

Gas Leakage Detector with GSM

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Abstract: *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 is a major problem in the industrial sector, residential premises, etc. Nowadays, home security has become a major issue because of increasing gas leakage. 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 paper is to propose and discuss a design of a gas leakage detection system that can automatically detect, alert and control gas leakage. This proposed system also includes an alerting system for the users. The system is based on a sensor that easily detects a gas leakage. Gas leakages become serious problem in household and other areas where household gas is handled and used. Gas leakage is Hazardous problem it leads to various accidents financial loss as well as health injuries. The aim of this work is to designing a system that detects gas leakage and alert these through message and status display besides turning off the gas supply valve as a primary safety measure. This work will minimize the occasioned losses by explosions due to gas leakages and improve safety of life*

Keywords: Liquid Petroleum Gas, Gas Sensor, Leakage

I. INTRODUCTION

Arduino based LPG leakage detector with SMS indication using GSM modem project detects the LPG gas run. If the LPG gas level crosses threshold level, then it sends SMS to the user using GSM modem. Arduino has inbuilt Analog to

Digital converter, so we need not to connect any external ADC IC. We have connected LPG sensor directly to the Analog pins of the Arduino Uno board.

This project really helpful when there is nobody in house which has LPG gas cylinder in it. Due to some negligence, there may be LPG gas leak which can cause measure accidents. GSM based Arduino LPG detector can help by sending an alert SMS to the owner. IoT stands for Internet of Things. It refers to the interconnectedness of physical devices, such as appliances and vehicles, that are embedded with software, sensors, and connectivity which enables these objects to connect and exchange data. This technology allows for the collection and sharing of data from a vast network of devices, creating opportunities for more efficient and automated systems.

Internet of Things (IoT) is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the

categories where IoT is strongly established. **IoT is network of interconnected computing devices which are embedded in everyday objects, enabling them to send and receive data.**

Over 9 billion 'Things' (physical objects) are currently connected to the Internet, as of now. In the near future, this number is expected to rise to a whopping 20 billion.

II. DESCRIPTION

As we know that various Arduino based projects for Engineering student helps to avoid various accidents. The project is one of them. Following are the components of this project:

- Arduino: Important and most useful part of the system is Arduino Uno. All the output devices are controlled by Arduino. At the same times it reads

and manipulates the input from sensor. LCD display receives various messages from Arduino.

- **LPG Sensor:** This sensor detects the LPG gas molecules in the air. And gives respective voltage output to the Arduino.
- **Modem:** User receives SMS indication with the help of GSM modem connected to the Arduino Uno board.
- **LCD Display:** This can be used to show various informative messages to the user like sending SMS.
- **Relay:** we have used 12volt relay in this system. Arduino cannot turn on a 12volt relay so we have used a relay driver circuit to turn on this relay. We can control any AC or DC device with the help of this relay

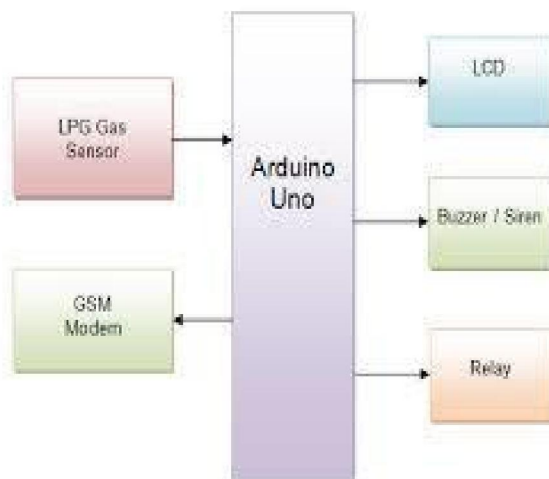
III. ADVANTAGES

Arduino Uno based LPG detector system gives remote indication to the user about LPG leakage with the help of SMS indication.

IV. DISADVANTAGE

- Continuous power supply will be required.
- Distance from the leaking site should be very small.
- Suitable for indoor use only.

V. BLOCK DIAGRAM



VI. WORKING OF THE CIRCUIT

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on

data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data. The functioning of the circuit when the device is powered on. First microcontroller initializes LCD display and starts reading the Analog voltage from MQ-5 sensor. The MQ-5 sensor has four pins i.e. two pins are used for interfacing with development board and other two for VCC ground. Out of two interfacing pins one is Analog pin and other is digital pin. Analog output pin is used for detecting concentration of leakage and interfaced with AO Analog input pin of the Arduino board. The 16x2 LCD display is used to display the value of gas concentration. It is connected to Arduino board by connecting its data pins to pins 4 to 7 of the Arduino board. RS and E pins are connected to D2 and D3 pins of Arduino board. The RW pin of LCD is connected to the ground. The sensor value is compared with a calibrated threshold and the sensor value exceeds that value, the system gets activated and sends SMS.

VII. DIAGRAM DESCRIPTION

Arduino primarily based LPG leakage detector with SMS indication using GSM modem project detects the LPG gas leakage. If the LPG gas level crosses threshold level then it sends SMS to the user using GSM modem. Arduino has in-built Analog to digital converter so we need not to connect any external IC. We have connected LPG device directly to the Analog input pins of the Arduino Uno board.

