UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF LPG GAS MONITORING BY USING MQ6 SENSOR TO DETECT LEAKAGE IN THE AREA.

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

by

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ABSTRAK

Abstrak: Kini kebocoran gas dan pengesanan gas merupakan salah satu masalah dalam kehidupan seharian kita. Gas LPG adalah gas mudah terbakar yang boleh membahayakan nyawa dan harta benda kita. Untuk mengelakkan situasi sedemikian, kami merancang sebuah projek untuk mengesan jika terdapat kebocoran gas di sekelilingnya. Gas adalah salah satu sumber yang paling penting bagi manusia di seluruh dunia di mana ia merupakan salah satu sumber penting untuk tujuan memasak terutama di rumah, restoran dan hotel. Tujuan projek ini untuk membangunkan sistem pengesanan kebocoran dan pemantauan kebocoran gas petroleum Liquefied Petroleum dengan menggunakan satu unit penginderaan, dua jenis isyarat penggera dan sistem pemantauan. Untuk unit penginderaan, kami menggunakan sensor yang hanya untuk gas LPG sahaja dan isyarat penggera fizikal menggunakan buzzer dipasang untuk pengesanan gas hanya manakala penggera amaran bukan fizikal yang menghantar pemberitahuan melalui e-mel kepada pengguna melalui telefon pintar dibangunkan untuk melengkapkan sistem dengan teknologi Internet Thing (IoT). penggera akan berdering segera apabila ia mengesan kebocoran gas dan ia akan membantu pengguna dapat mengambil tindakan pencegahan untuk mencegah kebocoran gas dengan memberitahukan pengguna melalui telefon pintar. Di samping itu, projek ini menggunakan injap Solenoid yang secara automatik boleh mematikan injap jika sensor mengesan kebocoran gas. Sebagai kesimpulan, sistem pengesanan dan pemantauan kebocoran gas LPG ini telah dibangunkan dan mempunyai kos yang lebih rendah. Sistem ini sesuai untuk penggunaan domestik dan penggunaan premis kecil.

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ABSTRACT

Abstract: Nowadays, gas leakage and gas detection is one of the problem in our daily life. LPG gas is a flammable gas that can endanger our life and property. To avoid such situations, we designed a project to detect if there has any gas leak in the surrounding. Gas is one of the most important sources for humans in worldwide where it is one of the important sources for cooking purpose especially at home, restaurant and hotel. This project purpose to develop Liquefied Petroleum Gas leakage detection and monitoring system by using one sensing unit, two type of alarm alerts and monitoring system. For the sensing unit, we are using the sensor which only for LPG gas only and a physical alarm alert using buzzer is installed for gas detection only while non-physical alert alarm which is sending notification by email to user through smartphone are developed to equip the system with Internet of Thing (IoT) technology. The buzzer will ringing immediately when it detected the gas leak and it will help the user can take precaution action in order to prevent the gas leakage by alerting the user through smartphone. In addition, this project are using Solenoid valve which can automatically turn off the valve if the sensor detect the gas leak. In conclusion, this LPG gas leakage detection and monitoring system has been developed and has a lower cost. This system is suitable for domestic usage and small premise usage.

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LIST OF SYMBOLS

mA	-	Miliampere
µA	-	Microampere
°C	-	Celsius
nm	-	Nanometre
mW	-	MiliWatt
%	-	Percent
V	-	Voltage

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LIST OF ABBREVIATIONS

LPG	Liquefied petroleum gas
IOT	Internet of Thing
LED	Light Emitting Diode
IDE	Integrated Development environment
SMS	Short Message Service
GSM	Global System for Mobile Communications
LCD	Liquid Crystal Display
WSN	Wireless sensor network
M2M	Machine-to-Machine
CNG	Compressed natural gas
GND	Ground
CH_PD	Chip Power-Down
DC	Direct Current
VCC	Voltage Common Collector
UART	Universal asynchronous receiver-transmitter
CPU	Central processing unit
I/O	Input or Output
PCB	Printed Circuit Board
USB	Input or Output

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter describes the project idea shortly. It also gives an explanation of the project's background and the issue that states leading to the project. This chapter also have an objective of the idea of the project that need to be achieved and the scope for the expected output from the project. Statement of the Purpose

