International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi : https://doi.org/10.32628/IJSRSET

LPG GAS Leakage Detection and Weight Detection Using GSM Module

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Article Info
Volume 9, Issue 5
Page Number : 07-12

Publication Issue :
September-October-2022

Article History
Accepted : 20 Aug 2022
Published: 04 Sep 2022

ABSTRACT

Gas leakage is a major problem with industrial sector, residential premises and gas-powered vehicles like CNG (compressed natural gas) buses, cars. One of the preventive methods to stop accident associated with the gas leakage is to install gas leakage detection kit at vulnerable places. The aim is to present such a design that can automatically detect and stop gas leakage in vulnerable premises. Gas leakage system consists of GSM (Global System for mobile communications) module, which warns by sending SMS. However, the former gas leakage system cannot react in time. It detects the malfunction of a pressurized gas system, so that accumulation of combustible gases and their explosion can be prevented. It also detects the leakage of gas into the area of an appliance when it is in a shutdown condition and not in operation. This system provides gas detection and monitoring which is economical to manufacture and which may be readily installed in conventional trailers and boats which are normally dependent upon a stored supply of pressurized gas. Gas leakage is a serious problem in household, gas vehicles and industries. Gas leakage leads to various accidents resulting into both financial loss as well as human injuries. In context with these issues, the proposed design is able to detect and monitoring gas leakage.

Keywords : Gas leakage, sensor, GSM, Weight.

I. INTRODUCTION

Objective These sensors can be used for various applications, e.g. monitoring and controlling of the explosive level of concentration of gases, finding of various harmful, dangerous, toxic gases, industrial automation etc. In recent years, the biggest advancement made in the sensor tools is the detection of liquefied petroleum gas and has become tip of the iceberg because outburst accidents force to be happened when it leaks excessively. Therefore, the research work particularly, in the area of wireless sensor network and earlier gas leakage detection (alert system) is imperative. The monitoring, reorganization and controlling of the data are the key concern of Wireless Sensor Network. The inaccessible interface and actual monitoring with the physical world can be done easily by mote of the network. The wireless sensor networks differ from general data networks, because WSN are application oriented, planned and deployed for dedicated purpose. The wireless sensor network provides extensive range of the applications

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such as in green monitoring, defense, health, etc. The litheness in plan, enhanced mobility, consistency, broadcast range, reduced power, cost-effective etc. are the good features of these network. Additionally, the system uses the ZigBee technology for wireless communication. This technology is most trustworthy and apposite for interior and outdoor applications. The ZigBee can be configured in star, mesh or peer to peer topology. A demanding subject in scheming WSNs is inadequate power supply for sensor nodes in some application. The breakdown of a mote results in degradation of the entire network. The preference of a topology can play an imperative role in reduction of power consumption. The present system is mainly used for the detection of LPG gas. If gas leakage happens at certain place, the present system detects the LPG gas alerts the peoples by buzzer ring and sending SMS on userôs mobile phone using Arduino GSM shield compatible to the Arduino board. The monitoring of the sensor node can be done using C-code created in Arduino. The current system provides genuine instance notifications. This system can be installed in a place where LPG is used as a fuel and leakage happens instantly. The present wireless gas detection system plays imperative role model to industry as well as general public.

II. LITERATURE SURVEY

Paper [1] This system represented the versatile nature of LPG it is used for many needs such as domestic fuel, industrial fuel, automobile fuel, heating, illumination etc and the demand for LPG is on an exponential raise day by day. The leaked gases when ignited may lead to severe explosion. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. Thus, there is a need for a system to detect and also prevent leakage of LPG.

Paper [2] This paper discussed a productò LPG Gas Leakage Detection and Alert Systemò The purpose of this project is to detect the presence of LPG leakage as a part of a safety system. Apart from sound alarm, an SMS alert will inform the authorized person and the solenoid valve will be triggered to shut down the gas supply to prevent any harmful effects due to gas leakage leakages are a mutual hindrance in household and manufacturing nowadays. It is very life threatening if you will not distinguish and modified right away. The idea behind our project is to give a solution by power cut the gas provision as soon as a gas leakage is perceived apart from activating the sounding alarm.

