GAS LEAKAGE DETECTOR USING ARDUINO AND GSM MODULE WITH SMS ALERT AND SOUND ALARM

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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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DECLARATION

I hereby declare that this project report entitled
Gas Leakage Detector Using Arduino And GSM Module With SMS Alert And Sound Alarm

is written by me and is my own effort and that no part has been plagiarized without citations

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Date: 21 August 2017

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Date: 21 August 2017

DEDICATION

This thesis is dedicated to ALMIGHTY ALLAH who is the most merciful and helpful and my precious and my beloved parents, my mother, brothers and friends especially because they really help to complete this project thesis. There are people whom grooms me and teaches me the way of life for this unconditional love, moral and financial support and also for their care and prayers. May ALLAH always showered HIS blessing upon them.

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Finally, I must acknowledge as well everyone who directly or indirectly assisted, advised and supported me on doing this Final Year Project over the semester.

ABSTRACT

Liquefied Petroleum Gas (LPG) consists of mixture of propane and butane which is highly flammable chemical. It is odorless gas, due to which Ethanate oil is added as powerful odorant. Some people have low sense of smell, may or may not respond on low concentration of gas leakage. Due to leakage of LPG, it produces hazardous and toxic impact on human begins and also other living creatures. To over this predicament, we need quittance. There by, we speculate some solution to detect the LPG gas leakage and make alert to users of it. The gas sensor used in this project is MQ5 which are detect the present of alcohol and Liquefied Petroleum Gas (LPG). These sensors will detect the concentration of the gas according the voltage output of the sensor. To make the sensors operate in the alarm system and data monitoring system, Arduino was used as the microcontroller for the whole system. The circuit also includes GSM modules and buzzer. GSM module will send sms alert to mobile phone user when the gas leakage was detect. The buzzer will sound to give warning the user. A graphical user interface (GUI) was created using app inventor for end user monitoring purpose.

TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	DECLARATION	**I**
	DEDICATION	**II**
	ACKNOWLEDGEMENTS	**III**
	ABSTRACT	**IV**
	TABLE OF CONTENTS	**V**
	LIST OF TABLES	
CHAPTER I	**INTRODUCTION**	
	1.1 Project Background	1
	1.2 Problem Statements	2
	1.3 Project Question	2
	1.4 Project Objective	3
	1.5 Project Scope	3
	1.6 Expected Output	3
	1.7 Project Contribution	4
	1.8 Report Organization	4
	1.9 Conclusion	6
CHAPTER II	**LITERATURE REVIEW**	
	2.1 Introduction	7
	2.2 Related Work/Previous Work	7
	2.3 Critical Review Of Current Problem And Justification	12
	2.4 Proposed Solution/Further Research	17
	2.5 Conclusion	17
CHAPTER III	**METHODOLOGY**	

3.1 Introduction 18
3.2 Methodology 18
3.3 Project Milestone 21
3.4 Conclusion 25
CHAPTER IV ANALYSIS AND DESIGN
4.1 Introduction 26
4.2 Problem Analysis 26
4.3 Requirement Analysis 26
4.3.1 Data Requirement 27
4.3.2 Functional Requirement 27
4.3.3 Non-Functional Requirement 28
4.3.4 Others Requirment 28
4.3.4.1 Hardware Requirement 28
4.3.4.2 Software Requirement 30
4.4 User Interface Design 32
4.5 Hardware Design 38
4.6 Conclusion 39
CHAPTER V IMPLEMENTATION
5.1 Introduction 40
5.2 Environment Setup 41
5.2.2 Software 41
5.2.3 Hardware 44
5.3 Conclusion 47
CHAPTER VI TESTING
6.1 Introduction 48
6.2 Test Plan 49
6.2.1 Test Organization 49
6.2.2 Test Environment 50
6.2.2.1 User In Home 50
6.2.2.2 User Not In Home 50
6.2.3 Test Schedule 51
6.3 Test Strategy 51
6.3.1 Classes Of Test 51

6.4 Test Design 55
6.4.1 Test Description 55
6.4.2 Test Data 58
6.5 Test Result And Analysis 58
6.6 Conclusion 59
CHAPTER VII PROJECT CONCLUSION
7.1 Introduction 60
7.2 Project Summarization 61
7.2.1 Project Weakness and Strength 62
7.3 Project Contribution 62
7.4 Project Limitation 63
7.5 Future Works 63
7.6 Conclusion 64
REFERENCE
APPENDICES

