DESIGN AND DEVELOP FIRE ALARM AND MONITORING SYSTEM BASED ON IOT

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ON IOT

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This report is submitted in partial fulfilment of this requirement for the degree of

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| Tajuk Projek | : | DESIGN AND DEVELOP FIRE ALARM AND MONITORING SYSTEM BASED ON IOT |

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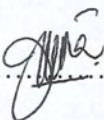
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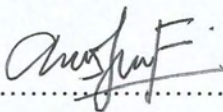76100 Durian Tunggal, Melaka

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Specially dedicated to

My beloved parents, who devote all the love to me and my family, my friends who have encouraged, guided and inspired me throughout my journey of education.

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ABSTRACT

Today, many cases of fire that involving human life related in our country. In an age of high technology, users are looking forward to a product or system that ensures the safety of their belonging. The project of "Smart Fire Alarm and Monitoring Based on IoT System" is proposed to overcome this fire issue. The project is used to notify users about the existence of fire at their home or workplace in the absence of people. Otherwise, user can monitor the temperature of multiple small area in their places wherever they are using android application which is Blynk application. It is designed to reduce the risk of more severe fire damage. The system is potential to help users in many aspects, especially in warning and fast notifying hence immediate action can be taken to overcome the rapid blaze spread. The problems and weaknesses are reviewed in detail and found the source to obtain the desired product quality. The hardware implementation in this project is temperature sensors, arduino mega and Wi-Fi module. The result from this project is useful to be implemented in home and industrial to help in the risk of death and injuries furthermore to avoid the losses that need to be borne by the victims.

ABSTRAK

Dewasa ini, banyak kes kebakaran yang melibatkan nyawa telah berlaku di Negara kita. Dalam zaman teknologi tinggi, pengguna sentiasa mengintai akan sebuah produk atau system yang dapat menjamin keselamatan diri dan harta benda mereka. Projek ini diberi tajuk "Smart Fire Alarm and Monitoring Based on IoT Sytem". Projek ini digunakan untuk memberitahu pengguna mengenai kebakaran di rumah ataupun di tempat kerja jika ketiadaan orang. Projek ini juga mempunyai ciri-ciri untuk memantau suhu di pelbagai kawasan kecil di kediaman mereka di mana sahaja mereka berada dengan menggunakan aplikasi android iaitu applikasi Blynk. Ia bertujuan untuk mengurangkan risiko kebakaran yang lebih teruk jika kebakaran berlaku. Dengan sistem ini, ia dapat membantu pengguna dalam pelbagai aspek, terutama sekali untuk memberitahu dan menggerakan pengguna. Dalam hal ini pengguna boleh mengambil langkah-langkah awal untuk mengatasi kebakaran. Pembaharuan dilakukan dengan melakukan penyelidikan mengenai masalah atau kekurangan dalam mana-mana bahagian sistem yang dilakukan. Masalah dan kelemahan dikaji secara terperinci untuk dijadikan sumber supaya mendapatkan kualiti produk yang dikehendaki. Pelaksanaan perkakasan dalam projek ini adalah sensor suhu, Arduino mega dan modul Wi-fi. Hasil daripada projek ini amat berguna untuk dilaksanakan di rumah dan industri untuk membantu dalam risiko kematian dan kecederaan, di samping dapat mengelakkan kerugian yang perlu ditanggung oleh mangsa.

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CHAPTER 1

INTRODUCTION

1.1   Background

Nowadays, we can see many issues of fire related in our country. This is because many people do not have fire alarm systems installed in their homes or workplaces. It is much safer to have a system that monitors and communicates to the device owner without involving human life at risk. There are many steps that have been taken to prevent their home and workplaces from fire occurred. Hence, it is important to have a security system installed in their places.

Basically, the fire alarm system has been widely used in order to detect the existence of fire in our places and to alarm peoples about the fire occurred. There are many types of fire alarm system in the market. The selection are made based on the sensitivity of the sensor, cost and most importantly, the capability of the system to alarm people. Normally, current technology of fire alarm system only can detect when the fire become bigger and fail to detect the initial detection of fire existence in the small area. Furthermore, the current technology is lacking in monitoring the temperature in our places and cannot alarm to people from far distance. So, we cannot take fast action to resolve the incident of fire occurred and this definitely risk our life.

Alternative method is needed to increase the capability of the system to alarm people and develop monitoring system, whereby human will have better security of fire detection at their places. This tends to utilize the availability of IoT system, mobile phone and electronic circuit to achieve an automated system which is programmed to

work as a thinking device to accomplish this purpose. Therefore, the purpose of this study is to design Smart Fire Alarm and Monitoring System based on IoT.

