



Faculty of Electrical and Electronic Engineering Technology



**DEVELOPMENT OF IOT HOME AUTOMATED
SYSTEM**

MOHAMAD QHAIRUL FITRI BIN HISHAM

Bachelor of Electronics Engineering Technology (Telecommunications) with Honours

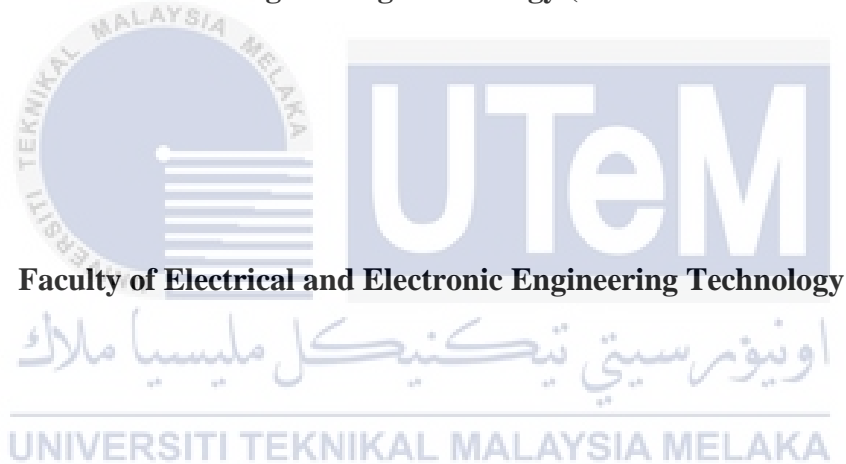
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

DEVELOPMENT OF IOT HOME AUTOMATED SYSTEM

MOHAMAD QHAIRUL FITRI BIN HISHAM

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



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

**BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II**

Tajuk Projek : DEVELOPMENT OF IOT HOME AUTOMATED SYSTEM

Sesi Pengajian : SESI 1 2022/2023

Saya MOHAMAD QHAIRUL FITRI BIN HISHAM mengaku membenarkan laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (✓):

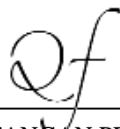
SULIT*

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

(Mengandungi maklumat terhadap yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

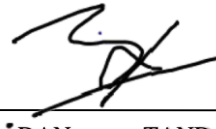
TIDAK TERHAD

Disahkan oleh:



(TANDATANGAN PENULIS)

Alamat Tetap: 1146, JLN TBK 4-4,
TAMAN BUKIT KEPAYANG, 70200
SEREMBAN, NEGERI SEMBILAN.



(**DOR MD ASIDAN BIN MD JAMAL**)
TANDATANGAN
Pensyarah Kanan

Jabatan Teknologi Kejuruteraan Elektronik Dan Komputer
Fakulti Teknologi Kejuruteraan Elektrik Dan Elektronik
Universiti Teknikal Malaysia Melaka

Tarikh: 13 JANUARY 2023

Tarikh: 13 JANUARY 2023

DECLARATION

I declare that this project report entitled DEVELOPMENT OF IOT HOME AUTOMATED SYSTEM is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

:



Student Name

:

MOHAMAD QHAIRUL FITRI BIN HISHAM

Date

:

13 JANUARY 2023

اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honours.

Signature

: 

Supervisor Name

: DR MD ASHADI BIN MD JOHARI

Date

: 16/01/2023

Signature

: 

Co-Supervisor

:

Name (if any)

Date

:

UNIVERSITI TEKNIKAL MALAYSIA MELAKA



DEDICATION

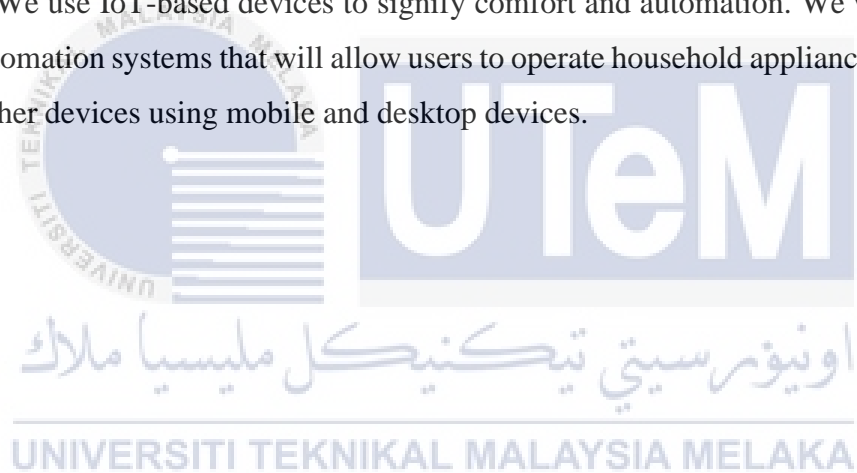
I dedicate my dissertation work to my family and friends. A special feeling of gratitude to my loving parents, Hisham Bin Nordin and Mahani Binti Mohd Noor whose words of encouragement and push for tenacity ring in my ears. My sister, Quzaitul Izzati Binti Hisham has never left my side and very special.

