UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF SECURITY DOOR WITH FINGERPRINT DETECTION WITH APP

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

by

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TECHNOLOGY

2020

DECLARATION

I hereby, declared this report entitled Development of Security door with fingerprint Detection with app is the results of my own research except as cited in references.

Signature: ……*Loga* ……

Author : LOGA A/L TACHINA MOORTHY

Date: 14.02.2021

APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

Signature: 

Supervisor : TS. FAKHRULLAH BIN IDRIS

ABSTRAK

Jaringan peranti yang bersambung yang berkembang, sering disebut secara kolektif sebagai Internet of Things (IoT), tunduk pada banyak kelemahan keselamatan yang berpotensi. Tujuan makalah ini adalah untuk mengembangkan prototaip pintu keselamatan menggunakan aplikasi dengan cap jari. Sistem ini mencadangkan kunci pintar ke homestay yang membolehkan pengguna mengganti kunci pintu mereka dengan telefon pintar. Sistem ini juga memperlihatkan keselamatan pengguna kerana mereka biasanya memberi manfaat 24/7 untuk sistem kunci pintu untuk membenarkan orang yang diluluskan sahaja memasuki homestay. Sistem ini terdiri daripada mikrokontroler berasaskan ESP32 Arduino sebagai otak prototaip ini yang menghubungkan pintu keselamatan sebagai sensor untuk membuka dan menutup pintu. Bahagian pengaturcaraan, ia mewujudkan penukaran dari pembacaan analog sensor ke digital. Aplikasi ini dapat mengimbas cap jari kami untuk disahkan untuk dipadankan dengan selamat dengan kata laluan yang tersimpan di Arduino agar pintu terbuka. Rangka kerja bolt pengimbas berasaskan cap jari yang diprogramkan ini akan memberi pelanggan kaedah yang lebih selamat dan minimum untuk mengunci-membuka pintu. Sistem automasi kunci pintu keselamatan menjanjikan langkah berani ke masa depan di mana kunci pintu mekanikal akan diganti dengan kunci pintu elektronik. Kesimpulannya sistem ini akan dapat memenuhi homestay dengan pintu keselamatan menggunakan aplikasi dengan cap jari untuk memberikan keamanan yang tinggi.

ABSTRACT

The growing network of connected devices, often collectively referred to as the Internet of Things (IoT), is subject to a vast array of potential security vulnerabilities. The aim of this paper is to develop a prototype of security door using app with fingerprint. The system proposed a smart lock to homestay that let users replace their door key with smartphone. The system also displays the user safe as they used to be give 24/7 benefit for door lock system to allow only approved persons to access the homestay. This system consists no as brain of this prototype which interface the security door as a sensor to open and close the door. Programming part, it creates conversion from analog reading of sensor to digital. The app can be scan our fingerprint to verified for secure matched with the stored password in Arduino for the door gets open. This programmed fingerprint-based scanner bolt framework will give client more secure and minimal effort method for locking-opening door. The security door lock automation system promises a bold step to the future where mechanical door locks will be substituted by electronic door locks. In conclusion this system will able to fulfill the homestay with security door using app with fingerprint to provide high security.

DEDICATION

I dedicate this project report to my beloved parents and friends. A special thanks to my mother Mrs. Sumathi a/p Rengganathan and father Mr. Tachina Moorthy who both always being support my ideas and give encourage to do this project. I also being grateful to thanks my friends Mr Dhevan , Mr Kishen and Mr Suraien who always been backbone to develop this project. Lastly to my supervisor Ts. Fakhrullah bin Idris who give lot of ideas and share her knowledge on doing report also prototype.

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CHAPTER 1

INTRODUCTION

1.0 Background

The Industrial Internet of Things (IIoT) or Industry 4.0 are both names dedicated to the use of IoT technologies in work settings in this modernization generation. The idea is the same as for home IoT electronic apps, except in this project the goal is to work with different type of sensors, wireless networks and big data to measure with using internet of thing. Home controllers is suitable for the android operating system because it commonly used in mobile phones and tablets for this generation.

This project is about a security door with app using fingerprint to homestay. This software app can be monitor the functioning of a security door system. The program for android app was created that scan fingerprint to access a secure control system to Monitor the door opening and closure situated at a distance from the individual. The app built on the phone would inform the door of obtaining the orders from smartphone and transfer these instructions to micro-controller to regulate of opening and closure of door.

1.1 Problem Statement

The issue of this project is to solve homestay owner a better solution of replacing key management for their customer to access homestay. The homestay owner actually have

many keys on their hands to open the specific door if the user lost the key might be a big problem. They also even forgotten to take along keys and the worst part is they have forgotten to unlock the door because they are reckless. An secure and effective system must be in action to support users particularly guests to lock the door. This security app system features a proper device where the customer can easily access. In addition, it is low cost and offers the user more secure. Work as a homestay management is particularly busy with routine job. So, they are very hard to monitor thier customer and safety. This device is built to help their job in order to provide high security in homestay.

In order to overcome the homestay problem, security door using apps and fingerprint need to implement for future project design introduced by (Kirbas, 2017). It can be authorized control of Wi-Fi-based door locking mechanisms from a certain control center via internet connectivity and the monitoring of input and output operations. Homestay management should be implemented this design to achieve more tourism and secure device control by this app. This project has been carried out especially for homestay management to monitoring the database tourism that has access the security door using app and fingerprint.

1.2 Objectives

When analyzing the previously mentioned problem statements, the main objectives are:

i. To design security door using apps and fingerprint and to develop a secure management mobile app to homestay.

ii. Alternative way to implement mechanical door lock mechanisms to reduce the usage of key for homestay.

iii. To implement the prototype and study its performance towards the app.

1.3 Scope of the project

The research would concentrate on develop the security door using fingerprint with app for homestay so as to access the door. Wi-Fi must be synchronized to a mobile phone and an order must be identified to connect to the controller. The project will have implementing software and hardware work. To work with this project, the right to implement software needs to be identified first. In fact, how the fingerprint authentication door for the app works and is integrated for hardware and software components.

The microcontroller Arduino would be merged with the Wi-Fi module. The Wi-Fi module would be a medium for transmitting data to the mobile device that acts as a network input. In this system, user will input fingerprint in the app to scan fingerprint and register details which is connected to the door latch through the microcontroller. After scanning the print, the system runs its database and looks for a match. If any match is found, the door opens and thus the door gets unlocked.

The Homestay program has significant potential as a community-based stuff for tourism to develop like a valued commodity for tourism with a unique nature of its own. Therefore, local and international tourists homestay has strength and uniqueness lies to people with traditional culture. The growing number of new members who register and join app as new user. Moreover, for sustainable development and secure management entrance for homestay to indicate good room management system.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Literature review is an essential part before beginning any project because it provides all required data related to the project. Based on that, the correct direction in developing the project can be performed proficiently. In this chapter, topic that will be explained are security Door system, Fingerprint sensor, Apps for homestay that going to be implemented form previous work.

2.1 Overview of security door with app using fingerprint

In general, The System Operating Android is commonly used in mobile phones and tablets, to controls the home for ideal. This project introduces development of security door with app using fingerprint to homestay to control the system operation of security door. Beside that, scan fingerprint to access a secure control system was designed using software of Android app . The user can access the door form a distance to Open and shut the door. App built on the phone would inform the door of receiving the commands from the android phone to transfer these commands to the micro-controller controlling door.

The concept is applied in order to have safer securities because users do not need to remember passwords and do not need any sort of keys or cards that sometimes get lost. If

someone's fingerprint is allowed to access a door in the network, he / she wouldn't face any sort of delays. Fingerprint identification is one of the simplest devices, because one person's fingerprint never fits another. Therefore, unauthorized entry can be limited by designing a lock that will save one or more authorized users' fingerprints and unlock the device when a match is identified. Modern portable devices such as cell phones and laptops will quickly guess the effectiveness and reliability of fingerprint scanner from its use.

2.2 Previous Related Work

Previous related work is basically about the researcher who have did similarly with the project which had plan. There are several researchers around the world had did almost the similar project, but there are differences in the equipment and method they have equipped to do the project. In order to complete this part had to select most similar article and summarize it. The article which chosen at are all listed at reference

2.2.1 Wifi Based and time Limited Secure Control System

According to (Kirbas, 2017) The proposed system provides for the authorized control of Wi-Fi-based door locking mechanisms from a certain control center via internet connectivity and the monitoring of input and output operations. A safe random key-token system has been developed to allow data sharing transfers more accessible over the Internet. Thus, when a user name and key information is accessed via a smartphone, tablet or device capable of connecting to a wireless network, central system monitoring of door locks and monitoring of input / output operations are given within the parameters of user permissions, including user name and secure key details.

This work based on Wi-Fi and web-based time and user-restricted remote-control application. Mobile devices is envisaged as a user interface such smartphone. In addition, a web-based control mechanism is used regardless of the operating system running on the intelligent devices. This is intended to be independent of the hardware and operating system. It acts as a server authorization service on the Internet, and it is decided whether or not users will be able to log in, taking into account user authority and time constraints. A low-cost minicomputer (Raspberry Pi 3) with a web server software is linked to a locking door mechanism and user's access through this computer's internet connection is controlled.

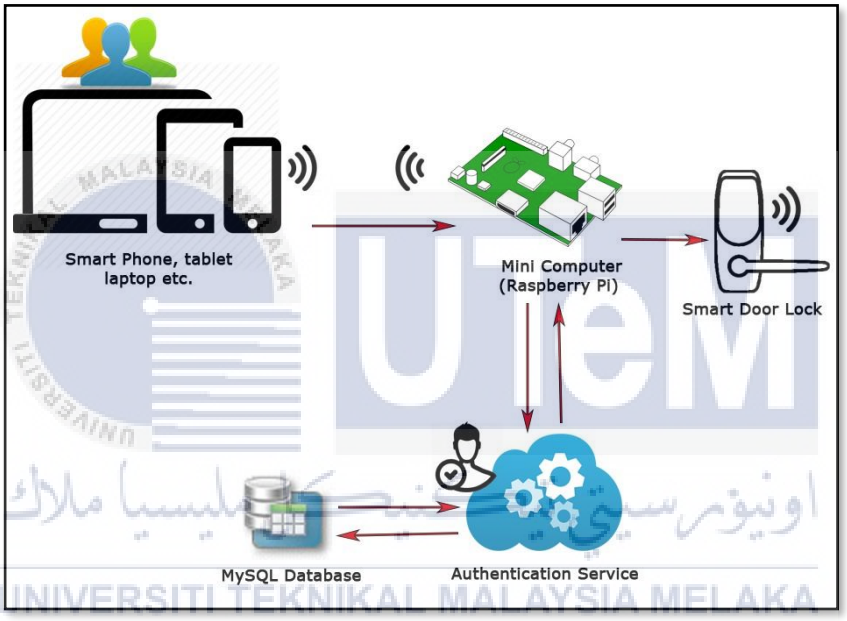


Figure 2.1: Communication system

2.2.2 Internet of things for Apps

The large variety of application can execute through smartphones have become widespread. Internet of Things (IoT) in order to make sure the vision of the, joint tasks where every devices communicate with each other, it is necessary that to

extend and adapt their functionalities apps on the moving based on their environment through this devices. Propose “hybrid Apps”, the concept of smartphone “Apps” designed to understand smart functionalities for IoT devices through small embedded systems.

Researchers (Yunge et al.,2015) points out that an App is built on the device, which includes a specific functionality with a customize code generator. This Software helps users to set up and customize their smart world. MicroApps are known as the custom code is created for all smart devices that research findings involved devices. The IoT devices wirelessly sent the code generated through smartphone. Generated microApp is integrated code interpreter capable of installing and executing the setup for all IoT devices.