LIST OF TABLES

TABLE	TITLE	PAGE
1.1	Problem Statement	2
1.2	Project Question	2
1.3	Project Objective	3
2.1	Critical Review of Current Problem and Justification	12
3.1	Gantt Chart for PSM1	22
3.2	Gantt Chart for PSM2	23
3.3	Milestone for PSM1	24
3.4	Milestone for PSM2	24
6.1	Test Organization	49
6.2	Test Strategy	51
6.3	Functionality Testing	55
6.4	Mobile Application Test Case	56
6.5	Test Case Bluetooth Connection	56
6.6	Test Case GSM Module	57
6.7	Test Case Gas Sensor Module	57
6.8	Test Data	58
6.9	Test Result	58
7.1	Weakness and Strength	62

LIST OF FIGURES

DIAGRAM	TITLE	PAGE
2.1	MQ-6 gas sensor and its sensitivity characteristics	8
2.2	Block Diagram	8
2.3	Block diagram of ARM LPG leak detection and prevention system.	9
2.4	Schematic Diagram	10
2.5	PIC Microcontroller	11
3.1	Flow Chart	21
3.2	Methodology Waterfall	25
4.1	Main Menu	32
4.2	Bluetooth Interface	33
4.3	Main interface with connection	34
4.4	Main Interface Normal Gas	35
4.5	Main Interface Medium Gas	36
4.6	Main Interface Dangerous Gas	37
4.7	Hardware Design	38
5.1	Coding Declaration	41
5.2	Coding Status Gas	42
5.3	Coding GSM	42
5.4	MITApp Inventor Designer Interface	43
5.5	MITApp Inventor Block Interface	43
5.6	Arduino Mega	44
5.7	Arduino Uno	44
5.8	GSM Module Sim900a	45
5.9	Gas Sensor MQ5	45
5.10	LED RGB	46
5.11	Buzzer	46
5.12	Bluetooth Module HC006	47
6.1	Not Connected	52
6.2	Connected	52
6.3	GSM send message	53
6.4	No Gas Detected	54
6.5	Gas Detected	54

CHAPTER I

INTRODUCTION

1.1 Project Background

LPG consists of mixture of propane and butane which is highly flammable chemical. It is odorless gas, due to which Ethanate oil is added as powerful odorant, so that leakage can be easily detected. There are other international standards like EN589, amyl Mercaptane and tetrahydrothiophene which are most commonly used as odorants. LPG is one of the alternate fuels used now days. LPG is also used as an alternate fuel in vehicles due to soaring in the prices of petrol and diesel.

Some people have low sense of smell, may or may not respond on low concentration of gas leakage. In such a case, some high security systems become an essential and help to protect from gas leakage accidents. Bhopal, Chernobyl, Okishima gas tragedy was an example of gas leakage accident in India, Russia and Japan. This was world's worst gas leakage industrial accident. Gas leakage detection is not only important but stopping leakage is equally essential. We designed a system which sniffs LPG leakage and emphraxis by the measures such as SMS message and Buzzer sound.

1.2 Problem Statement

PS	Problem Statement
1	Gas leakages accidents are a common problem especially in households and industries. If not detected and corrected at the right time, it can also be life threatening. Unlike a traditional gas leakage alarm system which only senses a leakage and sounds an alarm, the idea behind our solution is to turn off the main power and gas supplies as soon as a gas leakage is detected apart from sounding the alarm. Then, a alert message is sent to an authorized person to informing him about the gas was leakage.

Table 1.1: Problem Statement

1.3 Project Question

PQ	Project Question
PQ1	What is the purpose of making the gas leakage detector?
PQ2	How the gas leakage detector help the user safety?

Table 1.2: Project Question

1.4 Objective

PQ	PO	Project Objectives
PQ1	PO1	To test MQ5 gas sensor to detect gas leakage (like LPG leak, Butane leak, Methane leak) or any such petroleum based gaseous substance.
PQ2	PO2	To develop alert mechanism message and send message to specified mobile numbers.
PQ3	PO3	To test a buzzer give a sound alarm when gas leak was detected and stop the alarm once gas leak is under control.
PQ4	PO4	To display status in mobile application

Table 1.3: Project Objective

1.5 Project Scopes

Scope of this projects:

1. System can detect the leakage of LPG gas in a closed environment.
2. System will inform the user about the leakage of gas via SMS.
3. System will activate the alarm unit to inform neighbours about the gas leakage.

