruction to off the main Gas supply.
5. Also send alert SMS to main person whose no is save in card by using GSM modem.

A. HARDWARE DESCRIPTION

1. MQ6 Gas Sensor

Used in gas leakage detecting equipments for detecting of LPG gases. The sensor does not get trigger with the noise of alcohol, cooking fumes and cigarette smoke.

2. Micro Controller 89C51

It is a low power high performance CMOS 8 bit microcomputer with 4K bytes of flash programmable and erasable read only memory (PEROM).The AT89C51 is a low -power , high performance CMOS 8-bit microcomputer with 4K bytes of flash programmable and erasable read only memory (PEROM).The process of erasure of the entire contains takes less than a second ,or one might say in a flash ,hence the name ,flash memory. In addition the erasure method is electrical and for this reason it is referred to as flash EEPROM. To avoid confusion, it is commonly called flash memory. The measure difference between EEPROM and flash memory is the fact that when flash memory's contains are erase the entire devise erased ,in contrast to EEPROM , where one can erase a desired section or byte. Although there are some flash memories are available in which the contains are divided into blocks and the erasure con be done block by block, unlike
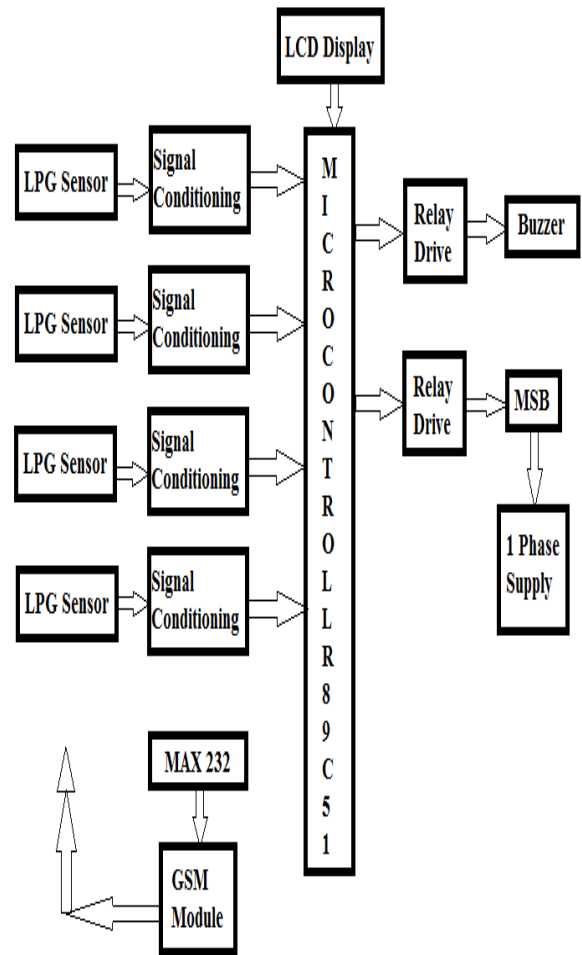

Figure 1 Block Diagram of Sensor to Detect Hazardous Gas Pipeline.

EEPROM, no byte erasure option is available .Due to the fact that flash memory can be programmed while it is in socket on the system board, it is becoming widely used as a way upgrade the BIOS ROM of the PC.

3. GSM Module

GSM is designed as data communication equipment. GSM modem requires SIM card from wireless carrier in order to operate. GSM Modem needs 5V DC supply. The modem needed only 3 wires (TX, Rx and GND) except Power supply to interface with Microcontroller/Host PC. Receiver pin connected to Microcontroller. It will receive the data from this controller [2].

4. Electromagnetic Valve

Electromagnetic valve has been used, which is connected to the relay driver IC (ULN 2003A). A 12V external DC supply has been given to the Electromagnetic valve. The main purpose of the electromagnetic valve to turn off the main Gas supply. Electromagnetic valve is attached to a main gas pipeline in such a way that electromagnetic valve rotates 180o then immediately the knob is closed. Electromagnetic valve is fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

5. LM339N Sensor

LM339 is a comparator IC with four inbuilt comparators. A comparator is a circuit use to moves signals between the analog and digital worlds. It compares two input voltage levels. It gives digital output to indicate the larger one. The input pins are termed as inverting (V-) and non-inverting (V+). The output pin goes low when voltage at V- is greater than that at V+, and vice versa. In applications, one of the pins is provided with a reference voltage and the other one receives analog input from a sensor or any external device. If inverting pin (V-) is set as reference, then V- must exceed this reference to result in low output. For inverted logic, the reference is set at V- pin.

B. SOFTWARE REQUIREMENT

The software for the GAS leakage was coded in embedded C, because of compiler availability, our familiarity with the language, as well as the greater control of the system offered as compared to other high level languages. While our Microcontroller supports ASM language, it was avoided because it's a difficult to maintain, and varies largely from processor to processor. C allows us to easily break apart the components of software design so that different members of the team could code the system due to its properties of easy understanding and not variant from system to system [4].

