



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF SMART LEAKING DETECTION  
SYSTEM FOR GAS CYLINDER**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours.

by

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## **APPROVAL**

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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## ABSTRAK

*Gas LPG adalah bahan api asas yang digunakan dalam unit keluarga. Pada masa kini tumpahan gas LPG menimbulkan kemalangan yang membawa kepada kemalangan yang luar biasa, terutamanya jika kejadian itu berlaku di dalam penginapan tebal. Pemerhatian tumpahan gas LPG dan lokasi awal tumpahan gas dan peringatan pelepasan dijangka dapat menghindarkan kemalangan maut secara progresif. Kerangka lokasi tumpahan cemerlang adalah usaha yang boleh digunakan dengan menyatukan kerangka pemeriksaan dengan menggunakan mikrokontroler sebagai rangka kerja antara muka dan kawalan. Siasatan ini membina alat kerangka yang dapat menyaring dari jauh dan penemuan awal tumpahan gas dengan menggunakan sensor gas MQ-2 dan keluarga mikrokontroler NodeMCU sebagai alat kawalan. Rangka kerja ini juga menggunakan modul Wi-Fi yang diimplan di dalam NodeMCU sebagai antara muka kepada rangka kerja pentadbiran sistem jauh untuk bertukar maklumat dari sensor yang secara rasmi disediakan oleh pengawal yang dilengkapi dengan rancangan LCD dan pengaturcaraan yang digabungkan dengan Blynk. Siaran pelepasan gas akan dijalankan oleh Blynk dan motor servo akan melepaskan pengawal gas untuk mengelakkan lebih banyak kebocoran gas.*

## ABSTRACT

LPG gas is the fundamental fuel utilized in family units. Nowadays LPG gas spill set off a mishap that brought about tremendous misfortunes, particularly if the mishap happened inside the thick lodging. LPG gas spillage observing and early location of a gas spill and a release cautioning is expected to avert progressively deadly mishap. Brilliant spilling location framework is a venture that can be utilized by bringing together the checking framework by utilizing a microcontroller as the interface and control framework. This investigation built up a framework gadget that can screen remotely and early discovery of gas spills by using gas sensor MQ-2 and NodeMCU microcontroller family as control gadgets. This framework is likewise utilizes the Wi-Fi module implanted inside NodeMCU as the interface to the remote systems administration framework to exchange information from the sensor that officially prepared by the controller outfitted with LCD show and programming incorporated with Blynk. Gas release alert will be carried out by Blynk and the servo motor will disengage the gas regulator to avoid more gas leakage.

## **DEDICATION**

I would like to dedicate this project and research work to my mother, Fathimah Pathma Binti Abdullah for her encouragement and loving throughout my life. Next is my supervisor, Sir Saifullah Bin Salam who has guided me in this project. Besides, I also like to obligate this project to Sir Khairul Azha Bin Abdul Aziz who was my co-supervisor for all the assistances and suggestions. Lastly, I would like to bestow my friends, lecturers and lab assistant who have helped and supported me



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# TABLE OF CONTENTS

	<b>PAGE</b>
<b>TABLE OF CONTENTS</b>	<b>x</b>
<b>LIST OF TABLES</b>	<b>xiii</b>
<b>LIST OF FIGURES</b>	<b>xiv</b>
<b>LIST OF SYMBOLS</b>	<b>xvii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xviii</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>19</b>
1.1 Background	19
1.2 Statement of the Purpose	19
1.3 Problem Statement	20
1.4 Scope	21
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>23</b>
2.1 Introduction	23
2.2 Related Work	23
2.2.1 Detecting and Refilling LPG System	23
2.2.2 Low Cost Centralized LP gas Leakage Alarm	25
2.2.3 PIC16F877A used as Microcontroller for LPG Detection System	28
2.2.4 Raspberry Pi used as Microcontroller for LPG Detection System	30

2.2.5	NodeMCU used as Microcontroller for LPG Detection System	32
2.2.6	Arduino Uno used as Microcontroller for LPG Detection System	33
2.2.7	MQ-2 as Gas Sensor	38
2.2.8	MQ-6 as Gas Sensor	41
2.2.9	Wi-Fi Module based LPG Leakage Detection	45
2.2.10	GSM based LPG Leakage Detection	48
2.3	LPG Gas	51
<b>CHAPTER 3 METHODOLOGY</b>		<b>53</b>
3.1	Introduction	53
3.2	Project Execution	53
3.2.1	Decision Making	53
3.2.2	Concept Design	55
3.3	Material and Equipment	57
3.3.1	Hardware Design	57
3.3.1.1	Gas Sensor	57
3.3.1.2	LCD Display	61
3.3.1.3	NodeMCU	64
3.3.1.4	Servo Motor MG996R	67
3.3.2	Software Design	68
3.3.2.1	Programming Language	68

