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Safety System for Gas Pipeline

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***Abstract* –To detect a presence of a dangerous LPG leak in your car or in a service station, storage tank environment used MQ-6 Gas sensor. This unit can be easily in incorporated to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity, with a quick and excellent response time. Also there is one pressure sensor to detect pressure in gas pipeline. If the LPG sensor senses any gas leakage form storage it will give signal to microcontroller. Also if the pressure of gas increases above given threshold it also give signal to microcontroller. This signal is monitored by the micro controller and it will identify the gas leakage. Now micro controller is turn on LED and buzzer whenever gas is detected by sensor. After few milliseconds delay it also turn off electromagnetic valve and send massages to mobile number. Also if pressure increases then it will turn off the electromagnetic valve.**

Index Term – ATmega8A AVR microcontroller, Gas sensor MQ6, Pressure sensor, GSM Module, Electromagnetic valve.

I.INTRODUCTION

Liquidised Petroleum Gas (LPG) is one of the inflammable gas which is used in excess in homes and industries as the name indicates liquidised, that means the gas is filled under pressure. If the gas leaks it may cause destruction to the lives and as well as the property. So keeping this concept in mind our group has decide to built detector system which detects the leak LPG gas and protect the plant by taking corrective action. Some people have low sense of smell, may not respond on low concentration of gas leakage. Become an essential and help to protect from gas leakage accidents. Embedded system for Hazardous gas detection and Alerting has been proposed in literature. Whenever the alarm is activating immediately, the gas concentration exceeds normal level.

In our project we have provided the provision back, if the gas leakage is detected then following action is taken- [1] There one LPG sensor to detect the LPG gas leakage. Also there is one pressure sensor to detect pressure in gas pipeline.[3] If there is gas leakage detected, also if pressure in pipeline increases above given threshold then buzzer (siren) turns on. Buzzer (siren) is indication of leakage. Electromagnetic valve will turn off gas supply. Alert sms will be send to concert person.[3]

II.BLOCK DIAGRAM

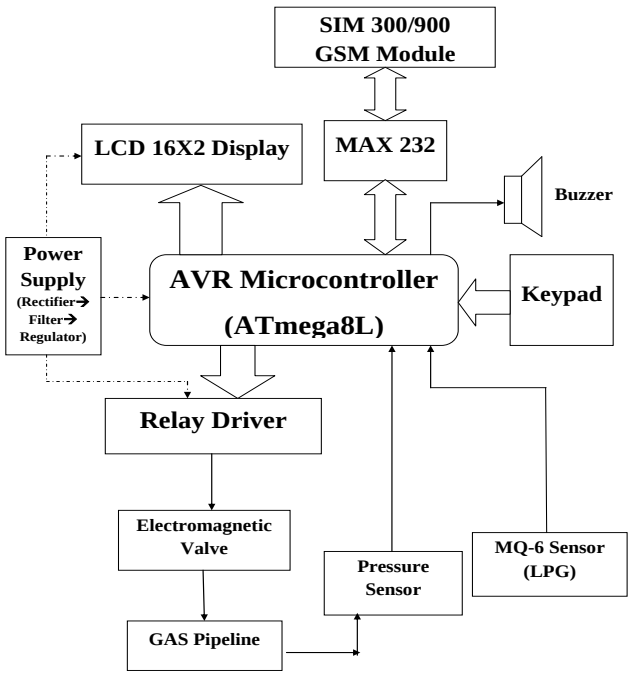

Figure.1 Block Diagram of safety system for gas pipeline

The system consist of, Sensor module consists of sensor for each parameter and its respective power circuitry. The micro controller is interfaced with sensor modules communication module. The required computations for the analog signals received from sensors data transmission are done within microcontroller unit.

The GSM is highly flexible plug and play quad band GSM modem for direct and easy integration to MAX232 supports features like SMS, GPRS and integrated TCP/IP stack.