I also dedicate this dissertation to my friends who have supported me throughout the process. I will always appreciate all they have done, especially Fahmi for helping me develop my technology skills, Harith for the many hours of proofreading, and Afwan for helping me to master the coding process skills. I dedicate this work and give special thanks to my best friend, Faiz for being there for me throughout the entire doctorate program. You have been my best cheerleader.



ABSTRACT

At this era, home automation has become a reality. With just one power, one can accomplish a variety of tasks. Recent advancements in technology can be used to create fully functional home automation systems and operate smart home devices such as lights, fans, and other appliances. The Internet of Things (IoT) is a network of physical objects that includes sensors, software, electric devices, and internet access to improve performance by exchanging data with other connected items. In recent years, the Internet of Things (IoT) has been defined as a network of all internet-connected objects. IoT devices can be accessed remotely and operated using an existing network architecture, enabling direct integration of computing systems with the physical world. Home automation has gained a lot of popularity in recent years, and it has improved people's comfort and quality of life. We use IoT-based devices to signify comfort and automation. We will design and create home automation systems that will allow users to operate household appliances such as fans, lighting, and other devices using mobile and desktop devices.



ABSTRAK

Pada era ini, automasi rumah telah menjadi kenyataan. Dengan hanya satu kuasa, seseorang boleh mencapai pelbagai tugas. Kemajuan terkini dalam teknologi boleh digunakan untuk mencipta sistem automasi rumah yang berfungsi sepenuhnya dan mengendalikan peranti rumah pintar seperti lampu, kipas dan peralatan lain. “Internet of Things” (IoT) ialah rangkaian objek fizikal yang merangkumi penderia, perisian, peranti elektrik dan akses Internet untuk meningkatkan prestasi dengan bertukar-tukar data dengan item lain yang bersambung. Dalam beberapa tahun kebelakangan ini, “Internet of Things” (IoT) telah ditakrifkan sebagai rangkaian semua objek yang disambungkan ke Internet. Peranti IoT boleh diakses dari jauh dan dikendalikan menggunakan seni bina rangkaian sedia ada, membolehkan penyepaduan langsung sistem pengkomputeran dengan dunia fizikal. Automasi rumah telah mendapat banyak populariti dalam beberapa tahun kebelakangan ini, dan ia telah meningkatkan keselesaan dan kualiti hidup orang ramai. Kami menggunakan peranti berasaskan IoT untuk menandakan keselesaan dan automasi. Kami akan mereka bentuk dan mencipta sistem automasi rumah yang akan membolehkan pengguna mengendalikan peralatan rumah seperti kipas, lampu dan peranti lain menggunakan peranti mudahalih dan desktop.

اونيورسيتي تيكنيكل مليسيا ملاك
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious and the Most Merciful. All praises to Allah and His blessing for the completion of this thesis. I thank God for all the opportunities, trials and strength that have been showered on me to finish writing the thesis. I experienced so much during this process, not only from the academic aspect but also from the aspect of personality. My humblest gratitude to the holy Prophet Muhammad (Peace be upon him) whose way of life has been a continuous guidance for me.

First and foremost, I would like to sincerely thank my supervisor Dr. Md Ashadi Bin Md Johari for his guidance, understanding, patience and most importantly, he has provided positive encouragement and a warm spirit to finish this thesis. It has been a great pleasure and honour to have him as my supervisor. My deepest gratitude goes to all of my family members. It would not be possible to write this thesis without the support from them. I would like to thank my dearest father Hisham Bin Nordin, my mother Mahani Binti Mohd Noor, my sister Quzaitul Izzati Binti Hisham and my brother Qhairul Zikri Bin Hisham.

I offer my special thanks to all my colleagues, Afwan, Shamil, Faiz, Fahmi, Rauf and Harith for their motivation, prayers and their sincere help during my studies. I would sincerely like to thank all my beloved friends who were with me and support me through thick and thin. I also want to extend my thanks to Puan Azien for her helps and supports in the administrative works. May God shower the above cited personalities with success and honour in their life.