3.3.2.2	Blynk	69
3.3.2.3	Sketch Drawing	69
<b>CHAPTER 4</b>	<b>RESULT AND DISCUSSION</b>	<b>71</b>
4.1	Introduction	71
4.2	Prototype Result	71
4.2.1	Coding Prototype	71
4.2.1.1	Project Coding	72
4.2.1.2	Library	77
4.2.1.3	Blynk	78
4.2.2	Project Circuit Connection	80
4.2.3	Hardware Result	81
4.3	Analysis Data	86
4.3.1	Analysis of Gas Concentration and Distance with Time	86
4.3.2	Analysis Concentration and Response	91
<b>CHAPTER 5</b>	<b>CONCLUSION AND RECOMMENDATION</b>	<b>94</b>
5.1	Summary of the project	94
5.2	Project achievement	94
5.3	Recommendation future work planning	95
<b>REFERENCES</b>		<b>97</b>

## LIST OF TABLES

<b>TABLE</b>	<b>TITLE</b>	<b>PAGE</b>
Table 2.1:	Capacity of the batteries	26
Table 2.2:	Comparisons between modes	27
Table 2.3:	Time response for sensor to validate the quantities of petrol	40
Table 2.4:	Time response for sensor to validate the quantities of LPG	40
Table 2.5:	Delivery time of short message sent by GSM module	50
Table 3.1:	Explanation on LCD pins configuration	62
Table 3.2:	Specific GPIO pins	65
Table 3.3:	Wire configuration	67
Table 4.1:	Time taken for MQ-2 to detect specific concentration	86
Table 4.2:	Value of first concentration detected by MQ-2 with various distance	88
Table 4.3:	Time Taken for the system to pre-heat	89
Table 4.4:	Time Response for sensor to validate the concentration of LPG	90
Table 4.5:	Time Taken for Blynk to send alert	90
Table 4.6:	Time Taken for the system to connect to Wi-Fi with various distance	91
Table 4.7:	Concentration and the response of this project	92

## LIST OF FIGURES

<b>FIGURE</b>	<b>TITLE</b>	<b>PAGE</b>
Figure 1.1:	Types of hazardous gas and their risk	21
Figure 2.1:	Block diagram of the system	24
Figure 2.2:	Selection of Sampling and Handshaking intervals	26
Figure 2.3:	40-pin configuration of PIC16F877A	29
Figure 2.4:	Block Diagram of the system by using Raspberry Pi	31
Figure 2.5:	Block diagram of the suggested framework by using NodeMCU	33
Figure 2.6:	Square outline of the proposed framework by using Arduino Uno	34
Figure 2.7:	Flowchart for the Arduino Programming for MQ9	35
Figure 2.8:	Graph of gas leakage detection	36
Figure 2.9:	Graph of gas leakage detection in serious condition	36
Figure 2.10:	Monitoring system shows the room in the safe condition	37
Figure 2.11:	Monitoring system shows the room in the dangerous condition	37
Figure 2.12:	Electric parameter measurement circuit	39
Figure 2.13:	The circuit connection for MQ-6 sensor	41
Figure 2.14:	MQ-6 gas sensor module and the pin out diagram	42
Figure 2.15:	Sensor pre-heat count down on start-up or reset	42
Figure 2.16:	Sensor detect LPG concentration less than gas reference	<b>43</b>

Figure 2.17: Sensor detect LPG concentration greater than gas reference	44
Figure 2.18: Test Result using the device at different distance from the gas source	45
Figure 2.19: Block Diagram of the proposed system	46
Figure 2.20: Flow chart of proposed LPG gas monitoring and alert system	47
Figure 2.21: Logic followed in the system	48
Figure 2.22: E-mail notification sent from Raspberry Pi to user when LPG leakage and fire is detected	48
Figure 2.23: The flowchart when there is leakage	49
Figure 3.1: Block Diagram	55
Figure 3.2: Flowchart of the system	56
Figure 3.3: Design of MQ-2 sensor	59
Figure 3.4: Design of MQ-2 sensor	60
Figure 3.5: The typical affectability qualities of MQ-2 for few gases	61
Figure 3.6: Example of 16x2 LCD Display	62
Figure 3.7: Function of LCD pins configuration	62
Figure 3.8: The board power pins	65
Figure 3.9: Buttons on NodeMCU	66
Figure 3.10: All 40-pin GPIO and its purposes	66
Figure 3.11: The wire configuration for MG996R	67
Figure 3.12: Example of Arduino Programming Language on NodeMCU	68
Figure 3.13: Styles of widgets used in Blynk	69

