

Chemical Gas Leakage Detector

NANDHANA.M.M NIRANJAN.R

CSE. COMPUTER SCIENCE OF TECHNOLOGY CSE. COMPUTER SCIENCE OF TECHNOLOGY SNS COLLEGE OF TECHNOLOGY SNS COLLEGE OF TECHNOLOGY COIMBATORE, INDIA COIMBATORE, INDIA nandhana.m.cse.2021@snsct.org niranjan.r.cse.2021@snsct.org

MOHAN SINHA.S NITHYA SREE.M.C CSE. COMPUTER SCIENCE OF TECHNOLOGY CSE. COMPUTER SCIENCE OF TECHNOLOGY SNS COLLEGE OF TECHNOLOGY SNS COLLEGE OF TECHNOLOGY COIMBATORE, INDIA COIMBATORE, INDIA mohan.s.cse.2021@snsct.org nithyamc26@gmail.com

Abstract

Gas or smoke leakage in household or industrial area causes many health issues and sometimes even put to death. Thus, to prevent such disaster happens the atmosphere of a work place should be regularly monitored and controlled in order to maintain the clean air environment. However, efforts in Industrial air quality control have been impeded by the lack of science-based approaches to identify the atmosphere Air quality and level of dangerous gas. Therefore, a monitoring system should be developed. The existing system provides an alarm system mainly meant to detect gas leakage using devices. In any industry a large fraction of the work is repetitive and judicious application of automation will most certainly result in optimum utilization of machine and man power. Robots play a vital role. They are mostly used to perform “pick and place” actions and this artificially intelligent robot developed to detect smoke/gas, fire, temperature, humidity by using some sensors. The aim of this proposed project is to automatically detect and stop gas leakage in various vulnerable premises. Even there is rapid development in technology which influencing the human life in several aspects due to rapid development in different fields, but we still need to adopt the technology such that we can make human life easier to live peacefully.

1. Introduction

A toxic gas can cause damage to living tissue, the central nervous system, severe illness, or even death. Some toxic gases are not visible, cannot be smelled, and/or they may not have an immediate effect but can be the cause of death. The highly toxic gas, hydrogen sulfide, occurs in a multitude of industrial processes, e.g., in petrochemical and biotechnological processes, and has to be strictly monitored. The problem of poisoning by dangerous gases is intense. The poisoning treatment aims at the stabilization of the patient's condition by the selection of the appropriate therapeutic measures. Any delay in treatment, may cause unpleasant effects that can even be fatal for the sufferer. Also, the treatment of poisoning is one of the most urgent incidents in the daily practice of health professionals. Carbon monoxide (CO) poisoning can lead to symptoms similar to those caused by a gas leak. Carbon monoxide is emitted when gas burns

incompletely. Exposure to CO can be fatal and requires emergency medical treatment. Bhopal disaster, chemical leak in 1984 in the city of Bhopal, Madhya Pradesh state was called the worst industrial accident in history. On December 3, 1984, about 45 tons of the dangerous gas methyl isocyanine escaped from an insecticide plant that was owned by the Indian subsidiary of the American firm Union Carbide Corporation. The gas drifted over the densely populated neighborhoods around the plant, killing thousands of people immediately and creating a panic as tens of thousands of others attempted to flee Bhopal.

2. Literature Review

In Shrivastava, A. Prabhaker, R., Kumar, R., & Verma, R. GSM based gas leakage detection system. International Journal of Emerging Trends in Electrical and Electronics authors introduced GSM based gas leakage detection system, in which the GSM module is introduced for wireless alert and gas leakage detection, efficiently implemented.

In Sanjay Kumar, S. Ramchandar Rao ,P. Rajendra Prasad, C. Internet of things based pollution tracking and alerting system. International Journal of Innovative Technology and Exploring Engineering, 2019 authors proposed IoT Based Pollution Tracking and Alerting System using ESP 8266. This system records the values of pollution of various types they are air pollution, water pollution, sound pollution. If there is a raise of the values of pollution in air, water, sound the gas, turbidity, sound sensor detects these values respectively and gives it to Node MCU.

In Ramu, M., & Prasad, C. R. Cost effective atomization of Indian agricultural system using 8051 microcontrollers. International journal of advanced research in computer and communication engineering, 2013, authors presented “Modernization of Indian agricultural system using micro controller” using 8051 and GSM. This system is focused on atomizing the irrigation system for social welfare of Indian agricultural system and also to provide perfect irrigation in particular area. Soil moisture sensor sense the condition of the soil whether it is dry or wet and sends the information to microcontroller. Water level sensor senses the water level in the water source and sends the information to the microcontroller. So the information from the microcontroller is sent as SMS through GSM. By taking references from the above paper we proposed a system which is used to detect leak of gas simultaneously at three different location and but it even alerts people by buzzer and by sending SMS by the GSM to the person whose number is written in the source code.

