

IoT Based LPG Gas Leakage Detector

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ABSTRACT

Gas leakage is a major problem in the industrial sector, in residential locations etc. One of the preventive methods to stop the incident related to the gas leak is to install a gas leak detection kit at vulnerable locations. The goal of this paper is to propose a system that can detect, alert and automatically control gas leaks. In particular, a gas sensor has been used which has a high sensitivity to gases such as propane and butane together with LPG. There is an alarm that is triggered once the LPG has been detected. The gas leakage system consists of a Wi-Fi module that alerts the user by sending an SMS message.

Keywords : LPG gas, IoT (Internet of Things)

I. INTRODUCTION

In homes and in various commercial areas, LPG is used for various purposes, such as cooking, Heating, Lighting, Cooling, etc. This energy source consists mainly of propane and butane, highly flammable chemical compounds. LPG loss can occur, albeit rarely, in a home, business or gas vehicle. The loss of this gas can be dangerous because it increases the risk of explosion. An odor such as ethanol is added to the LPG so that the losses can be easily detected by most people. However, some people with a reduced sense of smell may not rely on this intrinsic safety mechanism. In these cases, a gas leak detector becomes vital and helps protect people from the dangers of gas leaks. A number of research papers have been published on gas leak detection techniques. We have studied a research article about our topic "LPG GAS WARNING DETECTION AND LOSS SYSTEM". This document presents the detection and alarm system for LPG gases to prevent fire accidents and ensure the safety of the home. The LPG leak detection and reporting system has been

introduced so that it can also be used with alternating current. To support this last case, it has a bridge rectifier with a capacitor filter. This is followed by a controller that provides regulated power of + 5V. MQ-5 gas is used to detect LPG. This sensor can be used at + 5V. the sensitivity of this sensor is very high and its response time is fast.

There are about 30 crore users of LPG in the country where the majority of 40% of the population. Several standards have been put in place for the gas leak detection system. The existing system provides an alarm system primarily to detect a gas leak in domestic and commercial premises. The main objective of this system is to monitor the leakage of liquefied petroleum gas (LPG) in order to avoid serious fire accidents and facilitate safety measures. The system detects LPG leaks from the gas sensor and informs the consumer of the gas leak by sending a text message.

When the system determines that the LPG concentration in the air reaches the specified level,

tell the consumer by sending text messages to the registered mobile phone and informing people in your home by activating the alarm including the alarm and the message display the message on the LCD screen to take required action.

WHAT IS IoT?

From homes and industries to enterprises, Internet of Things have become commonplace in all walks of life. Connecting everything and everyone, IoT is making the world smarter and better than ever before. However, this is just the beginning. Unlocking the full potential of Internet of Things requires that businesses understand the opportunities for value creation and systematically address the underlying challenges.

Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The 'thing' in IoT could be a person with a heart monitor or an automobile with built-in-sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken. Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.

II. METHODS AND MATERIAL

Arduino Kit :

Arduino is an open-source electronics platform based on easy-to-use hardware and software. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. Arduino boards are able to read inputs - light on a sensor and turn it into an output - turning on an LED, activating buzzer and WiFi module for sending SMS. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Gas Sensor (Mq5) :

Generally, semiconductor sensors are used to detect LPG gas. MQ5 semiconductor sensor is used in this system. Sensitive material of MQ-5 gas sensor is SnO₂, which with lower conductivity in clean air. When the target combustible gas exist. The sensor conductivity increases along with the rising gas concentration. MQ-5 gas sensor has high sensitivity to Propane, Butane and LPG, also response to Natural gas. The sensor could be used to detect different combustible gas, especially Methane; it is with low cost and suitable for different application. The MQ-5 can detect gas concentrations anywhere from 200 to 10000 ppm. The sensor's output is an analog resistance.

WI-FI Module :

The WI-FI technology is radio wireless networking technology. It is mainly used for communication purpose. In this project, the WI-FI system is used to communicate with the user. When the gas leakage occurs, the microcontroller stops the leakage and alerts the surroundings. Then, the information about the leakage has to be informed to the user. For this purpose, WIFI is used. Using WI-FI, a warning is sent to the user. The method of communication is asynchronous serial communication. The

corresponding code has to be loaded into the microcontroller, to which WI-FI is connected.

Buzzer:

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound.

III. LITERATURE SURVEY

To overcome the issue of LPG leakage, many system has been proposed. Gas leak detection is the process of identifying potentially hazardous gas leaks by means of various sensors [2]. Several designs of LPG detection and alert system have been proposed in the literature. Apeh et al. designed kitchen gas leakage detection and automatic gas shut off system [3]. T.Soundarya et al. presented the cylinder LPG gas leakage detection system [4]. Wireless and GSM technology [5] based gas detectors have also been proposed. This paper presents a LPG leakage detection and alert system to avoid fire accidents and to provide house safety.

IV. PROPOSED SYSTEM

The proposed system uses the Arduino kit with an integrated microcontroller. This Arduino kit forms the core of our proposed system. Arduino is connected to other components that complement the system. These components are the MQ5 sensor, the LED light, the buzzer and the WiFi module. The system uses an MQ5 gas sensor to detect LP gas. A threshold value (180 ppm for the proposed system) is set in the MQ5 sensor. The sensor continuously detects the surrounding atmosphere. For this continuous air evaluation, the 5V power supply is supplied to the Arduino via an AC adapter. A buzzer

is connected to the Arduino kit. As soon as the gas level has exceeded this threshold value, the LED lights up and the system warns the environment by sending out a sound that is issued by the buzzer. At the same time, the sound is sent via a WiFi module to the user's mobile phone in order to inform the user of the loss. The user can avoid dangerous events such as fire with the help of an exhaust fan.

SYSTEM	SENSOR	INDICATION	FEATURE
ARM Based Gas Monitoring System	MQ-6	Inform through SMS	GSM Module is used to notify the user
Hazardous gas detection using arduino	MQ-4, MQ-7	LCD Displays	Detects the concentration
Gas leakage detector built on microcontrollers	MQ-2	Wireless Module	Sends the information through wireless module
IOT Based real time monitoring gas detection system	Electronic sensor	Through Social media	Customer can check the previous data and determine at which condition emergency occurred
Gas leakage detection and monitoring using IoT	MQ-5	Through buzzers and alarms	Notify the user through alarms

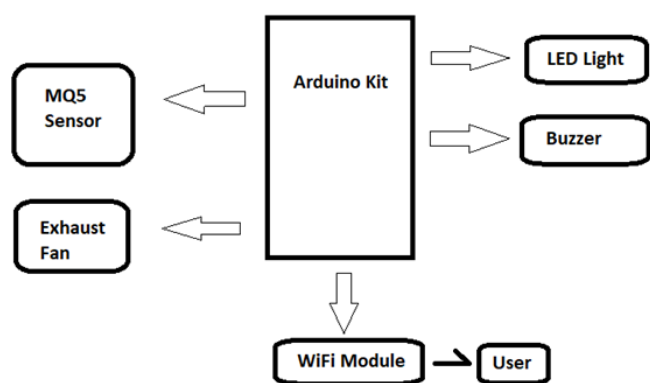


Fig 1. System Block Diagram

V. CONCLUSION

In this paper, LPG gas leakage is sensed by the MQ5 sensor. As soon as it detects LPG content in air more the threshold value, LED light glows and sound is produced. Also, a SMS is send to user's cell phone and thus notifies the user about the incident if the user is out of the range of sound. The system can be used to avoid fire accident and provide house safety.

VI. REFERENCES

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