1.2   Problem Statement

Nowadays, we can see many cases in Malaysia that involved industries and home are becoming in fire hazard. It has steadily increased yearly for the past ten years. This is because current fire alarm systems today have shortcomings that can lead to fire occurred become bigger and the current technology of fire alarm not focusing in detection of fire in small area. In addition, users cannot take fast action to resolve the incident of fire occurred. For example, when the users leave their places, they cannot identify the temperature in their places from far distance. Therefore other alternatives have been taken into account which is to design a Smart Fire Alarm and Monitoring System based on IoT. The Internet of Things broadens internet network beyond traditional gadgets like computers, smartphones and tablets to a diverse range of devices and everyday things that utilize embedded technology to communicate and interact with the external environment, all via the Internet. By using this technology implemented on the ordinary fire alarm and monitoring system, the limitations of security system in terms of feedback range can be successfully cancelled out.

1.3   Objectives

The objective of this project are:-

1. To design and develop Smart Fire Alarm and Monitoring System based on IoT
    platform:
    -   Detect the existence of fire at multiple area.
    -   Monitoring the temperature from far distance.

2. Able to use in small area part.
    To fast warning and notify to users about fire occurred.

1.4   Project Significance

This project will be a significant initiative in promoting good system for home or workplace security that makes life greater and better. This project will likewise be beneficial to the proprietor of a home or workplace where the proprietor will be aware whether their places are in safe condition or not from fires incident

1.5   Scope of Project

The design of this system for the project is to help alerting the users about the existence of fires in their home or workplaces and it also allow to users to monitor the temperature in multiple area in their places. The requirement for this system is a microcontroller, heat sensors, LCD displays and the main part component for this system is Wi-Fi module. And to make this system function smoothly, the algorithm will be kept simple without any complex instruction to be performed.

The heat sensors which are DHT11 and DHT22 will be set up in multiple area to detect the heat in the users place. The temperature in the multiple area can be monitored through the user smartphone by using Blynk application. This system will be set to activate when the existence of fire which mean the temperature in the area is above

50°C. When there is fire occur, the microprocessor will generate a command to the Wi-Fi module and then notification and email will be send through the smartphone to alert the users.

The designation of the circuit will be uses in software Proteus 8 Professional and Fritzing. And then, to make the circuit simple and easier it will be simulate first before it come to the soldering process in hardware part. Circuit to trigger the arduino mega will be design and be able to interface between arduino and Wi-Fi module. The controller need to be program before can be used it. This system will be developing using C language and will be burn into arduino after done the coding.

1.6   Thesis Outline

This Smart Fire Alarm and Monitoring System Based on IoT consists of five chapters as are outlined as follows.

Chapter I: Describes about the overview of the project including the background, objectives, problem statement and scope of the project.

Chapter II: Explains about the reviews on previous researches that are related to this project. Before starting the project, the background and literature review about development of the components that are using to build this system need to study and doing research well.

Chapter III: Elucidates the project methodology. It explains how the project was organized and the flow of the system designed. Before developing the prototype, the simulation has been done to make sure that the circuit would be working properly.

Chapter IV: Presents the result of project. This project has two parts of result. The first part is result at the simulation and the other part is result from real prototypes. It also consist the analysis and discussion of the results.

Chapter V: Is about the conclusion of overall analysis from chapter 1 until chapter 4. It also provides future work that contents some recommendations of what remains to be improved or learned.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

This chapter will include all related information and study in order to achieve the project aims. It involves the research and information around the project on various important concepts of security home system, engineering science and instruments utilized in the field. A study regarding all required components must be done in order to design the overall circuit. One of the method to gather information is by studying previous researches that has been done and related to this project. It is important to understand on how software and hardware were used in fire alarm and monitoring system.

2.2   The Ideas of Fire Alarm and Monitoring from Previous Project

The main reason for development thoughts of smart fire alarm and monitoring is to understand strategy utilized in previous project of fire alarm and detector before use to this project. There are a few thoughts of creation that identified with fire detector information system.

2.2.1 Temperature and Humidity Monitoring and Alert Management System

Kenneth Pinto (2016) has designed Temperature and Humidity Sensor Project [1]. From this project, an answer is given to monitor and get a caution of increase in temperature or humidity. An Arduino and Ethernet Shield was implemented in this project which the function is as to communicate with DHT22 temperature sensor. By utilizing the Blynk application and an Internet association on their smartphone, the Data Center at an organisation can get data about temperature and humidity from anyplace in the world. Hereby, it can makes a uniform interface which can be accessed locally or remotely by using some devices such as smartphones or laptops. Furthermore, this project also provided an alert via an email which it will be sent to the email ID specified in the program.

From this project work, it is evident that temperature and humidity at the data center can be controlled and monitored and the Temperature and Humidity Sensor Project can be cheaply made from low-cost locally available components. And better still, this project can be packaged into a small container because there are so small and few components are required. Hence, this system is flexible and portable. The designed project was tested a number of times and qualified to accomplish the aim of the project. This Temperature and Humidity Sensor Project can also be completed using the esp8266 or various other sensor.