



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF AN IOT INTEGRATED SMART
HOME CONTROL AND MONITORING SYSTEM**

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

by

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ABSTRAK

Istilah 'pintar' mempunyai peranan yang luas dalam bidang teknologi yang menjurus kepada peralatan pintar. Salah satu bidang yang digunakan adalah di rumah dengan melaksanakan IoT. 'Internet of things' adalah sesuatu teknologi yang sentiasa berkembang yang membolehkan konsep mengawal dan mengawasi objek di dunia nyata melalui internet dan juga menerima maklumat tentang keadaan rumah. Pelaksanaan ini tidak terhad disebabkan oleh kemampuan untuk teknologi ini yang sesuai dengan situasi di mana orang yang kurang upaya tidak dapat mengawal peralatan elektrik rumah mereka atau warga emas yang tidak mampu untuk beradaptasi dengan teknologi semasa boleh diajar untuk menggunakannya dengan bantuan kaedah kawalan yang mudah. Isu rompakan rumah juga merupakan salah satu jenayah utama yang mencatatkan kerugian besar bagi setiap kes. Kawalan dan memantau melalui internet telah menjadikan jarak dan masa sebagai satu halangan yang boleh diatasi dan memberi masa kepada pengguna untuk menghubungi pihak berkuasa. Projek ini akan memberi tumpuan kepada penggunaan yang mudah dan selamat untuk memantau rumah menggunakan telefon pintar melalui internet dan menerima amaran dari sensor dengan cara yang sama. Oleh itu, projek IoT rumah pintar ini dibuat melalui kaedah mengkaji dan menambah baik idea daripada penyelidik terdahulu yang berada di landasan yang sama. Akhirnya, projek ini akan membina sistem untuk mengawal dan memantau rumah pada telefon pintar dengan menggunakan sistem kawalan yang mudah dan selamat.

ABSTRACT

The terms 'smart' has wide field in technology that leads to the word intelligence device. One of the fields that it is being used is in house by implementing IoT. Internet of things is a growing technology that enables the concept of controlling and monitoring objects in the real world through internet while receiving the update of the house condition. This implementation is limitless due to adaptability to fit a situation where a disable person can control their home electrical appliances or the elders that were not used to current technology can be learnt to use it with help of easy control method. The house robbery issue also is one of the main crimes that recorded a mass loss for every case. Control and monitor through an internet had release the constraint of distance and time secure the house while letting the user a fast response to the authority. This project will be focused on deliver easy and secure of control and monitor a home using a smartphone through internet and receive alert from the sensor the same way. Therefore, this project development of IoT integrated smart home is carried out by studying and improving idea from the previous researcher that were in the same track. Lastly, this project will build a system to control and monitor a house on smartphone with an easy to use and secured user interface.

DEDICATION

Thanks to my dear parents, my late father, Wan Umar Bin Wan Hamat, and my mother, Nisah Binti Md Nor, for supporting me in my studies. Special thanks to my supervisor Ts. Shamsul Fakhhar Bin Abd Gani for willing to share his knowledge, advices, opinion and effort in helping me.

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LIST OF SYMBOLS

V	-	Voltage
A	-	Ampere
kΩ	-	Kilo Ohm
Hz	-	Hertz
W	-	Watt
AC	-	Alternating current
DC	-	Direct current
PPM	-	Part per million
%	-	Relative humidity percentage
R_o	-	Resistance value in Hydrogen
R_s	-	Resistance value in clean air
°C	-	Degree Celsius
AM	-	Ante meridiem
PM	-	Post meridiem

LIST OF ABBREVIATIONS

PCB	Printed circuit board
USB	Universal serial bus
IC	Integrated circuit
LCD	Liquid crystal display
LPG	Liquefied petroleum gas
IoT	Internet of things
LED	Light-emitting diode
DHT22	Temperature and humidity sensor
MQ2	Gas leakage sensor
HC-SR501	PIR motion sensor

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, the automation of electrical appliances is easy as moving only fingertips has grown the interest in the consumer eyes. This innovation means as possibility for the smart energy usage to be applied in the system to cut the cost of operational device in the house as well the adaptability for the system to accept the additional security aspect.

