Palestine Polytechnic University

Electrical Engineering

Smart Entrance

Team work :

Shada salameen **habib hawamdeh**

Supervisor:

Dr. Ghandi Manasra

Submitted to the College of Engineering

In fulfillment of the requirement for the Degree of

Bachelor degree in Electrical Engineering

Palestine Polytechnic University

MAY 2022

Alarm system with distress messages via mobile

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Signature of the project supervisor Signature of the Head of the Department

Name: Name:

Signature of the examining committee

…… ……

Palestine Polytechnic University

MAY 2022

الاهداء

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مهما تقدمنا وفُتِحت أمامنا الطرق ووصلنا لكل ما نحلم به، علينا أن نتذكر من كانوا سبب بنجاحنا، من ساندنا وأمسك بيدنا للاستمرار، من وجودهم حفزنا وشجعنا، فمهما عبرنا لهم فالكلمات قليلة، لهذا أقدم لكم هنا أجمل عبارات الشكر والتقدير والدينا الاعزاء.

Acknowledgement

Praise be to God, Lord of the worlds, and prayers and peace be upon the teacher of humanity and the guide of humanity, and on his family, companions, and those who followed them in goodness until the Day of Judgment.

My God, the night is not good except with your thanks, and the day is not good for your obedience, and the moments are not good except by remembrance of you, and the hereafter is not sweet without your forgiveness, and heaven is not sweet except by seeing you.

As we take our last steps in university life, we must pause back to the years we spent in the university campus with our honorable professors who gave us a lot, exerting great efforts in building the generation. Before we proceed, we offer our highest thanks, gratitude, appreciation and love to those who carried the most sacred message in Life, to those who paved the way for us with science and knowledge, to all our distinguished professors.

No matter how far we progress and the roads are opened before us and we reach everything we dream of, we have to remember those who were the reason for our success, those who supported us and held our hand to continue, their presence motivated us and encouraged us.

Abstract

Smart-entrance technology encompasses a wide range of everyday household devices that can connect to one another and to the Web. This connectivity allows owners to program simple daily tasks and, in some cases, to control device operation from a distance. Designed for convenience, smart homes also hold the promise of improved independent living for elderly people and those with disabilities.

In this project, we worked to find out if there were people trespassing on the entrance house by sending notifications on the home owner's phone and also knowing if it was opened house door or not ,In addition to a camera through which he can watch the people standing in front of the entrance to the house.

the system is linked to a mobile application to send data through the MQTT, and the system takes advantage of sensors such as (ultrasonic and RFID ,relay ,buzzer ,lock) and these sensors are connected to two pieces of the esp8266 there is also an ESP32-CAM .

List of Abbreviations

RFID	Radio-frequency identification
SoC	System On Chip
GPIO	General Purpose Input/output
IOT	Internet of Things
VCC	Voltage, Common Collector
GND	Ground
PC	Personal Computer
USB	Universal Serial Bus
SS/SDA/Rx	Acts as Serial input
SCK	Serial Clock
MOSI	Master out slave in
MISO	Master in slave out
RST	Reset
RX	Receive
SPI	Serial Peripheral Interface
esp8266	*Espressif modules*
IDE	integrated development environment
TX	Transmit

Table of Contents:

List of Figures:

List of Tables:

Chapter one: Introduction

1.1 Introduction

1.2 Literature Review

1.3 Problem Statement

1.4 Objectives

1.5 Importance

1.6 Project scope

1.8 Time frame

1.1 Introduction

Technology is constantly progressing and evolving to include various aspects of our lives, as no one expected that old science fiction films would become a reality we live in today, as smart devices and technologies are now available that allow individuals to plan various household jobs, control the temperature of the house, and determine if there are people in the house or not, As well as doing many other tasks. With the increase in scientific research and various innovations in the field of the digital world, smart home solutions and amazing technologies are expected in the future.

The smart entrance system is one of the ideas that depends on modern technological developments that secure homes from thefts and infringements by people and protect them in modern and safe technological ways, by providing home entrances with electronic parts that are linked together and programmed to create multiple functions for the development of home entrances to become more sophisticated than the normal entrances.

Internet of things (IoT) can be described as connecting everyday objects like smart phones, internet televisions, sensors and actuators to the internet where the devices are intelligently linked together to enable new forms of communication amongst people and themselves.

In our project, we will make a smart entrance system that works to protect homes from thefts and intrusion by individuals. The system works to detect people in front of the entrance to the house and when it detects the presence of any foreign object in front of the entrance, the system sends an alarm to the home owner on his smart phone to warn him of The presence of people in front of the entrance, and he can open the camera used in the project to see the people standing in front of the entrance to the house and the costs of the project are few and easy, and anyone can use this system.

1.2 Literature Review

1.2.1 Design and Implementation of a Wi-Fi Based Home Automation System

Implementation of new home automation system that uses Wi-Fi technology as a network infrastructure connecting its parts. The proposed system consists of two main components; the first part is the server (web server), which presents system core that manages, controls, and monitors users' home. Users and system administrator can locally (LAN) or remotely (internet) manage and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system. Unlike most of available home automation system in the market the proposed system is scalable that one server can manage many hardware interface modules as long as it exists on Wi-Fi network coverage. System supports a wide range of home automation devices like power management components, and security components. The proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems[6].

1.2.2 Smart GSM based Home System

The analysis and implementation of the home technology using Global System for Mobile Communication (GSM) modem to control home appliances such as light, conditional system, and security system via Short Message Service (SMS) text messages is presented in this paper. The proposed research work is focused on functionality of the GSM protocol, which allows the user to control the target system away from residential using the frequency bandwidths. The concept of serial communication and AT-commands has been applied towards development of the smart GSM-based home automation system. Home owners will be able to receive feedback status of any home appliances under control whether switched on or off remotely from their mobile phones. PIC16F887 microcontroller with the integration of GSM provides the smart automated house system with the desired baud rate of 9600 bps[7].