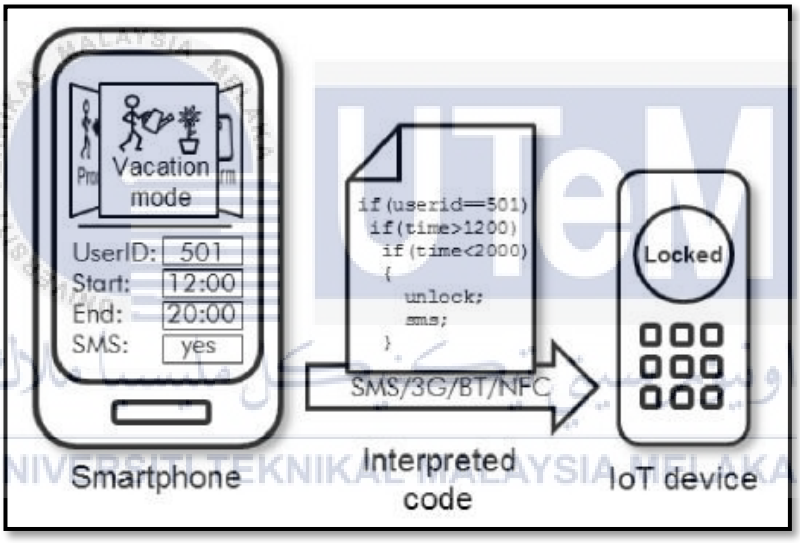


Figure 2.2: A smart computer programming through smartphone

2.2.3 Home Security Using Raspberry pi3 for Smart Door System

At this moment in time, latest technologies are being adopted to serve vital research providing a security system for houses purpose. Remote monitor and

control for the home appliances is used to provide wireless network for the technologies. The authors (Hussein et al.,2017) describe raspberry pi technology based on the security door lock system. Which determined to notify the owner by provide an alarming system through pi-lids , cameras and keypad are being utilized.

However, user-id also given to recognizing guests. In this way, only those who get permission to open the doors are the allowed persons. The device does operate by notifying owner through take pictures for the guest by a code and camera pi located in the doors. This article aims to say monitoring control system and a door access consist of different stages:

• Detection of pi user by keypad and webcam

• User-id file

• Verification

• Information

• Request to process according

A low-cost authentication system makes home automation system more secure and cost efficient based on face recognition and Raspberry pi3 system. This make change in the society to go down the percentage of crimes in technology. Securing home used RFID and NFC.

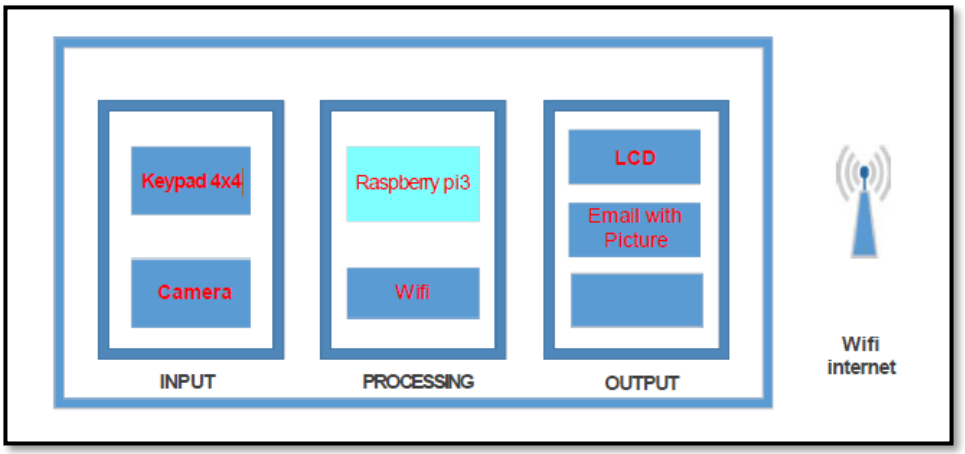


Figure 2.3: System Structure

2.2.4 Android mobile through Bluetooth and Wi-Fi by Arduino based Auto Door unlock control system

This generation, human life plays a vital role in public safety, and be accomplished through evolving technologies and making it possible through automation. Automation at home is one of the security technologies used in Auto door unlock system. The key to open the door be named the Bluetooth key with the mobile device app. The help of a Wi-Fi phone embedded with a camera feature the door be opened it will send snap of the individual present at the smartphone door. User can view image of individual and enable unlock the smart door lock, and also be one locked system.

While within the house, it is possible to open the door using Bluetooth, which can be additionally added for typical home protection purposes, so it can be useful for children or elderly persons, because activate the door via phone on certain location utilizing internet, because as long as surrounding the range of Wi-Fi connection. Install the app in their corresponding smartphone to home members. Thus lead a normal life,

to open the door without anyone help this will help the disability people.

According to (Muthumari et al.,2018) the main objective is the locks system of our homes and workplaces to provide security. People can face little comfort and safety, to unlock a door in a simple and intelligent way. Understand day-to-day experience in such a way that if there is a negative side of crime and robbery, our initiative will support us all in that scenario such that we can have a list about the individuals who enter our homes or workplaces.

This will also make our workplaces and houses secure in really clever way. The digital door unlock system has developed digital keys for smart-lock-system, which the Internet encrypted via the UTP.A system, the door unlock can be automatically unlocked via the central server from which the information can be collected. That's done through the wireless RF transmitter, receiver and RFID reader.

2.2.5 Using Keypad & GSM/CDMA Technology by Microcontroller Based Reprogrammable Digital Door Lock Security System

Presently in the home or office management safety was a main concern. Being harmed by external agent or undesired strangers digital door locking system gives security and safety to homes or workplaces owners, belongings and resources. According to (Mohammad Amanullah el al., 2013), as use a modern platform, approaching more monitoring security for number verification system.

This system doesn't utilize any secret key for conventional security, the system might be possible to hack or break. In this respect, we used an unregulated phone number that does not require the door to be opened. This system using matrix keypad & GSM/CDMA network i made out of the microcontroller.

The automated door lock protection device, built on a microcontroller, is an access control method that only enables allowed people to enter secure areas. In any

time the password can easily change in stored PROM. The program has a keypad matrix. At the point anybody enter the code microcontroller verify the codes in the matrix keypad. But if the entered code is wrong be red signal indicated someone enter wrong code.

GSM/CDMA module can be used to operate the device, The call form the main circuitry will transfer receiving device to anyone make a call from mobile. In event that the call originates from wanted number, the door will be unlocked when function the device. When there is a power failure an IPS circuit can be used for giving protection for emergencies

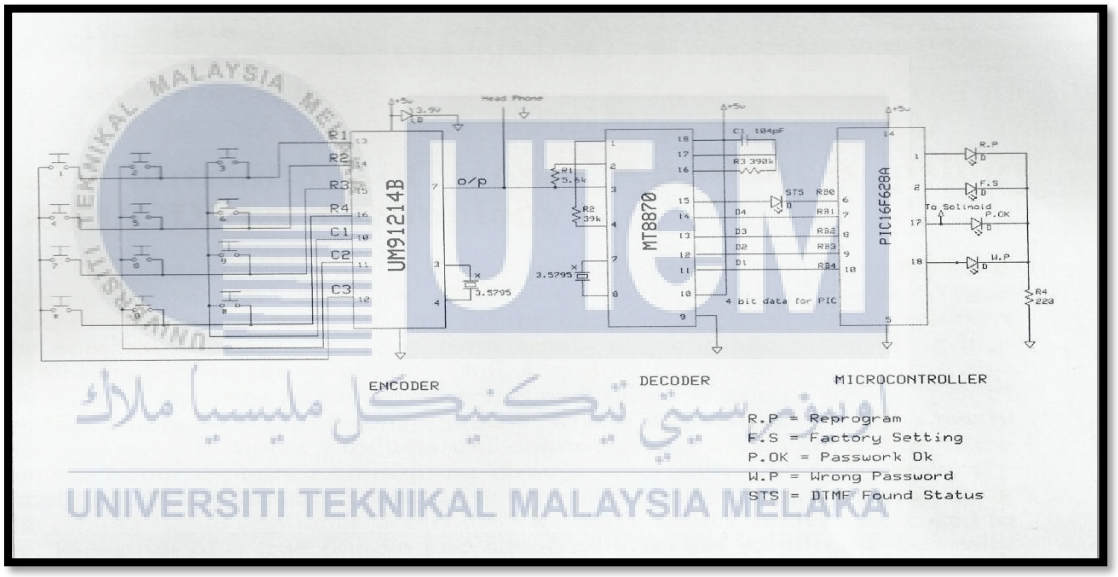


Figure 2.4: Circuit diagram of security system digital door lock

2.2.6 Digital Door Lock Security System Based GSM

GSM (Global System for Mobile communication) is widely used by mobile phone users with digital mobile network in the world. Three

digital wireless telephony technologies were most widely used GSM as variation of time division multiple access through TDMA, GSM and code-division multiple access (CDMA). According to (Ibrahim el al., 2016), using PIC platform the design and implementation of a GSM based Digital door locking system. Make used of a gear motor a 5-digit password used to lock and unlock the doors.

Three times direct attempts failed to enter the username and password login results in a notification being sent to as a methods for recognizing unapproved interruption. Exhibit the proposed system to execute and developed a 3D scaled model of a house with door controlled by a gear motor. Different course of action was made to introduce the control. The Digital Door Lock Security System was constructed and executed successfully based GSM. Both residential and commercial applications can be an emerging product in field of security systems was stable.

