

Alerting and Detection of Toxic Gases in Industries using the Internet of Things

A.A. Qazi¹, Monika Bhakare², Sushant Ghavale³, Bhagyashree Thakur⁴

¹Professor-Bachelor of Engineering, Electronics and Telecommunication Engineering Department, Bharti Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India

^{2,3,4}Student-Bachelor of Engineering, Electronics and Telecommunication Engineering Department, Bharti

Abstract - Industries disasters are the purpose for the increasing unreliability in human life particularly to the workers. Our project aims towards providing a safe environment for the health of workers in chemical, steel, petroleum Industries, etc. The major accidents cause due to leakage of hazardous gases used in production leads to the deaths and unsafe environment. To avoid such unpredictable incidents we had worked on a protocol system, The altering and detection of gases using Raspberry Pi and IoT. In this system gas sensor detects the presence of gases in the environment of intended level and alarm is used to alert the industrial area and surrounded residential area. If the average level of particular gases and temperature goes above then it is notified using internet of webpage and LCD display. In this GSM SIM900 module which sends alert message to the inspector' specific mobile for taking essential control action. The proposed system gives high accuracy by effective use of gas sensor like MQ2, MQ4, MQ8, MQ135 not only detect the leakage of hazardous gases also providing graphical user interface to the user using Thingspeak over an IOT.

Key Words: Gas Sensor, Raspberry Pi, GSM, LCD, IoT, Thingspeak.

1. INTRODUCTION

Presence of high concentrations of harmful gases such as dust, smoke responsible for Air pollution. Inhaling like propane, methane, carbon monoxide, hydrogen these gases can increase the chances of health problem. In fact, dust when inhaled can cause breathing problems, damage lung tissue, and boost up existing health problems. Humans are responsible for almost all of the increases in greenhouse gases. Therefore, every government has stringent regulations which require prevention and reduction of emission levels. In our project, the major air pollutants like C₃H₈, CH₄, CO and H₂ is monitored using sensors and values obtained are processed using Raspberry Pi. IP address is

used to send the data's and can be monitored from anywhere from logging into the IP address.

Industries accident are the purpose for the increasing unreliability in the human life particularly to the workers. To decrease these industries accident, we developed a gadget that might recognize the poisonous gas and other physical condition utilizing the Internet of things (IoT). This project planned to avoid industries accident and continuously monitoring presence of gas. A central Raspberry Pi is joined with sensors like temperature, gas sensor. Sensors would be used to get the information of presence of gas from the environment at the leakage time. A buzzer is used to generate a sound signal alert by industries to the nearby area living humans. Firstly, when the framework is developed, we make one account on thingspeak web. This information of the sensors is stored on the internet that is thingspeak graph that could make utilized for future and further processing, and this will be good begin for industries to protect the humans in the surroundings and guarantee them a secured existence.

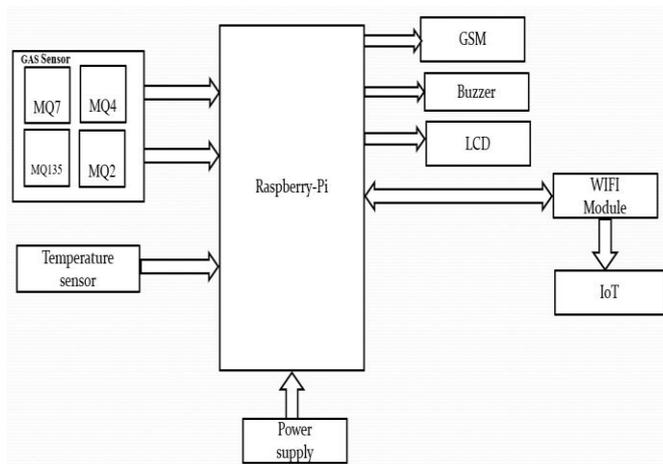
1.1 Objective

Detect Gas Leakage using MQ4, MQ8, MQ2, MQ135 Sensor (gas sensor). The SMS based alert system is setup by using GSM Module which sends alert messages to two specified numbers. Once the gas leakage is detected, a sound alarm is produced. The user can remotely determine the status of the system by using Internet of Things.

2. PROPOSED SYSTEM

The framework is utilizing constrained gases sensor and restricted radiation sensor these sensors are gathering information transmitting using Wi-Fi module to the Internet of Things module. Most dangerous area accidents happen time intimated information sending speed is high. IoT module utilizing transmitting and accepting information which is high and extendable as possible.

As shown in block diagram it consists of three section, the input section consists of four Gas sensor and temperature sensor. Leakage of gases is detected and processed by particular sensor. These outputs are given to the main board that is Raspberry Pi usually employ an alerting buzzer to alert people when hazardous gas is detected by using four different gas sensor which is connected to the Raspberry Pi. The buzzer beep when the gas has been detected. An LCD display will indicate the leakage of gas by displaying hazardous gas has been detected. Further monitoring section provides Graphical user interface over an internet of things and also sends an alerting message through GSM module.