In Pravalika V., & Rajendra Prasad, C. Internet of things based home monitoring and device control using Esp32 International Journal of Recent Technology and Engineering authors present a low cost flexible and reliable home monitoring and control system with additional security using ESP32, with IP connectivity through local Wi-Fi for accessing and controlling devices by formal user remotely using android smart phone application.

3. Project Analysis

A chemical gas detector is a device that automatically detects smoke and also gives us warning. In the proposed system, a gas detector upon senses gas activates its alarm, sends a low voltage signal to all other smoke detectors in the vicinity. This low voltage signal activates the individual relays in the other smoke detectors causing them to emit a tone that alerts residents that one of the smoke detectors senses smoke. In this system the transmitter and receiver are installed in a unit and the need for a base is eliminated. The individual smoke detectors are equipped with all the electronics required to both send and receive signals. The functionality of system is divided into three main steps. In the initial step, the gas leakage is detected by the gas sensor. This detects the gas leakage and gives the signal to the microcontroller. After that in second step the microcontroller receives the signal, which sends by gas sensor. It sends activation signal to other external devices.

Problem Statement

Safety is a crucial consideration in design of residential and commercial buildings in order to safeguard against loss of life and damage to property. Poisonous gas is a key element in safety considerations. As a result, it is necessary to identify and prevent gas leakage. Gas Detectors can be classified in a variety of ways. They're divided into categories based on the type of gas they detect, the technologies that power the sensor's output, and the components that impact the sensor's operation (semiconductors, oxidation, catalytic, photoionization, infrared, etc.). In our daily lives, we utilize a variety of gadgets for various purposes, and the majority of them have the ability to emit

any type of gas or chemical when in operation in the air. In many scenarios, it is difficult for human to keep an eye on the levels of the concentration of the leaked gas or to detect whether there is leakage of gas or not This project therefore seeks to design a microcontroller based gas leakage alarm that will continuously monitor the presence of significant amount

of poisonous gas and activate an alarm to prompt a safety measure to contain the situation. This system can be of great in domestic as well as industrial settings to detect smoke and alert people on an impending danger since poisonous gas is a precursor for fire, instead of relying on heat/temperature sensors which sounds alarm when the leakage has already started. This can go a long way in helping to save human life.

Proposed System

Sensitive material of the MQ-6 gas sensor is SnO₂, which has lower conductivity in clean air. When the target combustible gas exists, the sensor conductivity increases along with the rising gas concentration. The MQ6 gas sensor has a high sensitivity to Propane, Butane and LPG, and response to Natural gas. The sensor could be used to detect different combustible gasses, especially Methane; it has a low cost and is suitable for different applications. The MQ-6 can detect gas concentrations anywhere from 200 to 10,000 ppm. The sensor's output is an analog resistance. This system is based on the Arduino UNO R3 and MQ-6 gas sensor. When the sensor detects gas in the atmosphere, it will give digital output 1 and if gas is not detected the sensor will give digital output 0. Arduino will receive the sensor output as digital input. If the sensor output is high, then the buzzer will start tuning along with the LCD that will show that "Gas detected: Yes". If the sensor output is low then buzzer will not be tuning, and the LCD will show that "Gas detected: No". The buzzer most commonly consists of a number of switches or sensors connected to control unit that determines which button was pushed or whether a preset time has lapsed, and usually illuminates a light on the appreciate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. The device is portable, light weight, user friendly and efficient with multi-functional features.

4. Project Description

Existing System

When choosing gas detectors, many factors come into play. The type of facility in which they will be placed, the gases they are designed to detect, environmental conditions, and more all play a role in determining the accuracy and reliability of the detectors. While fixed detectors are important in that they don't often scan large areas for gas leaks, they sometimes may not be as effective in monitoring confined spaces. Since these areas are often smaller and in isolated areas, technicians and engineers in these areas require portable detection equipment that can be clipped to clothing or placed nearby while they perform equipment installations, testing, and repairs. The existing gas leakage systems are bounded to a certain region that they are fixed and not motile. This restricts its sensing to a limited area so that they can't cover the whole surrounding and alert the people about the poisonous gas leakage. Since many facilities will have numerous types of gases at their sites, it is crucial to select detection systems that include multi gas detectors. Though these detectors often cost more, they are long-lasting, can be used in virtually any type of facility and work environment, and allow for monitoring of multiple types of gases, both toxic and explosive. Along with this, they can use advanced technology, such as infrared sensing, to quickly locate various gases and transmit data to on-site personnel and off-site monitoring centers.

Working Of Proposed Methodology

In this method, semiconductor sensors are used to detect poisonous gas. An MQ6 semiconductor sensor is used. Sensitive material of the MQ-6 gas sensor is SnO₂, which has lower conductivity in clean air. When the target combustible gas exists, the sensor conductivity increases along with the rising gas concentration. The MQ6 gas sensor has a high sensitivity to Propane, Butane and LPG, and response to Natural gas. The sensor could be used to detect different combustible gasses, especially Methane; it has a low cost and is suitable for different applications. The MQ-6 can detect gas concentrations any where from 200 to 10,000 ppm. This system is based on the Arduino UNO R3 and MQ-6 gas sensor. When the sensor detects gas in the atmosphere, it will give digital output 1 and if gas is not detected the sensor will give digital output 0. Arduino will receive the sensor output as digital input. If the sensor output is high, then the buzzer will start tuning. If the sensor output is low then buzzer will not be tuning. The buzzer most commonly consists of a number of switches or sensors connected to control unit that determines which button was pushed or whether a preset time has lapsed, and usually illuminates a light on the appreciate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound.