TABLE OF CONTENTS

	PAGE
DECLARATION	
APPROVAL	
DEDICATIONS	
ABSTRACT	i
ABSTRAK	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	i ii
LIST OF TABLES	iii
LIST OF FIGURES	vi
LIST OF APPENDICES	v
CHAPTER 1 INTRODUCTION	1
1.1 Background Project	1
1.2 Problem Statement	2
1.3 Project Objective	3
1.4 Scope of Project	3
CHAPTER 2 LITERATURE REVIEW	4
2.1 Introduction	4
2.2 IoT Based Home Automation System	5
2.3 Internet of Things (IoT)	5
2.4 Related Work	6 7 8 9 10 11 12 13 14 15 16 17 18
2.5 Summary	19
CHAPTER 3 METHODOLOGY	20
3.1 Introduction	20
3.2 Methodology	20
3.3 Flowchart	21 22 23
3.4 Project Implementation	24
3.5 Software Development	25
3.5.1 Arduino IDE	25
3.6 Hardware Development	26
3.6.1 ESP8266 WiFi Module	26
3.6.2 DHT 11 Sensor (Temperature Sensor)	27

3.6.3	16x12 LCD	28
3.6.4	LED	29
3.7	Summary	29
CHAPTER 4 RESULTS AND DISCUSSIONS		30
4.1	Introduction	30
4.2	Schematic Diagram	30
4.3	Results and Analysis	31 32 33 34
CHAPTER 5 CONCLUSION AND RECOMMENDATION		35
5.1	Introduction	35
5.2	Conclusion Chapter 2	35
5.3	Conclusion Chapter 3	35
5.4	Conclusion Chapter 4	35
5.5	Future Work	36
REFERENCES		37 40
APPENDICES		41



LIST OF TABLES

TABLE	TITLE	PAGES
Table 1	Comparison of previous work	14 15 16 17 18



LIST OF FIGURES

FIGURE	TITLE	PAGES
Figure 3.1	Process flowchart	21
Figure 3.2	Algorithm flowchart	23
Figure 3.3	Project Illustration Diagram	24
Figure 3.4	Project Block Diagram	24
Figure 3.5	Arduino IDE Software	25
Figure 3.6	ESP 8266 WiFi Module	26
Figure 3.7	DHT 11 Sensor (Temperature Sensor)	27
Figure 3.8	16x12 LCD	28
Figure 3.9	LED	29
Figure 4.1	Home Automation System Schematic Diagram	30
Figure 4.2	Constructed Model	31
Figure 4.3	Blynk Application View	31
Figure 4.4	LED Turn ON	32
Figure 4.5	LED Turn OFF	32
Figure 4.6	LCD Turn ON	33
Figure 4.7	LCD Turn OFF	33
Figure 4.8	DHT 11 Sensor Readings (Temperature and Humidity)	34
Figure 4.9	A Message If Temperature Above 30°C	34

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix A	Gantt Chart	41



CHAPTER 1

1.1 BACKGROUND PROJECT

Nowadays, people had changed their living standards. Most of them are using technology on daily basis. The same goes for the daily chores. In modern life, people also use technology and machines to do their work. For example, people use voice recognition to open the lamp, television, and fans. Other than that, people also use a robotic vacuum to clean the house.

For information, this project is about an IoT Based Home Automation system. It is a project that is able to control domestic appliances by installing an electronic that is controlled by the internet connection system. Based on other projects that are related, the IoT Based Home Automation system also can be used as a house alarm which is connected to a central hub and remotely controlled by a mobile application.

A Home Automation system's purpose is to make the home functional in neatly order. The benefit of having a smart home is that people can save energy and time to do their house chores. For example, people can relieve their stress or work fatigue by controlling the machines to clean the house, wash clothes and many more in a glimpse of eye.

The Home Automation system also can make user feel comfortable by saving up some space in the house. The devices that were installed in the house are not big. So, in that situation, it can give users a nice and spacious view. Besides, this system is so convenient to the users because Home Automation system can automatically turn on and off the programmable devices at certain times.

1.2 PROBLEM STATEMENT OF PROJECT

Home Automation system is increasing in the number of households because of all the benefits it presents. Home Automation system has also been proven to be a tremendous benefit for the elderly and the disabled. The benefits that are given to the elderly and disabled are independence, providing emergency assistance systems, security features, fall prevention, automated timers and alerts. Home Automation System also allows monitoring from family members via an internet connection.

