

Gas Leakage Detection System

Prof. Anisha Cotta

Assistant Professor

*Department of Electronics & Telecommunication
Engineering
Don Bosco College of Engineering, India*

Mr. Gladney Silveira

Student

*Department of Electronics & Telecommunication
Engineering
Don Bosco College of Engineering, India*

Mr. Sohit Prabhu

Student

*Department of Electronics & Telecommunication
Engineering
Don Bosco College of Engineering, India*

Mr. Lakshank Naik

Student

*Department of Electronics & Telecommunication
Engineering
Don Bosco College of Engineering, India*

Abstract

Gas leakage can cause major incidents to human injuries, fires as well as high impact on resources. To avoid such situation, a preventive inspection is important. Since gas leakage is cannot be by naked eyes due to the energy that are emitted by gas are too small to simulate by eyes, thermal imaging technology is used to detect and evaluate the severity level of the leakage. This paper presents a method for detecting gas leak using different sensors and infrared image analysis. The target region of interests is enhanced and segmented to extract the leaky regions. The image is extracted to identify the leakage. From the experimental result, it shows that this system is effective in detecting the presence of gas leaks in real industrial problem.

Keywords: Infrared Image; Gas Leakage; Thermal Camera; Sensors

I. INTRODUCTION

Gases which are toxic are the once that causes serious health impacts, but are also used in industries in large quantities. These gases have to be monitored in such a way that increase in the normal level of them could be known and proper precaution measures can be taken. The current systems available are not so portable and are costly and difficult to implement. So, an embedded system is designed using Microcontroller, for the purpose of detection of hazardous gas leakage, which in turn avoids the endangering of human lives. The hazardous gases like LPG and methane were considered here. If these hazardous gases level exceeds normal level then an alarm is generated immediately, and a SMS is sent to the authorized user as an alert message, which leads to faster diffusion of emergency situation. Also Thermal camera is one of the tools to be used as the inspection tools. This is a thermal infrared technology that uses the principle of infrared radiation to measure the temperature and the radiant energy of the object. Detection of this thermal camera that has been developed in recent times is a new type detection technology, and its main feature is noncontact measurement, not change the temperature distribution field of the measured object, to measure the temperature of moving objects and the charged objects, and with the advantage of wide temperature range, high sensitivity, fast response time, high precision, low power consumption, long life, easy operation, safe and reliable .Since, the gas leakage cannot the seen by naked eyes, but can be read by thermal images, so the thermal camera is used to detect the gas leakage.

The system is of low cost and can be easily implement in the chemical industries and in residential area which is surrounded by the chemical industries or plants or even LPG gas leaks, to avoid endangering of human lives. The system also supports to provide real time monitoring of concentration of the gases which are present in the air. As this method is automatic the information can be given such that the endangering of human lives can be avoided in time.

