



**LPG GAS LEAKAGE &  
CAPACITY MONITORING SYSTEM**

**EIT/21/16B**

**GERMAN-MALAYSIAN INSTITUTE**

**JAN/2019**

# LPG GAS LEAKAGE & CAPACITY MONITORING SYSTEM

EIT/21/16B

## GROUP MEMBERS:

MUHD NAJMUL AMIN BIN MOHD NORUL QAMAR

ABDUL RAHMAN NUR HAKIM BIN RAHIM

MOHAMAD HAFIY AIMAN BIN MOHAMAD HAFZAL

SITI AMIRAH NAJIHAH BT ABD RAHMAN

This project report is submitted as a partial fulfilment  
of the requirement of the Diploma in Industrial Electronics.

## PROJECT SUPERVISOR

### PROJECT SUPERVISOR NAME'S

MISS ROSILAH BT RAMLI

ELECTRONICS & INFORMATION TECHNOLOGY

GERMAN-MALAYSIAN INSTITUTE

JAN/2019

## DEDICATION

We would like to dedicate this project report to our beloved family who have supporting our project with motivations and prayers. Also to our group member that always support each other from the beginning of this journey.

We also will like to send our appreciation to our beloved supervisor, Miss Resiah bt Ramli for her guidance and helps. Whilst, towards other German Malaysian Institute staffs and technician, we like to convey our humble gratitude towards all those who has helped us either directly or indirectly.

Last but not least, we hope this project can help everyone out there in leading a better and easier way of life. Lastly, we also hope that this project will give inspiration to others in improving our future and moving forward towards advanced technology.

## ACKNOWLEDGEMENT

Praise to Allah for giving us strength and spirit in completing the final year proposal. It is a pleasure that we can conclude our project proposal. We would like to dedicate this project to our supervisor, others technical training officers(TTO) and also our classmates. They have guide and help us during completing this project.

We also like to show our dedication to our own teammates and classmates, who have been with us through the difficult times. The commitment and cooperation from other individual and our teammates lead us to success.

## ABSTRACT

LPG Gas Leakage & Capacity Monitoring System is for the restaurant system. It will sense the leakage of gas and will notify the user through mobile apps. It's also will notify the user about the capacity that left in the gas cylinder from time to time. This system will make staff or chef job much easier because they will know when to change the gas cylinder in the kitchen. Therefore, it is necessary to have a system which continuously monitor the cylinder. The purpose of this project is to monitor and detect leakage on LPG cylinder in urban area. Commonly, there always has a sensor to detect any changes. For an example gas sensor. This sensor used to detect the amount of gas in atmosphere and alerts the consumer about this leakage by sending message through mobile apps.

Traditionally, people used soapy water to detect gas leakage. Firstly, they mix few tablespoon of dish soap into a container of water. The dish soap should not contain ammonia because ammonia can cause brass to become crack and brittle. Then, they turn on the gas supply. Lastly, they wet down the spot by using a soaked sponge or spraying the soapy water on it, to see if there is bubbles form on them. If the bubble exist, the leakage spot is found.

So with our system can detect faster that old method and more safe that can guarantee more safety than old method. It also will reduce the percentage of getting explosion.

## TABLE OF CONTENT

CHAPTER	CONTENT	PAGE NUMBER
CHAPTER 1	INTRODUCTION	
	1.1 PROJECT BACKGROUND	1
	1.2 PROBLEM STATEMENT	3
	1.3 PROJECT OBJECTIVE	4
CHAPTER 2	FEASIBILITY STUDIES	
	2.1 Liquefied Petroleum Gas (LPG)	5
	2.2 LPG Gas Leakage Cases in Malaysia	6
	2.3 LPG Gas Sensor	7
	2.4 Weight Sensor	8
	2.5 Arduino Uno	10

	PROJECT METHODOLOGY	
	3.1 PROJECT SPECIFICATIONS	11
	3.2 PROJECT FEATURES	12
	3.2.1 PROJECT REQUIREMENT	13
	3.2.2 PROJECT HARDWARE	14
CHAPTER 3	3.2.2 PROJECT SOFTWARE	26
	3.3 DATA FLOW DIAGRAM	27
	3.4 MACHINE LAYOUT DIAGRAM	28
	3.4.2. WIRING DIAGRAM	29
	3.5 PROJECT COSTING	30
	3.6 SAFETY FEATURES	31
	PROJECT IMPLEMENTATION	
	4.1 PROCESS PLAN	32
	4.1.1 BLOCK DIAGRAM	32
	4.1.2 FLOW CHART	33
	4.1.3 PROJECT SEQUENCE	38
CHAPTER 4	4.2 QUALITY PLAN	39
	4.2.2 STANDARD OPERATING PROCEDURES (SOP)	40
	4.3 PROJECT SCHEDULE	41

	4.3.1 GANTT CHART	41
	4.3.2 TASK DISTRIBUTION	42
	4.3.3 TASK SEQUENCE	43
	FINDINGS AND ANALYSIS	
CHAPTER 5	5.1 COMMISSIONING AND TESTING	44
	5.1.1 PROCEDURE	44
	5.1.2 Problems encountered and countermeasures	45
	5.2 RESULT AND DISCUSSION	46
	CONCLUSION	
CHAPTER 6	6.1 CONCLUSION	47
	6.2 RECOMMENDATIONS	48