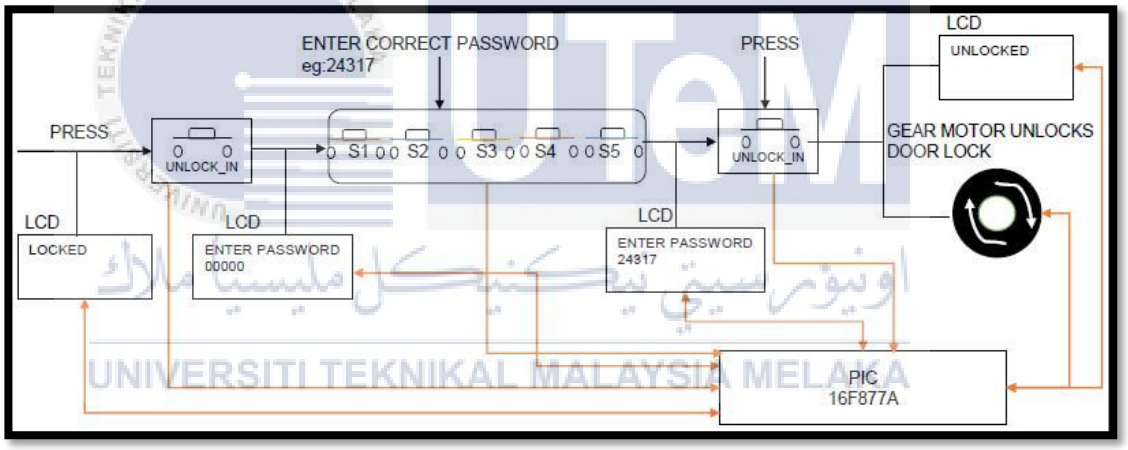


Figure 2.5 : Block Diagram Stage Unlocking

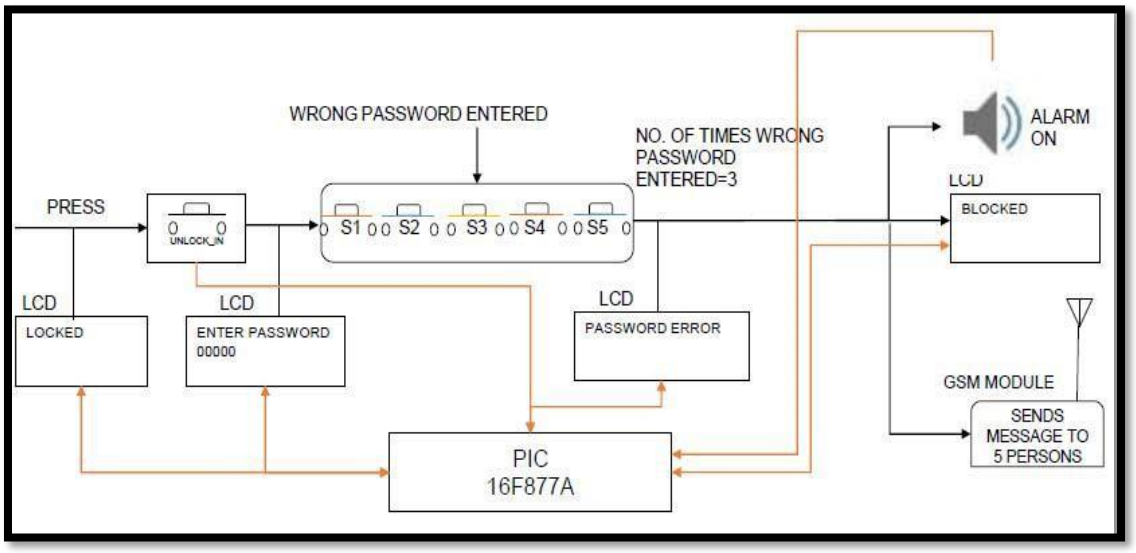


Figure 2.6: Block Diagram Stage Intruder Response

2.2.7 Development of Security Door System using Microcontroller-Controlled.

Throughout the years, insecurity of lives and property utilized battle hazard of few safety efforts. Because, biometric methods such as the iris facial recognition ,finger prints by preventing unauthorized entrance into buildings through ports of entering by conventional and electronic locks such as discrete access code. According to (Oke el al., 2009), a valid smart card authentication guarantees an entry through door security system to permit a client to get to a secure keyless door.

The model comprises equipment module and programming the microcontroller unit using smart card authentication gives a functionality to allow the door to be controlled. The system created in Mikrobasic programming language includes of an equipment module and an application program for microcontroller unit. The microcontroller stage, power supply unit , the door electromechanical relay interface, and the card reader containing three stages hardware module.

The microcontroller really performed by activity control. Insertion of the valid smart card at the entrance inputted from the card reader forms the signs (requests). The desired operational actions of the microcontroller output section is

connected via relays. Enter the building the card in reader is situated outside. All the doors in the room augmented database in card to entrance different doors in the room. The Muster list known as a database list.

When exiting a building the card out reader is situated inside the building. The all doors in the room incremented card out database of multiple exit doors in a room. The card access system enter the building of people that have “Carded In” to produce a list designed. When leaving the building user “Carded Out” upon entrance, user’s name remains on the muster list.

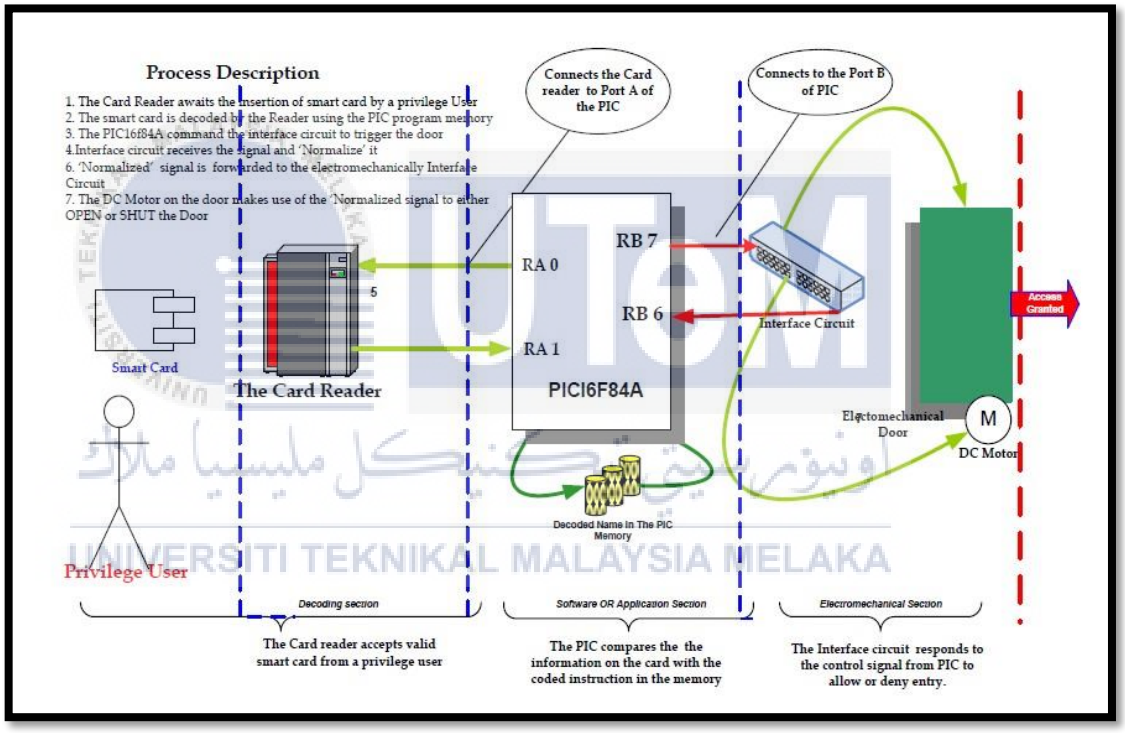


Figure 2.7: The Overall System Design and System Operation Diagram.

2.3 Summary of Extra journal that help in this project.

No	Authors	Title of Project	Technique	Performance Measured	etc
1.	(Sheet el al., 1983)	Fingerprint sensor	Electric output signal.	Contact device or sensor plate of a piezoelectric material.	-
2.	(O'Gorman el al., 1999)	Fingerprint verification	Digital image processing	Fingerprint from a raw image	-
3.	(Rasid el al., 2011)	Local Community Participation in Homestay Program Development in Malaysia	Tourism	Developing infrastructure and facilities	-
4.	(Ibrahim el al., 2010)	Homestay Program and Rural Community Development in Malaysia	Government is on community development and rural tourism	Socioeconomic changes	-

Table 2.1: Extra journal that attach to this work

2.3.1 Fingerprint sensor

This invention relates in identification of his or her fingerprints individual classify to a device. This device similar to the electric output signal into person's fingerprint includes information transforming in particular to a fingerprint sensor. It represents for further processing fingerprint information can be read into a system.

According researcher (Sheet el al., 1983), a piezoelectric material fingerprint sensor made of sensing element and contact device for conversion the fingerprint specific details towards contacting finger into an electric output signal. The surfaces has at least two contact device.

Because of its contact surface, the contact finger pattern changed according to the finger print surfaces of density towards electric charges. The surfaces determining the distribution of charges comprises an electric device to fingerprint sensor. In this fingerprint sensor, electric device of the signal output information towards contact device. Fingerprint data are transformed directly from a computer controlled.

2.3.2 Fingerprint verification

Fingerprints is unique to every person. This makes identifying people Information most reliable for fingerprint matching one. The fingerprints application is for personal authentication, for instance to a bank-machine, access a computer and a network. According to (O'Gorman el al., 1999) verification fingerprint, At which "authentication" indicates that a user matches a fingerprint against a single fingerprint connected to the identity assumed by the person. Digital image processing method thumbprint obtained from an input images to match result. The system will be mentioned such as spoof detection , recognition rate statistics verifications, system security considerations, fingerprint capture devices combination with other biometrics, and the future of fingerprint verification.

2.3.3 Homestay Program Development in Malaysia of Local Community Participation

The travel industry is the second biggest financial supporter in Malaysia, following the assembling division. Documented visitor arrivals exceeded 22.05 million in 2008, resulting in profit of RM49.6 billion (USD13.4 billion). The government has perceived the travel industry in Malaysia as an engine for economic, ecological development, political and social, especially in rural areas. The department of tourism is successfully promoting the Homestay System as a kind of community-based tourism in Malaysia.

It is recognized by the government as a catalyst for development of rural communities, particularly from a financial perspective. Similarly, the benefits of community-based tourism can be evolved through the benefit of women , youth and older people in understanding the ability of the programme homestay, the Malaysian tourism development Master Plan 2001 has been developed. One of several goals of government focus in the Malaysia plan period (2006-2010) is capacity building and tourism activities is among the processes. The overall 3,264 participants had attracted 140 Homestays on June 2009.

The department of tourism managed to put particular emphasis on the Homestay Programmed. According to (Rasid el al., 2011), establishing community members' capacity is a valuable element in ensuring that they profit from the tourism project development. This descriptive study therefore explores the encouragement of local communities associated in the Homestay Program and the capability between several surrounding people as well as training provided by government agencies to motivate local communities.

Homestay Program (Village) and Operators (June 2009)

State	No. of homestays	No. of villages	No. of participants	No. of rooms
Perlis	3	3	55	64
Kedah	7	7	116	175
Langkawi	6	11	152	215
Pulau Pinang	9	9	200	227
Perak	6	30	178	248
Selangor	15	18	581	819
Melaka	5	5	111	144
N.Sembilan	8	26	233	385
Johor	15	18	471	772
Kelantan	8	10	106	163
Terengganu	6	6	149	108
Pahang	12	21	375	412
Sarawak	19	21	233	243
Sabah	18	39	225	413
Labuan	3	3	65	75
Total	140	227	3,264	4,463

Note. Source: Ministry of Tourism, Malaysia (2009).

Figure 2.8: Homestay Program Participation of Local Community In 2009

No.	STATE	Number of Homestay	Number of Villages	Number of Operators	Number of Rooms
1	Perlis	3	3	56	64
2	Kedah	14	19	324	421
3	Pulau Pinang	9	9	200	227
4	Perak	6	30	231	308
5	Selangor	15	18	458	660
6	Melaka	7	7	115	173
7	Negeri Sembilan	10	30	251	379
8	Johor	16	35	508	663
9	Kelantan	8	9	152	182
10	Terengganu	6	6	101	103
11	Pahang	15	20	259	387
12	Sarawak	28	32	419	549
13	Sabah	16	25	228	438
14	Labuan	3	3	79	97
	TOTAL	156	246	3,381	4,651

Source: Ministry of Culture, Art and Tourism, Malaysia, 2011

Figure 2.9: Homestay Program Participation of Local Community In 2011.

2.3.4 Rural Community and Homestay Program Development in Malaysia

In Malaysia’s economy manufacturing sector is the second biggest supporter travel industry.The travel industry contributed RM 49.6 billion (USD 13.4 billion) and the nation recorded 22.05 million appearances in income 2008. The Ministry of Tourism emphasis unique travel industry item through homestay program. Understanding the project 's capacity, the 2001 economic development Master Plan was classified as a catalyst for economic and social development in order to progress homestay programme. The rural tourism is one of the components spotlight by government on community development in ninth Malaysia Plan (2006-2010).

The homestay program is capability to give extra pay and business, the quantity has been expanded to homestay suppliers in Malaysia. According to researcher (Ibrahim el al., 2010), the Malaysian Homestay Program discusses the evolution and concept rural community development in Malaysia contribution towards institutional framework of implementation and planning. The utilization of the limit homestay may diverse various nations. Example, English language learning often associated with United Kingdom where as in Australia farmhouse accommodation connected with the term especially.

The major dictionaries yet to be remembered the term of homestay. However, understanding among the villagers implementation high demands commitment. In required to design an effective homestay project a serious effort is required, especially in terms of advertising, without relying on the support of people from other countries. The rural communities provided huge opportunities for homestay program development.