Assistive domestic is a type of Home Automation system which offers a variety of functions that might help persons who have accessibility issues in their houses. For example, for people who would rather stay in their homes than go to an assisted living facility, these technology systems and aiding equipment have become viable options for them. To summarize, it is making a big difference in people's lives every day by depending on the Home Automation system, especially for the elderly and the disabled.

For additional information, this system had been planned in the early 20th century as a feature of science to help people with their problems. But, it had been delayed because of some factors that will affect the people. For example, Home Automation system is very expensive at that time. So, that is why this system cannot be installed in any houses that are low salary at that time. Besides, there are also some complexities to the system. That is why people back then did not want to be complex with machines and technologies.

As a result, this project indicates to introduce people to Home Automation system for all variants of houses through its benefits. Such as low cost, open source system and easy to use. In addition, this system also can provide energy efficiency and safety environment society.

1.3 PROJECT OBJECTIVES

In this project, the objectives that must be achieved for a Home Automation system are :

- To design a user-friendly system, easy to use and effectively controls devices in the household.
- To develop a controlled system that can wirelessly transfer data to an Arduino device.
- To study the system that is related to a cross-platform control.

1.4 SCOPE OF PROJECT

The main target for this project is to develop an affordable, easy-to-use, safe and comfortable household. So, therefore the Home Automation system is introduced because it is a system that works to control the house appliances with one another through the Internet medium. The appliances were installed with sensors that can connect them via WiFi, so users can easily control the appliances from smartphones or tablets.

Based on this project, the Arduino act as a microcontroller for the system by distributing signals to control the appliances. This project will be limited for prototyping purposes so that it can avoid any errors or threats before installing it to the real thing.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, the purpose is to make a review and comparison of the past studies about IoT Based Home Automation System. This chapter will also discuss how Home Automation system can be a control to households that can give protection to lives and investments. For example, this system enables it to be a protective system by converting it into intruder control, fire detection and access control. This project, it focuses on the IoT Based Home Automation system to control and manage the houses from inside or outside.

For information, the automation system is a fact that people nowadays are being controlled by technology and machines because it is an easy way to do work whether wireless or remote method. The concept of automation for household appliances through the Internet from anywhere is to make people life comfortable and feel safe by controlling their houses from smartphones or tablets.

2.2 IOT-BASED HOME AUTOMATION SYSTEM

In modern days, people now are using remotes to control the appliances at home. For example, the television is being controlled by people through wireless connections which are called the infrared medium. So, to be more specific about this project, this IoT Based Home Automation system is to help people by reducing their working time at home and securing their life from any outside or inside threat.

That is why this project is suitable for people nowadays to gain knowledge about this Home Automation system. This system is super cost-effective and it can also give users the ability to control any electronic devices without spending money to buy remotes. This project also can assist the user to control all the appliances at home only from their devices.

2.3 INTERNET OF THINGS (IOT)

The Internet of Things (IoT) is a relatively new technology that connects electronic devices and people over the Internet. The data collected by the devices are saved in the cloud and can be analyzed or studied by the users. With the growth of the Internet of Things, automation systems such as surveillance, fire control, access control and environmental management can now be automated. By using IoT, Home Automation system can be completely automated in a wireless method.

It is possible to monitor and manage household appliances from a distance. The information gathered from cloud-based items. Data from the cloud can be downloaded using several mobile devices for monitoring, controlling, and providing feedback. These operations are currently carried out by Arduino microcontrollers and other microcontrollers.

2.4 RELATED WORK

Based on this paper, it told that Home Automation system is so compatible with variant local housing because it can come out with good features by helping the users control their residences with just a remote control. In this paper, also told that this project is using an Arduino microcontroller to control the house appliances such as lights, garage doors, water pumping systems and smoke detection systems. This is because an Arduino microcontroller is low-cost and precise at controlling the automation system. Next, this project is using Bluetooth module component for transferring the signal via a controller device to the Arduino. This is because the Bluetooth module component is a far-range controller that can easily transfer the signal to other devices. For its input device, this project uses a smartphone that will be installed an application to connect the Bluetooth module. This paper is set to be an idea for helping the elderly and disabled people on working out their house chores and provide a safe life for them [1].

According to this paper, it told that this project uses the IoT-based Home Automation system to save energy and water consumption at home. This project also offers comfortable environments and safe lives. Besides, this paper talked about the benefits of using the Internet of Things (IoT) services in daily life connected to Home Automation system. For example, by using IoT, can provide an enhancement of comfort at home and create a quality lifestyle. It also shows that IoT based Home Automation system is a low-cost project if the users are using sensors to manage their home appliances where an IP connection is provided. This project also shows that it uses Android-based applications which must be installed in users' smartphones to control the electronic devices at home via the Internet medium. Because this project uses a Raspberry Pi microcontroller to activate the system such as sensors and home appliances [2].