1.2.3 A mobile-based smart home system

mobile-based home automation system that consists of a mobile phone with Java capabilities, a cellular modem, and a home server. The home appliances are controlled by the home server, which operates according to the user commands received from the mobile phone via the cellular modem. In our proposed system the home server is built upon an SMS/GPRS (short message service/general packet radio service) mobile cell module and a microcontroller, allowing a user to control and monitor any variables related to the home by using any Java capable cell phone. the design and implementation of AT modem driver, text based command processing software, and power failure resilient output for a microcontroller to facilitate in sending and receiving data via the cell module, together with the design of Java application to enable the cell phone to send commands and receive alerts through the cell module[13].

1.3 Problem Statement

Today, smart entrances have become the perfect solution for people who are looking for an easy way to check whether the entrance to their home is or not. These entrances are connected to the smart phones that most of us own, and smart entrances are a way to solve the problems that individuals suffer from, which is the large number of thefts and attacks on homes.

Our project aims to protect homes from people who try to unlock the homes and enter illegally, as the project works to find out if there are people in front of the entrance to the house and send a message to the owner of the house on his smartphone to tell him that there are people trying to enter the house and he can open the camera to see the people standing in front of the entrance to the house.

The advantages of this project are:

1. Get quick notifications in the event of any home intrusion.
2. It can monitor the entrance to the house remotely by opening the camera at any time.
3. No need to worry about the entrance of the house when outside the house.
4. The door of the house can be opened through the RFID smart card, which carries a special number that cannot be repeated.
5. There is an electronic lock on the door of the house from the inside.

1.4 Objectives

Design and build a prototype for the smart entrance system.

1. Increase the level of security at home.
2. The system focuses on Internet of Things technologies.
3. The smart entrance helps protect the home from thefts.
4. Low cost system work and widespread dissemination.
5. The system provides comfort and reassurance for the home owner.
6. Designing the entire system to meet the Palestinian trends.

1.5 Importance

Smart entrance systems are becoming more common and important day by day for many families who seek to protect their homes. Smart entrance is an essential part of protection and home automation systems that technology develops on a daily basis. Therefore, our project aims to increase the rate of development in protecting homes.

So, building and implementing such systems locally is an important path to follow, so we can produce a competitive system that opens new market doors for our economy, raises new job opportunities and develops quality technology in Palestine.

1.6 Project scope

In this project, we implemented and designed a prototype for the smart entry system using RFID, ultrasonic sensor, and electronic lock ,buzzer that connects to the NodeMCU board. We also used a ESP32-CAM . In addition, an application was designed to get notifications in the event of any attacks on the entrance to the house.

For easy implementation purposes we took a specific house as a case study to implement our system, then we could generalize our system for residual use.

We use fritzing program to design the circuit, before implement it, we use five circuit, first one for ultrasonic sensor and with first NodeMCU, second circuit for RFID and with second NodeMCU and third circuit for buzzer and with second NodeMCU , the fourth circuit for relay and with first NodeMCU , and connect lock with relay then finally use ESP32-CAM .

In Software section, we defined the main software and programming languages used for programming our system, and we designed a full flowchart for each software part in our system.

1.7 System Requirements:

The system must achieve the following functional requirements :

1. Using NodeMCU controller that connected by Wi-Fi with a mobile application .
2. Reading RFID sensor and ultrasonic and open camera .
3. Using the mobile application(Android SDK) to view the notification.
4. Opening and closing the entrance through the electronic lock.

The system must achieve the following non- functional requirements:

1. Designing a smart entrance suitable for individual in terms of (shape, size and color).

2. High sensor accuracy.
3. Fast response time.

1.8 Time frame

For tasks had been done in this course of our project see Table 1.

Weeks Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Real-time database															
Electronic parts check															
Web page programming															
Mobile application programming															
User interface For mobile															
Circuits testing and Soldering															
System testing															
Documentation															

Table1 Time frame

Chapter two: Main Design Concepts

2.1 Introduction

2.2 Theoretical background

2.3 System layout

2.4 Hardware

2.5 Software

2.6 Case Study

Main Design Concepts

2.1 Introduction

In this project we designed a complete system to protect homes using NodeMCU board on the use of personal computers as servers, and to make the system scalable we linked the controller (NodeMCU) with the mobile application and send the data through MQTT ,and show this data in the form of notifications to the owner of the house on his personal phone.

2.2 Theoretical background

2.2.1 General Description of the system:

Home security systems are an essential part of life, so we must work to develop them continuously, and there are many things that must be taken into account:

1. The nature of the system: the good and appropriate design where the best materials are chosen to design the system to suit The structure of the entrance to the house.

2. WIFI: High speed in the transmission of information from the system to the application and maintain synchronization in the process of transferring information in the case that the owner of the house wanted to know if people entered the house or not.

3. Mobile application: The appropriate design of the application the meet a number of tasks to be performed where the application is designed in an easy and simple way so that anyone can work.

4. The efficiency of the electronic parts used to meet the basic needs of the system and work on linking them with each other to get the best results.

2.3 System layout

Our system is divided into five main parts see Figure 1.

1. Two microcontrollers(ESP8266) connected to a number of sensors.
2. ESP- cam .
3. Transfer data via MQTT.
4. mobile application .
5. User receives notifications.

