



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF ARDUINO BASED SMART HOME

USING ESP 8266 WIFI MODULE

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

by

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I hereby, declared this report entitled DEVELOPMENT OF ARDUINO BASED SMART HOME USING ESP 8266 WIFI MODULE is the results of my own research except as cited in references.

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ABSTRAK

Laporan ini mencadangkan pembangunan sistem rumah pintar yang membolehkan pengguna untuk mengaitkan dengan peralatan dengan mengawal peralatan rumah menggunakan Wifi. Dunia sekarang tanpa telefon bimbit atau telefon pintar canggih ini sangat rumit. Oleh itu, kami telah mengintegrasikan modul Wi-Fi ESP 8266 dengan telefon pintar dan memberikan antara muka pengguna yang mudah, menentang sejumlah suis kompleks yang kami lihat di kebanyakan sekeliling bahagian rumah kami. Mengawal peralatan di rumah dari telefon pintar adalah lebih mudah bagi pengguna untuk mengawal peralatan rumah termasuk cahaya dan penggemar di rumah. Pengguna boleh mengawal peralatan rumah secara berkesan dengan menggunakan telefon pintar dengan ketersediaan Wi-Fi. Ini kerana hampir setiap telefon pintar berkembang dengan kemampuan untuk berkomunikasi dengan rangkaian mudah alih dan juga mempunyai kebolehan terbina dalam komunikasi jarak jauh, misalnya Wi-Fi yang membolehkan mereka berkomunikasi dan mengawal peralatan di lokasi berdekatan mereka. Makalah ini menggabungkan bahagian perkakasan dan perisian sebahagian Arduino Uno, ESP 8266 Wi-Fi Module dan juga telefon pintar yang merupakan kemajuan yang mampu untuk membina sebuah sistem rumah yang boleh mengawal atau memantau peralatan untuk menghidupkan dan mematikan alat. Bahagian ini menceritakan garis besar mengenai reka bentuk, pelan dan pelaksanaan sistem rumah.

ABSTRACT

This report proposes the development of smart home system that enables users to associate with appliances by controlling the home appliances utilizing Wi-Fi. The present world without an advanced mobile or smart phone it is extremely complex. Therefore, we have integrate the ESP 8266 Wi-Fi module with the smart phones and deliver easy user interface, opposed to complex number of switches which we have observe in several section of our houses. Controlling the appliances at home from the smart phone is additional convenient for users to control home appliances include light and fan at home. User can control home appliances effectively by using smart phone with Wi-Fi availability. This is because almost every smart phone develop with the capacity to communicate with mobile networks and also have built-in abilities of long range communication, for example Wi-Fi which could enable them to communicate and control appliances in their nearby location. This paper merge the hardware part and software part of Arduino Uno, ESP 8266 Wi-Fi Module and also smart phone which are the capable advancements to build up a home system that can control or monitor appliances to switch ON and OFF the gadgets. This part narrates the outlines about the design, plan and execution of the home system.

DEDICATION

Firstly, I want to thank God and dedicate my thesis paper to my beloved parents, siblings and friends at Universiti Teknikal Malaysia Melaka whom always give satisfied courage and motivation.

I would like to express my deepest gratitude to my Bachelor Degree Project Supervisor Puan Intan Mastura Binti Saadon who always guides me to achieve and complete my Bachelor Degree Project and helped in the writing of this report and above all the knowledge that has been shared.