1.6 Expected Output

This gas leakage detector can be easily integrated into a unit that can sound an alarm or give a visual suggestion of the LPG concentration. The sensor has both admirable sensitivity and rapid response time. This sensor can also be used to sense other gases like iso-butane, propane, LNG and even cigarette smoke.

1.7 Project Contributions

Gas leakage is a major concern at homes, offices, industries etc. Many homes and industries had fallen victims of inferno due to unknown gas leakage at a hidden point. This is dangerous and requires high security to avoid life and property being destroyed. So to avoid this problem occur, gas leakage detector must install at vulnerable locations. The system is designed to prevent loss/death to occur through gas leakages and hence promote safety of life and property.

1.8 Report Organization

Chapter 1: Introduction

This chapter 1 will explain about the introduction of the project and also focusing on problem statement and the objective that will be achieve in this project. The project background, scope and other explanation about this project also in this chapter.

Chapter 2: Literature Review

This chapter will be discuss about the detail of this project and also include the current problem. The related and previous project about the formulation of the LPG gas leakage detector are also discuss in this chapter.

Chapter 3: Methodology

This chapter will be explaining in detail about the method that will be choose and used in this project. The milestone also will be include in this chapter.

Chapter 4: Analysis And Design

This chapter will be explaining and discussing about the design of the gas detector leakage using arduino and GSM module with sms alert and sound alarm and also software and hardware that will be used in this project.

Chapter 5: Implementation

This chapter will be explain about all the activity that involve in the developing the gas detector leakage and also the testing to make the gas detector leakage to work will be done in this chapter.

Chapter 6: Testing

This chapter will include all the testing progress that have been done in this project.

Chapter 7: Project Conclusion

This chapter will be the final chapter and all the summary and conclusion of the project will be made in this chapter. The improvement that can be made for this project in the future also be explain in this chapter.

1.9 Conclusion

Gas leakages in households and industries cause risk to life and property. A huge loss has to be incurred for the accident occurred by such leakages. A solution to such a problem is to set up a monitoring system which keeps on monitoring the leakage of any kind of flammable gases and protects the consumer from such accidents. The present paper provides a solution to prevent such accidents by not only monitoring the system but by also switching off the main power and gas supplies in case of a leakage. In addition to this, it activates an alarm as well as sends a message to the user.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss in details on the components and instruments used for this project in general. Besides that, there are couple more of past related project or paper work that is related to this project.

2.2 Related Work/Previous Work

Based on the Abishek, V And Aierselvam, M. (2013) in their project “Wireless Auto Power Trip during Gas Leakage” state that it’s a known fact that LPG leakage during domestic usage is a disaster, especially when we switch on any electric switch or appliances because it may produce a spark which causes sudden loud explosion of the gas filled room. In the recent times, there is an increase in such accidents and casualties related to it in our nation.So the main idea is to develop security system for detecting gas leakage in closed environment using sensors. So to avoid the explosion, the wireless systems will trip the of the power supply depending on the level gas once the gas leakage is detected.

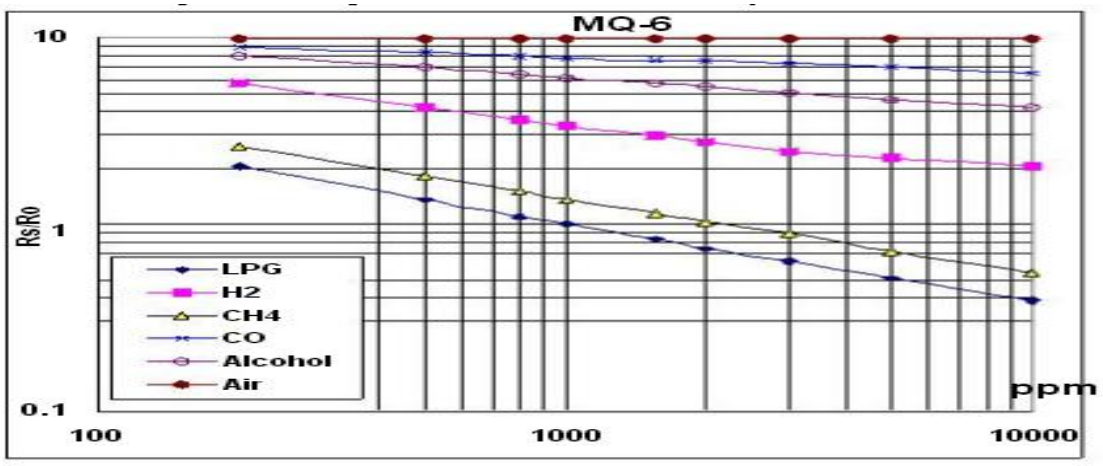

Figure 2.1 : Sensitivity characteristics of mq6 gas sensor.