This project proves really helpful in cases when there is nobody in house which has LPG gas cylinder in it. Due to some negligence there may be LPG gas leak which might cause measure accidents. GSM based mostly Arduino LPG detector can avoid such things by sending AN alert SMS to the owner.

VIII. APPLICATIONS AND BENEFITS OF USING A GAS MONITORING SOLUTION

Unidentifiable gas leaks give rise to explosions that are harmful to the employees working in the hazardous environment. There comes a need to install smart systems to accurately identify combustible, flammable and toxic

gases along with detecting oxygen depletion in industry premises for improved safety. In the automotive industries like oil and gas, hotels, and places where flammable gases are used in abundance, a gas detection system is a basic requirement for safety. An IoT powered gas detection solution uses gas sensors to identify the presence of toxic gases such as CO₂, CO, NO_x in the industrial facilities. Especially, in the oil and gas industry where many gaseous products like propane, butane, and hydrogen are manufactured at a greater level. Hence, the chances of gas explosions are higher as these gases are easily combustible in the oxygen-rich environment.

Apart from these, toxic gases like hydrogen sulfide (H₂S) is produced during refining processes that might harm the workers' health. Thus, it becomes a necessity to keep a real-time check on gas production. If these toxic gases are released untreated, their harmful contaminants result in air pollution and acid rains.

A human nose has around 400 different types of scent receptors that enable us to smell approx. 1 trillion different odors. But still, most of us cannot identify the type of gas present in the atmosphere. Hence, there are different sensors to measure accurate gas concentration in the atmosphere. Gas detection sensors are most commonly used to develop an IoT-powered system and identify the variation of toxic gases around an industrial facility. It helps benefit the factories and refineries by keeping them safe against any unexpected threats like explosions. Let's talk more about the applications and benefits of a gas monitoring solution:

Applications:

Harmful Gas Detection

The sensing of toxic gases such as H₂S, Methane, and CO is of great importance in any industry to avoid unwanted leakage and consequences like poisoning or explosions. The presence of these gases can be easily detected in the industrial facilities and commercial buildings with the help of IoT-powered gas monitoring solution. Moreover, a gas detector or sensor device is a crucial part to carry out safe industrial operations. The sensor-enabled solution helps prevent the high risk of gas explosions and affecting any casualties within and outside the premises.

Fire Hazard Prevention

The gas sensors help detect the concentration of the gases present in the atmosphere to avoid hazardous consequences like fire breakouts. Also, it is an imperative solution to keep the plant workers and equipment safe

from fire hazards. It effectively detects the presence of hazardous gases like propane and methane and alerts the plant authorities, preventing the premises from unexpected ignition. Moreover, a gas monitoring solution uses gas analyzers to generate alerts regarding the temperature increase. This allows the management to take immediate actions to curb harmful fire explosions.

Oxygen Level Measurement

Sensing the presence of gases is a necessity to conduct industrial operations as several pitmen had lost their lives due to lack of oxygen in the process of mining explorations. A sudden decrease in the oxygen levels can result in dizziness, brain damage, or even death among the workers working in mines or close-packed industrial premises. A gas monitoring system significantly benefits the industries by maintaining proper oxygen levels that reflect the optimal performance of your workers. This system also creates alerts in real-time about the decreasing oxygen levels, which gives enough time to take necessary measures to evacuate the facilities much before the health gets affected.

Benefits

- Get real-time alerts about the gaseous presence in the atmosphere
- Prevent fire hazards and explosions
- Supervise gas concentration levels
- Ensure worker's health
- Real-time updates about leakages
- Cost-effective installation
- Data analytics for improved decisions
- Measure oxygen level accuracy
- Get immediate gas leak alerts

IoT networks are well-known for their low energy consumption and low power transmission, which allows the assets to operate for a longer duration and generate precise data information. An IoT-powered gas monitoring solution works through sensors that provide accurate data regarding the presence of toxic gases in the atmosphere. It is a very useful system to implement in the industries or plant facilities to avoid catastrophic explosions.

With the help of a gas monitoring solution, you can successfully measure temperature and humidity in the atmosphere, which results in improved plant facilities and ensures employee health safety.

IX. FUTURE SCOPE

- We can add GPS modem to this system.
- We can alert through buzzer.
- Trigger LED and alert people to avoid accidents.
- Automatic closure of gas source using solenoid controller

X. CONCLUSION

A device that may observe such leakages and shuts off the gas offer to the burner from the cylinder was designed and developed. It was discovered that when the LPG device was tested by inserting it at totally different distances from the gas supply, the interval of the LPG system cut as the distance from the gas source increased and vice versa. The gas sensor's varied temperature while the reference voltage remained constant over time. This device can be deployed anywhere cooking place or in kitchen.

This system will ensure that explosions resulting from leakages of cooking gas from cylinders are averted.

XI. PURPOSE

Basic purpose behind choosing this project is to get more and more information about sensitive components and get know how they actually works. This is our first project. Before choosing this project, we met some people to get information about components and its availability. Later On we found some shops from where we got all the materials and project components. We purchased these components from Lamington Road (CST). Then we started working on project on the other hand we started researching on the project.

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