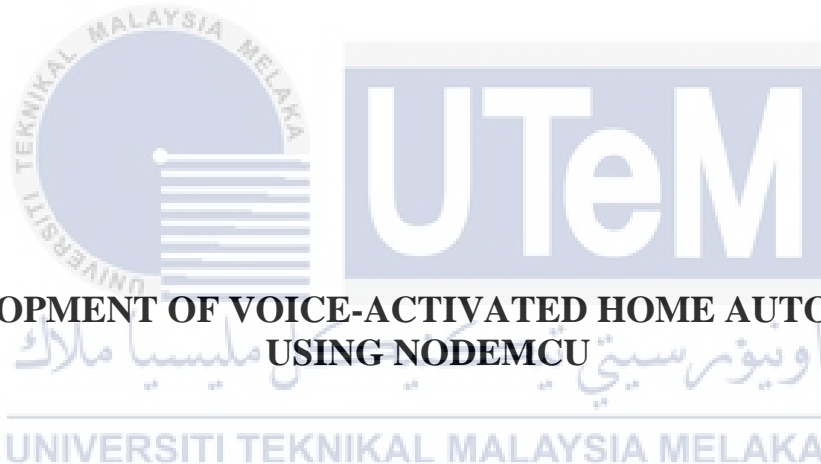




Faculty of Electrical and Electronic Engineering Technology



**DEVELOPMENT OF VOICE-ACTIVATED HOME AUTOMATION
USING NODEMCU**

ANIS NADHIRAH BINTI MAJIT

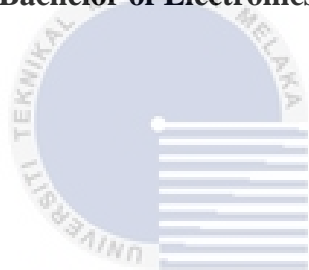
Bachelor of Computer Engineering Technology (Computer Systems) with Honours

2021

**DEVELOPMENT OF VOICE-ACTIVATED HOME AUTOMATION USING
NODEMCU**

ANIS NADHIRAH BINTI MAJIT

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology with Honours**



Faculty of Electrical and Electronic Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

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DECLARATION

I declare that this project report entitled “Development of Voice-Activated Home Automation Using NodeMCU” is the result of my research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

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APPROVAL

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DEDICATION

I would like to say a thousand thanks to both my parents Majit Bin Jusoh and Siti Fatimah Binti Mohammad who gave me so many words of encouragement as I completed my final year 1 project. My father helps me a lot while I try to implement my project. He gave me an idea of how can I finish it on time without any pressure and stress. They also prepared a comfortable place for me to find ideas and inspiration to complete my assignments. Apart from that, let's not forget my colleague NurAin Ahmad Harun who gave a lot of opinions and ideas for me to improve my work to be better. Apart from that, to my supervisor Ts. Ahmad Fairuz thank you for all the help and feedback throughout my inquiries about the project regardless of time.

ABSTRACT

Home is the place where people spend the most time with family and friends and also a place to rest after a day of work. Moreover, in this pandemic era, most people work from home so it is very important to create a comfortable and safe place to live. However, for those with disabilities and the elderly, the problem of wasting electricity bills is one of the big problems in their lives. This is because they are not able to turn off the fan, lights, and television at all times. Especially in the living room of the house. Thus, voice-activated home automation using NodeMCU has been developed to provide an overview of how disabled and aged people can control their home appliances such as fans, lamps, and television through voice commands using the mobile application in their smartphone. This paper also shows the development of how the automated home using google assistant voice recognition can be connected with NodeMCU. The home automation system used a NodeMCU as a microcontroller to control the input and output of the system while google assistant acted as a transmitter to transmit the data to the mobile applications respectively. IFTTT is used to interpret the voice command from the user before sending the voice data into the transmitter and being delivered to the control unit of this project which is NodeMCU. Then, NodeMCU will control the turning on or off the process of the entire appliances in the living room. The result of this project is the electricity wastage problems have been reduced and a voice-activated system is a more effective way to use among disabled and aged people since they do not have to type but just use voice as the input. This project is user-friendly as it introduces a better improvement to the internet of things technology by using voice commands to control certain devices at home.