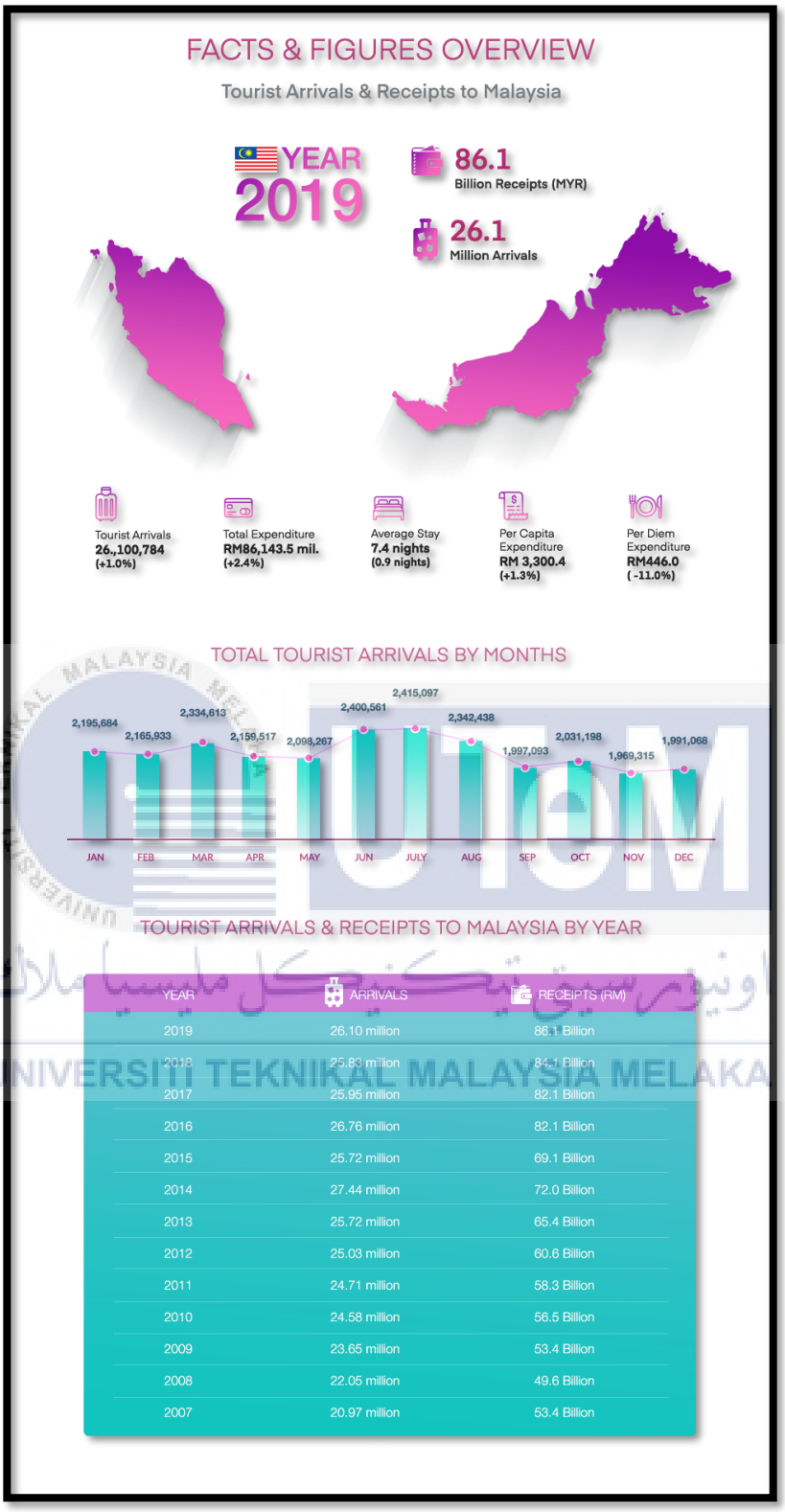


Figure 3.0: Total Tourism Arrival to Malaysia

2.4 Summary Table

The overall journal summary which conducted by multiple researchers is illustrated via the

Table 2.2: Seven most similar article and summarize it

No	Authors	Title of Project	Technique	Performance Measured	etc
1.	(Kirbas el al., 2017)	Wifi Based and time Limited Secure Control System	Key-Token Security Mechanism	Time-Limited Access	Minicomputer (Raspberry Pi 3)
2	(Yunge el al., 2015)	Apps for the Internet of things	Wireless Sensor Networks and Apps	Notification, Mailbox	Hybrid Apps
3.	(Hussein el al., 2017)	Smart Door System for Home Security Using Raspberry pi3	Smart home automation security face recognition	Object tracking and then used an illumination-sensitive background modeling	Message alarm and also sending proper live feed to the owner
4.	(Muthumari el al., 2018)	Arduino based Auto Door unlock control system by Android mobile through Bluetooth and Wi-Fi	Bluetooth module and wireless camera embedded with Wi-Fi	Identify the person and how fast the Bluetooth can perform	Arduino microcontroller
5.	(Mohammad Amanullah el al., 2013)	Microcontroller Based Reprogrammable Digital Door Lock Security System by Using Keypad & GSM/CDMA Technology	Keypad & GSM/CDMA	DTMF encoder and decoder	-
6.	(lbrahim el al., 2016)	GSM Based Digital Door Lock Security System	LCD display and buzzer	Intruder Response	Microcontroller PIC 16F877A, GSM module
7.	(Oke el al., 2009)	Development of a Microcontroller-Controlled Security Door System.	Card reader, smart card	Door access control	-

CHAPTER 3
METHODOLOGY

3.0 Introduction

The chapter includes a summary and explanation of the project methodology. This will be carried out with the method of understanding and fulfilling the analysis in order to achieve the desired goals. The chapter is composed of four elements. First of all is flow of the project then secondly it blocks diagram which suit to create the project top to bottom. Next was the working flow of project. Lastly, all the element which needed in this project which is hardware and software was explained in this chapter.

3.1 Project Methodology

This project details was shown in the Figure 3.1 flow chart. In this project flowchart should illustrate the methodology. Selecting the proposed project begins by doing research depending on the flow chart below. There is a lot of information learned and studies to design this project type. In their research, people face the issues in this project has been developed. Make it interesting and simple study the problem to solve and collected all the information in order. In addition, all materials, components or software chosen for this project have a source from the research study.

After all the information from the study or journal related to the project was gathered, the literature review was continued to evaluate all the previous studies related to the project research as a guide. As a result, the design of the project was carried out after conducting the literature reviews. Next is design part where it divided into two part which is software and hardware design. In the hardware part, implement security door with finger

print detection with app.

Nowadays, each and every one using smart phone so the main idea is form outside a range can access the security door using fingerprint. Web base server is the important role play in this project which the data access towards the entry should be register in the system. However is creating a app and it should be interconnect into door mechanism that must synchronize with a successful entry.

