DEVELOPMENT OF LPG LEAKAGE DETECTION USING NODEMCU ESP8266

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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.

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I hereby, declared this report entitled "Development of LPG Leakage Detection Using NodeMCU ESP8266" is the results of my own research except as cited in references.

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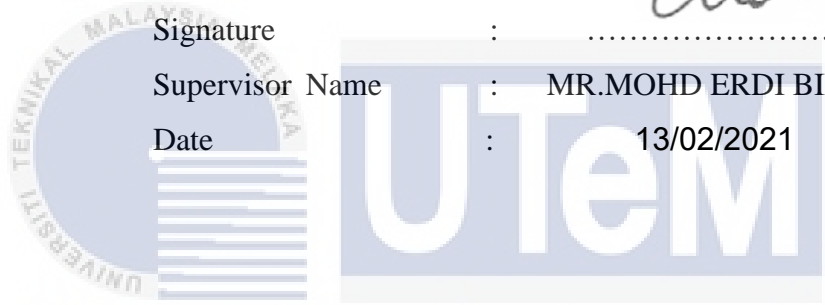
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APPROVAL

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

Signature   : ....

Supervisor Name : MR.MOHD ERDI BIN AYOB

Date   : 13/02/2021

DEDICATION

This report is dedicated fully to my backbones which is my family, my lecturers and all my course mates who has involved directly or indirectly.

ABSTRAK

Laporan ini mencadangkan sebuah sistem pemantauan gas di rumah menggunakan aplikasi Blynk yang membangun dengan kos yang rendah dan membolehkan pengguna mengawal Gas petroleum cecair rumah. Projek ini adalah untuk membina sistem pemantauan Gas petroleum cecair rumah yang berkaitan dengan platform IoT, Blynk. Data-data tersebut akan dimaklumkan dalam aplikasi android. Pengguna akan diberitahu bahawa gas LPG di rumah dalam keadaan on / off. Bukan itu sahaja, dengan pengesan gas, jika berlaku apa-apa kebakaran di rumah, pengguna akan mendapat pemberitahuan dengan segera melalui applikasi android. Modul ESP8266 Wifi disepadukan untuk menghantar data melalui Wifi kerana teknologi internet telah dinaik taraf di Malaysia. Semua sistem masuk disepadukan dengan Wifi sekarang untuk menjadikan kehidupan lebih mudah. Ini membantu pengguna memantau sistem tidak kira di mana sahaja dan bila-bila masa. NodeMCU ESP8266 digunakan sebagai mikrokontroler dalam sistem ini untuk mengawal sistem. Apabila pengguna terlupa untuk tutup suis gas atau kebocoran gas berlaku disebabkan gas suis tidak tertutup, ia akan menghantar pemberitahuan dalam aplikasi android serta ianya dapat mengawal melalui aplikasi blynk.

I

ABSTRACT

This report proposes a low cost LPG gas leakage detecting system using Blynk application which enables users to monitor their home gas. The project is to build a home gas monitoring system which was connected to the IoT platform, Blynk. The data will be communicated in the android application. Consumers will be notified whether home gas are on / off. Not only that, with gas detectors, if there was fire at home, users will be notified immediately via android application. The ESP8266 Wifi module is integrated to transmit data over Wifi as the internet technology has been upgraded in Malaysia. All systems are integrated with Wifi now to make life easier. This helps users monitor the system no matter where and when. The NodeMCU ESP8266 is used as a microcontroller in this system to control the framework. When a user forgets to turn off the home gas or leakage happen due to open gas, it sends a notification in the android application and user can controls it via Blynk application.

ACKNOWLEDGEMENTS

I would like to express deepest appreciation to my project supervisor, Mr. Mohd Erdi Bin Ayob who has given persistent encouragement throughout this project. He also has guided, giving brilliant opinions and ideas in completing this project over the years. Without his tremendous support, the road may seem difficult and bushed.

