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FIRE ALARM SENSOR AND GAS LEAKAGE DETECTION

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ABSTRACT

Fire alarm sensors and gas leakage detectors are designed to sense gas leaks and smoke in homes and industries. This is a crucial safety measure, as demonstrated by the Bhopal tragedy. In that incident, more than 40 tons of methyl isocyanate gas leaked from a pesticide plant in Bhopal, killing 3,800 people within seconds.

"If a system of fire alarm sensors and gas leakage detectors had been in place at the time, it could have prevented the tragic loss of life and premature death of thousands of individuals. The fire alarm sensors and gas leakage detectors were designed using components such as the Arduino Uno, Relay, MQ2 gas sensor, and "Embedded system." technology is being used in this project. This project promotes awareness about gas leakage

resulting in an eco-friendly future.

Keywords: Detection, Embedded Technology, Morbidity, Ionization detector, Alarm activation, emergency evacuation.

INTRODUCTION

Gas leakage is a common problem that many people face in their daily lives. Often, people leave burning candles unattended, which can result in serious damage. Therefore, the main objective of this project is to ensure safety measures in case of an emergency. [1]

Gas leaks can occur due to industrial operations and faulty appliances. To detect these gas leaks, fire alarm sensors and gas leakage detectors are used. These detectors can sense hazardous gases such as ammonia, chlorine, formaldehyde, hydrogen, sulfide, and methyl bromide. These gases are noxious and can be harmful to humans. In this project, an Arduino UNO board is used as a microcontroller to power different

TITLE	AUTHOR	CONFERENCE	YEAR
"A Review on Gas Leakage and Fire Detection Systems"	Raghunathan, A., & Parthiban, L.	2019 3rd International Conference on Computing Methodologies and Communication (ICCMC)	2019
"Development of a Wireless Gas Leakage Detection System Based on IoT Technology"	Wang, Q., & Yang, J.	IEEE Access	2020
"Design and Implementation of a Gas Leakage Detection System using Wireless Sensor Network"	Singh, R., & Kumar, R.	International Journal of Computer Applications	2015
"Wireless Sensor Network-Based Fire Detection System for Underground Mines"	Gunarathne, S., & Wijayasekara, H.	2020 3rd International Conference on Advancements in Computing (ICAC)	2020
"Design and Development of Smart Fire Detection and Alarm System Using IoT"	Agrawal, S., & Kumar, A.	2021 International Conference on Computer Communication and Informatics (ICI)	2021
"A Review of Fire Detection Systems Using Image Processing Techniques"	Patil, A., & Patil, A.	2018 2nd International Conference on Electronics, Materials Engineering & Nano-Technology (IEMEN Tech)	2018

components. The MQ2 gas sensor is used to detect gas or smoke, which then transmits data to the Arduino and activates the buzzer to alert people of a potential gas leak.

[3]

3. METHODOLOGY:

In this method which is an embedded based fire alarm sensor and gas leakage detection. If the MQ2 gas sensor senses a gas, it will produce a sound to an alarm at the same time led will start glowing. The alarm makes a sound when the MQ2 gas sensor detects the gas leakage.[13]

2) SELF-REGULATING MODE

This function is fully based on the embedded system. The Components like Arduino Uno relay and MQ2 gas sensor perform self-operating functions no manual help is needed "When gas leakage occurs, the components involved operate automatically."

3.1) PROTEUS SOFTWARE

Proteus is used to simulate, design, and drawing of electronic circuits. It was invented by the Lab center electronic. By using proteus you can make two-dimensional circuit designs as well.