1.2 Background of Project

From many recent years until now, the risk of the LPG gas leakage is one of the problem in our daily life. LPG gas is mainly used for cooking purposes and it is a flammable gas that easily to lead the explosion. The leak from this LPG gas will cause major damage to our life and our property. Every year, the incident of explosion that occur form this LPG gas leak increasing. There are many causes that lead to explosion form this LPG gas leak which is old valves, worn out regulators, poor-quality rubber tube or the regulator is not turned off when it was not in use. LPG leak can cause a big damage if there are not immediate action are taken to prevent it. So, the person or party need to notice as soon as possible as the gas leak for taking a fast action to take care the gas leak from spreading into worst. This project is created to help the users to take a fast action due to gas leakage that comes along with smoke detector and buzzer to notify the users.

Nowadays, in this all-modern era of advanced technology, user need the help from the technology that can warn against danger to enable user for having enough time to prevent the danger. When it comes with security issues, people cannot take it easy in this regard as it can cause a lot of damage and losses or maybe it may cause tremendous accidents. So this project is to detect gas leak in the surrounding. So it may help people

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to warn people by using buzzer which can make the people notice if there any gas leak in the surrounding.

1.3 Problem Statement

Liquefied Petroleum Gas or called as LPG is generally used in the entire world because this gas is used for cooking purpose at home, hotel and restaurant. So, there are the place that have many people especially at hotel and restaurant. So, the security towards LPG gas leak in the area should be improved. Despite the fact that human is an ideal production of God, regardless they have certain shortcoming. Human can't distinguish the presence of regular gases as quick as the sensor do. Subsequently, it is highly expected that the use of the gas detection system will provide continuous monitoring of the gas system.

Nowadays, there are lack of LPG gas leakage detector that can monitor the gas leak which alert the users if there has gas leak in the house even the users are not at home. In this modern era, people are getting busy with their own works which make their time limited to be at home. So, monitoring the gas leakage are important in order to make their life easier. Without LPG gas leakage monitoring system, user are not able to know how the condition of the gas since the users are not at home which can lead to danger. For example, the users are not able to know if the gas leak or not. So, it will lead to major damages and losses in user's life and property.

LPG gas leak is one of the problems that can occur major damages and losses. The warehouse of popular food chain in Subang Jaya had a gas explosion due to Liquefied petroleum gas (LPG) leak which injured 8 peoples that works there. This LPG gas leak had major damage and losses on injuries and property. Five from eight workers were seriously injured with burns on their bodies of about 20% to 80% and the others two workers was hit by the splinters from the explosion but only had a minor injuries while other one had suffered with food fracture causes form the accidents (Pui Fun, 2017). The gas explosion was occurred because of the used of gas for cooking purpose were accidently exploded.

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LPG cylinder blast destroys building

Gas leak leads to massive explosion triggered by electrical discharge

| AZARAIMY HH |

A MASSIVE explosion, which nearly obliterated a building, believed to have originated from a leaking domestic LPG gas cylinder, destroyed an eatery, damaged an adjacent confectionary shop and nearby houses in Kg Serambangun, Tutong District.

The explosion happened at the eatery yesterday around 6.15am. Fortunately, no casualties were reported except for a minor injury.

The explosion, which happened inside the eatery, was so strong that it blew off the walls, part of the adjacent concrete wall and nearby houses with debris scattered over a large area.

Fortunately, only one man living in an adjacent house suffered a minor injury to his chest and was brought to the hospital.

An investigation by the Fire and Rescue, Operation 'E' Branch, Tutong District, found that the hose connected to a domestic gas unit was leaking and the strong explosion was triggered by an electrical discharge, either from an electrical appliance or a power switch.

(Continue To Page 2)

Building that housed the eatery and confectionary shop damaged in the explosion

AZARAIMY HH

Figure 1.1: The news that show LPG gas occur the explosion bring major damage on property.