## LIST OF TABLES

TABLE	TITLE	PAGE NUMBER
3.1	Project specification for LPG Gas Leakage & Capacity Monitoring System(GLCMS)	11
3.2.1	Requirement of Project LPG Gas Leakage & Capacity Monitoring System (GLCMS)	14
3.2.2.1	TP Link AC750 Wireless Dual Band 4G LTE Router MR200 feature & specification.	21
3.2.2.2	Arduino Uno Technical Specifications	23
3.2.2.4	Project Software of LPG Gas Leakage & Capacity Monitoring System (GSLCMS)	26
3.5.1	Project Costing	30
3.6.1	Safety Features of the project	31
3.6.2	Safety Features on the workplace	31
4.3.2.1	Task distribution of the project	42

## LIST OF DIAGRAMS

DIAGRAM	CONTENT	PAGE NUMBER
2.2	shop zinc is pulled out of the blast	6
2.4	mass and measurement of gas cylinder	9
3.2.2.1	Load cell	14
3.2.2.2	MQ-6 gas sensor	15
3.2.2.3	Switching power supply AC to DC 24V 5A 120W S- 120-24	16
3.2.2.4	Wi-Fi module	17
3.2.2.5	Power Adapter 12V	19
3.2.2.6	Arduino PWM	20

3.2.2.7	TP Link AC750 Wireless Dual Band 4G LTE Router MR200	21
3.2.2.8	Arduino Uno ATMEGA328	22
3.2.2.9	HX711 MODULE	24
3.2.2.10	Portable adjustable Bunsen burner	25
3.3.1	Data Flow Diagram of LPG Gas Leakage & Capacity Monitoring System (GLCMS)	27
3.4.1	Machine Layout Diagram	28
3.4.2	Wiring diagram of the project.	29
4.1.1.1	Shows block diagram of the project	32

## LIST OF SYMBOLS AND ABBREVIATIONS

LPG	-	Liquefied Petroleum Gas
LLCMS	-	LPG Gas Leakage & Capacity Monitoring System
$R_s$	-	Resistance of resistor
IE	-	Industrial Electronics
PT	-	Production Technology
EIT	-	Electronics and Information Technology
FYP	-	Final Year Project
LED	-	Light Emitting Diodes
DC	-	Direct Current

## LIST OF APPENDIX

APPENDIX	TITLE	PAGE NUMBER
1	Design of the project	47
2	Design of top & base casing	48
3	Gantt chart	49
4	Coding for notifications	50
5	Coding for Node MCU.	58
6	Coding for firebase database	64
7	Index File	65
8	Index Java Script.	76
9	Capacity Tables.	77
10	Login form.	95
11	Login Java Script	97
12	Sign out Java Script.	99

## CHAPTER 1:

### INTRODUCTION

#### 1.1 PROJECT BACKGROUND

Nowadays, the usage of Liquefied Petroleum Gas (LPG) in Malaysia is widely used in many fields such as in homes, restaurants, industries (small scale to big scale) and in automobiles as fuels. LPG is well-used fuel for cooking, drying and heating. Although LPG and natural gas are known as an environmental friendly but still those gaseous can instigate a serious effect in case of leakage or disclosure. Leakages may lead to explosion which can lead to many deaths. As the usage of LPG increases in domestic, the accidents occur by this LPG explosion also increases due to lack of continuous inspections and monitoring. In home residence such explosion can happens due to substandard cylinders, old valves and loose type of head gas. Other than that, configuration on weight of cylinder gas also lacking in most urban area. For example, at Kuala Lumpur, seven people were injured after two restaurants were damaged by explosions at a shopping mall. This incident occurred due to testing on restaurants' LPG piping features by two maintenance workers.

LPG Gas Capacity and Leakage Monitoring System (LLCMS) is an idea to improve existing restaurant system in Malaysia. Most restaurant in Malaysia have a relatively slow system which when their cooking gas empty, they will replace with another gas cylinder. So, using our project will make it faster which our system will notify staff, chef or anyone that install our apps if the LPG gas inside cylinder have 20% left through mobile application.

LPG Gas Capacity and Leakage Monitoring System (LLCMS) will use 2 sensors which are weight sensor and LPG gas sensor. The weight sensor used to detect quantity of LPG gas inside gas cylinder to the microcontroller to derived LPG weight. We add

LPG gas sensor as our features which will be installed at the top of the gas cylinder while the weight sensor will be put under gas cylinder. The LPG gas sensor used to detect quantity from 200 ppm - 1000 ppm of LPG gas and sent the result to the microcontroller. Then, the microcontroller will decide if both sensor's readings above threshold, it will turn on the alarm and notify user the status of gas leakage and gas capacity inside gas cylinder through mobile application. The user also can access real time data of sensor's reading mobile application.

## 1.2 PROBLEM STATEMENT

A system consists of detection and monitoring system is very common in industrial field. However, this system still very rare in domestic. Detection and monitoring system of Liquefied Petroleum Gas (LPG) is very important in home and restaurants because it is common to be used at there. As the usage of LPG increases in domestic field, the accidents occur by this LPG explosion also increases due to lack of continuous inspections and monitoring.

- 1) System in restaurants to detect empty gas is slow which is staff or chef will be only notify when gas is empty and can't be used. After that, they will replace it with the new one. It will interrupt the process to cooks.
- 2) Most chef cannot monitor the capacity of gas continuously because there is no system to display the real time data.
- 3) Most LPG gas detector did not alert worker by using mobile apps. It will be only alert the user through sounding buzzer and turning on the LED light at their devices.

### 1.3 PROJECT OBJECTIVE

Project objective can be described as an outcome, meaning the effect of change that the project supposed to cause for the target group. The main objective of this project is to implement the knowledge that has been learnt in Electronics & Information Technology. In our project, we listed three main objectives as our target:

- To detect gas leakage using LPG gas sensor.
- To monitor gas capacity through web application and mobile apps.
- To notify maintenance staff through mobile apps.