University Of Petroleum And Energy Studies

Final Project Report
on
IoT Based Gas Leakage Monitoring System using FPGA

SUBMITTED BY

Ayush Nautiyal R200220086
Ashish Bisht R200220081
Shivam Negi R200220050
Himanshu Bhandari R200220095

GUIDED BY
Dr.Tarandeep Kaur Bhatia

Industry Mentor: Mr. Mohsin Qureshi

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1.Background

1.1 Aim

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system where security is an important issue. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and home. Our aim is to make a very accurate and cheap sensor which gives the precise readings and alerts the user.

1.2 Technologies

Gas leakage leads to various accidents resulting in both material loss and human injuries. After the effects of harmful gases on human health were discovered gas leak detection methods became concern. Gas leak detection is the process of identifying potentially hazardous gas leaks by mean of sensors. These sensors usually employ an audible alarm to alert people when dangerous gas has been detected. The primary objective of this project is to design a Gas Leakage Detection and Monitoring system for industries and homes, which is based on the FGPA or its prototype, Arduino.

1.3 Hardware

Arduino
Smoke Detector
Gsm Module
Relay Module
Dc Fan
Buzzer

2.System

2.1 Requirement

2.1.1 Functional Requirement:

- Should be able to detect Gas Leakage within a seconds.
- System must be able to detect multiple Gases simultaneously.
- It should be able to send messages or call to the forest fire team.
- System must be able to activate itself without any human intervention.

2.1.2 User Requirement:

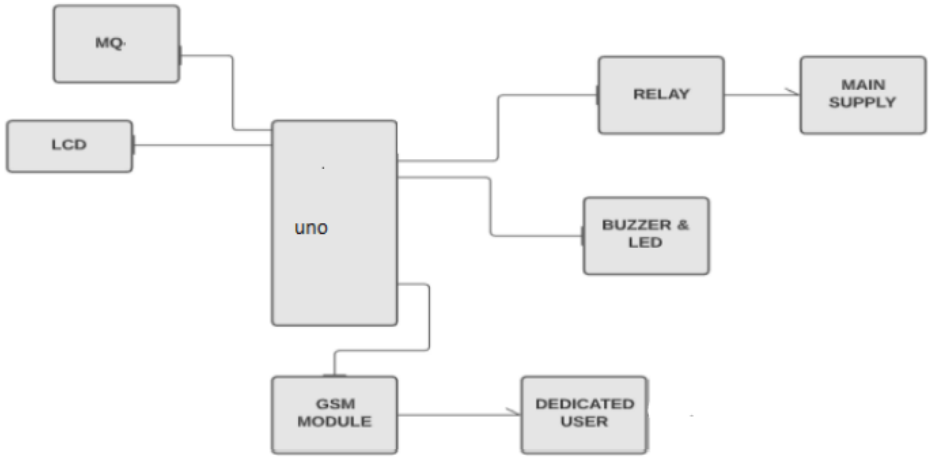
- Limit the emission of harmful gases.
- Minimum cost of installation.

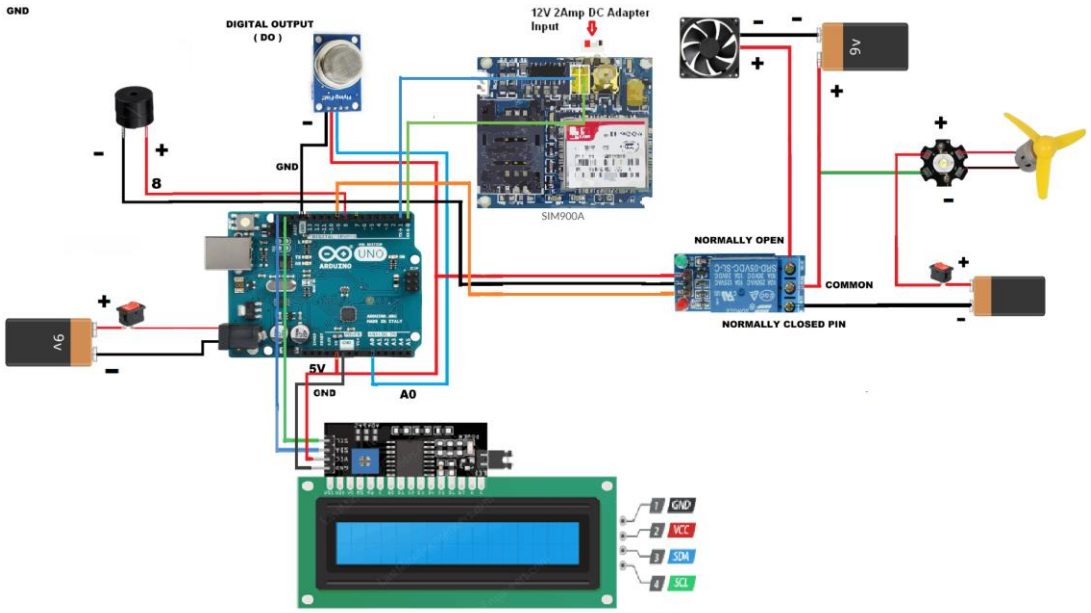
2.1.3 Environment Requirement:

- Preserving Natural habitat & Living Beings
- Preserving Environment from emission of harmful gases.

2.2Design and Architecture

The MQ sensor detects the gas around the Further the gas sensor is used to detect the gas particles and trigger the buzzer so the alarm works in a fine and proper way. When Arduino receives these signals, it performs the resultant action in response, which contains a SMS generating process through the GSM module. At last, the information is sent to the user and main supply will be cut off and Buzzer will bell.





2.3 Implementation

Gas leakage is detected through gas sensor MQ2 which is interfaced through Arduino.it will send the analog and the digital value to the Arduino ,Along with the Arduino board we have interfaced buzzer. It will ring when the gas will leaked and sensor will detect it for the next five seconds We have also used relay module which control one electrical circuit by opening and closing contacts in another circuit. As soon as the gas leakage is detected instantly a signal is sent through the MQ2 sensor to the Arduino. Once the signal is received in Arduino all the electric devices gets turned off through relay which turns on exhaust fan and also turns on the beep sound of the alarm. It alerts person who is at some distant point from the spot. After some time when the gas goes down or not detected it subsequently turns on all the relay and electronic devices. We have also interfaced a LCD which is used for displaying the status of gas leakage. The detection system uses to detect the leakage and automatically initiate a warning message through a GSM . It is very important to detect the disaster early and create a healthy environment and avoid Leaking of harmful Gases.