ABSTRAK

Rumah adalah tempat di mana orang menghabiskan banyak masa bersama keluarga dan rakan dan juga tempat berehat setelah seharian bekerja. Dalam era pandemik ini kebanyakan orang bekerja dari rumah maka dengan itu adalah sangat penting untuk mewujudkan tempat tinggal yang selesa dan selamat. Namun, bagi mereka yang kurang upaya dan warga tua, masalah pembaziran elektrik adalah salah satu masalah besar dalam kehidupan mereka. Ini kerana mereka tidak dapat mematikan kipas, lampu dan televisyen setiap masa terutamanya di ruang tamu rumah kerana mereka adalah golongan yang kebanyakannya memiliki masalah kesihatan yang menyekat mereka dari bergerak terlalu banyak. Oleh itu, automasi rumah yang diaktifkan dengan suara menggunakan NodeMCU telah dikembangkan untuk memberikan gambaran umum mengenai bagaimana orang kurang upaya dan orang tua dapat mengawal perkakas rumah mereka seperti kipas, lampu dan televisyen melalui arahan suara hanya dengan menggunakan aplikasi mudah alih di telefon pintar mereka. Ini juga menunjukkan perkembangan bagaimana rumah automatik menggunakan pengecam suara pembantu Google dapat dihubungkan dengan NodeMCU. Sistem automasi rumah menggunakan NodeMCU sebagai mikrokontroler untuk mengawal input dan output sistem sementara pembantu Google bertindak sebagai pemancar untuk menghantar data ke aplikasi mudah alih masing-masing. IFTTT digunakan untuk menafsirkan perintah suara dari pengguna sebelum mengirim data suara ke pemancar dan dihantar ke unit kawalan projek ini yang merupakan NodeMCU. Kemudian, NodeMCU akan mengawal proses menghidupkan atau mematikan keseluruhan peralatan di ruang tamu. Hasil dari projek ini ialah masalah pembaziran elektrik telah dikurangkan dan sistem pengaktifan suara adalah kaedah penggunaan yang lebih berkesan di kalangan orang kurang upaya dan orang tua

kerana mereka tidak perlu menaip tetapi hanya menggunakan suara sebagai input. Projek ini mesra pengguna kerana memperkenalkan peningkatan yang lebih baik kepada teknologi internet sesuatu dengan menggunakan perintah suara untuk mengawal peranti tertentu di rumah.



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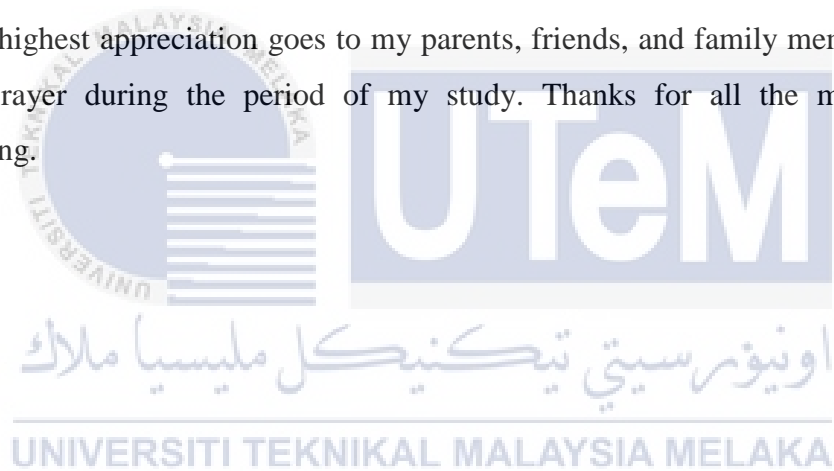


TABLE OF CONTENTS

	PAGE
DECLARATION	
APPROVAL	
DEDICATIONS	
ABSTRACT	i
ABSTRAK	ii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	i
LIST OF TABLES	iv
LIST OF FIGURES	v
LIST OF SYMBOLS	viii
LIST OF ABBREVIATIONS	ix
LIST OF APPENDICES	x
CHAPTER 1 INTRODUCTION	1
1.1 Background	2
1.2 Problem Statement	2
1.3 Project Objective	4
1.4 Scope of Project	4
CHAPTER 2 LITERATURE REVIEW	5
2.1 Introduction	5
2.2 Related works	5
2.2.1 Introduction of NodeMCU ESP8266	5
2.2.2 Introduction of NodeMCU ESP32	7
2.2.3 Comparison of ESP8266 and ESP32	8

2.2.4	PIR Motion Sensor	9
2.3	Technology Development	11
2.3.1	Integrated Smart Home Automation System (IoT)	12
2.3.2	Home Automation and Security System with NodeMCU using Internet of Things	15
2.3.3	Development of House Automation using Google Assistant	16
2.3.4	Voice Activated Home Automation using Amazon Echo Dot	17
2.3.5	Comaprison of Virtual Assistant	18
2.4	Summarizations and comparison from previous project	21
 CHAPTER 3		 23
METHODOLOGY		
3.1	Introduction	23
3.2	Project Workflow	23
3.2.1	General Block Diagram	23
3.2.1.1	Flowchart	24
3.2.1.2	Gantt Chart BDP2	25
3.3	Hardware Specifications	26
3.3.1	ESP32 DEVKIT V1 DOIT	26
3.3.2	PIR Sensor	28
3.3.3	Home Appliances	28
3.3.4	L298N Motor Driver	29
3.3.5	Ac Light Dimmer Module	30
3.3.6	Mobile Phone	31
3.3.7	Wireless connection between ESP32 and Internet	31
3.4	Hardware Connection	32
3.5	Software Specification	33
3.5.1	Arduino IDE Software	33
3.5.2	Blynk Apps	34
3.5.3	Google Assistant and IFTTT	35
3.6	Software Implementation	36
3.6.1	Configure nearest IP address of Blynk Server	36
3.6.2	Create phrase voice command for Google Assistant	37