3. DESCRIPTION OF HARDWARE AND SOFTWARE

A. Hardware Description

- Raspberry Pi module
- SIM800C GSM Module
- MQ4, MQ8, MQ135, MQ2 Gas Sensor
- Temperature Sensor

B. Software Description

- Operating System.
- Raspbian OS.
- Python programming

Raspberry Pi Module

It is an ARM based personal computer. Raspberry Pi comes with a Broadcom System on Chip (SOC) processor that has high integrated graphics capability. It has 256Mb of RAM and uses an SD card in place of hard disk drive. There is a mini-USB port for power which needs to be connected to a USB or mobile phone charger to a power the device. HDMI port handled the Video output or composite video output. Raspberry Pi 3 Model B is simply the best single board

computer which include an on-chip graphic processing Unit. The setting up of raspberry Pi consist of selecting Raspbian OS. In the Micro SDHC slot the data will be stored.

SIM800C GSM Module

SIM900A GSM Module is the module which supports 900MHz band for communication purposes. In India, network providers operate in the band of 900Mhz.

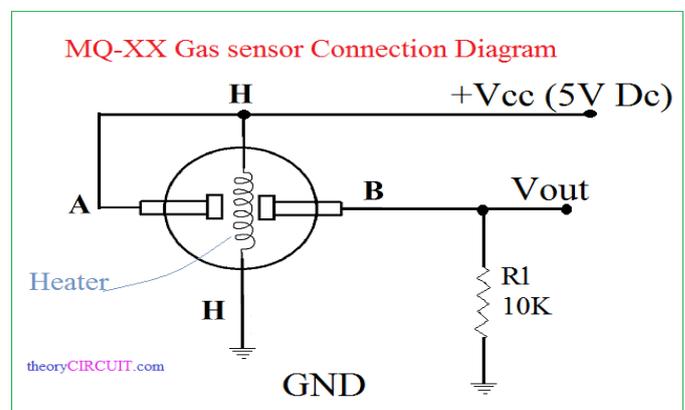
For working the GSM module requires an input of 12 volts. The feeding done by using a 12V,1A DC power supply as shown in below figure.

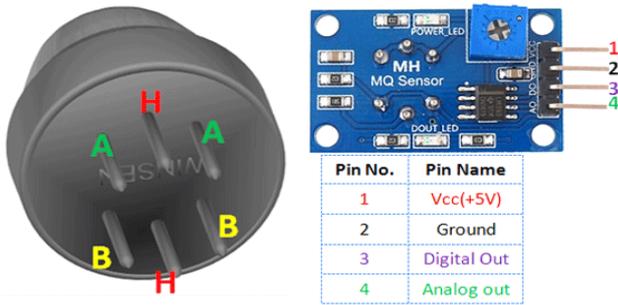


GAS SENSOR

A gas Sensor is a device which detects the presence or concentration of gases in the atmosphere and thus produces corresponding potential difference by changing the resistance of the material present inside the sensor which can be measured as output voltage. Following are the gas sensor used.

1. Carbon monoxide Gas Sensor (MQ-2)
2. Methane Gas Sensor (MQ-4)
3. Hydrogen Gas Sensor (MQ-8)
4. Propane Gas Sensor (MQ-135)
5. Tempearture Sensor.





Buzzers:

