UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART GAS LEAKAGE ALERT SYSTEM USING GLOBAL SYSTEM FOR MOBILE WITH A SHORT MESSAGE

This report submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Bachelor of Electronic Engineering Technology) (Industrial Electronic) (Hons.)

by

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DECLARATION

I hereby, declared this report entitled "Smart Gas Leakage Alert System Using Global System For Mobile With A Short Message" is the results of my own research except as cited in the references.

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follows:

…………………………

(Ir. Nik Azran Bin Abdul Hadi)

ABSTRAK

Motif utama produk ini adalah untuk pengesan kebocoran gas LPG menggunakan GSM SIM900A dengan sistem penggera. Sensor gas yang digunakan dalam produk ini adalah sensor gas MQ2 yang dapat mengesan gas LPG iaitu Gas Petroleum Cecair dan Asli. Sensor MQ2 gas ini berfungsi dengan mengesan kepekatan gas yang terkeluar, mengikut keluaran voltan sensor tersebut dan menghantar sistem pesanan ringkas kepada peguna. Arduino UNO telah digunakan sebagai pengawal mikro untuk keseluruhan system dan membuat sensor beroperasi dalam sistem penggera dan motor,. Litar ini juga termasuk , paparan LCD dan motor arus terus. Motor tersebut akan menutup bekalan gas automatik segera apabila kebocoran dikesan oleh sensor gas MQ2.

ABSTRACT

Nowadays, gas leakage incidence is increasing. Peoples at home or industry unable to get know the leakage of gas so it causes some loss to them in term of property and money. So here is the reason for this project is created to automatic gas leakage detection using GSM with alarm system. To detect the leakage of gas MQ2 gas sensor was used in this project. After the gas leakage was detected it will send an alert to the user. Arduino UNO is microcontroller for this project, which will control the entire system of this project. In addition, this project also has a , LCD display and a DC motor. The motor will close the supply of gas automatically immediately once the leakage was detected by the sensor.

DEDICATION

To my beloved

parents

Hithayatullah Bin Mohamed Abdullah &Halima Beevi

siblings,

Fairoz Khan ,Hussain

Thankful for your supporting advice and the best wishes

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

A/D	-	Analog to Digital
AC	-	Alternating Current
App	-	Application
AVR	-	Aboriginal Voices Radio
CO		Carbon Monoxide
DC	-	Direct Current
GND	-	Ground
GPRS		General Packet Radio Service
GPIO		General Purpose Input Output
GSM	-	Global System for Mobile communications
I/O	-	Input Output
LCD	-	Liquid Crystal Display
MCU	-	Microcontroller
MHZ	-	Mega Hertz
OSHA		Occupational Safety and Health Administration
OUT	-	Output
PC	-	Personal Computer
PIN	-	Personal Identification Number
PIR	-	Passive Infrared Radiation
PUK	-	Personal Unblocking Code
SIM	-	Subscriber Identification Module
SMS	-	Short Messaging Service
TCP/IP	-	Transmission Control Protocol/Internet Protocol
USB	-	Universal Serial Bus
V	-	Voltage

CHAPTER 1
INTRODUCTION

1.0   Introduction

This section consists of the project background, problem statements, objectives, the work scope, and thesis outline.

1.1   Project Background

In the late day event of household dangers because of the very inflammable LPG gas spills and the subsequent flame mischances have achieved disturbing rates. Such life debilitating household risks are found to happen every now and again. The significant explanation behind this being absence of appropriate cautioning. Such issues have been the inspiration to outline a framework that gives an earlier alarm on LPG gas spillage before it could break out into a flame. The point is to outline a financially savvy and low power, expending cation framework that gives a complete security alarm to the general population in case of gas break or smoke alongside the sign of their focus levels. It additionally dissects the level of risk and makes a legitimate move to keep away from the flame utilizing transfer component enacted by method for remote correspondence. The proposed way is an expansion of an electronic system composed particularly for gas spill. To solve and reduce such problems, a system is developed using GSM technologies and an application is introduced in research work. This project is Arduino UNO microcontroller based. A Gas sensor is utilized to distinguish dangerous gas leakage in the kitchen or close to the gas warmer. This sensor identifies 100 to 3000ppm of Natural Gas and LPG. Besides, this unit additionally can identify the least amount of smoke and liquor as