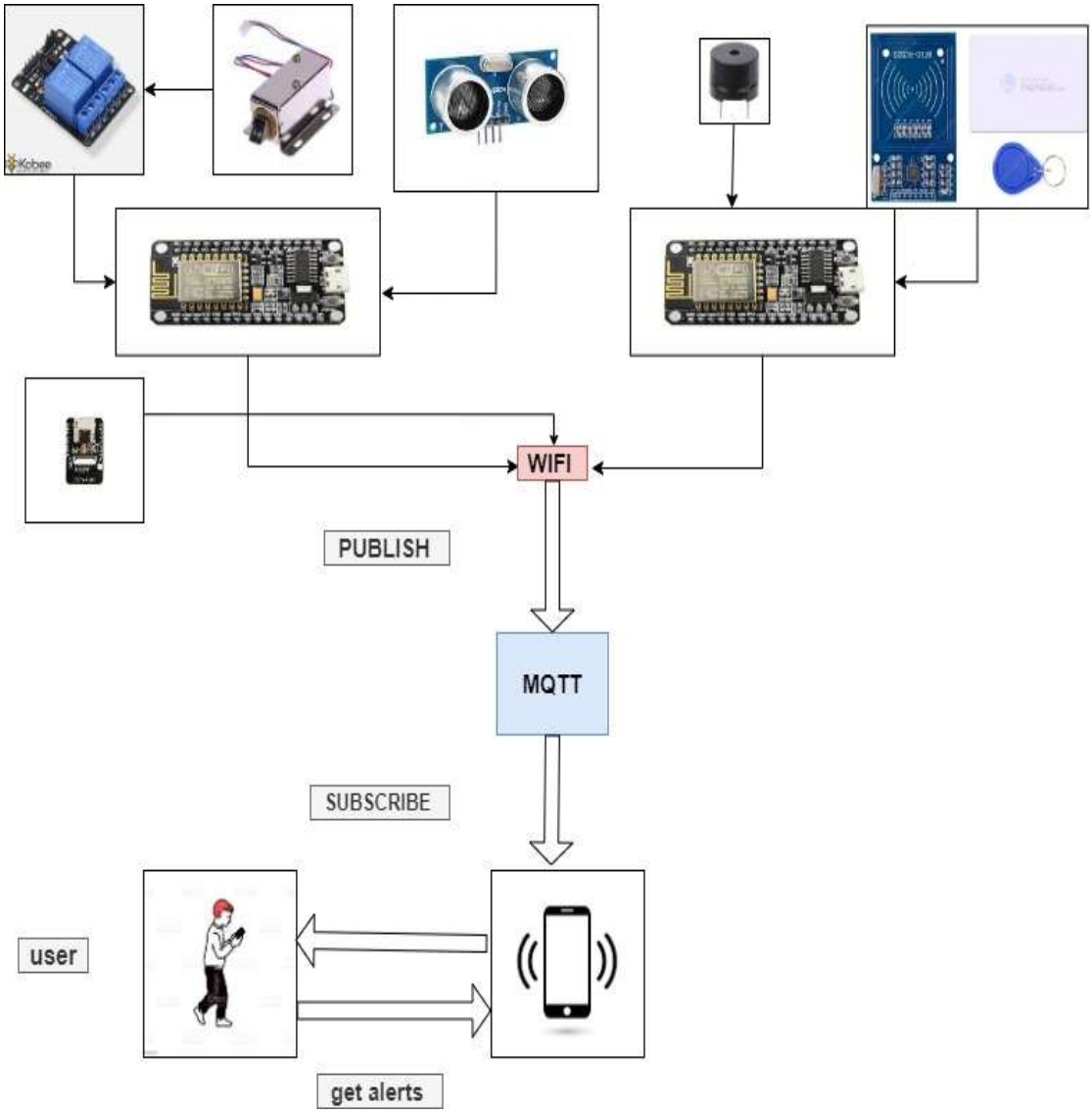

Figure 1:system layout

2.4 Hardware

In this section we're listing our project hardware components with full description and working principle of each component:

1. NodeMCU esp8266

The NodeMCU (Node Microcontroller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. That makes it an excellent choice for the Internet of Things (IoT) projects of all kinds[3].

Difference between NodeMCU and Arduino:

The arduino project created an open-source hardware design and software SDK for their versatile IoT controller. Similar to NodeMCU, the arduino hardware is a microcontroller board with a USB connector, LED lights, and standard data pins. It also defines standard interfaces to interact with sensors or other boards. But unlike NodeMCU, the arduino board can have different types of CPU chips (typically an ARM or Intel x86 chip) with memory chips, and a variety of programming environments. There is an arduino reference design for the ESP8266 chip as well. and most arduino boards do not have Wi-Fi capabilities, and some even have a serial data port instead of a USB port.

Figure 2:sep8266

2. Radio Frequency Identification (RFID):

The RC522 is a RF Module that consists of a RFID reader, RFID card and a key chain. The module operates 13.56MHz which is industrial (ISM) band and hence can be used without any license problem. The module operates at 3.3V typically and hence commonly used in 3.3V designs. It is normally used in application where certain person/object has to be identified with a unique ID[2].

Some of the applications used:

- Automatic billing systems
- Attendance systems
- Verification/Identification system
- Access control systems

RC522 Features

Operating voltage:	2.5V to 3.3V
Communication:	SPI, I2C protocol, UART
Maximum Data Rate:	10Mbps
Read Range:	5cm
Current Consumption:	13-26mA
Power down mode consumption:	10uA (min)
MHz RFID module:	13.56MHz

Table 2:RC522 Features

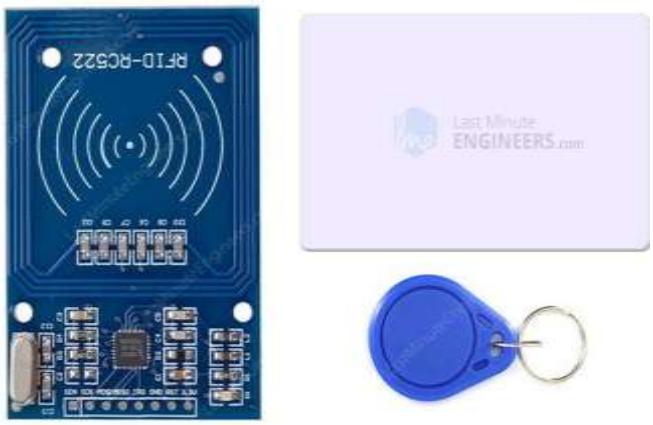

Figure3 :RFID

3. Ultrasonic sensor:

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is D = ½ T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be[9]:

$$D = 0.5 \times 0.025 \times 343$$

Figure 4:Ultrasonic sensor

4.Relay

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations[4].

Figure 5:Relay

5.Buzzer:

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren[8].

Figure 6:buzzer

6. ELECTRONIC ARDUINO DOOR LOCK – 12VDC

This electronic door lock uses a solenoid to move an armature in or out. It is useful for projects and applications involving security door locks .When no power is applied, the metal slug points out, but when 9V to 12V is applied to the coil, the slug pulls in and the whatever has been locked is opened .Even though this door lock will work with 9V, it is best to power it with 12V since 9V will cause it to respond much slowly .Also the current drawn while energizing the solenoid is high (500mA at 9V and 650mA for 12V) so do not use a 9V battery. Get a dedicated 12VDC Adapter instead if you can[10].