Paper [3] This system presented the main objective of the work is designing microcontroller based toxic gas detecting and alerting system. The hazardous gases like LPG and propane were sensed and displayed each and every second in the LCD display. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (SMS) is sent to the authorized person through the GSM. The advantage of this automated detection and alerting system over the manual method is that it offers quick response time and accurate detection of an emergency and in turn leading faster diffusion of the critical situation.

III. EXSISTING SYSTEM

This system helps you to upgrade your safety standards. Most importantly protect life and property from disaster by preventing accidents. It detects the malfunction of a pressurized gas system, so that accumulation of combustible gases and their explosion can be prevented. It also detects the leakage of gas into the area of an appliance when it is in a shutdown condition and not in operation. This system provides gas detection and monitoring which is economical to manufacture and which may be readily installed in conventional trailers and boats which are normally dependent upon a stored supply of pressurized gas. Gas leakage is a serious problem in household, gas vehicles and industries. Gas leakage leads to various accidents resulting into both financial loss as well as human

injuries. In context with these issues, the proposed design is able to detect and monitoring gas leakage. The system detects gas leakage and alerts the subscriber through alarm the report consists of a background into the area of PIC16F877A microcontroller and Zigbee Module, how they are communicating to each other. Microcontroller based LPG Gas Leakage Detectors Zigbee Module is the system where lot of researcher working on it for its developments from all over the world. Since then, many systems and devices have been developed to detect, monitor, and alert the leakage of a wide array of gases. In the existing method, different gas sensing technology is used. This gas leakage is detected by the semiconductor sensor.

DISADVANTAGES

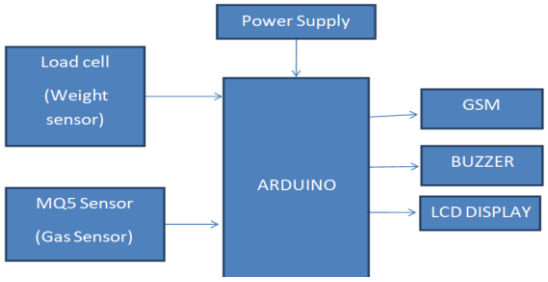
- Zigbee disadvantages mainly include short range
- Low complexity, and low data speed
- Its high maintenance cost, lack of total solution, and slow materialization,
- Low transmission, as well as low network stability, are also some of its disadvantages that takes it a step back as compared to others
- Replacement with Zigbee compliant appliances can be costly
- Zigbee is not secure like Wi-Fi based secured system
- It does not have end devices available yet.

IV. PROPOSED SYSTEM

Gas leakages results a serious problem in household and other areas where household gas is used, therefore the proposed gas leakage detection and monitoring system is developed. There are many methods available for booking a Gas Refill, methods include online booking, telephonic booking etc. It will be difficult situation for the one who uses LPG gas for cooking regularly. The aim of this paper is to present a new system automatically books a cylinder when the gas is about to empty is by sending a notification to the gas agency GSM. In addition to that sensor is used to detect gas leakage at home. If the gas leakage is sensed automatically it will send SMS to the user. GSM is one of the most used networks across the world. Hence, load cell has been used to monitor the weight of the LPG gas regularly. The values are next fed to the microcontroller. If the gas in the cylinder indicates a value where the remaining percentage level is crossed below the threshold level set for gas to be indicated as getting emptied, then a notification will be delivered to gas enterprise automatically to book the new cylinder. Subsequently, reply notification will be sent to the customer about the booking status. At the same time, application software is developed in the gas enterprise to inform and record the booking. This, work this helps the society to specifically indicate gas leakage and also helps both customers and the agency to get the gas booking made automatically using the GSM technique. This device will continuously monitor the level of LPG gas present in the air. Buzzer will on and whenever the gas exceeds solenoid value will turn off. Gas Refill, methods include online booking.