1. SENSOR

1.1gas sensor

MQ6 is a semiconductor type gas sensor which detects the Gas leakage. The sensitive material used in MQ-6 is tin dioxide (SnO2). In clean air it has very low conductivity. This Gas sensor not only has sensitivity to propane and butane, it also sensitive to other natural gases like cigarette smoke and alcohol.

This sensor can be used for detection of other combustible gas such as methane. The concentration range of MQ-6 gas sensor is 300-1000ppm. This sensor is available in 6 pins package, out of which 4pins are used for fetching the signals and other 2 pins are used for providing heating current.

1.2 pressure sensor

Figure.2 pressure sensor

Pressure sensor is used to sense the pressure of gas in pipeline. When pressure of gas in pipeline is increase above threshold level then pressure sensor sends signal to microcontroller. It turns of main gas supply through relay driver.

Pressure is an expression of the force required to stop a fluid from expanding. Pressure is stated in terms of force per unit area. A pressure sensor is generates a signal as a function of the pressure imposed.

2. MICROCONTROLLER

It is a low power high performance AVR 8 bit microcomputer with 8K bytes of flash programmable & erasable read only memory (PEROM).

The ATmega8uc is a low -power , high performance AVR 8-bit microcomputer with 8K 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. 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 EEPROM, no byte erasure option is available .Due to the fact that flash memory con 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 MODEM

This module can be easily connected with low cost MCUs like AVR/PIC/8051. The communication is over asynchronous serial line.

Specification:

a. Low Supply Current 8 mA.
b. It has two drivers and two receivers.
c. Required +12V power supply.

4. ELECTROMAGNETIC VALVE

Figure.3 Electromagnetic valve

Electromagnetic valve has been used, 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. When gas leakage or high pressure occurs, immediately the knob is closed. Electromagnetic valve is fast and safe switching, high reliability, long life services, good medium. Compatibility of the materials used low control power and compact design. It works in 5-10ms.

III.SOFTWARE REQUIREMENT

The software for the GAS leakage was coded in embedded C. Because of compiler availability, our familiarity with the language, and the greater control of the system offered as compared to other high level languages. AVR 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.

IV.EXPERIMENTAL RESULT

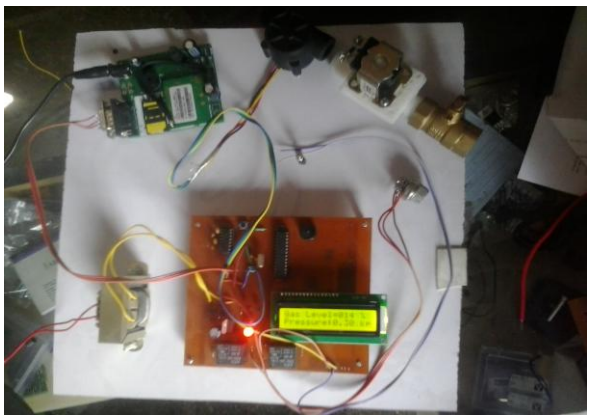

Figure 4. Top view of hardware of safety system for gas pipeline.

