Home & Industrial Safety Using Fire & Gas Detection System

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ABSTRACT

The Internet of Things IOT is an upcoming domain which is already ruling the computer world. Its main feature is connecting the electronic stuff with a nonelectric stuff. Stuffs like vehicles, home appliances and kind of physical stuff are embedded with electronic components or software components etc. the main of the project is to detect the liquid petroleum gas (LPG) leakage to avoid the fire accidents in home and in the industry and increase the safety feature with more accuracy and with more efficiency as we know that security is an important issue. The system detects the leakage using the sensors we have used the gas sensor to detect the leakage of the gas and we have also used the flame sensor to detect the flames. the MQ-2 and flame sensor simultaneously collect data from the environment and then transfer it to the Arduino UNO board in the form of analog inputs. The Arduino board then check the inputs and act according to it.

Keywords

Gas Detection, Liquid Crystal Display (LCD), LPG (liquefied petroleum gas), buzzer (alarm), LED (light), Safety Monitoring Systems, Internet of Things, Intrusion Detection, Sensors, Reliability, ATmega 328 AVR microcontroller, gas sensors MQ-2, flame sensor, temperature sensor, power supply.

INTRODUCTION

In this world of urbanization security has been an important issue to safe guard the people from the LPG leakage and to decrease the fire accidents in home and also at the industry level. we all know that the LPG is a mixture of propane , butane and ethane, at home level fire accidents occur due to leakage of the gas from gas cylinders which when released in excess can lead to huge catastrophe , these accidents can also occur at the time of filling of gases in the gas cylinder , in order to minimize this gas pipelines have been introduced to each and every home, but, even because of the gas pipelines the gas is leaked from the

pipes either due to the low quality of the pipes or due to the environmental conditions or it might sometimes even happen because of the human errors in designing and also in laying of the pipes. At the industry level fire accidents occur due to the short circuit or due to the human errors or maybe because of any Environmental situation. So, these type of accidents leads to many injuries, causes severe burns, loss of life and also loss of property. Many measures have been taken to arrest these fire accidents but they occur either of the way. Gas leakages and fire outbreaks in industries as well as houses have lead to wide destruction and losses in the past. Gas leakages and fire outbreaks both spread widely and lead to even greater loss of life and property if proper action is not taken on time. So here we propose a system that detects gas as well as fire outbreaks and alert us accordingly so that proper action may be taken to control it. In this project the MQ-2 and flame sensor simultaneously collect data from the environment

and then transfer it to the Arduino UNO board in the form of analog inputs. The Arduino board then checks if the values submitted by the sensors is less or more than that of the value kept constant in the memory. If the value is higher or lower than the threshold value the Arduino acts respectively.

When there is presence of a flammable gas or smoke the red light glows and the buzzer beeps and display the alert massage on the LCD Screen. When there is no presence of a flammable gas the green led glows and display the massage with smoke lavel on the LCD Screen. When there is a flame nearby the red light glows and the buzzer beeps and display the alert massage "FIRE IS DETECTED" on the LCD Screen. When there is no flame nearby there is no beeping of the buzzer and no flashing of lights and display show massage "NO FIRE IS DETECTED".

LITERATURE SURVEY

Gas leakage is a serious problem and nowadays it is observed in many places like residences, industries, and vehicles like Compressed Natural Gas (CNG), buses, cars, etc. It is noticed that due to gas leakage, dangerous accidents occur. The Liquefied petroleum gas (LPG), or propane, is a flammable mixture of
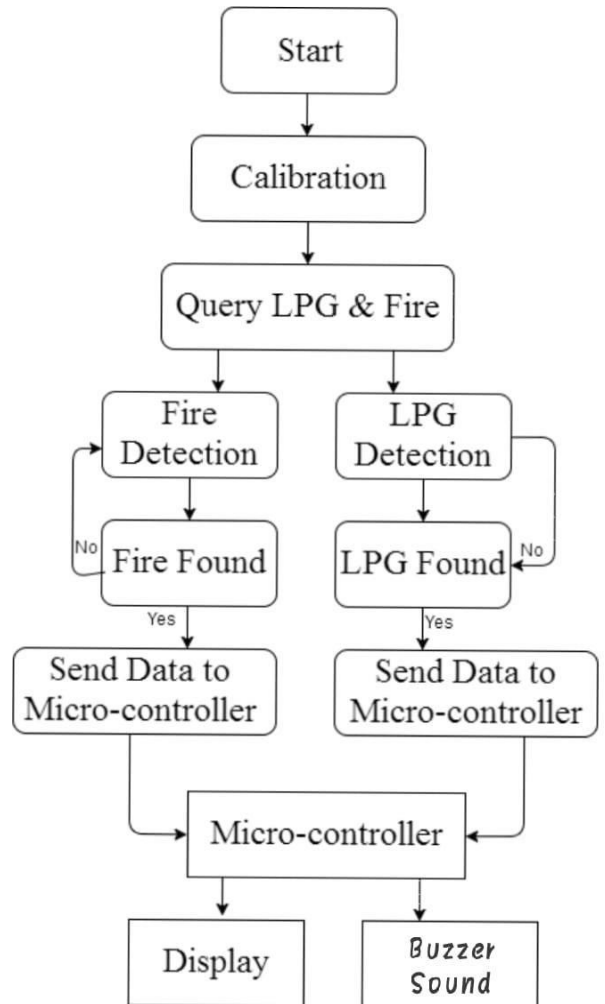
hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, and vehicles because of its desirable properties which include high calorific value, less smoke, less soot, and meager harm to the environment. Liquid petroleum gas (LPG) is highly inflammable and can burn even