IV. RESULTS AND EXPERIMENTATION

The prototype of our project has been shown in figure 2. This system has been tested by lighter leak gas near to sensor, MQ6 gas sensor is detect the gas leakage and send signal to microcontroller then microcontroller send an active signal to other externally connected devices. As a result message is send by GSM module. In experimentation, results for LCD Display are observed below:

LCD display –

   1=N   2=N   3=N   4=N.
Leakage is detected by sensor then LCD display–

   1=N   2=D 3=N   4=N.

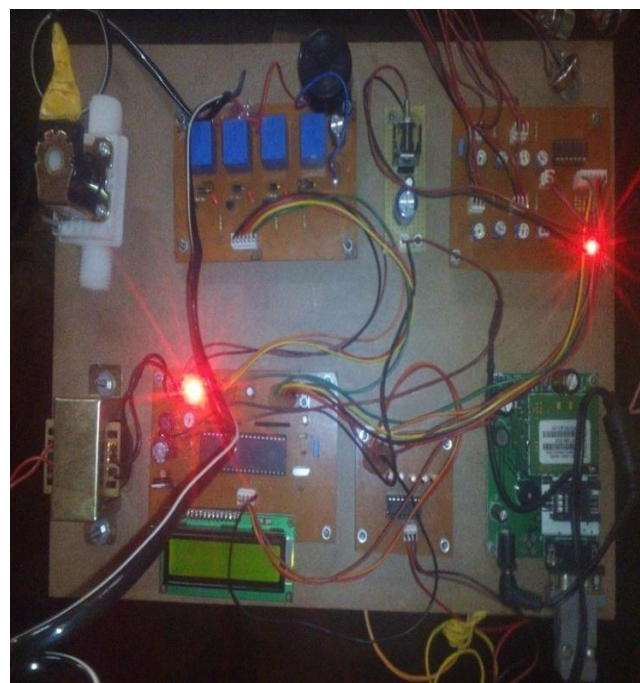After this buzzer rings and SMS send to specific person then action taken by that person.
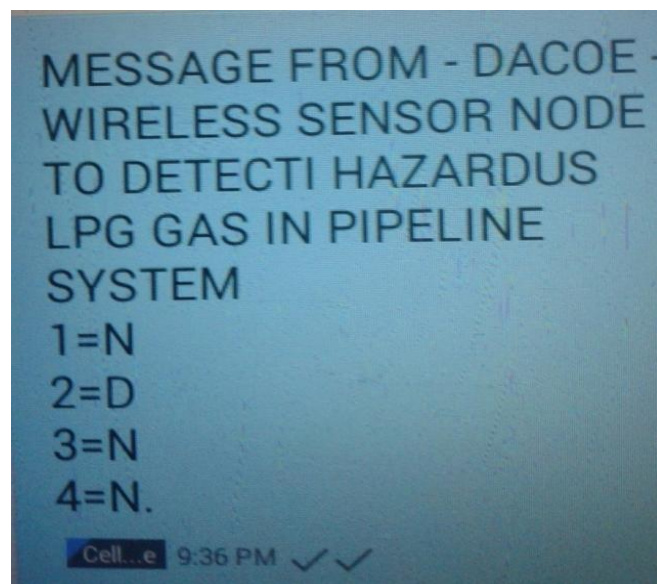

Figure 2 Image of project system.

Figure 3 Image of Message Send by GSM.

V. CONCLUSION

While going through this project we concluded that this design is very useful for detection the LPG gas. It is very useful in domestic applications. Using this project we can save the human beings life in hazardous situation. Using GSM modem we will get the alert. A sensor node with sensing modalities such as carbon dioxide, oxygen, humidity and temperature is constructed and validated. The node has the compatibility with the sensors and it can also be customized with other environmental sensors. The characteristics such as power consumption and transmission range are estimated. The sensor board is constructed using simple procedures and Micro controller

89C51 as its computational unit. The obtained results create the possibility of adapting such strategies to develop the sensor node for other environmental applications. The sensor node has the features such as low power usage, minimum size, low cost and long network range. The design and development of compatible coordinator node with relevant firmware is in progress.

VI. ACKNOWLEDGMENT

REFERENCES

[1] GSM Based Gas leakage Detection System" by Ashish Srivastava, Ratnesh Prabhukar Ass. Prof. Galgotias Collage of Engg. Greater Noida, India

[2] "Embedded System for Hazardous Gas Detection and Altering" by V. Rammaya, B Palaniappen Ass. Prof. Dep. Of CSE Annamalai University Chidamburam India

[3] "WSN based Smart system for detection of LPG and Combustible Gases" by L.K. HEMA Dr. D. MURUGAN, M. CHITRA Faculty, Aarupadai Veedu Institute of Technology, OMR, Paiyanoor-104, INDIA.

[4] "PIC18LF4620 Based Customizable Wireless Sensor Node to Detect Hazardous Gas Pipeline".

[5] "Development On Gas Leak detection and location system Based on Wireless Sensor Networks: A Review" .Miss Sidhu S Kale #1,Amairullah Khan#2 #ME Student, ENTC Department, Dr.BAMU, BEED, Maharashtra, India.

[6] "Hazardous Gas Pipeline Leakage Detection Based on Wireless Technology "Assistant Prof.Dept of ECE,Nova college of Engineering and Technology for Women Jupudi villaga,Ibrihimpatnam Madal,Krishna Dist A.P,India