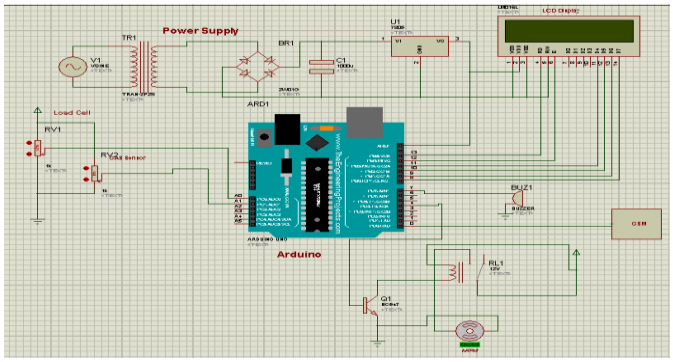
ADVANTAGES

- Can monitor pollution with high accuracy
- IOT and Arduino based LPG leakage detection system can be installed in Homes, Hotels, LPG Cylinder storage areas. The main advantage of this project is that it can determine the leakage and send the data over to a website, where it can be monitored and corrective actions can be taken.
- If appropriate measures are taken quickly after it is reported over the GSM, it can help in saving the loss of lives and property.



Block diagram

Circuit diagram



Circuit diagram

V. METHODOLOGY

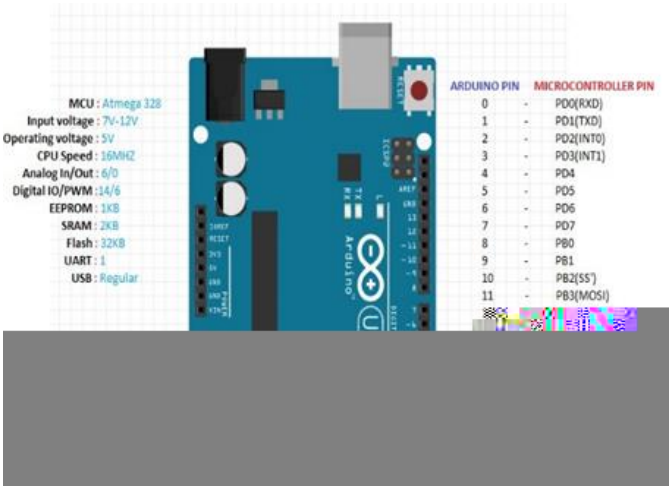
GSM and Arduino based LPG leakage detection system senses the LPG gas with the help of an LPG gas sensor. LPG gas sensor interfacing with Arduino is implemented in this project. The Signal from this sensor is sent to the Arduino microcontroller. The microcontroller is connected to an LCD, Buzzer and Gsm module LPG leakage detector project is implemented using a sim 900. The T module then sends the data over to a website. Once the gas leakage is detected, the buzzer is turned ON and a ◊Leakage detected◊ message is displayed on the LCD. The Pre-requisite for this LPG gas leakage detection and the smart alerting project is that the Wi-Fi module should be connected to a Wi-Fi zone or a hotspot. We have used various components in the IOT and Arduino based LPG leakage detection system. LPG Gas Sensor is used to detect the gas leakage. Arduino is used to turning ON the buzzer, to send a message to LCD and to send data to the IOT module. LCD is used to display an informative message. A buzzer is used to signal the gas leakage. And GSM is used to send data network. This device will continuously monitor the level of LPG gas present in the air. Buzzer will on and whenever the gas exceeds solenoid value will turn off. Gas Refill, methods include online booking.