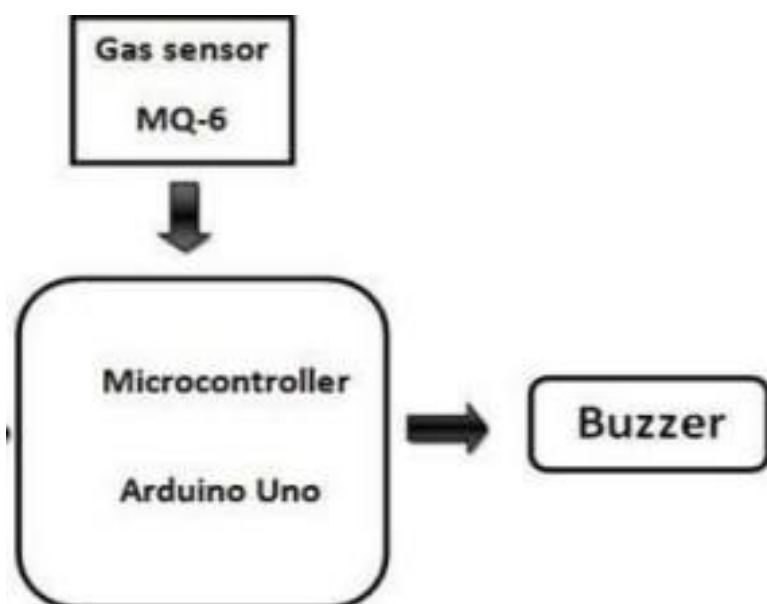


Figure No: 4.2.1

also lead to raise our economy, because when gas leaks it not only contaminates the atmosphere but also wastage of gases will hurt our economy In future, more advanced features will be integrated with this system which will provide users with more safety and relaxation.

Most of industries can use it, because it work fatly to protect and most effective

.This system can be of great in domestic as well as industrial settings to detect poisonous gas and alert people on an impending fire since smoke is a precursor for fire, instead of relying on heat/temperature sensors which sounds alarm when the fire has already started. This can go a long way in helping to save human life. The cost of implementing this system is relatively low since the components used are relatively cheap and are easily available in the market. The single microcontroller can be used to interface several sensors with alarms located in different locations as long as more pins are freed for multiple inputs multiple outputs.. We can use this project and accidents can be controlled to a great extract in a place such as forests, home ,colleges industries ,trains etc.

4. Impemetation

The system contains Node MCU, LPG GAS device Module and buzzer. Node MCU controls the complete method of this technique like reading LPG Gas device module output, causation message and activating buzzer. The functioning of the circuit once the device is supercharged ON. The MQ5 device gas module has four pins. 2 pins area unit used for interfacing with development board and 2 other pins area unit VCC and ground. Out of 2 interfacing pins one pin is analog output and the other is digital pin. The analog output pin of the module is employed for detecting concentration level of gas outpouring and interfaced with the A0 analog input pin of the Node MCU board. In this circuit, we have connected the A0 pin of the MQ-5 to the A0 pin of the Node MCU module and D0 pin remains disconnected Internet of Things (IOT) is the networking of 'things' by which physical things can communicate with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction and same is the case with IOT based gas detection system, it does not require human attention. IOT and Arduino based LPG leakage detection system senses the LPG gas with the help of an LPG gas sensor.

LPG gas sensor interfacing with Arduino is implemented in this project. The Signal from this sensor is sent to the Arduino microcontroller. The microcontroller is connected to an LCD, Buzzer and IOT module (ESP8266). IOT LPG leakage detector project is implemented using an ESP8266 chip. This is a Wi-Fi module which is used for connecting micro-controllers to Wi-Fi network and make TCP/IP connections and send data. Data, which is sensed by these sensors, is then sent to the IOT. The IOT module then sends the data over to a website. Once the gas leakage is detected, the buzzer is turned ON.

5. Advantages

- Efficiency: it uses less power of only 5v.
- Portable: it is very small to carry wherever you go
- Future Enhancement: This technology could be further modified and more upgraded as per individual need and interest.
- We have discussed some basic ideas of this technology. And depending on innovative applications user can upgrade as per requirement.
- Most of industries use it, because it works fatly to protect, and it is most effective.

6. Conclusion

The design of a sensor-based automatic gas leakage detector with an alert and control system has been proposed and discussed in this paper This is a low-cost, low power, lightweight, portable, safe, user friendly, efficient, multi featured and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department but it will

7. References

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