Specifications:

1. 12VDC (you can use 9-12 DC volts, but lower voltage results in weaker/slower operation)
2. Draws 650mA at 12V, 500 mA at 9V when activated
3. Designed for 1-10 seconds long activation time
4. Extension length: 9.8mm close
5. Lock Size: 53 x 39 x 25(mm)
6. Bolt Dimension: 9.8 x 9(mm)
7. Weight: 150g

Figure7 :lock

7. ESP32-CAM

The ESP32CAM is a tiny module based on ESP32 chip and OV2640. You can even program the ESP32CAM through the ESP-IDF by installing the ESP32 Core

The ESP32CAM equips the ESP32 with everything necessary to program, run and develop on the wonder chip. Additionally, the board reserved the MPU6050,BME280 and an analog MIC.

ESP32-CAM can be widely used in various IoT applications. It is suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications. It is an ideal solution for IoT applications[12].

Figure 8:E-SP-CAM

2.5 Software

In this projects we used different software programs and programming languages to implement our designs, as shown in Table 3[1]:

Program	Use
Arduino IDE software based on C/C++	Arduino programming
Microsoft Visio 2016	Design project Diagrams and Flowcharts
Fritzing	Design Main Electrical Circuits
Protocol MQTT	lightweight publish/subscribe messaging transport protocol that connects remote devices
Notepad++	Used for text editor

Table 3:Software

2.6 Case Study

For simplification purposes this project will rely on specific case study to be generalized later, this case study is a house consisting of:

1. the home.
2. the main entrance
3. surrounding garden

The main entrance to the house will be monitored by placing the electronic pieces that have been connected to each other, programmed and tested. In the event of any breaches to the entrance, notifications will be sent to the owner of the house, and with the possibility of opening and closing the entrance electronically.

Chapter Three: General Mechanism

3.1 General Mechanism

3.2 Electrical Components

3.3block diagram

3.4 Flowchart

3.5Wiring Diagrams

3.6 Schematic Diagrams

3.1 General Mechanism

In this project we implemented and designed a smart entrance system prototype by using RFID ,ultrasonic, relay, buzzer that connect with 2 NodeMCU board and connect lock with relay and use ESP-CAM.

1. The NodeMCU will connect with Wi-Fi to reach server
2. The data will pass from NodeMCU to mobile application through MQTT.
3. The MQTT publish data to mobile application to show a notifications on owner mobile.

3.2 Electrical Components

In This section we're all used components with expected End-customer prices in table 4.

ITEMS	Price	Quantity	Total NIS
NODMCU (ESP8266)	65	2	130
Relay	15	1	15
Ultrasonic Sensor	25	1	25
Buzzer	5	1	5
RFID	30	1	30
ESP-CAM	95	1	95
Electronic Lock	75	1	75
Wire	1	60	60
Project Structure	200	1	200
Total			635

Table4 :Electrical Components

3.3block diagram:

In this figure 6, the mechanism for connecting the pieces together and linking them with the mobile application that the system notifications will receive. The figure shows how the RFID, buzzer relay and ultrasonic were connected with 2 NODMCU and programmed for NODMCU to send data through MQTT to reach mobile application .