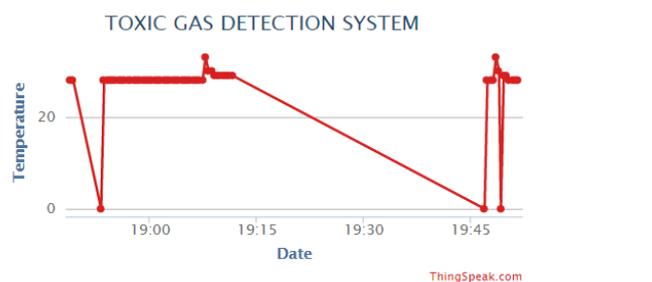
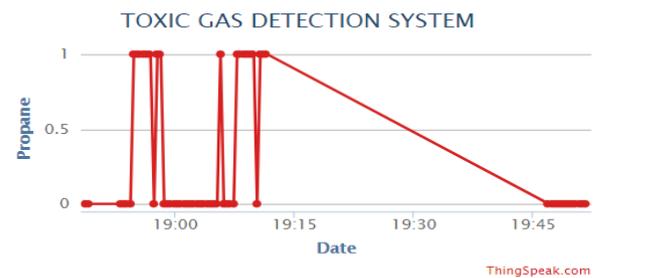
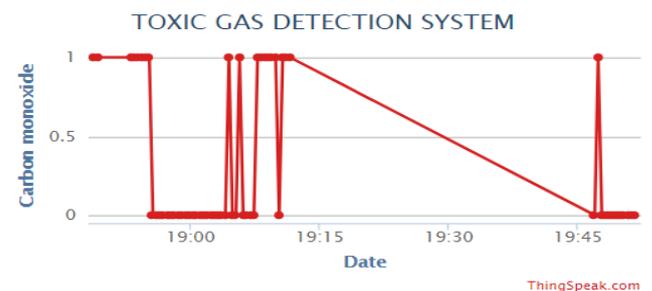
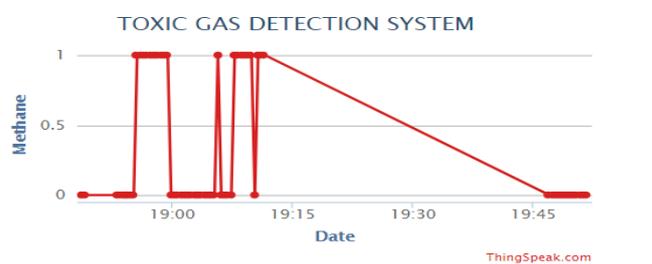
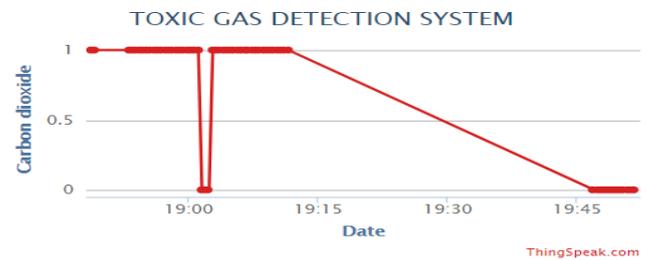
Buzzer is audio device which may be mechanical electromechanical, piezoelectric. the uses of buzzer are to indicating the leakage of gases.



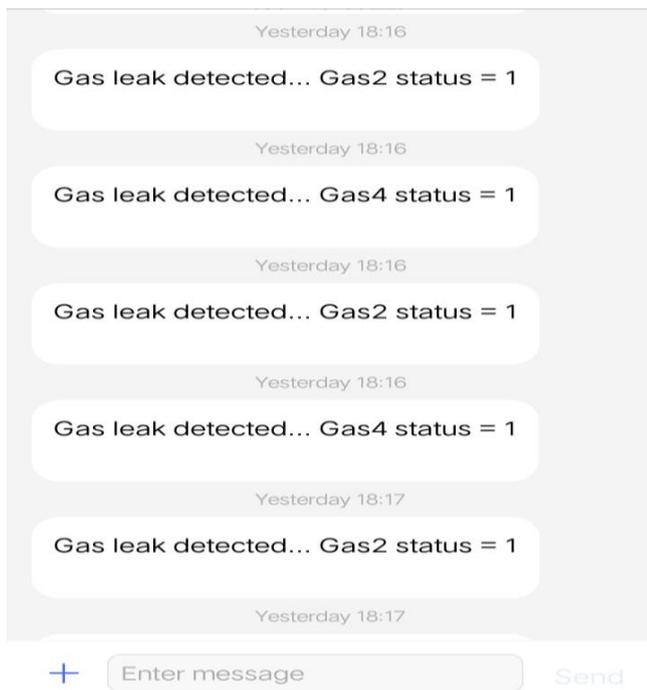
Internet of Things:

The Internet of things (IoT) is a system is used to connecting computing devices, mechanical and digital machines provided with unique identifier (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The Internet of things is inventing due to the intersection of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. IoT is used in the various field such as embedded systems, wireless sensor networks, control systems, automation .The new field of IoT the new product with concept of "smart home" which covering devices and application(such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) which can be controlled via smartphone and smart speakers.

4.RESULT



The graph shows the detection of Gases.



This is the result of detection of gases is send to the user number as SMS through GSM module.

5. CONCLUSION AND FUTURE SCOPE

The project will ultimate designed to mitigate serious accidents caused due to leakage of hazardous gas. For further application in chemical industries etc., the close loop system can be made using Close Loop stepper motor that turn off the gas supply and also using advanced controller with more accurate and efficient gas sensor used for poisonous gas detection.

REFERENCES

- [1] Chang-Su Ryu "IoT-based Intelligent for Fire Emergency Response Systems "International Journal of Smart Home" Vo l. 9, No. 3 (2015), pp. 161 -168.
- [2] Guohong Li, Wenjing Zhang, Yi Zhang "A Design of the IOT Gate way for Agricultura l Greenhouse" Sensors & Transducers, Vol. 172, Issue 6, June 2014, pp. 75-80.
- [3] International Journal of Pure and Applied Mathematics Volume 120 No. 5 2018, 955-966 Alerting and Detection of Toxic Gases in Industries using the Internet of Things