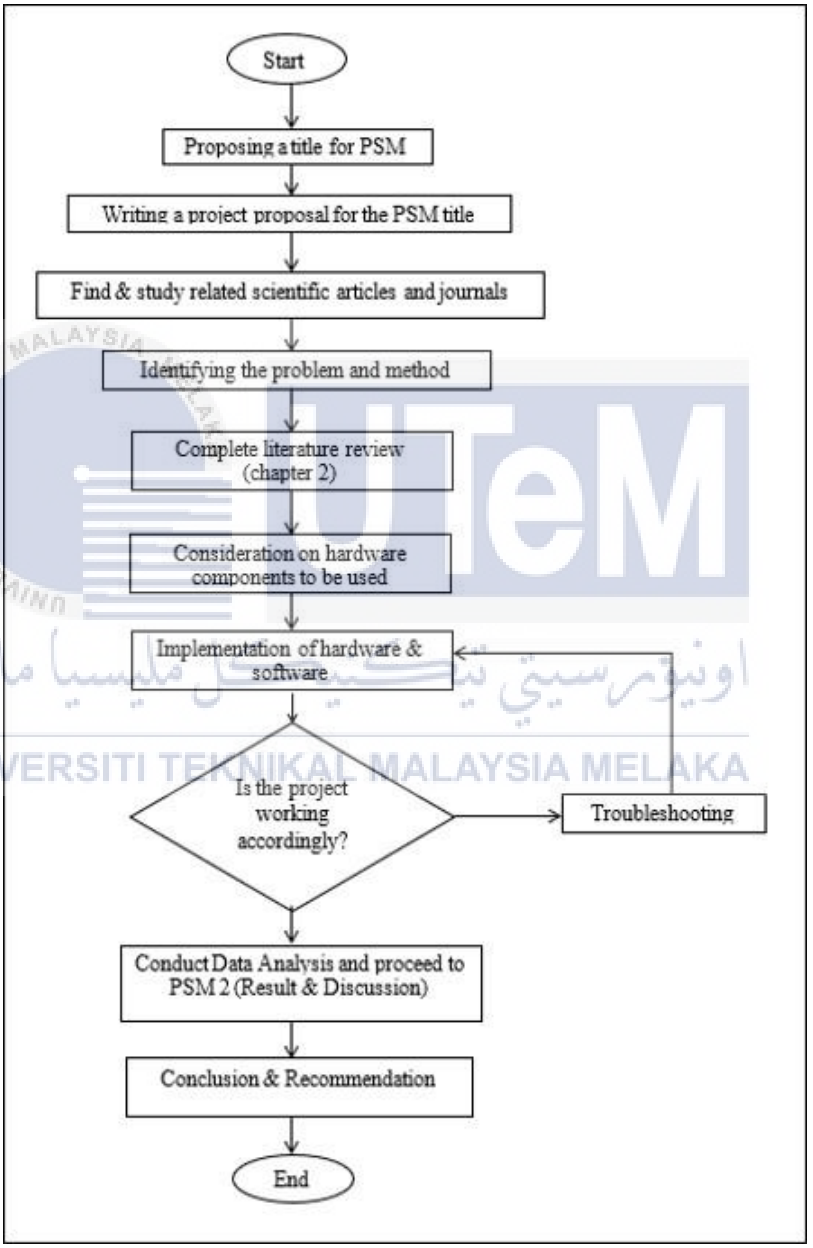


Figure 3.1: Flowchart of overall PSM flow

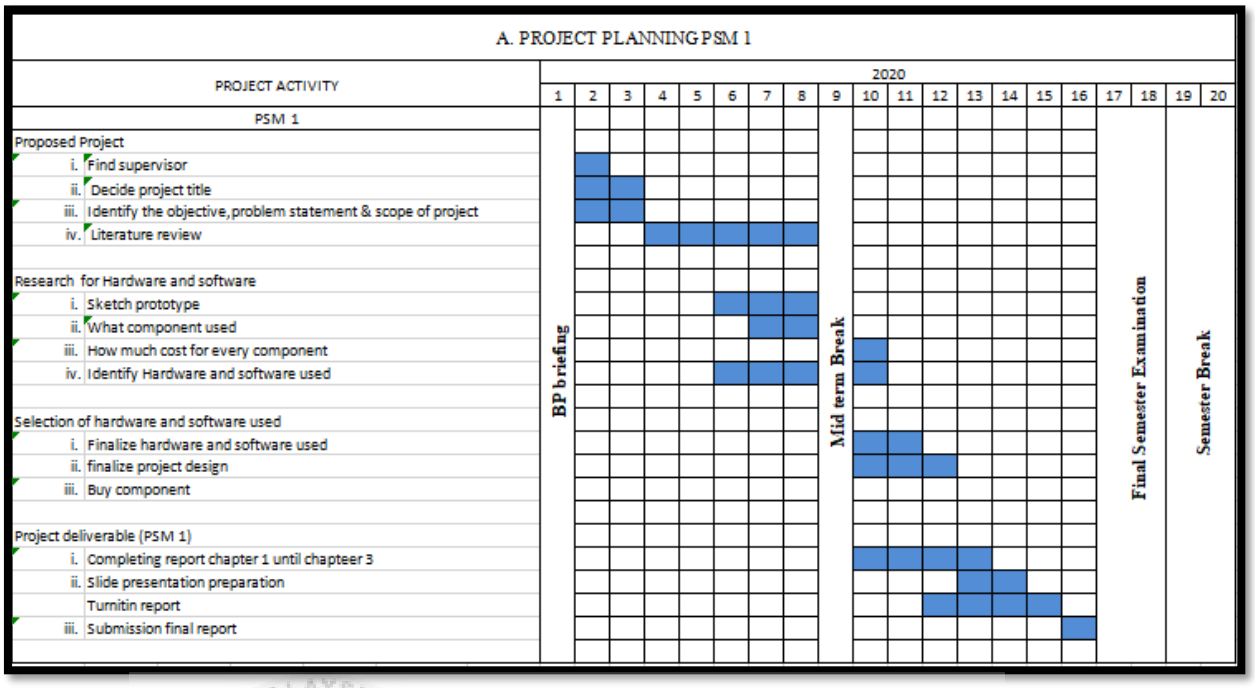


Table 3.1 : Gant Chart for project PSM 1 Progress

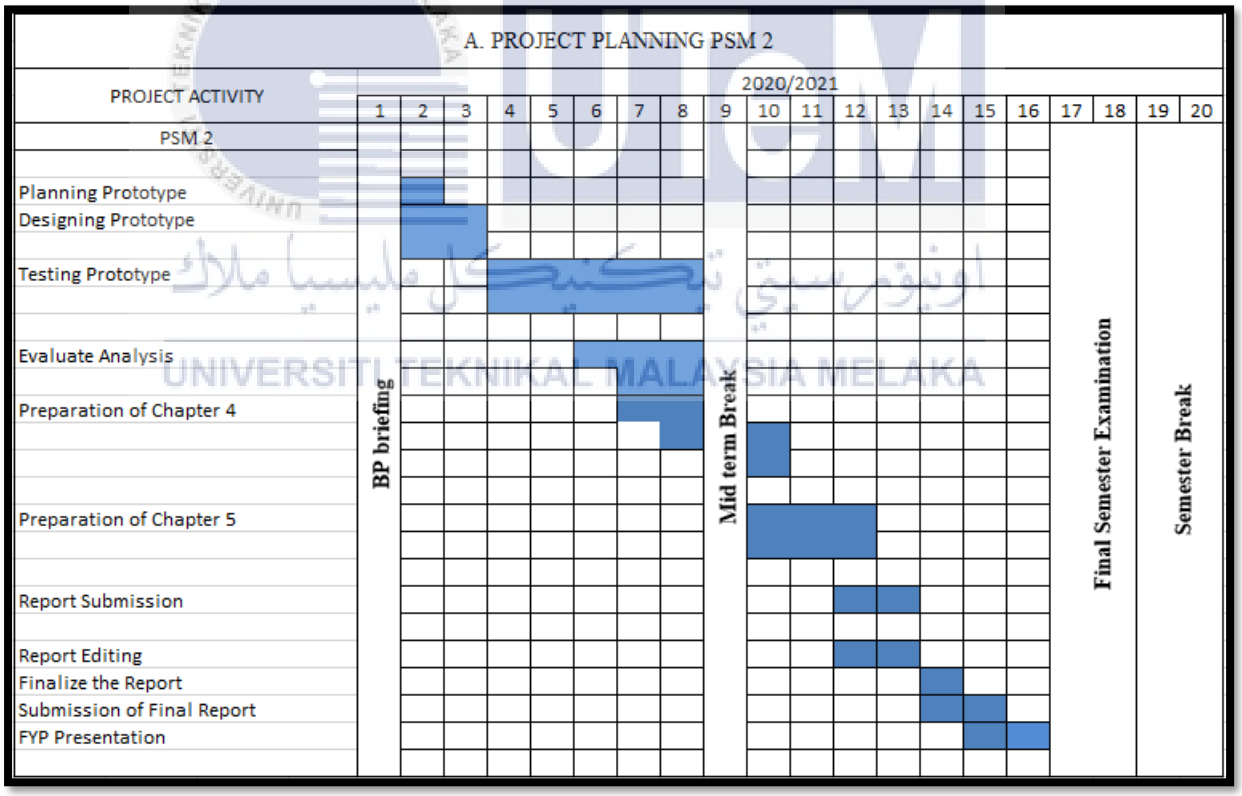


Table 3.2 : Gant Chart for project PSM 2 Progress

3.2 Project Block Diagram

Figure 3.2 shows the block diagram for security door using fingerprint with app. This block diagram on how the security door using fingerprint with app perform and implementation together with the software application and hardware components. The Wi-Fi module would be combined with the Arduino microcontroller. The Wi-Fi module would be a medium for transmitting data to the smartphone device that serves as a system input.

In this system, user will create account such as Email and password to login the ionic app. User need to scan the QR code to enter the specific door. Then user can fill the ticket name and check in and check out date for staying at homestay. Once admin approve the user login they can enter manually by fingerprint in the app which is connected to the door latch through the nodemcu. When they register their time and date to stay at homestay will login manually until the date expired.

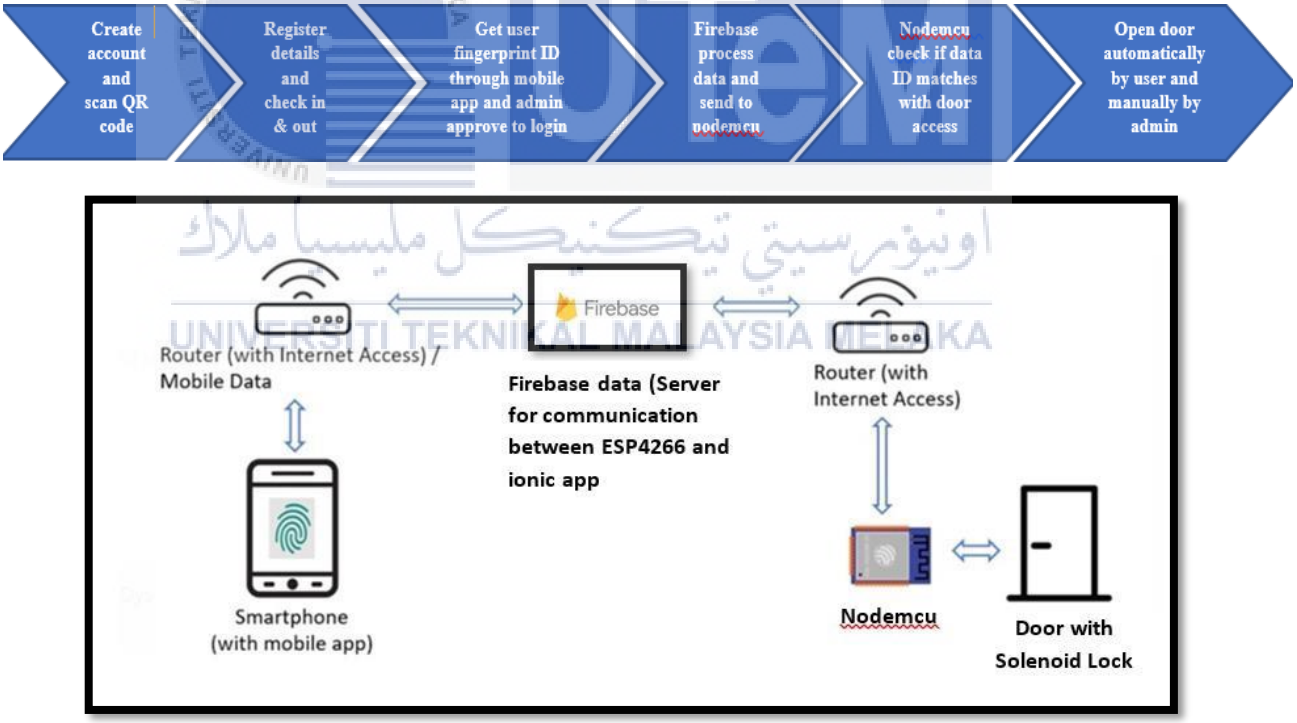


Figure 3.2: Block diagram of security door with app using fingerprint

3.3 Hardware specifications

In this part of the project, various hardware and materials were used to produce the required output product. The hardware components implemented in this project are the Nodemcu, Wifi device, Relay Module, 12V DC Solenoid Door Lock, Micro USB cable, Android-powered smartphone and other valuable components that are useful for this project.

3.3.1 NODEMCU Wifi

NodeMCU is an open-source LUA-based firmware built for the ESP8266 wifi chip. By exploring the capabilities of the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development Board/Kit i.e. The Production Board of NodeMCU. The ESP4266 is a low cost Wi-Fi chip developed by Espressif Systems with a TCP/IP protocol. This makes it an ideal alternative for all sorts of Internet of Things (IoT) ventures. CPU, RAM, WiFi, and even a new operating system and SDK. This makes it an ideal alternative for all sorts of Internet of Things (IoT) ventures.

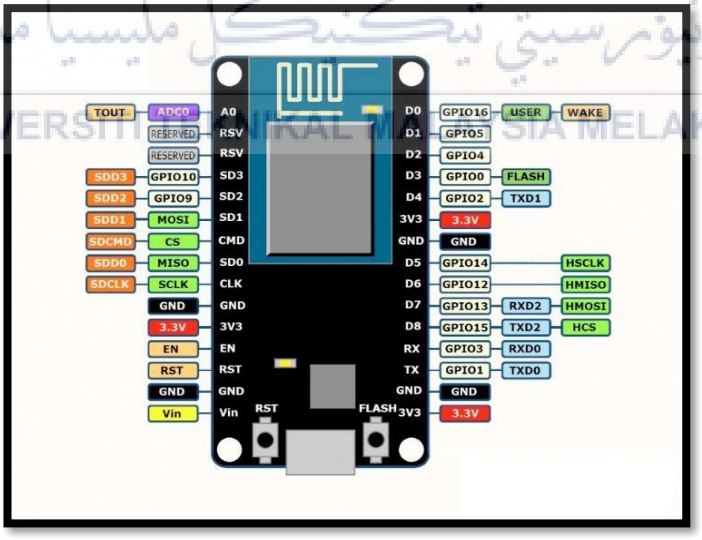


Figure 3.3: Pin configuration of Nodemcu

3.3.2 12V DC Solenoid Door Lock

Solenoids are basically electromagnets, a large coil of copper wire with a balanced armature. The slug is pulled towards the center of the coil, while the coil becomes energized. This leaves the solenoid capable of pulling from one hand. This solenoid is comfortable and strong because it has a slug with a slanted cut and a strong bracket for mounting. In fact it's an electronic lock. The lock is usually working, meaning that you can't unlock the door because the solenoid slug is in the way. At this Level, it uses no electricity. Nevertheless, the slug pulls in as 9-12VDC is added, and the door can be opened.

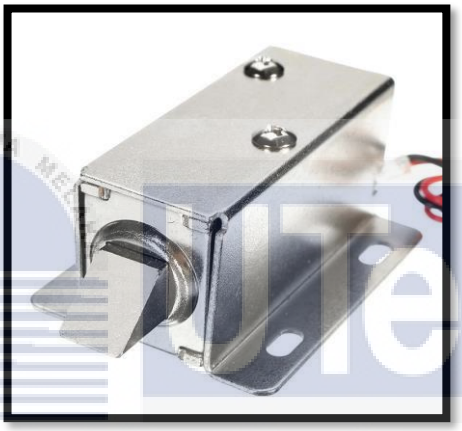


Figure 3.4 : 12V DC Solenoid Door Lock

3.3.3 Relay Module

A relay essentially is an electromagnet powered device. The electromagnet needs a small voltage to activate which we will give from the Arduino and will pull the connection to create the high voltage circuit once it is triggered. The relay module we will use will be the SRD-05VDC-SL-C. It runs on 5V and we can use any microcontroller to power it. That limits with strategy for thinking level signs from 3.3V or 5V contraptions and it's furthermore Opto partition equipment. It can be used to control distinctive mechanical assemblies, and diverse supplies with huge current.