well. It can be effectively designed as a cation framework as well. This part can be used as an attention to caution an aware or provide a graphic sign or notice of the LPG focus. The device has excellent effect joined with a snappy response period. Recognized is informed of the approved individual utilizing cell system called GSM. In this anticipate there are basically two units, GSM modem and Arduino UNO as microcontroller unit. GSM modem can be designed with standard GSM AT charge set for sending and accepting SMS and getting modem status. Depending on the Gas sensor output Arduino UNO microcontroller can send message to the approved individual furthermore, depending after the message got the microcontroller unit will control the gadgets and recognizes the gadget status to the client as SMS.

1.2 Problem Statements

i. Gas leakage detectors are big in size and very difficult to own.
ii. The gas leakage detector can't send alerts to the user in a short time can cause damage.
iii. User unable to handle the gas leakage without personally checking on the place.

1.3 Objectives

The objectives of the project are:

i. To develop a compact LPG gas leakage prototype.
ii. To reduce the damage of gas leakage accident to prevent fire.
iii. To solve the possible gas leakage without manual checking.

1.4   Work Scope

To develop a system which can detect gas leakage such as LPG, Natural Gas, Alcohol and Smoke which allow user to detect gas leakage in their home more easily and quickly. Their hardware development and integration of hardware and software in order to achieve the objectives of the project. The scope of this project focused on a gas leakage security system that will alert the user once it detected. In this project, the Arduino UNO works as microcomputer and is programmed using Python language. The gas sensor is used to detect the LPG gas sensor. The SMS will send to the user once the sensor detects the leakage. At the same time, it will alert with to with LED notification in the incident place. Finally, new attempt in this project is closing the supply of gas once the leakage happens.

1.5   Thesis Outline

There are five chapters in this report. The first chapter is all about the project background, problem statements and objectives of the project and the scope of work. While in chapter 2 is all about literature review. It's more about discussed the previous researches that have been conducted by other students or other researchers and differentiate the products in the market. Last but not least, in chapter 3 is it will more in block diagram, the software development and hardware of the project, flowchart the project are discussed.

CHAPTER 2
LITERATURE REVIEW

2.0   Introduction

Chapter 2 is discussed more about the difference in the components and instruments can be used for this project. Furthermore, there are some of past related projects or research's about related to this project.

2.1   Related Project

There is a related project of identifying of gas leakage detector project, which titled as "Carbon Monoxide Detection and Autonomous Countermeasure System for a mill use Wireless sensor and Actuator Network", in an institute in Pakistan. The University name is University of Engineering and Technology from Peshawar (Jan et al. 2010). The focal controller is a top of the line computer which is connected to the TelosB remote sensor module by means of USB and to the actuator circuit by means of RS232. The CO sensor device is connected by a TelosB hub and link with Zigbee remote availability to the central controller. The CO focus was recorded and later sends to the computer.
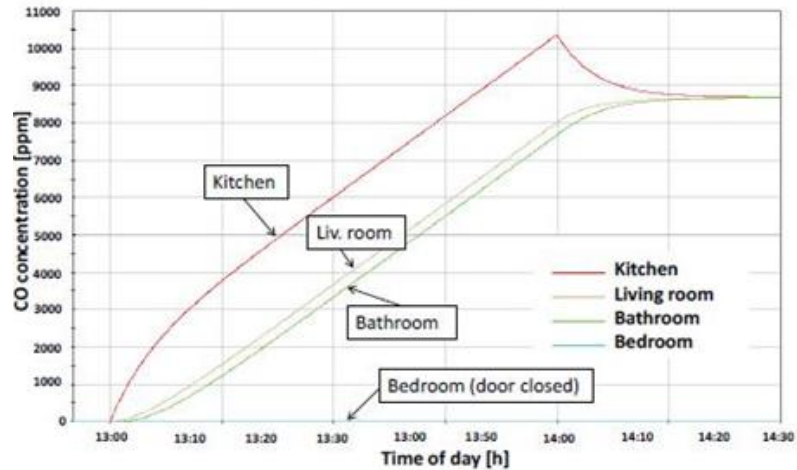
Figure 2.2   Gas concentration based on the sensor replacement(Somov et al. 2011).