This paper, it has provided an explanation about a Smart Home Automation system that can make an easier and simpler lifestyle for people. This is because people nowadays are always dependent on technology and Internet usage. Both things had been an important role in daily life because people have always been with their smartphones or tablets 24 hours per day. In addition, this project also told that it was used as a remote control for a temperature controller, reading humidity percentages and surrounding area detectors such as fire, gas and rain. This project, it uses a lot of components to make this Smart Home Automation system. For example, an alarm for fire detection, a buzzer, a relay component, an Arduino Mega microcontroller for controlling electronic devices, sensors for light, fire, rain, gas, temperature and humidity detection, computers or laptops, and an Ethernet Shield to connect to the microcontroller via the Internet. From this project, it can be concluded that the system used is to alert users to surrounding area phenomena such as heavy rain or gas leaks that could happen [3].

In this project paper, it shows that there are two microcontrollers used which are Raspberry Pi and Arduino to control electronics devices at home. In addition, both microcontrollers must be in stable condition to control the appliances at home, so this project has provided a logic converter to control the voltages that flow through those devices. The logic converter component has a big purpose where it has to convert high-level voltage to pass through Arduino and low-level voltage to pass through Raspberry Pi. In conclusion, this project is a complex build because it uses two microcontrollers but at the same time, it also can prevent the system from damage because of the logic converter component [4].

This Android Based Home Automation using Arduino UNO is also one of the project papers that were referred. The project represents only basic usage of Arduino UNO to control home appliances via remote control. It uses Bluetooth medium to connect the input device which is a smartphone or tablet to the Arduino UNO. This system can provide an increase in work efficiency and makes life even better at home. It also can make a big difference to the disabled because they are no longer needed to walk around and do their house chores [5].

This project's documentation outlines the design and prototype implementation of a novel home automation system that connects its component elements via Wi-Fi technology. There are two primary parts to the proposed system. The server (web server), which serves as the system's central processing unit and controls and keeps an eye on users' homes, is the initial component. The project's goal is to develop a sophisticated home automation system using Wi-Fi and a standard web server. Through Wi-Fi, a Personal Computer (PC) may read sensors and turn on/off the devices [6].

They use a self-managed content infrastructure for this paperwork since they have complete control and personalization over the information. The original capital expenditure for the physical infrastructure was very costly and administration was challenging. Key suppliers sought to lower the cost of server rentals by connecting to cloud platforms with dynamic server provisioning through the effective and affordable ESP8266 chip, which was the primary goal for content providers. This article discussed the difficulties in lowering the cost of accessing cloud platforms [7].

In this paper, an ESP8266 Wi-Fi module and Arduino Uno are used to demonstrate a home automation system. With this, you may use a web browser on your PC, smartphone, or other device to control lights, electric fans, and other home appliances. These AC mains appliances will be wired to relays that the Arduino will operate. User will give control commands through a web browser like Google Chrome or Mozilla Firefox, and ESP8266 and Arduino work together as a Web Server. One of the most widely used and reasonably priced Wi-Fi modules on the market right now is the ESP8266 [8].

The ESP8266 Wi-Fi module will be used as a network provider in this project's design and prototype for a home automation system that will link with other appliances. There are two primary parts to the proposed system. The Wi-Fi module's input is managed and controlled by Arduino, which is the first major component. The Wi-Fi module, which may be used to add a web server and enable device control over the Internet, is the second key component. If a server is within range of a Wi-Fi network, it can manage numerous hardware interface modules. It supports a variety of home automation devices, including security and power management components [9].

This paper presents a low-cost flexible and reliable home automation system with additional security using Arduino microcontroller, with IP connectivity through local Wi-Fi for accessing and controlling devices by authorized user remotely using Smart phone application. The proposed system is server independent and uses Internet of things to control human desired appliances starting from industrial machine to consumer goods. The user can also use different devices for controlling by the help of web-browser, smart phone, or IR remote module. To demonstrate the effectiveness and feasibility of this system, in this paper we present a home automation system using Arduino UNO microcontroller and ESP8266-01 as a connectivity module. It helps the user to control various appliances such as light, fan, TV and can take decision based on the feedback of sensors remotely. To control lights, fans and other home appliances which are connected to the relay system, the system offers switching functionalities. It is also used for environmental monitoring by sensing and analyzing data about temperature and humidity. Another notifying feature in this system designed is the intrusion detection which is offered by this system using motion sensor. All these activities are controlled by using Android mobile app-Blynk [10].