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LIST OF SYMBOLS

m	-	Distance in meter
s	-	Time in seconds

LIST OF ABBREVIATIONS

GSM	Global System for Mobile Communication
Mobile App	Mobile Application
I/O	Input / Output
AC	Alternating Current
DC	Direct Current
PWM	Pulse Width Modulation
Wi-Fi	Wireless Fidelity
EEPROM	Electrically Erasable Programmable Read Only Memory
NC	Normally Closed
NO	Normally Open
COM	Common
PC	Personal Computer
UART	Universal Asynchronous Receiver / Transmitter
GPIO	General Purpose Input / Output Pin
IoT	Internet of Things

CHAPTER 1

INTRODUCTION

1.0 Introduction

Smart or Savvy Home is a standout among the most recent movement that can change the people life. It is planned with the end goal of physically challenge people and elderly the purpose of Smart Home. Smart Home is create mainly to give those unique needs with a system that can control or monitor condition of electrical appliances for example lights, fans, door at house. This Smart Home framework will empower the proprietors or customers to control and monitor their appliances at home by using the mobile applications. The customers or proprietors can additionally control their electrical appliances whether to turn ON or OFF through smart phone at any time and whenever. The framework should be unobtrusive, simple and easy to design and not difficult to work. The utilization of mobile applications to control home appliances can be viewed as latest and most recent trend in this Smart Home System. In this advancement of smart home change, there are few particular affiliations was demonstrated for example overall system for mobile communication (GSM), Wi-Fi and applications. This chapter introduces the subject matter and problem(s) being studied, and indicates its importance and validity. Introduction is the first part of a thesis and allows the readers to get the general idea of what your thesis is about. It also acquaints the readers with the thesis topic, explaining the basic points of the research and pointing the direction of your research. Introduction sets out the hypotheses to be tested (if applicable) and research objectives to be attained. It is important to remember that the

research objectives stated in the thesis should match the findings of the study. Failing to do so could result a recommendation by the examiners to conduct additional studies so that the stated objectives are met.

1.1 Problem Statement

Nowadays smart home systems are getting higher request and interest to enhance our lifestyle. Smart home is a utilizing home and control appliances by utilizing smart phone and mobile application system is advancing. Smart home system offers a lifestyle in which an individual finds the chance to control electrical appliances at house by utilizing a mobile phone. Also, measure of energy used by the client of smart home brings down the sum requires to be paid. These days the physical challenge and senior citizen depends upon people to turn on or off any appliances at home. This development of smart home will help them to control and monitor this appliance at home to avoid the senior citizen from tumbling down and this will also make their life simple. In addition, this advancement of smart home will reduce the danger of falling of the senior citizen and also for handicapped individual.

1.2 Objective

This project embarks on the following objectives:

- 1) To develop a Smart Home system controlled by using smart phone.
- 2) To develop a mobile apps system that uses Wi-Fi to monitor/control appliances.
- 3) To control electrical appliances of Smart Home using mobile apps.

1.3 Scope of Project

- The wireless smart home framework is conveyed in display by utilizing Arduino Uno and ESP 8266 Wi-Fi Module.
- Arduino Uno and Wi-Fi module plays a fundamental impact in this project undertaking which it will control/monitor the electrical appliances at home.
- ESP 8266 Wi-Fi module is utilized to monitor and control electrical appliances at home by utilizing through mobile applications.
- Logic Level Converter is used in this smart home project undertaking to lessen 5 volt output of arduino to the 3.3 volt before interface with the ESP 8266 Wi-Fi module.
- One Channel Relay was also used in this project for Lamp and Fan.
- Servo Motor will be used for the door open and close.