Digambar Surse., Swati Talekar., Tejal Suryawanshi And Prof. Gaikar. (2016) in their project "Smart Gas Booking System & Leakage Detection" state that it is difficult to know the level of LPG gas cylinder. If LPG is going to finish without informing us it can create difficult condition for cooking etc. Our system design can help us to avoid such kind of problem in our daily life. Our design is based on ARM controller, it can track LPG emptiness all the time if LPG is very close to finish or at empty level then it can alert us by sending SMS to LPG Agency for ordering the LPG cylinder.

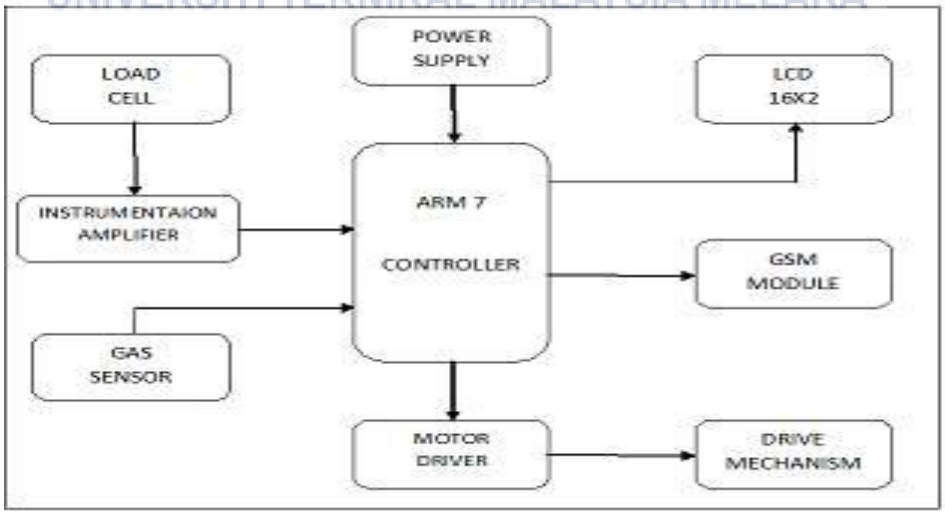

Figure 2.2 : Block Diagram

Padma Priya, K., Surekha, M., Preethi, R., Devika, T., And Dhivya, N. (2014) in their project “Smart Gas Cylinder Using Embedded System” state that The design of a wireless LPG leakage monitoring system is proposed for home safety. This system detects the leakage of the LPG and alerts the consumer about the leak by SMS and as an emergency measure the system will turn off the power supply, while activating the alarm. The additional advantage of the system is that it continuously monitors the level of the LPG present in the cylinder using load sensor and if the gas level reaches below the threshold limit of gas around 2kg so that the user can replace the old cylinder with new in time and automatically books the cylinder using a GSM module .The device ensures safety and prevents suffocation and explosion due to gas leakage. This project is implemented using ARM 7 processor and simulated using keil software.