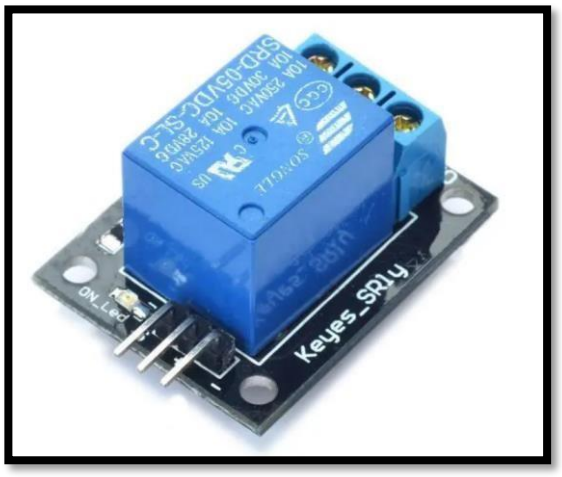


Figure 3.5 : Relay Module

3.3.4 Micro USB cable

A regular USB 2.0 connector on one end and a Micro USB connection on the other is supported by the micro USB cable. Insert the USB plug into a Micro USB port connected with a monitor, gaming console, or AC adapter, and the Micro USB plug.

Figure 3.6 : Micro USB cable

3.3.6 Fire Base

The Firebase Realtime Database is a cloud-hosted NoSQL database that lets you store and sync data between your users in realtime. Cloud Firestore enables you to store, sync and query app data at global scale.

The Firebase Realtime Database lets you build rich, collaborative applications by allowing secure access to the database directly from client-side code. Data is persisted locally, and even while offline, realtime events continue to fire, giving the end user a responsive experience. When the device regains connection, the Realtime Database synchronizes the local data changes with the remote updates that occurred while the client was offline, merging any conflicts automatically.

The Realtime Database provides a flexible, expression-based rules language, called Firebase Realtime Database Security Rules, to define how your data should be structured and when data can be read from or written to. When integrated with Firebase Authentication, developers can define who has access to what data, and how they can access it.

The Realtime Database is a NoSQL database and as such has different optimizations and functionality compared to a relational database. The Realtime Database API is designed to only allow operations that can be executed quickly. This enables you to build a great realtime experience that can serve millions of users without compromising on responsiveness. Because of this, it is important to think about how users need to access your data and then structure it accordingly.

Figure 3.7 : Fire base

3.3.5 Ionic mobile app

In 2013, Max Lynch, Ben Sperry, and Adam Bradley created Ionic mobile app. Ionic is a full open-source SDK for the development of hybrid mobile app development. It also enables the use of Ionic elements and no code for the user interface at all. Ionic offers resources and facilities for the development of hybrid smartphone, desktop and progressive web applications based on modern web development frameworks and techniques, leveraging web technologies such as CSS, HTML5 and Sass.

Allowing configuration easier for settings. Ionic Smartphone Device has experienced a remarkable transformation to allow more robust management and control of the door access system.Door Status and User Movement are two lists of information that appear under the Monitoring tab. Door statuses are displayed as Offline, Open Door, Close Door, On Alarm, Timeout, or Disabled.

Under the User Movement list, will be able to monitor In and Out time of people through a display of the User ID's, the door accessed by the people member and the corresponding time of the access. This system advanced access control models is used to card, fingerprint and face recognition verification and multiple terminals that centralized in ingress network control panel.

Figure 3.8: Ionic Mobile apps

3.4 Project implementations

Once the hardware specifications were finalized, the project implementation flow was determined and analysed. Some of the factors that have an effect on the method when carrying out an analysis of potential risks, the dimensions of the technological response needed, ensuring a solid desired performance and maintaining the functionality of the mechanism in the long term. When such aspects have been identified, the planning of a comprehensive development plan for the project will be made as appropriate to the requirements. Outlining the optimization of the implementation of the task is important to reinforce it, because it requires an extraordinary deal of thought in which any adjustments made as soon as the systems are finalized could be difficult within the proof of the implementation of the project.

In this part, the task that make so challenging is the integration of hardware and software implementation on conducting this project. On doing this part it is also ensure the objective to be followed Security door with app using fingerprint. One of the major components used in this project are Relay module, 12V DC Solenoid Door Lock, ESP32 Arduino based microcontroller, Micro USB cable, Android powered smartphone

The concept is applied in order to have safer securities because users do not need to remember passwords and do not need any sort of keys or cards that sometimes get lost. If someone's fingerprint is allowed to access a door in the network, he / she wouldn't face any sort of delays. Fingerprint identification is one of the simplest devices, because one person's fingerprint never fits another. Therefore, unauthorized entry can be limited by designing a lock that will save one or more authorized users' fingerprints and unlock the device when a match is identified. Modern portable devices such as cell phones and laptops will quickly guess the effectiveness and reliability of fingerprint scanner from its use.

3.5 The Operation Flowchart

The overall process flow of the security door with app using fingerprint is illustrated via the flow chart shown in Figure 3.5

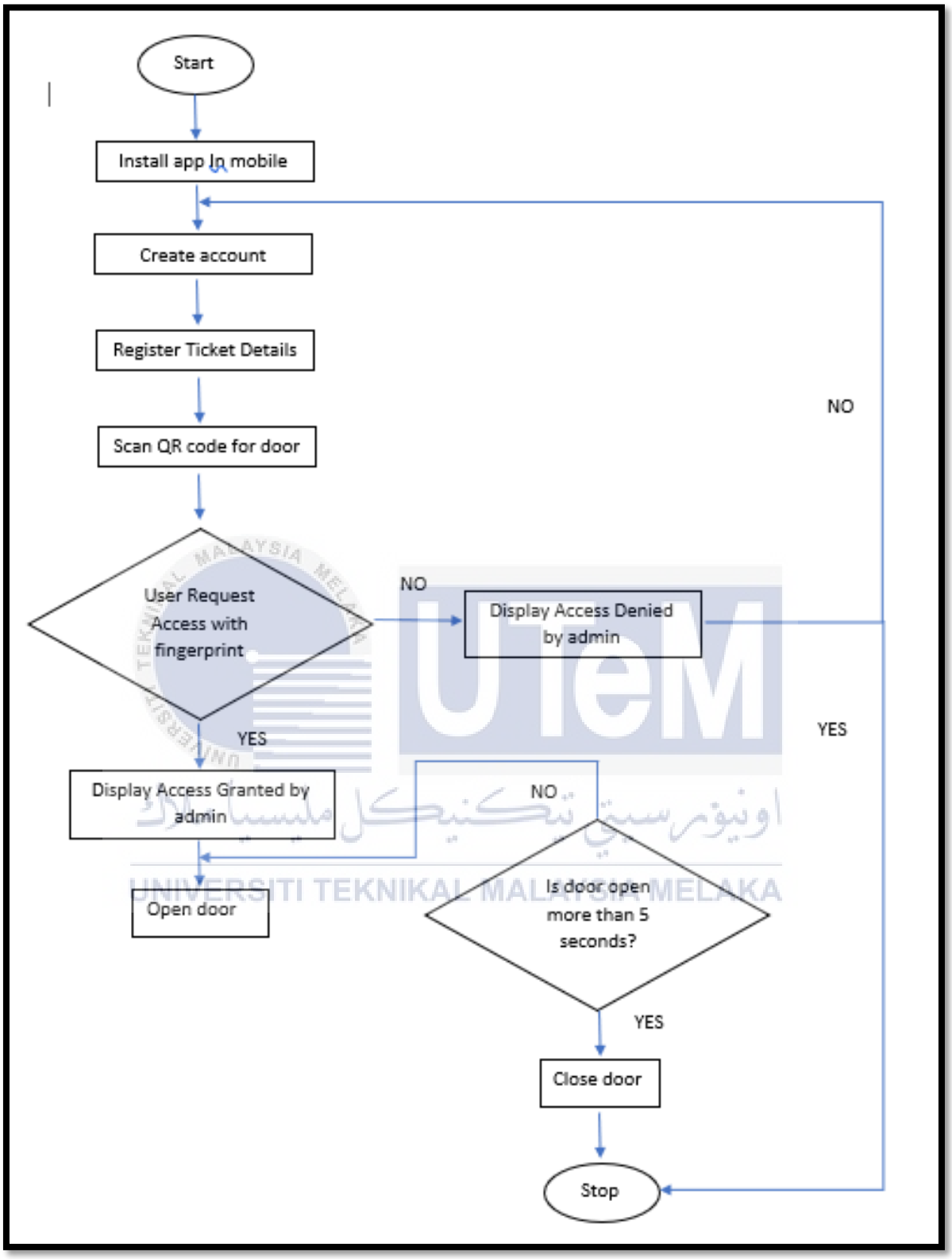


Figure 3.9 : The device operation flow process

3.6 Project Costing

Table 3.6 show the estimate cost to build this project that show Solenoid Lock 12V is the most expensive component compared to others. The lowest cost of component is buzzer. The total cost for this project roughly about RM132.50.

No	Products	Quantities	No Resit/Invois	Real Price (RM)
1	Project Board	1	CS00033474	10.00
2	Header Rainbow (Jumper)	1	CS00033474	10.00
3	KSE Test Pan	1	CS00033474	2.50
4	NODEMCU Wifi device	1	CS00033474	28.00
5	Buzzer	1	CS00033474	2.00
6	5v Relay Module	1	CS00033474	15.00
7	12V Adapter	1	CS00033502	17.00
8	Solenoid Lock 12V	1	CS00033502	48.00
Total Cost				RM 132.50

Table 3.6 : Total Cost of Project

3.6 Summary

This summary of the methodology illustrates the importance of selecting the right methods of research and operational preparation in the process of regulation as effectively as possible. The conceptual model of this chapter is emulated with many measures to ensure that the outcome of the project is as similar as previously expected. This chapter also presents the platform and the means of obtaining the desired data and information which are important to the objective of executing this PSM title. One of the objectives to design security door with app using fingerprint and develop a secure management mobile app to homestay. If this chapter analyzed correctly, would gain an effective approach to replicate the desired data and is beneficial to the homestay management

CHAPTER 4

RESULT AND DISCUSSION

4.0 Introduction

The performance and results of the development of the fingerprint detection door with the app will be illustrated and discussed in this section. In addition, the implementation and design of the prototype will be demonstrated. At the same time, the configuration of the software using nodemcu version 2 will also be demonstrated. Analysis addressed related to the accuracy of the fingerprint and the response time to activate the door. At the end, the discussion of the project outcome will also be included in this chapter.