VI. HARDWARE IMPLEMENTATION

COMPONENTS DETAILS

- Arduino Controller
- Powersupply
- Gsm
- Lcd Display
- Gas Sensor
- Load Cell
- Buzzer
- Relay

ARDUINO CONTROLLER



The Arduino Uno is one of the most common and widely used Arduino processor boards. There are a wide variety of shields (plug in boards adding functionality). It is relatively inexpensive (about $25 - $35). The latest version as of this writing (3/2014) is Revision 3 (r3): · Revision 2 added a pull-down resistor to the 8U2 HWB line, making it easier to put into DFU (Device Firmware Update) mode · Revision 3 added o SDA and SCL pins are now brought out to the header near the AREF pin (upper left on picture). SDA and SCL are for the I2C interface o IOREF pin (middle lower on picture that allows shields to adapt to the voltage provided o Another pin not connected reserved for future use The board can be powered from the USB connector (usually up to 500ma for all electronics including shield), or from the2.1mm barrel

jack using a separate power supply when you cannot connect the board to the PC's USB port.

MQ5 GAS SENSOR

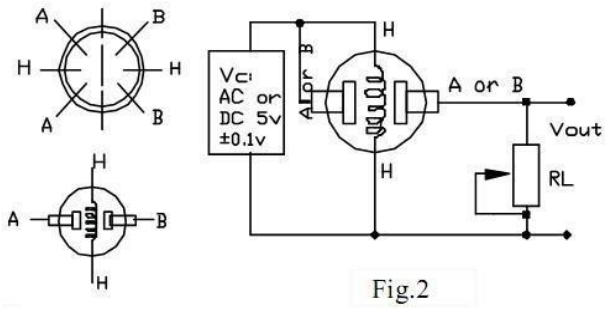
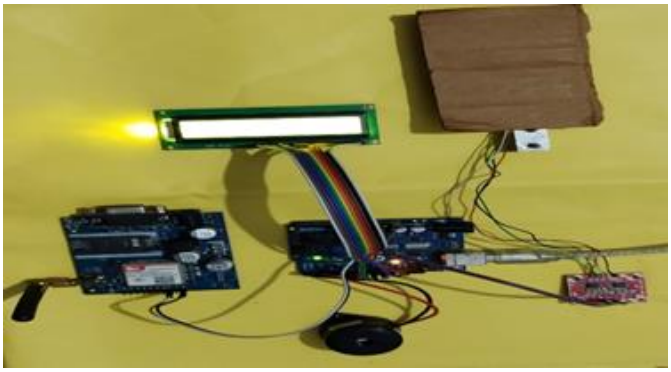


Fig.2

LOAD CELL

A load cell (or loadcell) is a transducer which converts force into a measurable electrical output. Although there are many varieties of force sensors, strain gauge load cells are the most commonly used type. Except for certain laboratories where precision mechanical balances are still used, strain gauge load cells dominate the weighing industry. Pneumatic load cells are sometimes used where intrinsic safety and hygiene are desired, and hydraulic load cells are considered in remote locations, as they do not require a power supply. Strain gauge load cells offer accuracies from within 0.03% to 0.25% full scale and are suitable for almost all industrial applications. A load cell works by converting mechanical force into digital values that the user can read and record. The inner working of a load cell differs based on the load cell that you choose. There are hydraulic load cells, pneumatic load cells, and strain gauge load cells. Strain gauge load sensors are the most commonly used among the three. Strain gauge load cells contain strain gauges within them that send up voltage irregularities when under load. The degree of voltage change is covered to digital reading as weight. Load cells represented the first major design change in weighing technology. In today's processing plants, electronic force sensors are preferred in most applications, although mechanical lever scales are still used if the operation is manual and the operating and maintenance personnel prefer their simplicity.

VII. RESULTS AND DISCUSSION



VIII. CONCLUSION

An overall conclusion GSM based toxic gas detector, or GSM technology has come a long way since it was conceptualized two decades ago. It has become more efficient, more applicable to today's applications and smarter. The work presented in this project was directed towards pushing GSM technology to the next level. The work has presented solutions to several problems and issues that have not been addressed in previous work. The principle of operation of Operation of GSM based gas leakage and monitoring system was shown by operating the Arduino model attached with embedded system with required input and output gas level with the help of gas sensors. This results in a more efficient in operation because it is connected to a common web page specially built to notify the responsible authority automatically so reduces the stress of constant monitoring. The choice of using a