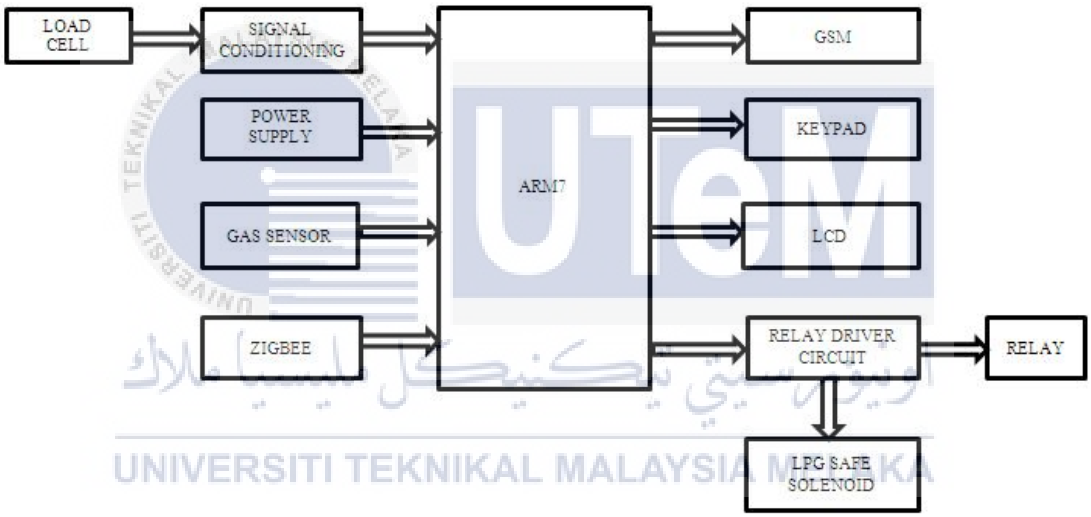

Figure 2.3 : Block diagram of ARM LPG leak detection and prevention system.

Ashish Sharma. (2009) in his project “Microcontroller Based LPG Gas Detector Using GSM Module” state that ideal gas sensor is used to detect the presence of a dangerous LPG leak in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke. If the LPG sensor senses any gas leakage from storage the output of this sensor goes low. This low signal is monitored by the microcontroller and it will identify the gas leakage. Now the microcontroller is turn on LED and Buzzer. After few milliseconds delay, it also turn on exhaust fan for throwing gas out and continue send messages as “GAS LEAKAGE” to a mobile no written in c-code.

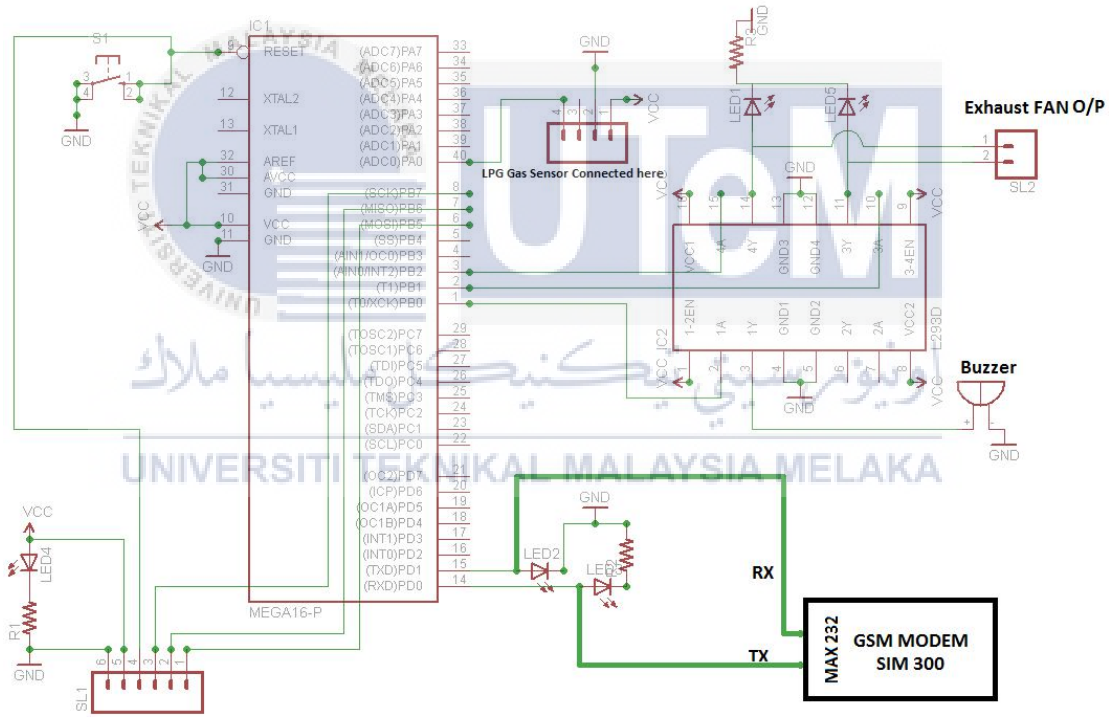

Figure 2.4 : Schematic Diagram

Prof. Amsaveni, M., Anurupa, A., Anu Preetha, R., Malarvizhi, C And Gunasekaran, M. (2015) in their project “Gsm based LPG leakage detection and controlling system” state that Gas leakage is a major problem with industrial sector, residential premises etc. One of the preventive methods to stop accident associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. The aim of this project is to present such a design that can automatically detect, alert and control gas leakage. In this project, after the leakage of gas is detected, the valve is automatically closed, thereby stopping the leakage. Then the electric power supply is also shut down to prevent fire accidents. In particular, gas sensor has been used which has high sensitivity to gases like propane and butane. Gas leakage system consists of GSM module, which alerts the user by sending SMS.