Using this engineering software, you can construct and simulate different electrical and electronic circuits on your personal computers or laptops. Using proteus we can find different components like current, power, voltage value of any components, and resistance at any instant which is very hard to design a practical circuit. With the help of proteus software, we can design any electronic circuit. [12]

3.2 BLOCK DIAGRAM

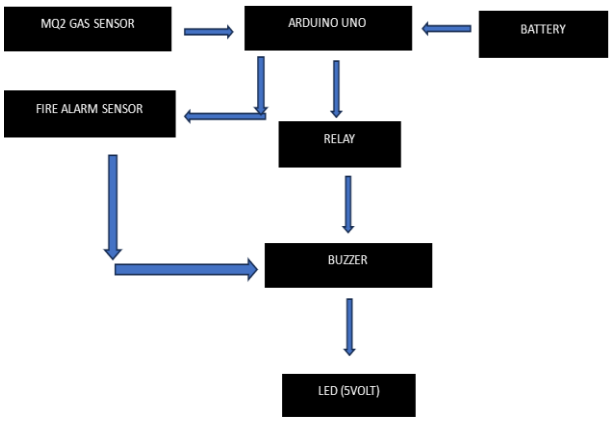

Fig 1: Block Diagram

3.3 PROPOSED EQUIPMENT:

1 Arduino Uno:

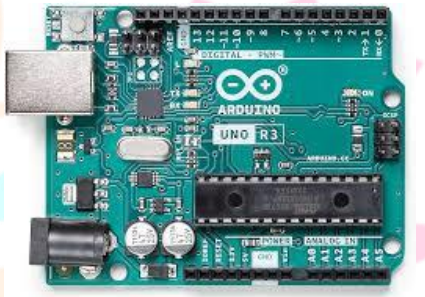

Fig 2: Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. The Arduino UNO has a resettable poly fuse that protects your computer's USB ports from shorts and overcurrent.[4]

2 MQ2 Gas Sensor:

Fig 3: MQ2 Gas Sensor

The MQ2 sensor is one of the most widely used in the MQ2 sensor series. It is a MOS (Metal Oxide Semiconductor) sensor. Metal oxide sensors are also known as Chemiresistors because sensing is based on the change in resistance of the sensing material when exposed to gasses. The MQ2 gas sensor operates on 5V DC and consumes approximately 800mW. [5]

3 Fire Alarm Sensor:

Fig 4: Fire Sensor

Fire Alarm System is designed to alert us to an emergency so that we can take action to protect ourselves, staff, and the general public [6]

4 Relay:

Fig 5: Relay Module

A relay is an electrically operated switch that has input terminals for control signals and operating contact terminals. relay is an electrically operated switch. It consists of a set of input terminals for single or multiple control signals and a set of operating contact terminals. A relay is an electromechanical device used to control the flow of electricity in a circuit.[7]

5 Led:

Fig 6: Led

LED stands for Light Emitting Diode. It's a semiconductor device that emits light when an electric current passes through it. LEDs are used in various applications such as lighting, displays, indicators, and more due to their energy efficiency, durability, and compact size.[8]

6 Battery: DC Supply

Fig 7: Battery

battery is a device that stores energy in chemical form and converts it into electrical power, usually in the form of direct current.

When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode.[9]

7 USB Cable: Micro USB 2.0 Cable

Fig 8: Micro USB 2.0 Cable [10]

8 Jumper wires

Fig 9: Jumper Wires

Various additional components, including jumper wires, are used to establish connections between different parts of the system. These components contribute to the overall stability and functionality of the project. Interconnection and Communication The system architecture connects the above-mentioned components. The Node MCU communicates with the water sensor to gather data, process it, and then display the results on the LCD. The DC pump is controlled by the relay module based on predefined water level thresholds.[11]

4. RESULT

The conclusion concerning fire alarm sensors and gas detection consistently revolves around their success in detecting potential hazardous gases, protecting people, and assets, preventing accidents, and guaranteeing the safety of individuals and properties.

These projects are essential for two early warning and rapid action in case of fire burst or gas leaks, substantially shortening the risk of injury, loss of life, and property damage

5. CONCLUSION

In conclusion, fire alarm sensors and gas leakage detection systems play a crucial role in ensuring the safety of individuals and properties this technology is essential in early warning and prevention helping to mitigate the risk associated with fire and gas leaks. Their integration into harm, business, and industrial facilities is paramount for safeguarding lives and assets continuous advancement in sensor technology and monitoring capabilities further enhance their effectiveness making them indispensable components of model safety and security system

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