II. GAS LEAKAGE DETECTION SYSTEM

Given below is the flow of the project including circuit diagram

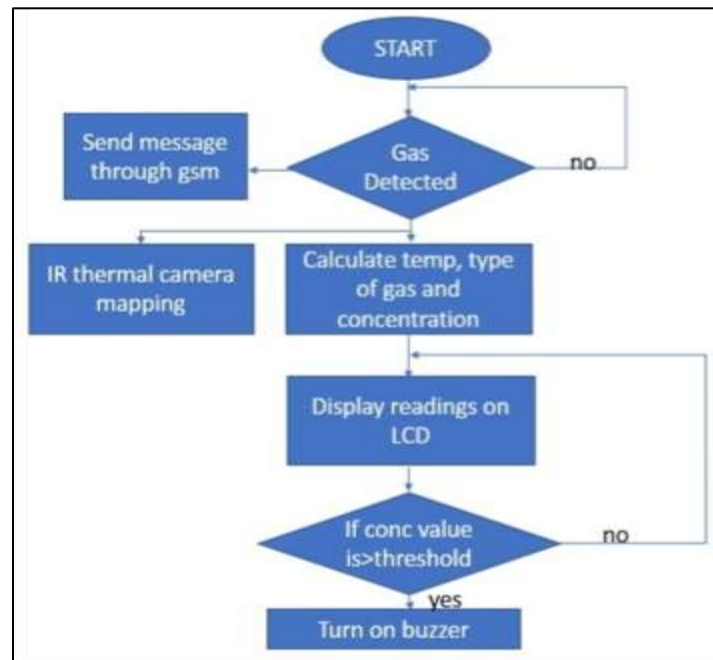


Fig. 1: Flow of the project

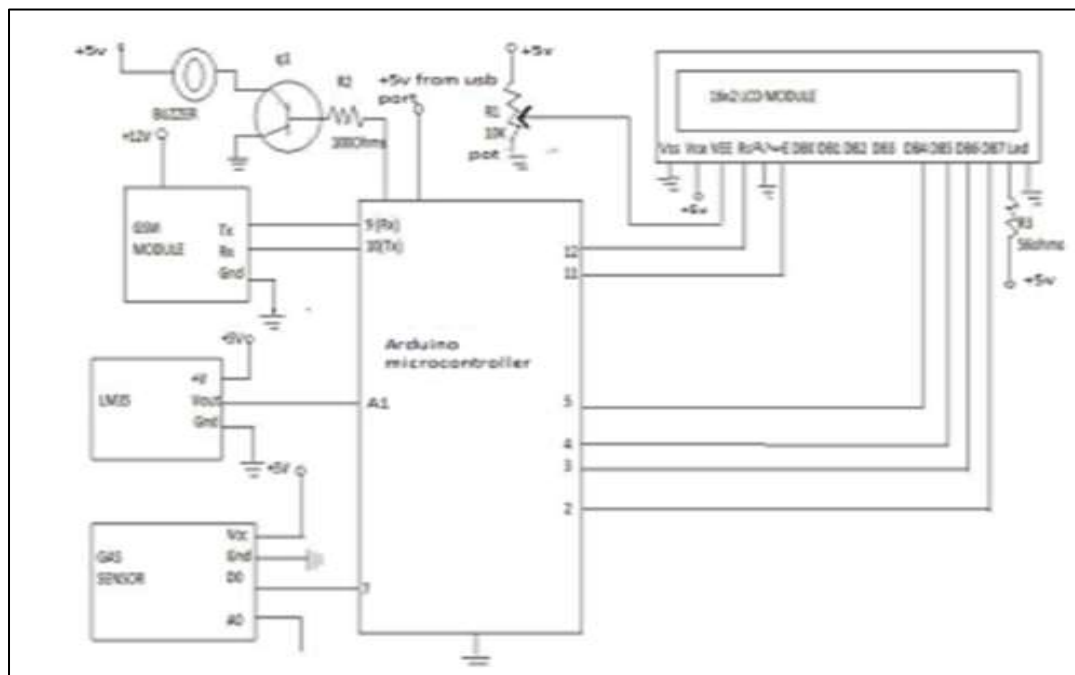


Fig. 2: Basic gas leakage detection circuit

It is operated by +5volt dc supply. It uses mq2 sensor which can detect gases like LPG, methane, butane, smoke, etc. It also has temperature sensor to show the temperature of the room. If gas leak is detected it sends message through embedded gsm module to the authorized person. At the same time, it does IR thermal camera mapping using AMG 8833 IR thermal camera breakout board. It shows gas concentration and temperature of the room on LCD alphanumeric display. If the gas concentration goes above the critical value as programmed it turns on the buzzer.

As different gases have different temperature it is easy to detect exact gas leak on IR Thermal camera. During the gas leak due to significant speed of the gas extension, the temperature of the pipe around the crack is rapidly cooling. Compare to the normal temperature, the drop of temperature of the leak hole is according to expanding of the gas. This is due to the frequency of the atomic collision of the gas is decreased. Thermal imaging is the one of the accurate methods of detection for the gas leakage. This method is widely used for the gas leakage detection because the thermal image can detect the radiation of the gas pipeline by displaying the image on the thermal camera.



Fig. 3: Temperature and gas concentration on LCD display



Fig. 4: Gas leak detection using thermal camera

III. CONCLUSION

As the conclusion, the system successfully fulfils the objective. The system was designed by technique of basic gas detection and thermal IR camera mapping. The system finally success to recognize types of gas condition, which are normal and abnormal condition. This system is able to classify the situation when we need for maintenance. The warning given indicates that the situation is in danger. Further study is needed to achieve a clearer image, thus decreasing the error detection. The higher resolution of camera is needed if want to achieve higher accuracy.

REFERENCES

- [1] International Journal of Distributed and Parallel Systems (IJDPS) Vol.3, No.3, May 2012 Embedded system for Hazardous Gas detection and Alerting V.Ramya, B. Palaniappan, Dean FEAT.
- [2] LPG Gas Leakage Detection and Alert System E. Jebamalar Leavline, D. Asir Antony Gnana Singh, B. Abinaya, H. Deepika4.
- [3] Hazardous Gas Detection using ARDUINO Prof. K.R. Katole, Vrushali Bangade, Bhagyashree Bangade, Ankita Soni.
- [4] Gas leakage detection using thermal imaging technique, 2014 UKSim-AMSS 16th International Conference on Computer Modelling and Simulation
- [5] AMG8833 IR thermal camera sensor breakout board, Adafruit Industries library.