4.1 Software and coding Development

4.1.1 Coding for Nodemcu

The key component of this project is the ESP4266 nodemcu version2, which communicates the whole project to a smart phone. Some coding has been introduced to function and communicate with a smart phone. That is safely because that the owner phone authorised to communicate. The name assigned to a Wi-Fi (wireless) network. All devices in the network must use this case-sensitive name to communicate over Wi-Fi, which is a text string up to 32 bytes long. So the authorised person only have power to change the ssid and password for security purpose.

```
#include <ESP8266WiFi.h>
#include <FirebaseArduino.h>

// Set these to run example.
#define FIREBASE_HOST "dooraccess-dd7c3-default-rtdb.firebaseio.com"
#define FIREBASE_AUTH "8UmNBwYaZPznxbLfslNrxFI8dkvAEpo8scPyvAs4"
#define WIFI_SSID "Shashan"
#define WIFI_PASSWORD "2811996loga"
String doorid = "Door1";
uint8_t doorpin = D2;
void setup() {
  Serial.begin(9600);

  // connect to wifi.
  WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
  Serial.print("connecting");
  while (WiFi.status() != WL_CONNECTED) {
    Serial.print(".");
    delay(500);
  }
  Serial.println();
  pinMode(doorpin,OUTPUT);
  Serial.print("connected: ");
  Serial.println(WiFi.localIP());
  digitalWrite(doorpin,HIGH);


  Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
}

int n = 0;

void loop() {
  String path = "/keylist/"+doorid+"/";
  boolean doorstatus = Firebase.getBool(path+"open");
Serial.println(doorstatus);
if(doorstatus == 1){

  digitalWrite(doorpin,LOW);
  Firebase.setBool(path+"open",false);
  delay(5000);
  digitalWrite(doorpin,HIGH);
}

}
```

Figure 4.0 : Coding for nodemcu

4.1.2 Ionic Application Development

The main program of the development of the fingerprint detection door with the app is the development of ionic application. By using the ionic application, it had multiple function such as the Wi-Fi connection, password access, and lock and unlock the door system as shown in figure below. Then register the particulation for check in and check out details for homestay. There are some features such as scan QR code for door and verified fingerprint entering the homestay. For admin need to run the program in command prompt. If compiled successfully the browser window will opened http://localhost:8100! as shown in figure below. It automatically open the ionic app in laptop or Pc.

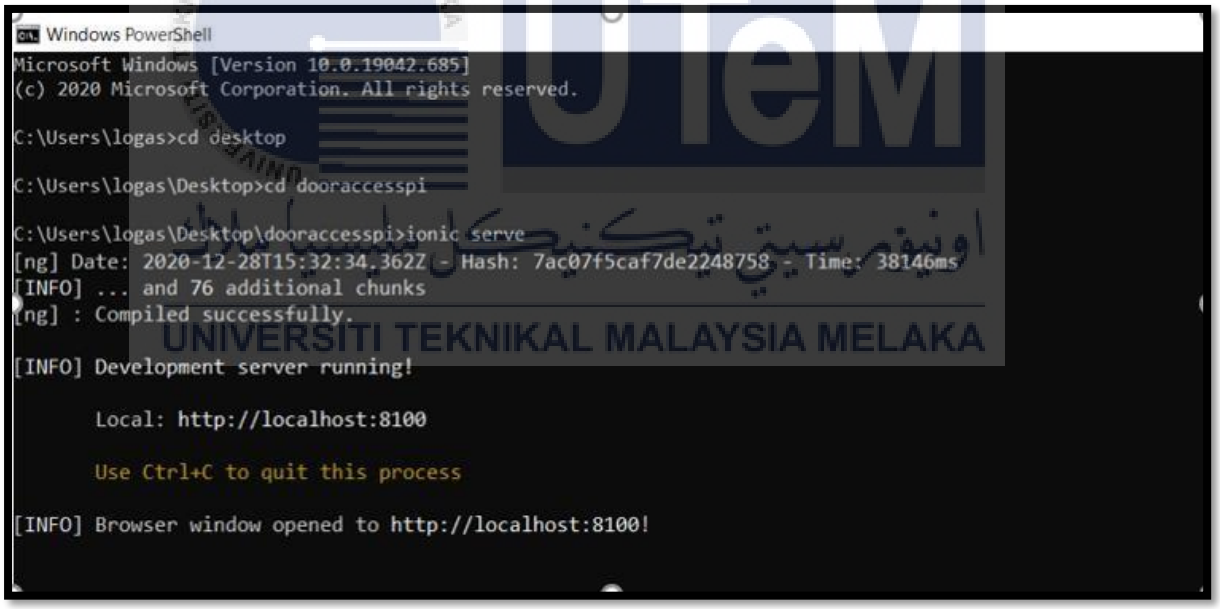


Figure 4.1 : Command prompt

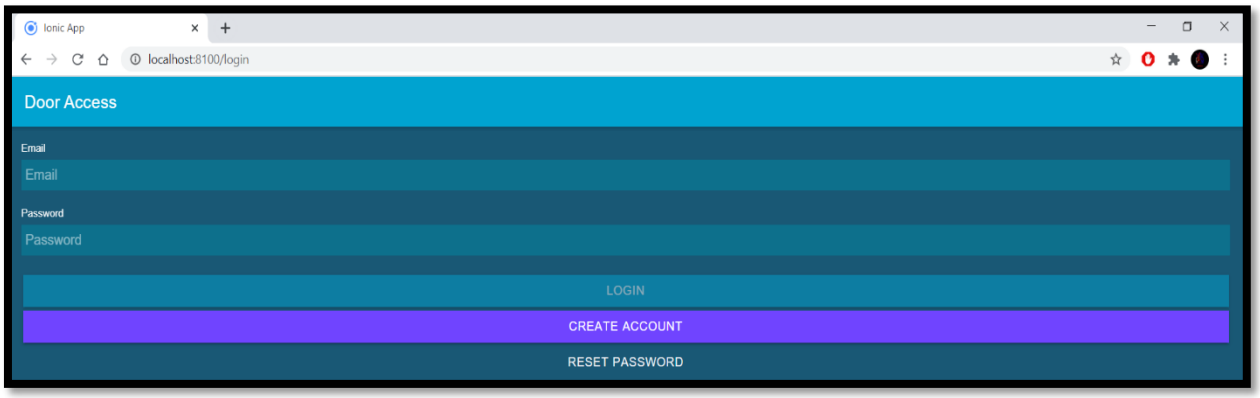


Figure 4.2 : Ionic app in browser

4.1.3 Ionic application in phone

A document with the APK record expansion is an Android Package record that is utilized to circulate applications on Google's Android working framework. APK documents are saved in the ZIP design and are regularly downloaded straightforwardly to Android gadgets. For User they need to install the Apk file for homestay loga app.

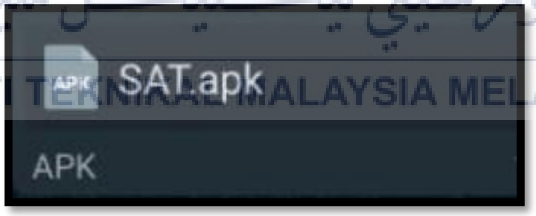
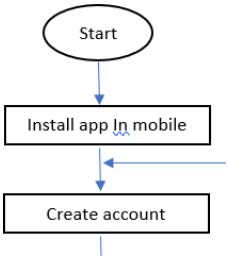
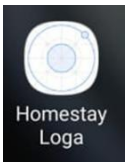
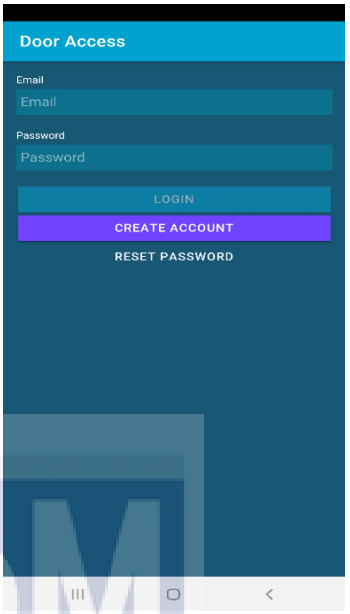
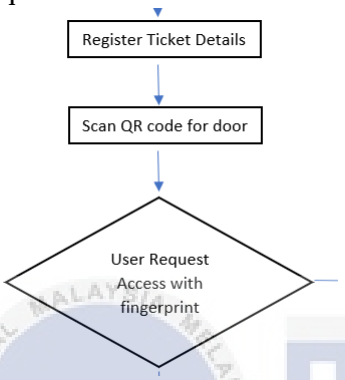
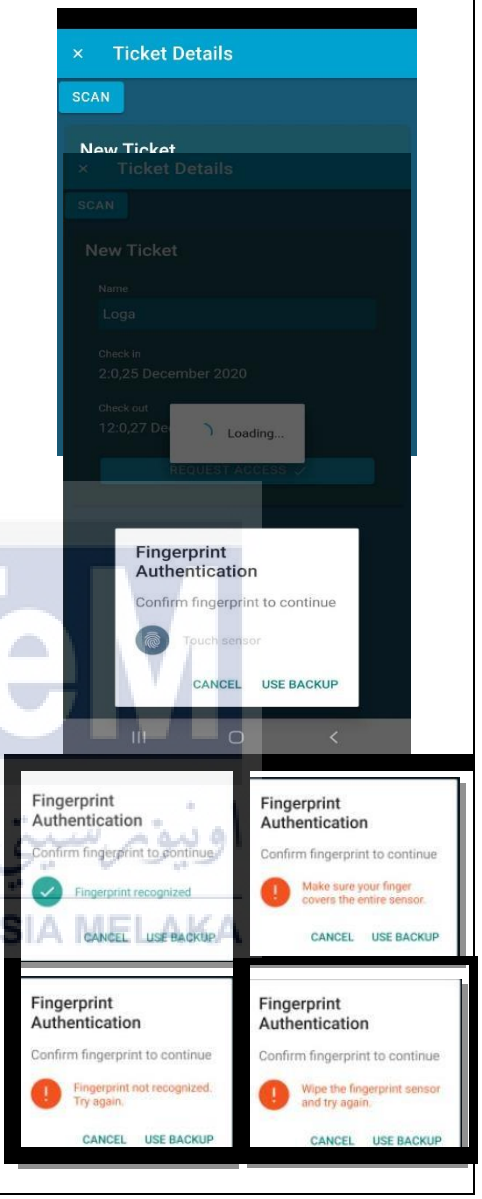
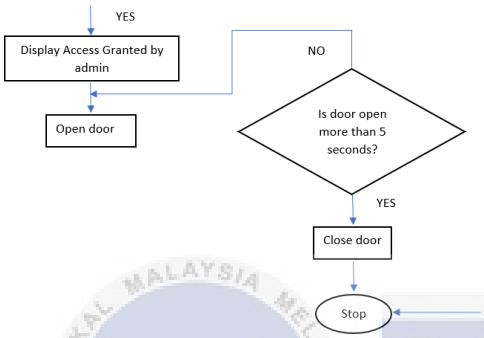
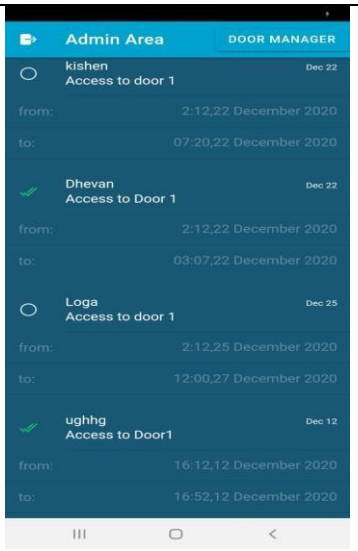


Figure 4.3 : Apk file to installing ionic app for homestay loga

4.1.4 How the application function

NO	Flowchart	Actual Result
1	User need to install the app call Homestay Loga, the main screen will show the Door Access and create account. 	 

2	When user enter details and click login, its shows Ticket Details. Need to register name, when they want check in and out. Top there got SCAN access for the door they want to enter. Each door got different QR code they can simply scan and request access to admin.  Before the request to admin we need to fingerprint the authentication by press the touch sensor in phone. This are the outcome might get, if user fingerprint recognized automatically admin will have the request list to approve.	 

3	Admin give access to user to open door. Double tick means admin give access towards no tick, no access. Admin can view the Ticket Details when they want to booked and delete the unnecessary room. 	 