Figure 3.14: Drawing of Ublock	70
Figure 3.15: Drawing of servo holder	70
Figure 4.1: Project Prototype Coding	74
Figure 4.2: Coding to read the values from the sensor	75
Figure 4.3: Coding to display virtually	75
Figure 4.4: Coding for the IF statement	76
Figure 4.5: Library included	77
Figure 4.6: Certified token and Wi-Fi identifications	78
Figure 4.7: Wi-Fi connection details	79
Figure 4.8: Coding for widgets used in Blynk	79
Figure 4.9: Widgets used in Blynk	80
Figure 4.10: The circuit connection	81
Figure 4.11: Gas Leaking Detector Prototype	82
Figure 4.12: Gas leaking below 500 ppm	83
Figure 4.13: Gas leaking above 500 ppm	83
Figure 4.14: Blynk notification during SMALL LEAK	84
Figure 4.15: Gas leaking above 1000 ppm	85
Figure 4.16: Blynk notification during DANGER	85
Figure 4.17: Time taken for MQ-2 to detect gas concentration at 500 ppm	87
Figure 4.18: Time taken for MQ-2 to detect gas concentration at 1000 ppm	87
Figure 4.19: Average value of first concentration detected by MQ-2	89



## LIST OF SYMBOLS

<b>C</b>	-	Celcius
<b>F</b>	-	Fahrenheit
<b>V</b>	-	Voltage

## LIST OF ABBREVIATIONS

<b>LPG</b>	Liquidfied Petroleum Gas
<b>IOT</b>	Internet of Thing
<b>DC</b>	Direct Current
<b>GSM</b>	Global System for Mobile
<b>PIC</b>	Peripheral Interface Controller
<b>PLC</b>	Programmable Logic Control
<b>SMS</b>	Short Message Service
<b>LCD</b>	Liquid Crystal Display
<b>LAN</b>	Local Area Network
<b>PPM</b>	Parts per Million
<b>VCC</b>	Voltage Common Collector
<b>GND</b>	Ground
<b>ADC</b>	Analogue to Digital Converter
<b>UART</b>	Universal Asynchronous Receiver Transmitter
<b>PWM</b>	Pulse Width Modulation
<b>SPI</b>	Serial Peripheral Interface
<b>I2S</b>	Inter-IC Sound
<b>I2C</b>	Inter-Integrated Circuit
<b>RF</b>	Radio Frequency
<b>LDO</b>	Low Dropout

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Gas spillage prompts different mishaps acknowledging both material hardship and human wounds. The danger of effect, finishing, suffocation depend upon their physical properties such hurtful quality, flimsiness, and so forth. The measure of passings by virtue of effect of gas chambers has been broadening beginning late. The illumination behind such effect is an immediate consequence of inadmissible chambers, old valves, demolished controllers and nonattendance of consideration in managing gas barrels. The LPG or propane is an ignitable blend of hydrocarbon gases utilized as fuel in different applications like homes, motels, endeavours, autos, vehicles by excellence of its engaging properties which combine high calorific respect, less smoke, less sediment, and unfortunate mischief to the earth. Vaporous oil is another all things considered utilized fuel in homes. The two gases uses to make clean importance, regardless there is an inconvenient issue of their spillage. Being heavier than air, these gases don't scatter suitably. It might incite suffocation when taken in and may instigate sway. In this manner, this examination is proposed to shield any underhandedness from occurring. This examination will structure something else that will pull back the controller when there is gas nearness recognized.




### 1.2 Statement of the Purpose

There are several objectives to achieve the aims:

- a) To study the smart gas leaking detection system used as main fuel in household.
- b) To develop a smart leaking detection system by monitoring the leakage from the regulator area that excretes the gas by using microcontroller.
- c) To evaluate the performance of “Smart Leaking Detection System for Gas Cylinder” prototype.

### **1.3 Problem Statement**

Gas spillage prompts various disasters coming to fruition into both cash related mishap similarly as human injuries. In human's regular day to day existence, condition gives the most vital impact to their therapeutic issues. The threat of ending, impact, suffocation all rely upon their physical properties such instability, toxic quality, etc. The amount of passings on account of the impact of gas barrels has been growing starting late. The reason behind such impact is a result of deficient barrels, old valves, annihilated controllers and nonattendance of care using gas chambers add to the risks. Evaluations by oil associations found that various LPG purchasers are unmindful of prosperity checks of gas chambers. Another reason is unlawful filling of gas chamber similarly causes accidents. There is a prerequisite for a system to recognize and besides stay away from spillage of LPG.