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LIST OF ABBREVIATIONS

UTeM   -   Universiti Teknikal Malaysia Melaka

RF   -   Radio frequency remote control

RX   -   Receiver

TX   -   Transmitter

LPG   -   Liquefied Petroleum gas

O/P   -   Output

App   -   Application

AC   -   Analog converter

DC   -   Digital converter

IoT   -   Internet of Things

CHAPTER 1

INTRODUCTION

1.0 Introduction

The basic idea and developments of the Liquefied Petroleum Gas (LPG) leakage detection are based on the use of the Internet of Things (IoT) platform. As an IoT platform, Blynk application is used in this project. This chapter gives an overview of the project regarding background of the project, the problem statement, objectives to achieve, scope of the project and the thesis organization of the overall project.

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1.1 Project Background

The Internet of Things is aimed at facilitating life by automating any small task that lies around us. As much as IoT helps in automating processes, the advantages of IoT can also be extended to improve current safety standards. Safety has always been an important criterion in the construction of houses, constructions, factories, and cities. The increased concentration of certain radioactive elements will prove extremely dangerous. These gasses may be inflammable under certain conditions of temperature and humidity, toxic after exceeding the specified concentrations thresholds or even a contributing factor in environmental air pollution leading to problems such as smog and poor visibility, which can cause serious accidents and adverse effects on people's health

.

In addition, The majority of societies have a mechanism for fire safety. In any scenario, it will use when there is a fire. So as to have a command over such conditions this

framework is suggested that utilizes sensors which is equipped for recognizing the gases, for example, LPG, CO2, CO and CH4. In detail normal gases as liquefied petroleum gas (LPG) are broadly utilized in this project. The gases will certainly leak and the system should be checked continuously. By having the LPG leakage detection framework can assist with limiting the hazard and prevent fire mishappen.

However, the purposed topic focuses on Gas leak identification and automated gas valve regulation. The Gas Leakage Detection Framework that provides home security, detects the LPG leakage and alerts the user to the leakage through a notification via Android application and turns off the gas valve from anywhere through the user's Internet Of Things (IOT).

Moreover ,the advantages of the system is that it continuously monitors the leakage of the LPG present in the cylinder using MQ-7 sensor and if the gas leakage occur and over the limit that have been set ,so the buzzer and exhaust fan will on automatically to alert people at home and the use of exhaust fan is to minimize the concerntration of gas in air because LPG is being heavier than air, it do not disperse easily and may lead to suffocation when inhaled and when ignited may lead to explosion. An added feature is that if the users accidently forget to turn off the gas burner, first it have been set to off automatically at the same time consumer can monitored and control using blynk application So the problem of wastage of the energy is solved.

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1.2 Problem Statement

Gas leakage is a typical problem in households and businesses Where it is no longer detected and fixed at the same moment, it tends to be the cause of the loss of homes and lives. The leaking of gas can be dangerous. People operating in toxic atmospheres are at risk of open flame, which is the cause of a fireplace outbreak. Fatalities and deaths are a threat to their work. Potentially lethal carbon monoxide is also very dangerous to life. A leakage of natural gasoline may be risky as it will increase the danger of fire or explosion. Local gas companies 'work hard to give satisfactory notice in the event of a gas leakage. Since methane and in this way, natural gaseous doesn't have any adour, the fuel endeavor includes an admonition "spoiled egg" smell (mercaptan or a tantamount sulfur based thoroughly compound) that might be without trouble identified by utilizing the larger part. However, persons who have a dwindled sense of smell may not be equipped to rely on this safety system. In addition, leakage can occur at a time when no one is in the region that would raise the likelihood of an explosion.

In certain sectors, one of the main components of any protection strategy for mitigating risks to persons and plants is the use of early warning systems such as gas indicators. These can help to provide longer periods during which remedial or defensive practices are needed. It can also be used as part of a full automated control and protection system for an industrial plant. Rapid expansion of oil and gas industry results in gas leakage incidents which are very serious and dangerous. Solutions need to be found in order to reduce the effects of these events, as gas spills often result in substantial losses. The challenge is not only to build a system prototype that can only detect it, but also automatically respond to it once the leakage happens.