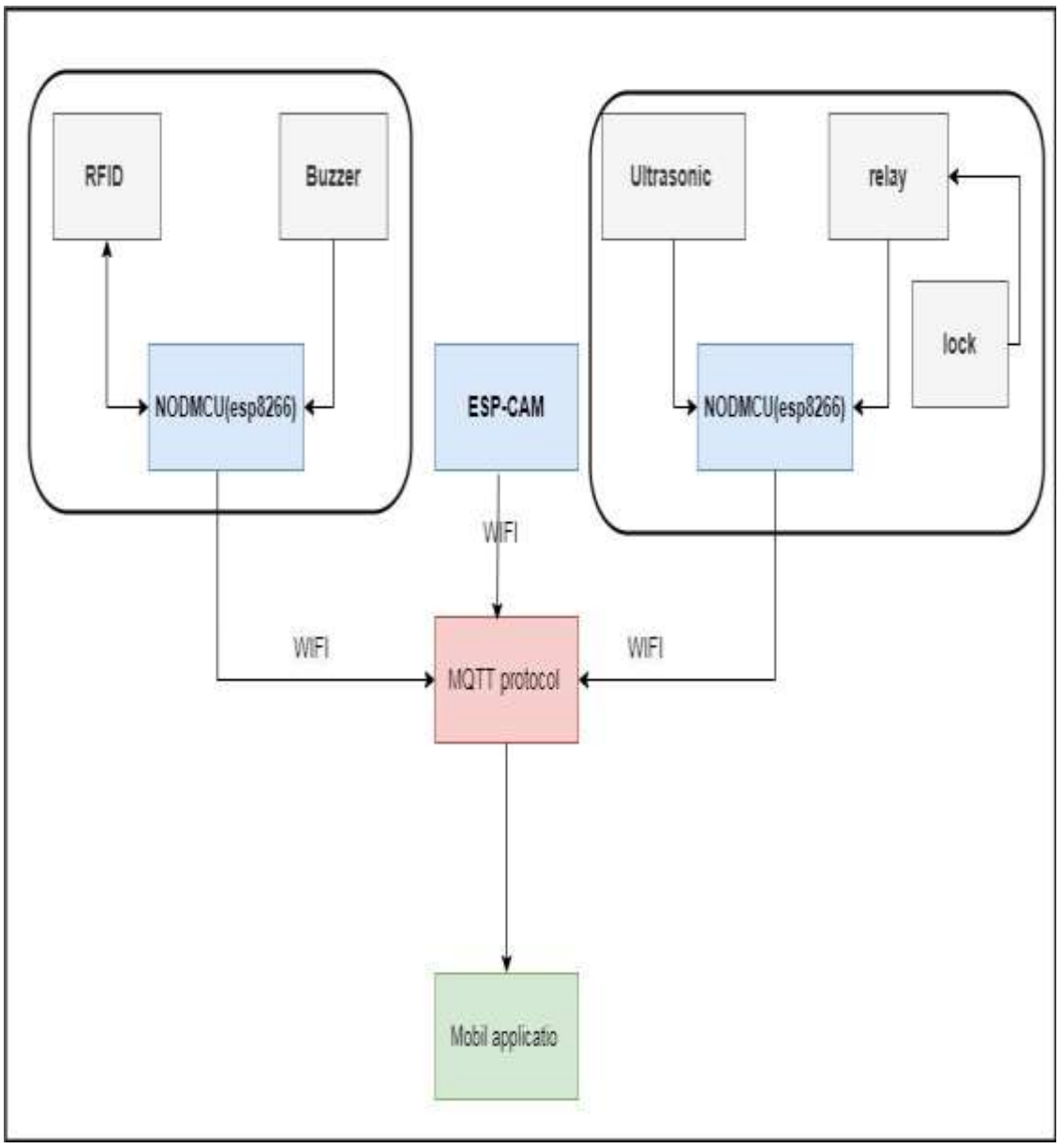

Figure 9:block digram

3.4 Flowchart:

In this figure 7, it shows how the designed mobile application works. The figure shows how the application works through the login page through which the user name and password are entered, after which the entries are verified and a warning message is given if the entries are wrong, then the entry is made To the main page to display the value of the sensor (ultrasonic, RFID, camera, lock, mqtt connection), and there is also a button to log out from the app.

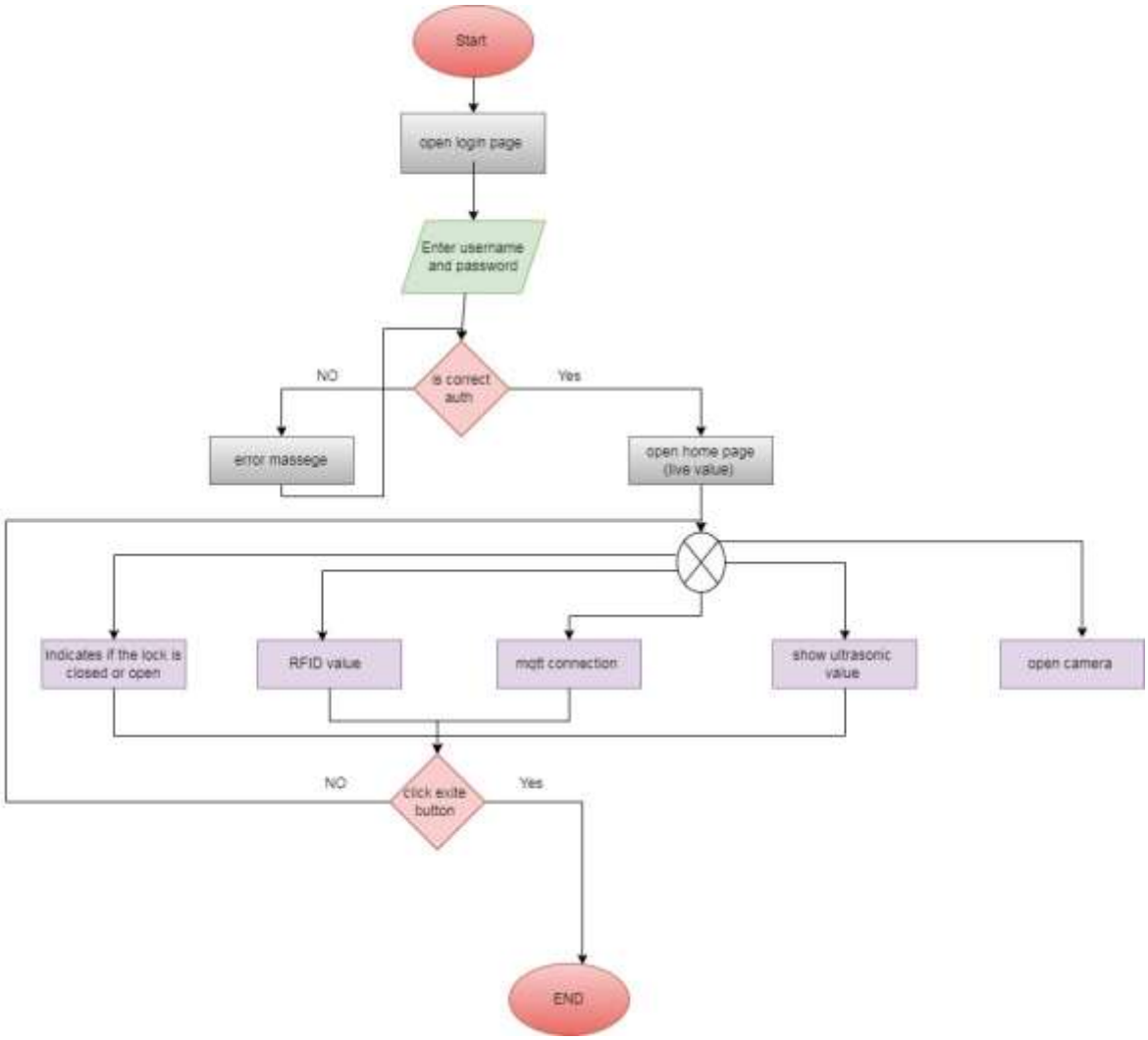

Figure10 :flow chart

In Figure 11, it shows how the devices they are designed work, including: FIRST ESP8266 (Relay + Ultrasonic):

In the beginning, the operation of the system is confirmed and the Wi-Fi network is connected, then the sensors are selected to read the value of the ultrasonic sensors to spread the unlocking, then the alarm is triggered, and then the connection with mqtt is confirmed, and in the end the connection is confirmed the system .