Types	Gases	Representation
Flammable	Methane ,butane LPG ,propane	 risk of fire, explosion
Toxic	Hydrogen carbon monoxide	 risk of poisoning
Asphyxiant	Oxygen deficiency	 risk of suffocation

**Figure 1.1: Types of hazardous gas and their risk**

Figure 1.1 shows types of hazardous gas and their risks and LPG gas is flammable type that is why LPG leakage should not be taken lightly. It may also lead to suffocation as LPG is heavier than air. Therefore necessity for once there is leakage is that the consumer has to upgrade the safety standards and act in accordance with statutory requirement on. A system detecting and monitoring gas leakage is a need it is for prevention and adding on a wireless system to the system so that the user can notify and monitor while being away from home.

#### **1.4 Scope**

The goal of this project is to build a system that detect LPG gas leakage and alert the user even though the user is not at home. After that, this system will disengage the gas regulator when it detects gas spillage. The value of LPG discharge can be monitored wirelessly by using Blynk. In this project, there will be some limitation such as the system only detect gas leakage around gas regulator. Adding more, the monitoring system will

only be applied to houses with Wi-Fi only. Furthermore, the system will only be storing data when there is connection to Wi-Fi if the house does not have Wi-Fi or no connection to Wi-Fi this system cannot monitor the gas value and cannot be alerted if there is any leakage.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

The purpose of this chapter is to review journals and previous studies conducted by other researchers relevant to the system for gas leaking detection. Furthermore, the perspective and method associated with the project will be determined and discussed in previous research.

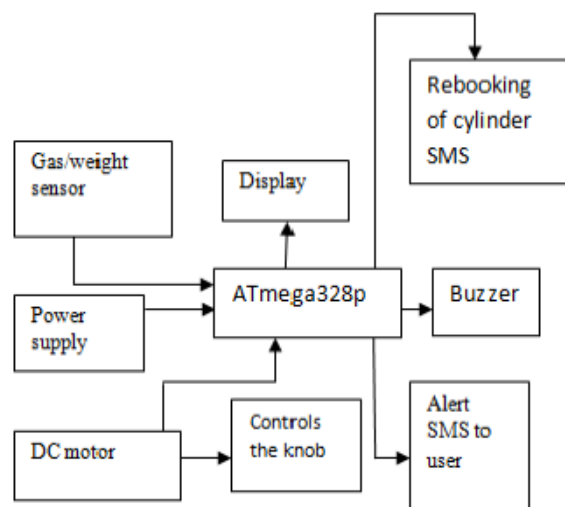
#### 2.2 Related Work

##### 2.2.1 Detecting and Refilling LPG System

The creator reason a discovery, observing and control arrangement of LPG spillage. Utilizing hand-off DC engine the stove handle is consequently controlled. Alongside wellbeing estimates the framework has extra favourable position of programmed rebooking of chamber when the dimension of gas goes beneath the ordinary load of barrel. So as to accomplish this, two framework is utilized; first is identification framework. In the recognition framework the MQ6 gas sensor is utilized which is reasonable to LPG, isobutene and propane gases. This sensor sends a sign (computerized beat) to the microcontroller when gas is being spilled. An alarm message is sent through the GSM to the client and a bell caution is initiated in the room. This alert produces gigantic sound which drops down the consideration of client and neighbours in current hole/fire mishaps. These alarm messages will be shown on LCD. At the same time, LPG controller fitted to the barrel is consequently killed utilizing a transferred DC engine to

maintain a strategic distance from more spillage from chamber. Next, the LPG barrel refilling unit includes for the most part the weight sensor, which is combined with to the ATmega328p microcontroller (Soundarya *et al.*, 2014). At the point when the heaviness of the chamber comes to the underneath the foreordained esteem the GSM modem interfaced to the microcontroller sends booking solicitation to the merchant. The wholesaler will confirm the legitimacy of client in the database an in like manner an affirmation message is sent through GSM modem to the client naturally.

At the point when a little break happens, the framework sensor identifies the spillage (the range is between 400-600 ppm) and sends the ready SMS to the client and actuates the caution and gives the security hardware (Exhaust fan) and controls the handle of chamber utilizing transfer DC engine. On the other hand the framework screens the LPG dimension of chamber, consequently books the barrel when it achieves the lower weight 0.5kg. The figure underneath demonstrates a square chart of the proposed framework. The square chart involves microcontroller, weight sensor, level sensor, GSM, Alarm unit and Knob control (Patil *et al.*, 2017).



**Figure 2.1: Block diagram of the system**