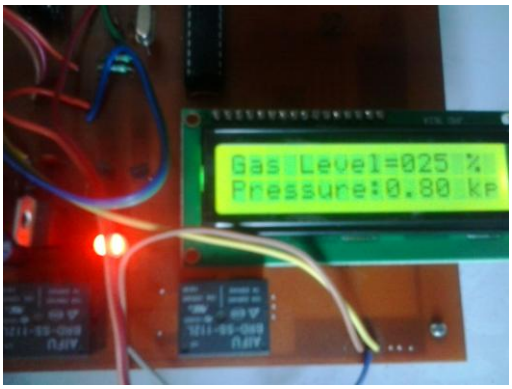

Figure 5. LCD displays

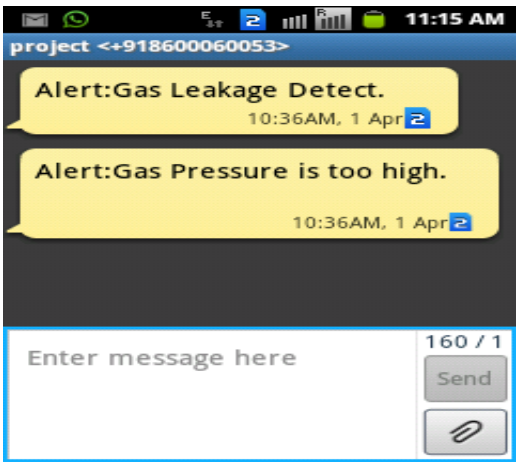

Figure 6. Output of Proposed System

V. EXPERIMENTAL RESULTS

TABLE I

Time Duration	GAS Leakage	Gas Pressure
5 Min	No gas leakage	103.42 kPa
10 Min	No gas leakage	103.42 kPa
15 Min	Gas leakage detected	0.0 kPa

VI. FLOWCHART

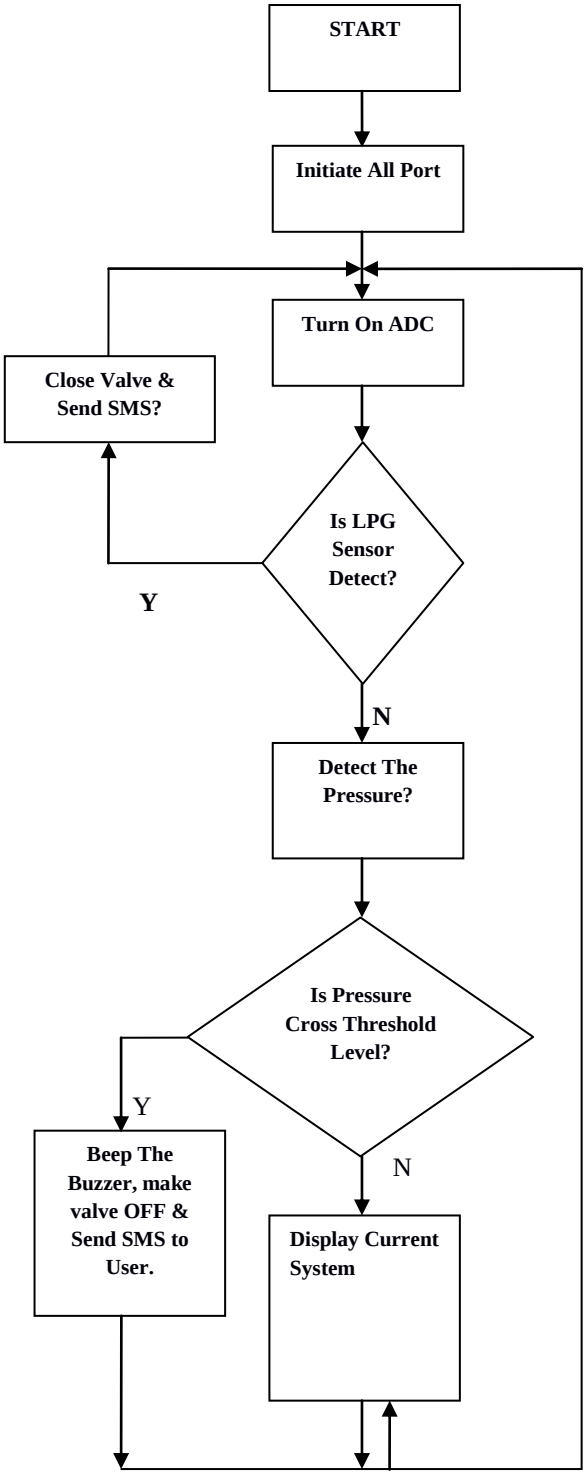

Figure 7. Flowchart of project system

VII.CONCLUSION

While going through this project we concluded that this design is very useful for detection of LPG gas. It is very useful in domestic as well as industrial applications, gas powered vehicles. Using this project we can avoid accidents associated with gas leakage.

VI.ACKNOWLEDGMEN

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