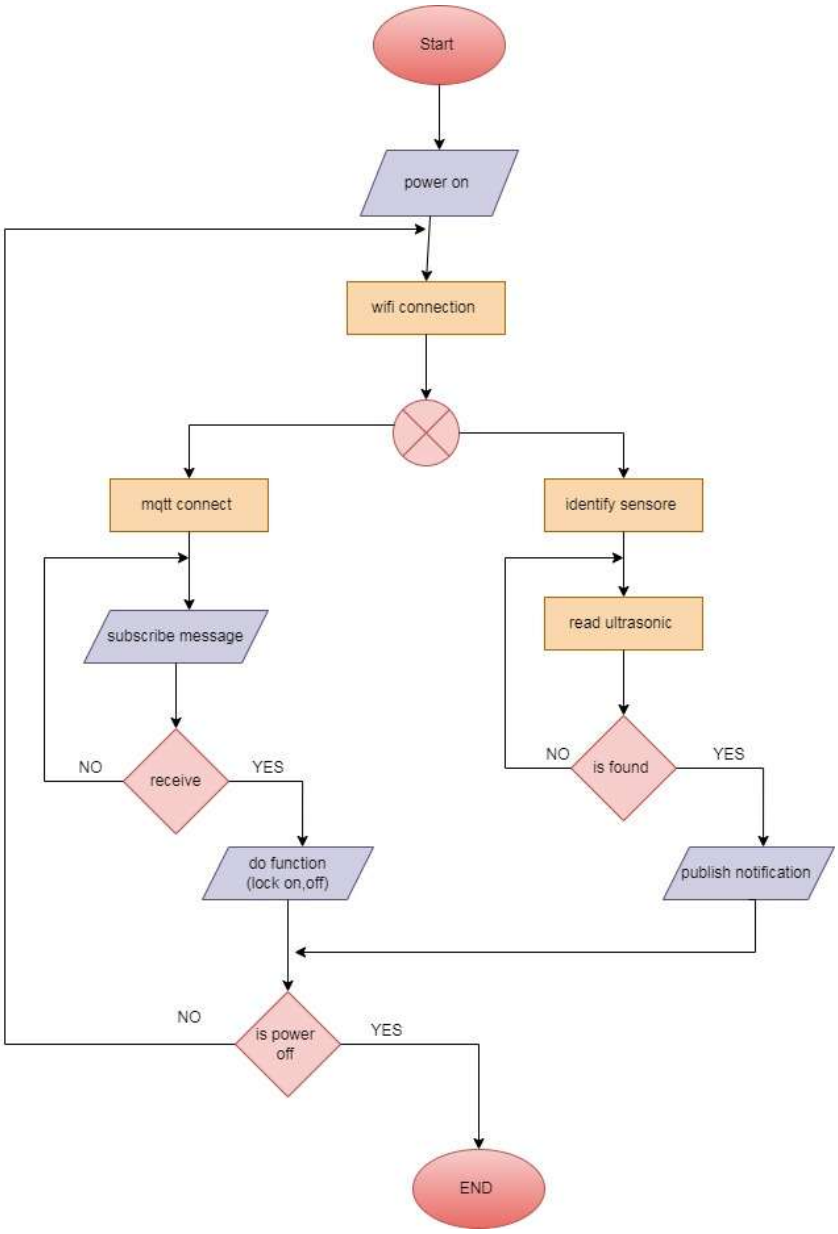

Figure 11:flow chart

In Figure 12, it shows how the devices they are designed work, including: second ESP8266 (RFID + buzzer):

In the beginning, the operation of the system is confirmed and the Wi-Fi network is connected, then the sensors are selected to read the value of the rfid sensors to spread the unlocking, then the alarm is triggered, and then the connection with mqtt is confirmed, and in the end the connection is confirmed the system .

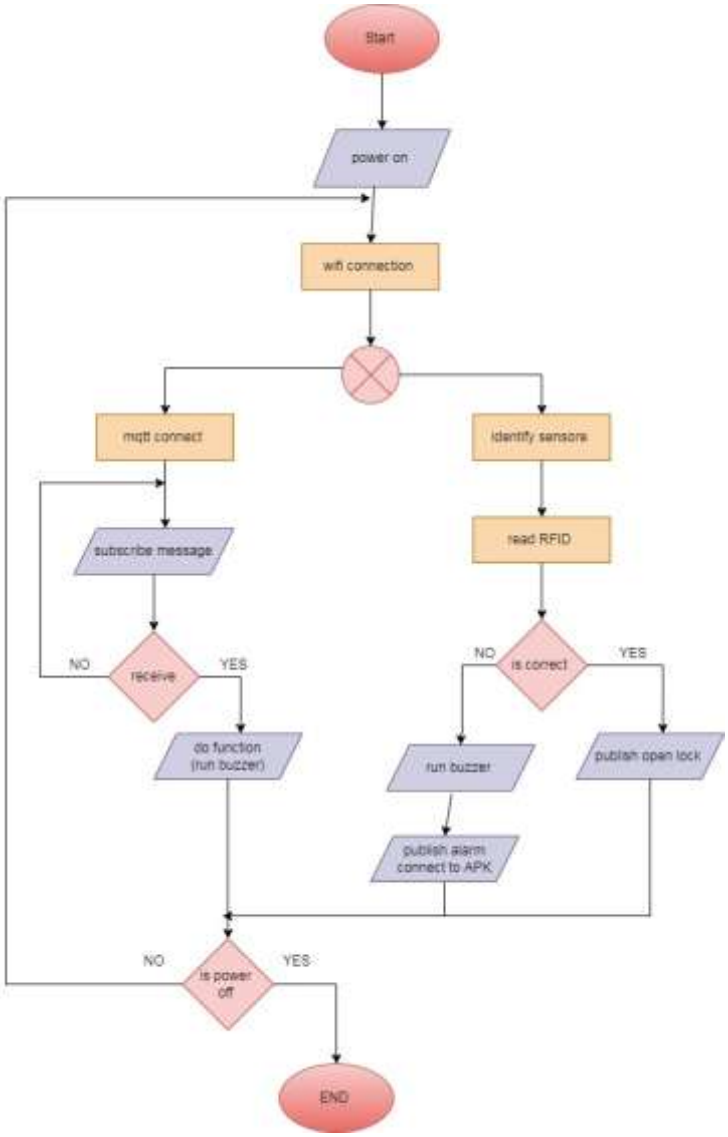

Figure 12:flow chart (hardware)