Hence, application of the system can provide security which can be the detect of intrusion inside the house. This intrusion detection can be applied by using the motion sensor and then alert the owner using smartphone connected to the Wi-Fi system. Wireless system also provides the authority to the owner to control the appliances inside the house. Thus, this overall system is user friendly to the wide age including the handicapped and elderly.

1.2 Problem Statement

This project of Development of an IoT integrated smart home control and monitoring system is derived from this problem below thus, aim to counter the problem.

1. People always forget to turn off their electrical appliance before leaving their house.

2. Elders, handicapped person and kids had difficulty to operates their home appliances. The difficulty occurs due to the disability they had.
3. Accident occurs like gas leakage, house on fire or flood and unauthorized breach when the house owner is not around. For instance, if there is a remote monitoring system, these hazards can be avoided as soon as the system detects abnormal level gas.

1.3 Objectives

The objectives of this project are:

- I. To develop a smart home automation and monitoring system based on IoT.
- II. To implement security authorization for intended user.
- III. To provide easy to use control to home appliances by using application on smartphone.

1.4 Limitations

There is some of limitations to develop this project which can obliterate the purpose of this project to be used to fulfil the requirements. Some of the limitation is stated as below;

1. The connection from user to their house might lost due to a blackout – user cannot monitor the house.

2. Low speed internet connection will interfere the user to connect to their smart home system.
3. Sharing username and password might lead to unauthorized use of home electrical appliances.

1.5 Scope of work

The design of this system is to help the user to control the inside house appliances and monitoring the operation of those device and for the penetration of the security of the smart house. The development of this project requires microcontroller, movement sensor, and wi-fi module to connect the local system to the user smartphone.

The movement sensor is PIR motion sensor will be set inside the house and when intrusion is detected, it will generate command through the wi-fi module to alert user from smartphone. To control the electrical appliances, microcontroller will generate command to them when user need to through the wi-fi module. Gas sensor can detect any gas leakage or fire that produces smoke inside the house and temperature sensor will work the same way to detect fire.

The development of this project is using the proteus and will be simulate the operation. The fritzing software will be used to give graphical view of the connection involving the microcontroller and the wi-fi module. The Arduino IDE software will use the C language for the coding language and to upload the code onto the microcontroller.

1.6 Report outline

1. Chapter 1: Introduction

This chapter is the overview of the designated projects. This chapter also discuss the objectives, problems and limitation on conducting this project.

2. Chapter 2: Literature review

This chapter discuss the knowledge on the home automation systems that implement IoT. It also provides the study comparison of the related subject from previous researcher.

3. Chapter 3: Methodology

This chapter provides the procedures in sequence of the project development. It includes project flowchart, block diagram, component used and specification of the components.

4. Chapter 4: Result and discussion

This chapter discuss the result and provides analysis of this project from the system that being developed.

5. Chapter 5: Conclusion

This chapter is the summary of the projects. The benefits of the projects will be discussed in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature review is a chapter that discuss all the related information that have been collected. This chapter is divided into two part. The first part is the review of the past projects that has been done and the other part is the overview of the hardware and software used. The details in this part is reviewed from the various source such as journal, articles and internet.

2.2 Previous study and projects

This part is the research reviews made based on the journal by other researchers. The source of the journal is from Mendeley software and Academia education website.

2.2.1 Implementation of IoT for Home Automation System

(MIHALACHE 2017) stated in the paper studies that application being integrated into an automate systems are considers to be an open information, so it can be attack and controlled by person without authorization.

The difference of the home automation and smart home is that the home automation concept is to integrate the domestic appliances to fit and makes things easy for user to fit their lifestyle. Meanwhile, smart home has the home automation as its foundation and include wider range of features and technologies that interconnected through IoT and this make the smart home has its own intelligent concept.