at some distance from the source of leakage. This energy source is primarily composed of propane and butane which are highly flammable chemical compounds. These gases can catch fire easily. In homes, LPG is used mainly for cooking purposes. When a leak occurs, the leaked gases may lead to an explosion. Gas leakage leads to various accidents resulting in both material loss and human injuries. Home fires have been occurring frequently and the threat to human lives and properties has been growing in recent years. The risks of explosion, fire, suffocation are based on their physical properties such toxicity, flammability, etc. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. The Bhopal gas tragedy is an example of accidents due to gas leakage. The reason for such explosions is due to substandard cylinders, old valves, no regular checking of gas cylinders, worn out regulators and a lack of awareness of handling gas cylinders. Therefore, the gas leakage should be detected and controlled to protect people from danger. A gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage.

Existing model was studied here- Ahmed Imteaj et.al. Studied the problems faced by factory workers in times when fire breaks out. They proposed a system using Raspberry Pi 3 which is capable of detecting fire and providing information about area of fire. The Raspberry Pi controls multiple Arduino boards which are connected with several motors and cameras to capture the fire incident. In this, they discussed about the modern technology that can be used to reduce extremely unfortunate accidents caused by fire. We designed the whole system and calculated its effectiveness.

METHDOLOGY

In this Project, semiconductor sensors are used to detect LPG gas and

Fire. An MQ-2 and Flame semiconductor sensors are used.

The MQ-2 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-2 can detect gas concentrations anywhere from 200 to 10,000 ppm. The sensor's output is an analog resistance. A fire sensor module contains a fire sensor (IR receiver), resistor, capacitor, potentiometer at the bottom, and comparator LM393 as an integrated circuit. It can recognize infrared light with a wavelength running from 700nm to 1000nm.

The block diagram of the gas leakage and fire detection and alert system. Block diagram of gas leakage and fire detection and alert system. This system is based on the Arduino UNO, Flame sensor and MQ-2 gas sensor. When the sensors detects gas and Fire in the atmosphere, it will give digital output 1 and if gas and Fire are not detected the sensor will give digital output 0. Arduino will receive the sensor output as digital input. If the sensors output is high, then the buzzer will start tuning along with the LCD that will show that "Gas & Fire detected: Yes". If the sensor output is low then buzzer will not be tuning, and the LCD will show that "Gas & Fire detected: No".

Liquefied Petroleum Gas (LPG) is a main source of fuel, especially in urban areas because it is clean compared to firewood and charcoal. Gas leakage and fire incidents are major problem in the industrial sector, residential premises, etc. Nowadays, home security has become a major issue because of increasing gas leakage and fire incidents. Gas leakage is a source of great anxiety with ateliers, residential areas and vehicles like Compressed Natural Gas (CNG), buses, and cars which are run on gas power. One of the preventive methods to stop accidents associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. The aim of this project is to propose and discuss a design of a gas leakage And Fire detection system that can automatically detect and alert.

This proposed system also includes an alerting system for the users. The system is based on a sensor that easily detects a gas leakage and Fire.

ACKNOWLEDGMENT

RESULT

We have tested our project and observed it's successful operation. To ensure safety condition a system has been developed which is reliable in detecting fire and gas leakage and can even detect the specific room or floor in which the fault is present. Moreover, the system can show an alert message regarding the information of fire detection or gas leakage to the Screen. The Smoke sensor and Fire sensors are connected with a microcontroller that will control the total system. In this system two sensors are used and three conditions are given while programming for these sensors. In first and second step, a gas sensor and a fire sensor are calibrated on the basis of their given reference value. If the microcontroller gets the sensor value more than the setup reference value then it will make an alarm till the gas or fire is present. According to the third condition report will be displayed in LCD Screen. In the age of scientific advancement, the use of technological innovation is going to be an extremely important issue in industrial world. In this sense, this device will be helpful for the mankind. It will make personnel's life

secured and will reduce the loss of assets.

CONCLUTION

Fire and gas detections are vital issues for all spheres of lives where precautions are very important. The system is very useful, simple and easy to install. The components used in the system are available in the local market. By ensuring fire & LPG security in different industries this system can help reducing losses of lives, livelihoods and properties.

FUTURE SCOPE

In future some of the modification can make this project more useful, reliable and give it more applications for real life situations.
such as-
1. The System can be connected by fire department to solve the problems.
2. Ability to connect multiple sensors wirelessly.
3. Having a separate back-up power system.

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