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Figure 1.1: Damage that occurred due to LPG explosion

Figure 1.1 above is an example of an eruption of LPG. Such an accident can occur because it is not adequately supervised. In four-season nations, such as Russia, LPG is used as one of the heaters to steam the homes of people during the winter. No one was in the building at the time of the blast.
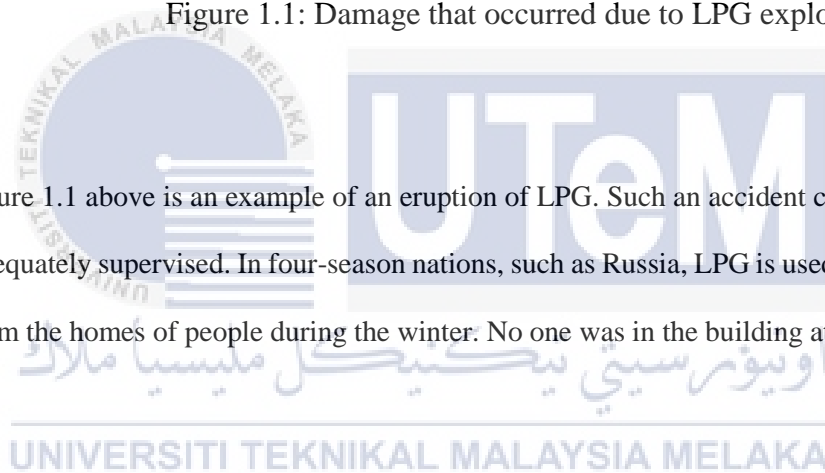
1.3 Objectives

The aim of this project is to make a development in LPG leakage detection by displaying the alert notification to user via blynk application. Therefore, there are several objectives stated to fulfill the project criteria:

I. To design a portable and low cost gas leakage detector.

II. To develop the smart gas leakage detector and monitoring system using Blynk application.

III. To apply user monitoring gas leakage detection system from any location.

1.4 Scope

The scope of this thesis relates to the aim of the prototype as set out below:

1. There have been developments in computer technology, electronic communication, wireless communication, the world of telecommunications, and this opens the door to the Internet of Things. It is split into two main sections which are the transmitter and receiver of the LPG leak detection system. As a result, the Internet of Things plays a role as a network-connected system that can be a sensor, a cell phone or something that can send and receive information in a contact channel anywhere in time and deliver value-added services for consumers to make their life better.

2. This research uses the MQ-7 sensor to diagnose leakage of liquefied petroleum gas. The MQ-7 sensor can interface with the NodeMCU ESP8266 to provide the NodeMCU ESP8266 Internet connectivity for mobile applications that are open to it. The NodeMCU ESP8266 acts as an input or receiver from the MQ-7 sensor and stores it directly in Blynk for smartphone applications.

1.5 Thesis Organization

This proposition is comprised of 5 sections. Following this first part which explained the background detailing and came up with main concept of this LPG leakage detection system. Chapter 2 describes the earlier research papers which is same as this framework and includes comparison of the components that have been used in the articles. Hence, chapter 3 consequently characterizes a drawn out efficiency system dependent on the new strategy including of system flowcharts, hardware, and programming program recreations. Chapter 4 portrays the last part of a general view assessment structure as layouts principle segments and various advances that structure new strategies. To sum up, chapter 5 discusses overview result of the project and give suggestion for enhancement to this framework.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Essentially, this section contains a number of articles , journals and conferences dedicated to a brief summary and relevant to the project to be undertaken. This study focuses on the development of the detection of LPG leakage using NodeMCU ESP8266. The study shows that LPG computerization systems which controlled by android based phones or tablets with Blynk Application. Every module has its own highlights from the journals. A few industries are currently legitimately selected and are working to give better features of LPG leakage computerization structure.

The flexible use of a high-precision gas leak detection device in homes that saves time, resources, and plays an important role in modern times. This technology focuses primarily on the automated monitoring of gas leakage. This research paper includes extensive details on the NodeMCU ESP8266 LPG leak detection and protection framework and how to handle home gas leakage using the Android application.