3.5Wiring Diagrams:

In this section some component is shown with its connection the of the NodMCU as shown in the following figures:

1.RFID with NodMCU(esp8266)

RFID PIN	ESP(8266) PIN
Vcc	3V3
RST (Reset)	D0
GND (Ground)	GND
MISO (Master Input Slave Output)	D6
MOSI (Master Output Slave Input)	D7
SCK (Serial Clock)	D5
SS/SDA (Slave select)	D8

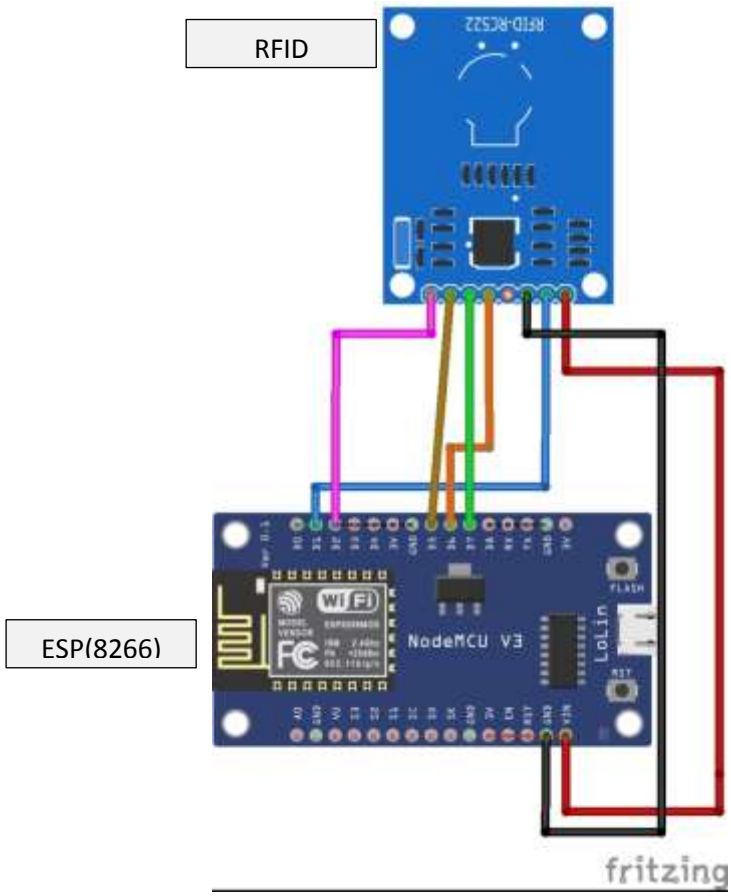

Figure 13:RFID with NodMCU(esp8266)

1.Schematic Diagrams: RFID with esp8266

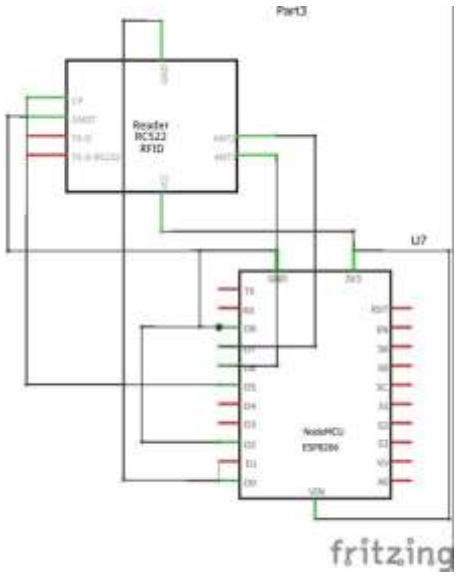

Figure14 :Schematic Diagrams: RFID with esp8266

2.Buzzer with NodMCU(esp8266)

BUZZER PIN	ESP(8622) PIN
(+)leg	D3
GND (Ground)	GND

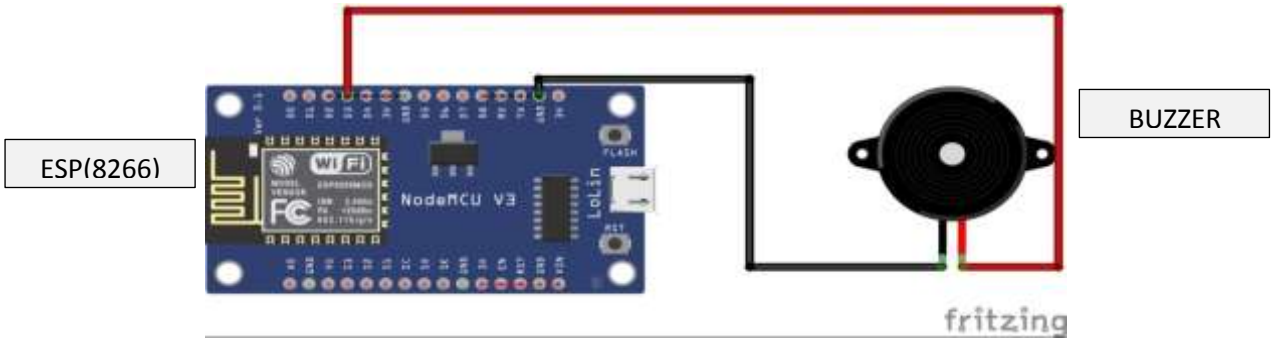

Figure15 :Buzzer with NodMCU(esp8266)

2.Schematic Diagrams: buzzer with esp8266

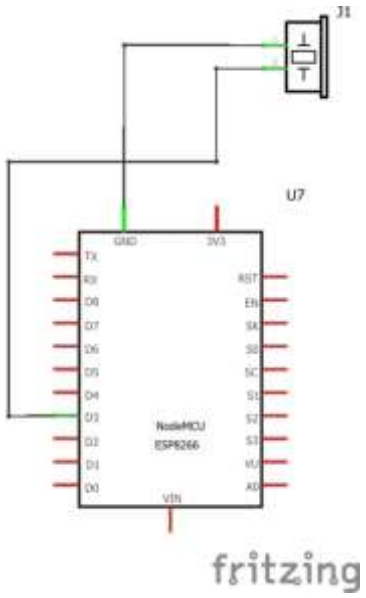

Figure16 :Schematic Diagrams: buzzer with esp8266

3.Ultrasonic with NodMCU(esp8266)