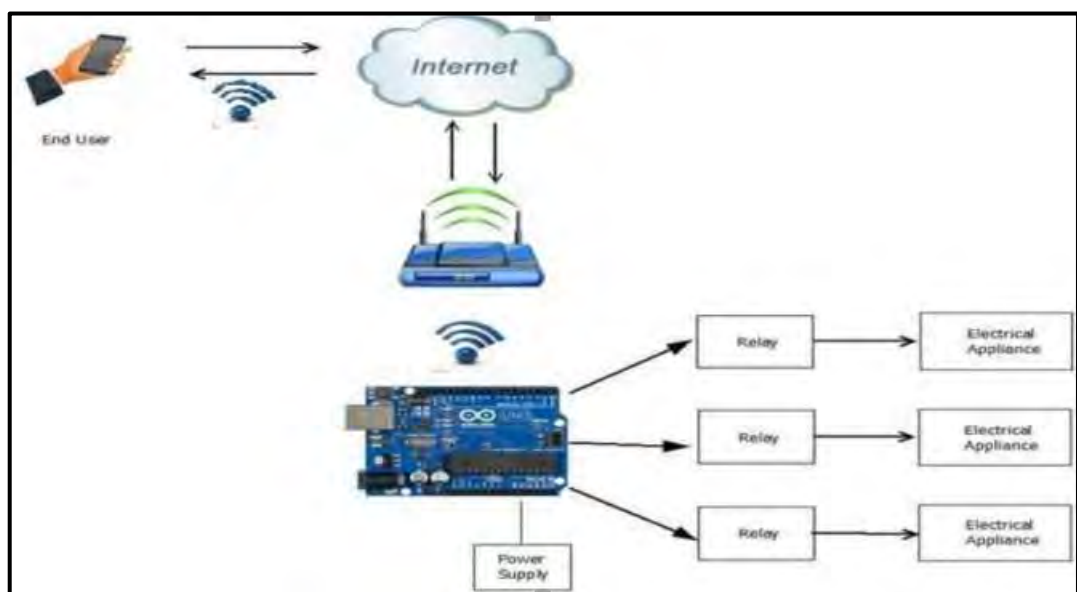


Figure 1.1: System Architecture of Smart Home

Figure 1.1 exhibits the arduino based of smart home by utilizing the Wi-Fi is use to monitor and control electrical appliances through mobile applications. ESP 8266 equipment is used as a Wi-Fi module and also the mobile apps is use to control/monitor the appliances. ESP 8266 (ESP-01) Wi-Fi module and Arduino Uno is utilized together to control/monitor the electrical appliances of smart home. 5 volt from arduino microcontroller is to limit by using logic level converter to the 3.3 volt as needed by ESP 8266 Wi-Fi Module. One channel relay is used to utilize the project as a part of this task to control the output loads. Servo Motor will be used for the door open and close. The Arduino software and mobile application is used in this entire program for the smart home project.

1.4 Project Methodology

Stage 1: Literature review were done to explain the research on certain attribute such as components that will be used to designed the circuit and advance expansion of this project.

Stage 2: Next consequent step is an advance design and organize on how this technique and procedure can be clarified or figured by utilizing the suitable system or methodology.

Stage 3: Project works were partitioned into two segments; in particular hardware equipment plan and software design. Microcontroller that was inclining toward in this venture is Arduino Uno. To control/monitor the home appliances by using ESP 8266 Wi-Fi module.

Stage 4: Lastly final circuit design and program coding is tested and guarantee that it is free from error and work in normal condition.

1.5 Thesis Guidelines

In this thesis report contains five specific chapters. The following details describe about chapters that are outline for Development of Arduino Based Smart Home using ESP 8266 Wi-Fi module.

Chapter 1: Mainly concentrate on the overview of the project with brief discussion and analysis regarding the introduction of project, objectives, problem statement, scope of project, project methodology and also thesis guidelines.

Chapter 2: This chapter includes the study on related articles or previous journal research. It also consists of the study of any important details or concept idea that will be applied in Development of Arduino Based Smart Home using ESP 8266 Wi-Fi module. Details regarding the study of equipment to be used, components and design for the thesis part will be written in details in this chapter. In this part likewise expressed obviously sort of microcontroller and programming to be utilized as a part of this task.

Chapter 3: This chapter discuss in detail and concentrate on the project methodology that includes designing planning, simulate the circuit and also programming the coding. Each of these techniques must be fulfilled and satisfied in order to create, develop and build up a good and smooth flow of the thesis development.

Chapter 4: This chapter consists analysis and data that is obtained from the Smart Home project. The analysis is done by using the Proteus 8 Professional Software and also MIT App Inventor Mobile apps. The results from the Proteus and also MIT App Inventor are shown in this chapter.