3.6.3	Create a web request in Webhooks	38
3.6.4	Test voice command using Google Assistant	39
3.6.5	Notify IFTTT	40
CHAPTER 4	RESULTS AND DISCUSSIONS	42
4.1	Introduction	42
4.2	Project Prototype	42
4.3	Project Demonstration	43
4.3.1	Block Diagram of internet connection to Esp-32	43
4.3.2	Login page	44
4.3.3	Demonstration Blynk Notification	44
4.3.4	Demonstration voice command for control light brightness	45
4.3.5	Demonstration voice command for control speed fan	47
4.4	Google Assistant Server	47
4.5	Analysis project	48
4.5.1	Project Test Accuracy (Distances)	48
4.5.2	Project Test Accuracy (Internet Access point)	50
4.6	Summary	52
CHAPTER 5	CONCLUSION AND RECOMMENDATIONS	54
5.1	Conclusion	54
5.2	Future Works	55
	REFERENCES	56
	APPENDICES	58

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1	Comparison of ESP-8266 and ESP32	9
Table 2.2	Accuracy with 2m distances	49
Table 2.3	Accuracy with 6m distances	49
Table 2.4	Accuracy with 12m distances	49
Table 2.5	Accuracy with 15m distances	49
Table 2.6	Distances vs Time Table (Mobile Hotspot)	50
Table 2.7	Distances vs Time Table (Wi-Fi Router)	50



LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2.1	ESP-8266	6
Figure 2.2	Functional block of ESP-8266	6
Figure 2.3	ESP-32	8
Figure 2.4	Functional block of ESP-32	8
Figure 2.5	PIR sensor	10
Figure 2.6	The adjustable setting of PIR sensor	11
Figure 2.7	Mechanism of Integrated Smart Home Automation System	13
Figure 2.8	Android application interface	14
Figure 2.9	The Firebase Database updated status	14
Figure 2.10	Ultrasonic sensor transmission and reception of the signals	15
Figure 2.11	Overall setup of the home automation system using IoT	16
Figure 2.12	Overview of the result	17
Figure 2.13	The Amazon Echo Dot System Design	18
Figure 2.14	Queries answered correctly by categories	19
Figure 2.15	Statistic of user choice of the best Virtual Assistant	20
Figure 2.16	Overall setup of the home automation system using IoT	16
Figure 3.1	Project workflow	23
Figure 3.2	General Block Diagram	24
Figure 3.3	Flow chart of project	25

Figure 3.4	Gantt Chart	26
Figure 3.5	ESP 32 DEVKIT V1 DOIT board	27
Figure 3.6	Pinout of ESP32 DEVKIT V1 DOIT board	27
Figure 3.7	PIR sensor	28
Figure 3.8	Bulb	29
Figure 3.9	Cooling fan	29
Figure 3.10	L298N Motor Driver	30
Figure 3.11	AC Light Dimmer Module	30
Figure 3.12	Mobile phone	31
Figure 3.13	Wireless connection between ESP32 and internet	31
Figure 3.14	Voice-Activated Home Automation Connection	33
Figure 3.15	Arduino IDE software	34
Figure 3.16	Blynk apps Android application interface	35
Figure 3.17	Voice customize using Google Assistant	36
Figure 3.18	Ip Address of Blynk Server	37
Figure 3.19	Google Assistant Phrase field	37
Figure 3.20	Webhooks field	39
Figure 3.21	Authorization Token of Blynk Apps	39
Figure 3.22	Google Assistant interface	40
Figure 3.23	Applet active	40
Figure 3.24	IFTTT update	41
Figure 4.1	Project prototype	43
Figure 4.2	Block Diagram of internet connection to Esp-32	43
Figure 4.3	Login page	44

Figure 4.4	Notification of people in living room	45
Figure 4.5	Notification of no people in living room	45
Figure 4.6	Demonstration of turning on light	46
Figure 4.7	Demonstration of turning on fan	47
Figure 4.8	Data of voice command	48
Figure 4.9	Graph Comparison	51



LIST OF SYMBOLS

% - Percentage



LIST OF ABBREVIATIONS

V	-	Voltage
s	-	Second
A	-	Ampere
m	-	Meters



LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix A	Coding	58
Appendix B	Gantt Chart BDP1	61



CHAPTER 1

INTRODUCTION

1.1 Background

Home is not just a place for us to live, sleep, and spend time with our family. However, home is the ultimate environment for us to communicate, manage time and our business, especially in this pandemic era. Most people stay at home most of the time because of that they need to turn on a comfortable atmosphere and facilitate to the owner of the house. The Internet of Things keeps on extending quickly, and the shrewd home will be one of the keys to additional development through the 2020s, as indicated by a new examination from Strategy Analytics.