2.4 Testing

2.4.1 Test Plan Objective

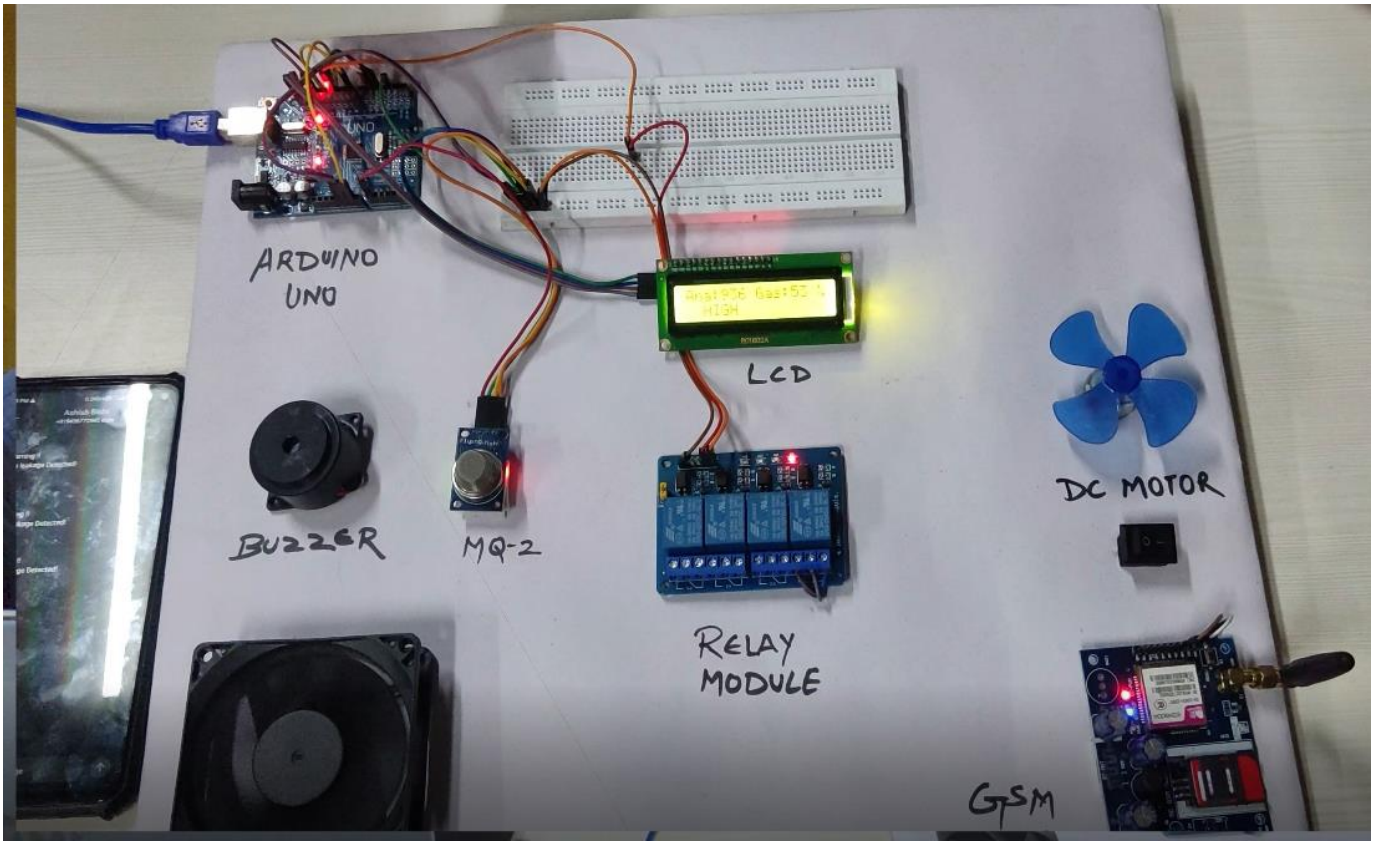
- Testing the written code.
- Compiling the Code
- Unit testing of each devices
- Test all required components.
- Check the Performance of our code.

2.4.2 Basic Test

During low level designing we did unit testing for all devices and we got these results.

S.No.	Component	Test Case	Expected Result
1	GSM Module	After getting the signal of fire, the GSM module sends a message to the user.	The message was sent successfully.
2	LCD	Analog value will be Print over lcd	Monitor the Smoke level
3	MQ2 Gas Sensor	In case of smoke the Gas Sensor detects the smoke and sends a signal.	The MQ2 Gas sensor detects the fire and sent the signal successfully.
4	Piezo Buzzer	After detecting the signal from sensors buzzer makes a noise.	Buzzer makes noise successfully.

3. Project snapshot



4. Conclusion

This monitoring and detection system is proposed mainly to meet the safety standards and to avoid fire accidents because of gas leakage. An embedded system for hazardous gas detection has been implemented. Here we have detected gases for demo purpose. This system can be implemented for detecting various gases either in domestic area such as places of educational institutions, residential and industrial areas which avoids endangering of human lives. This system provides quick response rate and the diffusion of the critical situation can be made faster than manual Methods

5. Further Development and Research

- This system is monitoring only ten gases and hence can be expanded by considering more parameters that cause the pollution especially by the industries. By uploading on the webpage for the common man, it helps them to know about the pollution in their area. This system consumes more power, by replacing the power source with an solar power then it will definitely improve the reliability of the system. We can use Wi-Fi module which will send Data Online In a Data Base and It will help in Making the reports
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6. Reference

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Guide on IoT-Based Gas Leakage Detection And Monitoring Systems | Intuz

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Video Src-

https://drive.google.com/file/d/1HmOBr-Ur-ck-2-CcFjZx4AJaHOHb3SDv/view?usp=sharing