University of Petroleum and Energy Studies

PRESENTATION ON -

" IoT Based Gas Leakage Monitoring System using FPGA "

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PROJECT GUIDE

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Overview

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Introduction

- 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.

Problem definition

- Gas leakage leads to various accidents resulting in both material loss and human injuries.

- After the effects of harmful gases on human health werediscovered gas leak detection methods became a concern.

Objective/Aim

- 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.

COMPONENTS

COMPONENTS
ARDUINO UNO BOARD
MQ2 GAS SENSOR
16*2 LCD DISPLAY
GSM Module
9V POWER ADAPTER
LED
BUZZER

Block diagram

Arduino Uno

An Efficient controller and smooth working is needed to continuously sense both leakage and level of the gas and also fast response is required when leakage found.

Arduino is an open-source electronics platform based on easy to-use hardware and software. The Arduino Uno R3 is an ATmega328P microcontroller-based development board.

With 14 digital input/output pins where 6 can be configured and used as PWM outputs, 6 as analog inputs is a great addition for I/O related operations. Powered with a 16 MHz ceramic resonator, an USB connection, a power jack, an ICSP header, and a reset button.

MQ2 Gas sensor

- MQ2 Gas sensor is a Metal Oxide Semiconductor (MOS) type Gas Sensor mainly used to detect gases like Methane, Butane, LPG, Smoke, etc.

- It is also known as Chemiresistors as the gas detection is based on the change of resistance of the sensing material when the Gas comes in to contact. If you want to measure a different type of Gas you can check these Gas Sensors.

- MQ2 Gas sensor module works on 5V DC and uses around 800mW. It can detect LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide concentrations in a range of 200 to 10000 ppm(Parts-per-million)

LCD Display

- It is necessary requirement to put a display about system monitoring and controlling performance which displays the alert message.

- Additionally, the system also displays the action carried out. For the work of displaying the alert message liquid crystal display(LCD)of 16*2characters operating of+5v supply and operated 4bit mode is implemented

GSM Module

- GSM (Global System for Mobile communication) Module (Fig.6.0) SIM900A The Global System for Mobile Communication is a standard developed by the European Telecommunications Standard Institute to describe the protocols for second generation digital cellular networks used by the mobile devices such as mobile phones and tablets.

- A GSM requires a SIM Card to be operated and operates over a network range subscribed by a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connections.

Buzzer

- Buzzer or beeper is a signaling device, usually electronic, typically used in automobiles and household appliances. It is an audible alarm for alerting the surrounding people.

CONNECTIVITY

Working of circuit

- 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.

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 menual Methods

Applications

Thank You!