Figure 2.2 above shows the result of the system operation the concentrations of CO. It depends on the time of sensor senses the gasses. The kitchen room gave is at the top in highest reading, which is between 1300 and 1400 in the analysis of the graph. At the same time, we also can see that bedroom with close door has a zero percentage of CO concentration.

2.2   Hazardous Gas

The explanation of dangerous gas is well-defined as those chemical present in the workroom which are accomplished by causing harm. From the classification of the hazardous gas, the chemical term refers to dust, mixtures and common materials such as paints, fuels and solvents. Agreeing to the drawback of the LPG gas, OSHA mentioned that leaks above 1000ppm of LPG gas will root a hazard to the human breathing system. Therefore, this value is used as the inception value for the project. Beside it, the alcohol gas threshold value was chosen to be the partial rate of the graph of the gas sensor.

2.2.1 Liquefied Petroleum Gas

Liquefied petroleum gas (LPG), is known as just propane or butane, are burnable mixes of hydrocarbon gasses which used fuel as a piece of cooking rigging. Generally, it likewise uses in vehicles and some warming machines. Recent years back, there was a gigantic number of expanded utilization of condensed petroleum gasses (LPG) and normal gas (comprises for the most part of methane) to take care of the expanding demand for vitality and supplant oil or coal because of their ecological detriments. LPG and characteristic gas blaze neatly and are less hurtful to the earth. They have been broadly utilized as a part of the industry, warming, home apparatuses, and engine fuel. Despite the fact that LPG and normal gas are natural neighborly, they can represent a genuine risk on the off chance that they spill. They are ordinarily put away in pressurized steel barrels in fluid frame and vaporize at typical temperatures. LPG is heavier than air, in this way it streams along the floor and settle in low focuses which makes it hard to scatter. On the off chance that hole happens, LPG and regular gas bubble into the air and supplant oxygen which can bring about suffocation. In addition, the ignition may happen and cause a blast. Subsequently, the recognition of gasses has acquired enthusiasm for later years, particularly in fields of well being, industry, environment, and emanation control (Grattan, 1995).

Family security is turning into an issue because of the expansion utilization of LPG and common gas for warming and home machines. In Jordan (a creating nation), other than the tremendous utilization of LPG in industry, a large portion of the cooking is utilized LPG, and more than half of the warmers use LPG (Jaber et al., 2003).

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2.3   Global System For Mobile Communication

In the created microcontroller based monitoring association, there must be a system going about as the data bearer which the information is the pace and area data to and from the checking base station. This character of information bearer is favored in light of the fact that it is just about the most far reaching communication system in all over the nation furthermore to assemble the system versatile for future developments. The exceptionally helpful properties of GSM systems are the Short Messaging Systems as known as SMS (Chen and Liu 2010). GSM is a telecommunication network, which means that cell phones connect to it by searching for cellphones in the immediate locality. There are five different cell sizes in a GSM system,which are full scale, miniaturized scale. The range region of specific chamber varies as per the procedure atmosphere. Large scale cells as chambers everywhere the ignoble station reception apparatus remains set up proceeding a opposite or a working overhead usual top surface. Miniaturized scale cells will be cells whose reception apparatus height is below the medium house highest level and they are ordinarily used as a part of town zones. Picocells are little cells, which the scope, breadth is a pair of dozens meters and they are essentially used classified. Femtocells are chambers envisioned for use in lodging zones or tiny commercial circumstances and subordinate with the management dealer's scheme done a web connotation. Umbrella cells are connected to shelter followed districts of minor chambers and seal in crevices in possibility among those cells. The GSM system utilized by cell phones gives an easy, long achieve, a wireless communication channel for applications that call for availability as opposed to high information rates. Set up along the mechanical capability and the given vehicle, custom-made administration interims can be set. A bit of the administration understanding is the start of a GSM modem in the vehicle as demonstrated Figure 2.4. On board administration application can then inform the carport when the vehicle draws close to its administration interim. The administration division will plan an arrangement and advise the customer(Allen et al. 1975). A Worldwide system for Mobile (GSM) is more known as second era telecom framework standard that was worked to deal with the crack issues of the main cell structures. Beforehand it was known as Group Special Mobile. They chamber took up the task of demonstrating an ordinary Mobile