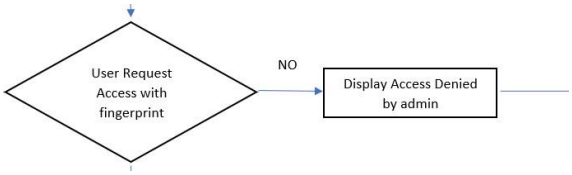
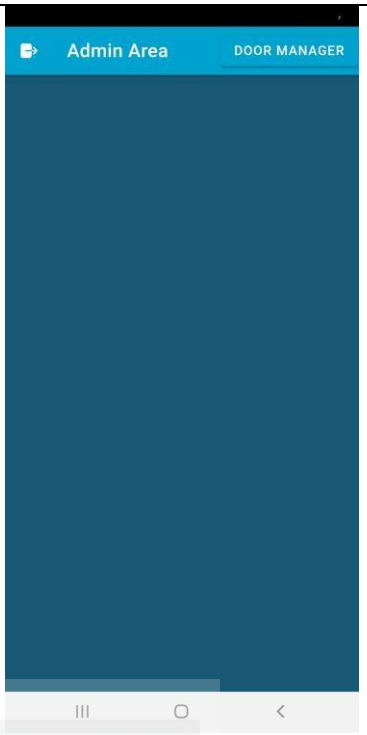
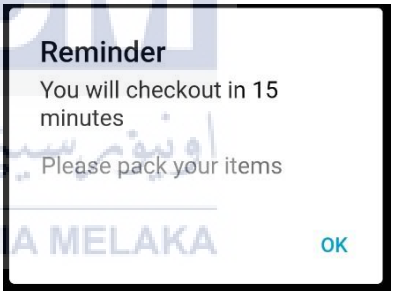
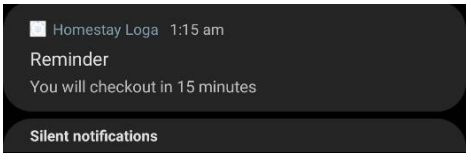
4	Admin have authority to delete unwanted door access slot. In Admin area screen already delete the user register once their booked date is over. If the admin refuse the access maybe need to register again.  	
5	Notification for booked homestay might helpful for the user to remember the time for checkout. This app is very convenient and easy to be used. User will clear their things and pack items within the checkout time.	 

Table 4.1: How the application Function

4.2 Hardware Development and Experiment Work

The development of the fingerprint detection door with the app was successfully developed based on the objectives and the internal functionality has been implemented. A preliminary prototype was implemented as shown in figure below where the nodemcu act as “central commander” to control the flow of the system.

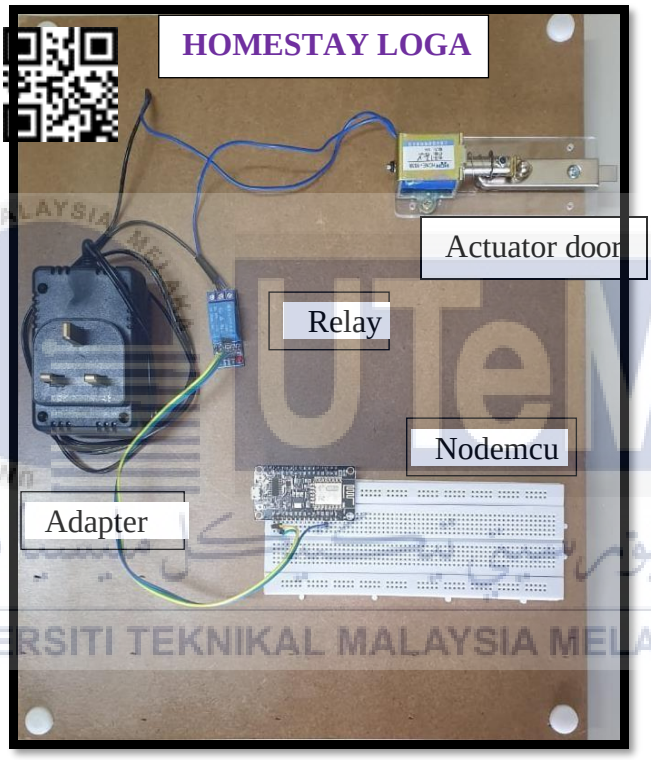


Figure 4.4 : Hardware Development

4.3 Project Analysis

In this project, the aim of this experiment is analyses the response time to enter door. In other words, the message in term of sending the alert notification to the user during the homestay loga checkout time. The purpose of this analysis is very important in order to

determine the performance of Wi-Fi technology and ionic app to send and receive the message.

No. of Test	Distance (m)	Time taken for app functioning to enter door (s)
1	0	1.35
2	1	1.50
3	2	1.83
4	3	2.43
5	4	3.10
6	5	3.58
7	6	4.05
8	7	4.60

Table 4.3 : Time taken for app functioning to recognise message to enter door

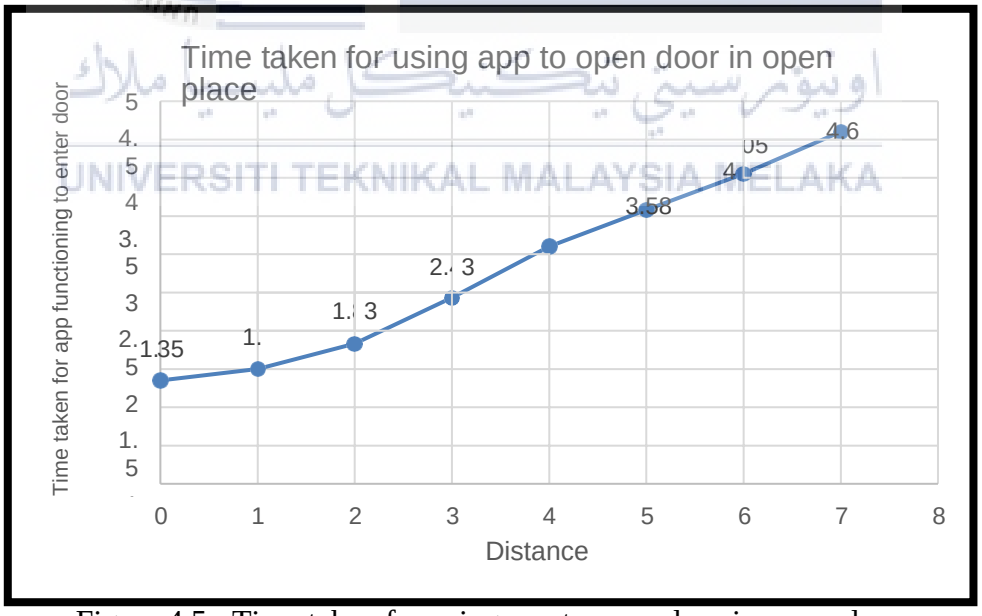


Figure 4.5 : Time taken for using app to open door in open place

4.4 Discussion

In this project, the main focus is to design security door using apps and fingerprint and develop a secure management mobile app to homestay. This was a long journey where begins with the problem statement and comes out with an ideas until developing process and problem faced during the development of the app. Finally, the prototype of security door using apps was successfully implemented and achieved the objectives stated. It is a purpose to implement the security door for able to minimize the key management for user to access homestay and also with an affordable cost to be use. Although, there are numerous security system has been implemented and sold in the market, but there still have some limitation in term of portability, cost and durability. There are few problems faced during complete the hardware and software. There took some time to troubleshoot the coding. Besides that the problem faced during complete is the hardware where the cable is too sensible for nodemcu running and too hard to control and initialize with coding. By guidance of research methodology of security door it could make ease and helpful for some source to this project.

CHAPTER 5
CONCLUSION & RECOMMENDATIONS

5.0 Introduction

In this chapter, the overall development and performance of Security Door with fingerprint detection with app is discussed. This chapter also discuss about the achievement of the project objectives and explain on the overall performance and briefly outline the Security Door system with the nodemcu and Wi-Fi technology. Giving recommendations and propositions to the future work in the terms of, how to further improve and develop the system more efficiently.

5.1 Conclusion

The Industrial Internet of Things (IIoT) or Industry 4.0 are both names dedicated to the use of IoT technologies in work settings in this modernization generation. The idea is the same as for home IoT electronic apps, except in this project the goal is to work with using app and fingerprint and develop a secure management mobile app for homestay. The program for android app was created that fingerprint to access a secure control system to Monitor the door opening and situated at a distance from the individual. The app built on the phone would inform the door and delivery the instructions to nodemcu to regulate of

opening and closure of door.

At the beginning, the intent of this project is to study on better solution for replacing key management to customer for access homestay to preventing it from the theft or unauthorized person. Here, developing a new security door system in app, which will provide the user on his mobile phone without wasting any time, when any one stolen the homestay key. All this can be done by installing the Apk file for installing the homestay app . By doing this, able to provide security to the homestay for preventing it from the theft or unauthorized user to access.

From the study of the Nodemcu and Wi-Fi technology, it is found that these technologies have proven to be effective because of its low cost, high reliability and easier to interface with Arduino. Lastly, this study leads us to be convinced that ionic app was one of the trustful systems that capable of implementing on the security door system and the Wi-Fi system providing the text message service to inform the user via their mobile phone to alert the user to pack their belonging within 15 mins. This project is undertaken with the aim of designing an affordable in term of cost for security door using fingerprint detection with app system.

At the end, a prototype of security door was successfully developed. The prototype able to function and allows the authorized user to access the system on his mobile phone. Meanwhile, admin will deny the unauthorized person those who wrongly register their details in the app. Most importantly, the total cost expenditure for the components was below than hundred thirty ringgit which is affordable by the large community. This system is however more advanced because by applying the WIFI technology, it is more convenient nowadays and use mobile phone daily.

In additional, the intention of examining the relationship between the times taken by the Wi-Fi technology to response against the distance has been analyzed. Through the experiment data obtained, it is shown that the distance will affect the time taken by the Wi-Fi technology to response, where the modem takes a quite number of time to reconized a message when the distance is further. However, the results of the analysis are limited since the distance studied is based on only few hundred meters.

5.2 Future Recommendations

Nowadays the tourist is rapidly increasing in number to booked for homestay. However, key locking system still used in door but this security is not adequate to secure. Due to this reason, it is recommended to use the mobile apps to control the security system and to look for more advanced security. This project introduces the wireless technology effectively for the environment by using the Wi-Fi technology modem. It is also recommended to install a hidden camera in security door where this can be helpful in identifying the person responsible and the owner can view the video recording.

Moreover, it is suggested that future prototype can have a face recognition or eye recognition system. Besides, it is suggested to improve the system by using Internet of Things (IoT) technology where the world is always looking toward to the future technology path where people demand for more safety and user friendly security door system. Hence, these advanced technologies are definitely important to fulfill the requirements for the security door safety.

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APPENDIX

Coding of the project

```
#include <ESP8266WiFi.h>
#include <FirebaseArduino.h>
// Set these to run example.
#define FIREBASE_HOST "dooraccess-dd7c3-default-rtdb.firebaseio.com"
#define FIREBASE_AUTH "8UmNBwYaZPznxbLfs1NrxFI8dkvAEpo8scPyvAs4"
#define WIFI_SSID "Moorthy@unifi"
#define WIFI_PASSWORD "1234abcd"
String doorid = "Door1";
uint8_t doorpin = D2;
void setup() {
Serial.begin(9600);
// connect to wifi.
WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
Serial.print("connecting");
while (WiFi.status() != WL_CONNECTED) {
Serial.print(".");
delay(500);
 }
 Serial.println();
```

```
  pinMode(doorpin,OUTPUT);
  Serial.print("connected: ");
  Serial.println(WiFi.localIP());
  digitalWrite(doorpin,HIGH);
  Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
}
int n = 0;
void loop() {
String path = "/keylist/"+doorid+"/";
boolean doorstatus = Firebase.getBool(path+"open");
Serial.println(doorstatus);
if(doorstatus == 1){
digitalWrite(doorpin,LOW);
Firebase.setBool(path+"open",false);
delay(5000);
digitalWrite(doorpin,HIGH);
```