Home activated voice-controlled using Node MCU ESP32 and Google assistant is one of the efforts that have been explored by me to provide convenience to the public in operating home appliances at home especially to the handicapped people and aged people who are not necessarily able to control home appliances at home at all times which can lead to electrical wastage and home fire accidents. [1] NFPA estimates about 15% of home fire deaths from 2007-2011 were the cause of physical disability. It was identified as one of the wide contributing factors of home fire deaths in the United States. It is not impossible to increase in 2021. A voice-activated home automation system is one initiative to help handicapped people around the world that cannot able to control home appliances at their house only using their voice. Other than that in 2017, CNET partnered with Coldwell Banker Real Estate to develop an industry standard for smart homes said a smart home is a house that be met with network-connected products such as Wi-Fi and Bluetooth to control,

automate and optimize functions such as temperature, lighting, security, safety or entertainment by controlling using a phone, tablet, computer.

We usually see many people that use voice Google assistant to call any contact number in their phone or to play their music playlist. So by fulfilling this project people can control their home through their voice such as “Hey Google turn on the light” using their smartphone. The basic equipment that can be controlled using the internet of things(IoT) is a lamp, fan, switch, and other than that is an air-conditioner. People can use this technology for their entire house area but for this project, I make it specific in the living room since the living room is the most favorite area in the house and most of the home appliances such as fans and bulbs are in the living room. In this case, the Wi-Fi module, Node MCU ESP32, acts as a gateway to connect the home appliances to the Blynk server and those appliances can be triggered remotely through the Blynk mobile app. Since we use google assistant voice recognition, the command must be interpreted first by IFTTT then will be sent to the Blynk server and the Blynk server delivered the message to Node MCU ESP32 and all the home appliances can be controlled. Additionally, this Internet-based home automation system has been integrated with a passive infrared sensor (PIR sensor) which will help to notify users if whenever there is no physical movement in the house via an application called Blynk Apps through user mobile phone because sometimes people forget to switch off their home appliances when they out of the house especially when it comes to handicapped people and aged people.

1.2 Problem Statement

Normally, the normal person should not have any problems in switching electrical appliances such as a lamp, fan, television, and air conditioning in their house. However, handicapped people and aged person, they have the limitation of movement in their house

sometimes they just go without switching off their home appliances that cause electricity wastage. The solution to this problem is using voice commands to activate or deactivate any home appliances and providing low-cost and flexible home automation and monitoring system among disabled and aged people. The use of google assistant voice recognition is one of the ways to reduce electricity wastage among handicapped people and aged people in controlling home appliances through voice command by using mobile applications. Then, Node MCU ESP32 is the microcontroller that acts as the control unit in controlling the home appliances that will get voice input from google assistant before switching on or off the home appliances. However, google assistant cannot directly connect to Node MCU ESP32 since google assistant cannot understand a foreign language. So that, the solution is IFFTT must be used to interpret the voice command first then it will send the input to the mobile application and the apps will send the command data to Node MCU ESP32 and for controlling the home appliances in the living room.

One of the problems related to this voice-activated system is only can be used in the living room or places that are actively connected with Wi-Fi as long as still in the house area. So, the user cannot control the home appliances outside of the house according to the distance that has been set. Sometimes, users will forget to switch off home appliances when they are out of the house. Thus, the use of a PIR sensor has been developed in detecting the movement of people in the house in case there are no people in the house and the user's mobile phone is triggered and the user can check their home appliances either in ON or OFF mode before they go far from home since the notification will be sent right after the user left the living room area.

1.3 Project Objective

The objective of this project is:

- a) To implement voice-activated home automation using NodeMCU ESP32 as the control unit.
- b) To design a user-friendly voice-activated home automation project using Google Assistant to control home appliances in the living room from different areas in the house via voice command.
- c) To develop the use of a motion detection sensor as a component to detect object movement in the living room and send a notification to users' mobile phones.

1.4 Scope of Project

The scope of this project are as follows:

- a) Voice-activated home automation system is used for controlling lamps and fans in the living room from different areas in the house such as bedroom and kitchen that programmed by using Node MCU ESP 32 and Google Assistant.
- b) Detecting object movement in a living room to notify users about the status of the home appliances in the living room using a PIR sensor.
- c) Type of area are covered in this project is in the living room.