2.4　Microcontroller

There are two types of microcontroller were researched which is Raspberry PI and Arduino UNO.
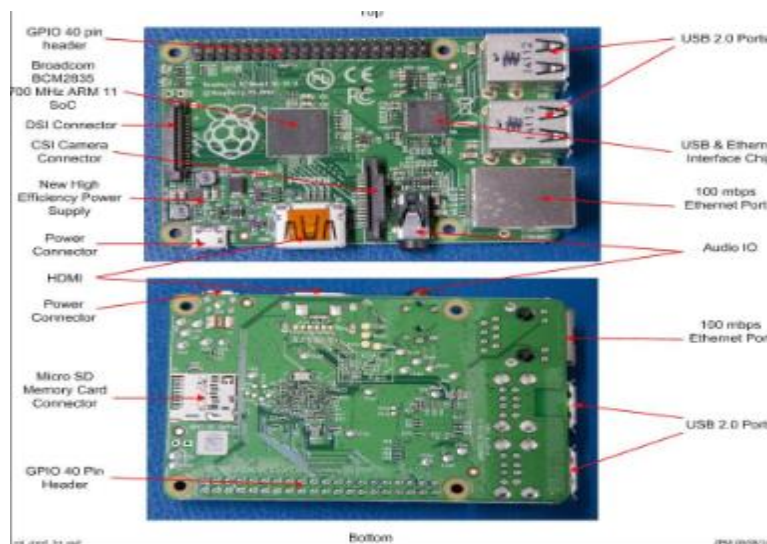
2.4.1 Raspberry PI

The Raspberry Pi is a minimal effort, Visa measured PC that attachments into a PC screen or TV, and utilizations a standard console and mouse. It is a fit little gadget that empowers individuals of all ages investigate processing, and to figure out how to program in dialects like Scratch and Python. It's fit for doing all that you'd anticipate that a desktop PC will do, from perusing the web and playing top quality video, to making spreadsheets, word-handling, and playing recreations. Raspberry PI is also known as pocket PC with Linux working framework introduced to it. This is not expensive and it more supports youngsters for learning, programming, testing and advancement. Looking like motherboard, raspberry pi has every one of the parts to associate inputs, yields and capacity(Agrawal & Singhal 2015).

The Raspberry Pi is a little and generally modest, credit card estimated PC. It was created with the aim of starting an enthusiasm for software engineering related subjects and abilities in youngsters and raising the expertise level of potential software engineering undergrad candidates for third level instruction(Byrne et al. 2015).

The Raspberry Pi can cook for an extensive variety of programming and coding opportunities from straightforward programming coding to more unpredictable equipment ventures. The suggested working system is Raspbian, in view of the Debian Linux conveyance, assembled particularly for the Raspberry Pi equipment. This conveyance accompanies an extensive variety of programming instruments preinstalled including Scratch and Python. The Raspberry Pi additionally incorporates various General Purpose

Input Output (GPIO) pins that give a straightforward approach to interface with equipment inputs, for example, sensors and catches and equipment yields, for example, Light Emitting Diodes (LED's) and servo engines. The Raspberry Pi has a substantial online group creating instructional exercises, tasks and assets, making it conceivable to find, investigate and even experiment with a great many diverse application from programming to equipment advancement. The mix of an adaptable equipment and programming stage joined with a fantastic group makes the Raspberry Pi a conspicuous decision of hardware to use with both understudies and educators alike. Raspberry pi set up and utilize, furnishes educators with a stage from which to offer understudies the chance to learn registering while in the meantime apply 21st century learning aptitudes trying to show and impart their figuring out how to their companions and partners.

Figure 2.4   Raspberry PI Board(Shinde & Mane 2015)