The restaurant explodes due to LPG gas leak in the premise. The restaurant had major damage and losses because of explosion due to LPG gas leak. It was thought that the 14-kilogram LPG leaked before it exploded and led to small fires in the kitchen of the premises. LPG gas is a flammable gas that easily to burn. Even the small fires occurred, the fires will spread easily and the smallest fire is also supported by nearby objects. (Mohd. Sani Harul, 2017) said that after receiving an emergency call, a total of 21 Sungai Buloh Fire and Rescue Station (BBP), BBP Kota Anggerik and BBP Damansara officers and members were rushed to the scene and found that the explosion is occur because of the hose tube that connected with the gas barrel is leak but luckily the fire has been extinguished by locals using fire extinguishers. In that accident, there are no injuries and death were reported because the explosion occurs when there are no one in the restaurant premise.

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Figure 1.2: The damage and losses of the restaurant due to explosion.

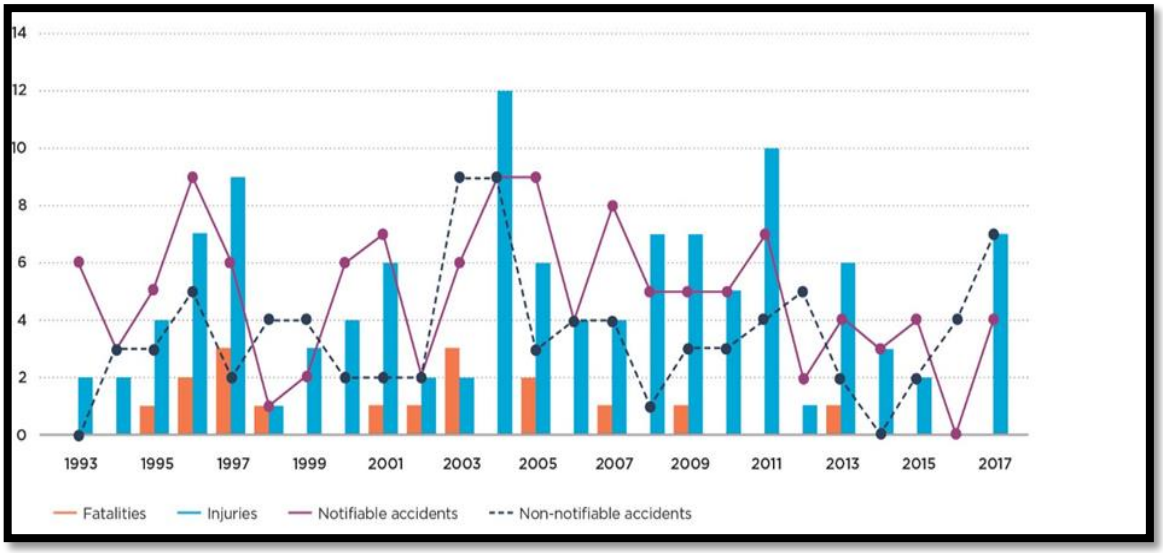

Figure 1.3: The statistic of fatalities and injuries of notifiable and non-notifiable accidents in 1993-2017.

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Referring to all the information below, it is important to implement a housing and household LPG gas leakage detector because the gas leak will cause explosion and the users did not know when or how it will happen which it can happen anytime and anywhere. The explosion will occur a major damages and losses to our life and property especially when no one at house. This project purpose is to develop for alerting users from the gas leak accident and help users to minimize the major damages and losses that occur from the LPG gas leak accident.

1.4 Objective

1) To develop a monitoring system based on Internet of Thing (IOT) technology using website.
2) To implement alarm system for alerting the user if there has any gas leakage.
3) To control the gas leak from spread into worst in order to prevent explosion.
4) To give immediate respond towards the leaking gas in the surrounding by alarming the user to take preventions towards it from spreading into worst.

1.5 Scope of the project

According to the problem statements and objectives above, this project will be focussing on residential and household where it is the important places for the consumers where this LPG gas are commonly used for cooking purpose. This project can help user to keep alerting in the danger that occur due to the gas leak and also can help user to take an immediate action to minimize the damages and losses. It also can help to stop the gas leak from spread in order to prevent form gas explosion. This project is using MQ-6 sensors which can detect various of gasses which like propane, hydrogen, methane and others but this project is focusing on LPG gas which are compatible with residential and household.

The main component of this project is Arduino UNO as a control unit. This component is meant to implement to read the gas sensor, buzzer, solenoid valve, LED and Wi-Fi module. The sensor that use is the MQ-6 sensor used to detect the surrounding gas leak which connected to Arduino UNO. This project also utilizes the solenoid valve

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