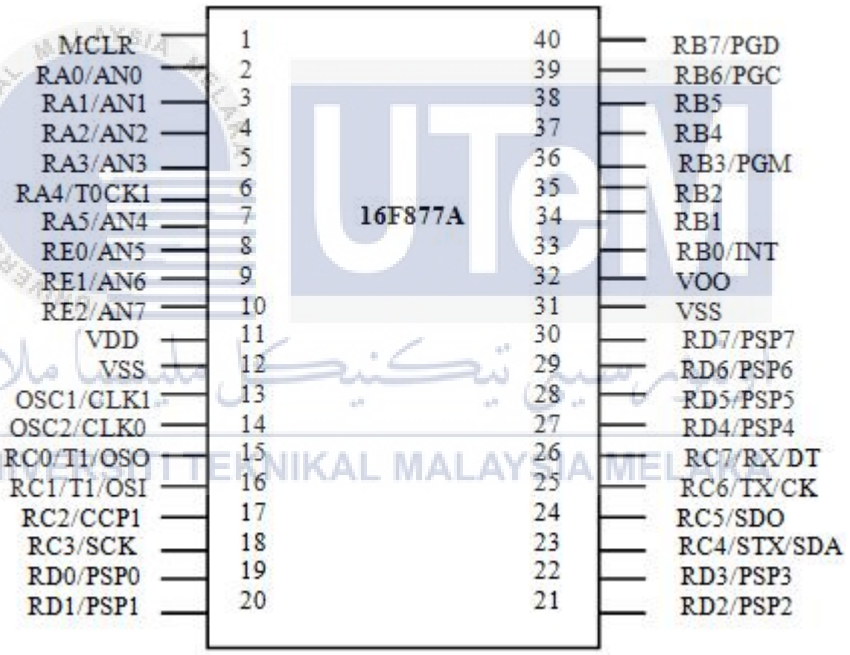

Figure 2.5 : PIC Microcontroller

2.3 Critical Review Of Current Problem And Justification

Table 2.1: Critical Review of Current Problem and Justification

Research Title/Product	Author	Purpose	Description	Method
'Wireless Auto Power Trip during Gas Leakage in *Research India Publications of Advance in Electronic and Electric Engineering, 3(3), 327-332.'*	Abishek, V And Aierselvam, M. (2013).	The proposed wireless gas leakage system is composed of two major modules: the gas leakage detection and transmission module, and the receiver module. The gas leakage detection and transmission module detects the change in concentration of LPG and natural gas and activates an audiovisual alarm when it exceeds a certain threshold. Furthermore, it sends another alarm message through a radiofrequency (RF) system to the receiver module. The receiver module is a mobile unit that could be placed	The wireless gas sensing and power trip system was implemented and its working depends on the distance of receiver and the concentration of the gas present in the air. Furthermore the system has a calibrated threshold concentration value so when again the concentration drops below the threshold value automatically the power trip will be reversed and the alarm will go off.	Use the RF receiver and a microcontroller (PIC-16F877A Or INTEL 8051).

		anywhere within the premises of the house so that the alarm can be detected and heard at a distance from the place of gas leakage.		
'Smart Gas Booking System & Leakage Detection in *International Journal of Innovative Research in Computer and Communication Engineering, 4(3), 3221-3226.'*	Digambar Surse., Swati Talekar., Tejal Suryawanshi And Prof. Gaikar. (2016).	The automatic gas booking system was proposed, designed and successfully implemented in this paper for human simplicity and gas leakage detection is useful in home safety and industrial applications. This system detects the leakage of the gas and alerts the owner about the leakage of gas by SMS, while activating the alarm. The system continuously monitor the weight of the gas cylinder and its display on LCD makes it an efficient home security system and also can be used	LPG gas leakage detection projects main idea is to implement security system for detecting leakage of gas in the house. Now days there are many cases related to gas leakage which cause innocent people lives and property damage. This system detects the leakage of the LPG and sounds the alarm to alerts the consumer also it send the SMS about the gas leakage. It can also turn off the main power supply. The presence of dangerous LPG leakage in the gas	Use the ARM (Advance RISC Machine) is an 16 bit/32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support.