ULTRASONIC PIN	ESP(8266) PIN
Vcc	Vcc
GND	Ground
trig	D5
echo	D6

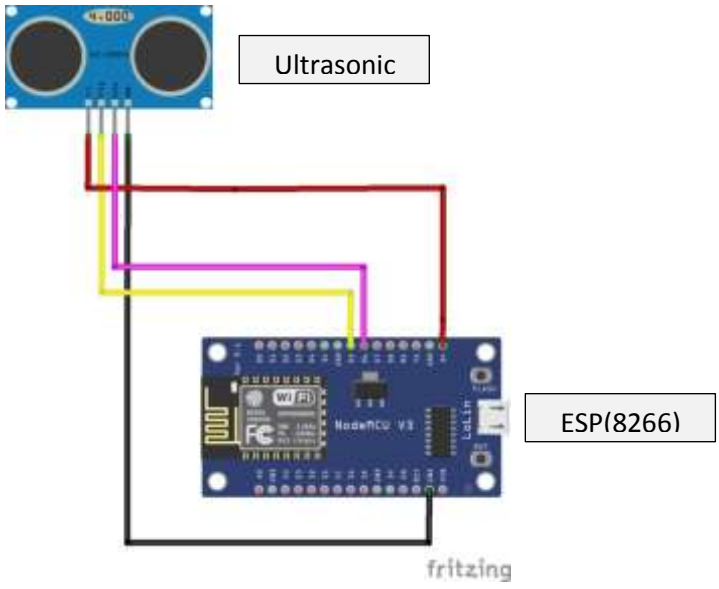

Figure17 :Ultrasonic with NodMCU(esp8266)

3.Schematic Diagrams: ultrasonic with esp8266

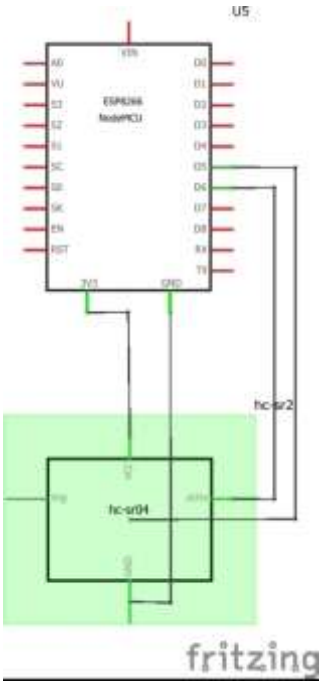

Figure18 :Schematic Diagrams: ultrasonic with esp8266

4.relay with NodMCU(esp8266)

RELAY PIN	ESP(8266) PIN
+5V	Vcc
Ground	GND
N1	D7

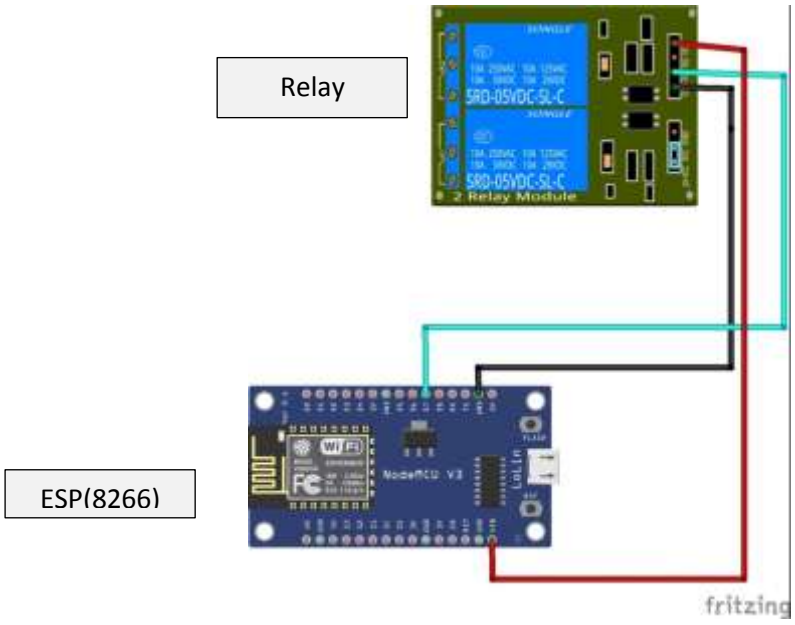

Figure 19:relay with NodMCU(esp8266)

3.Schematic Diagrams: relay with esp8266

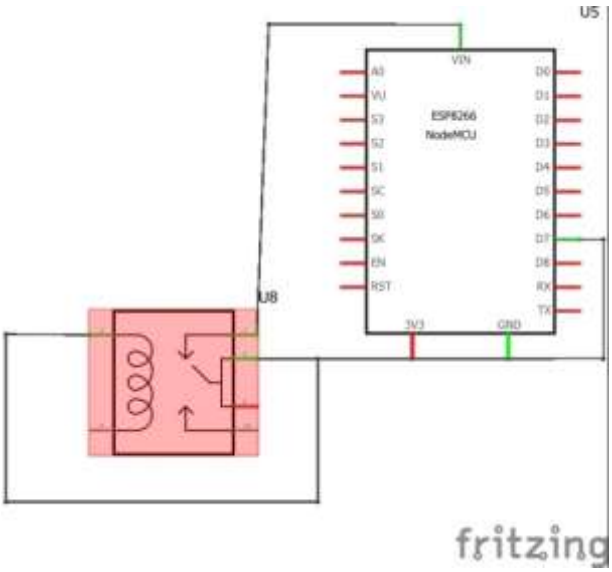

Figure 20:Schematic Diagrams: relay with esp8266

Wiring Diagrams of smart entrance:

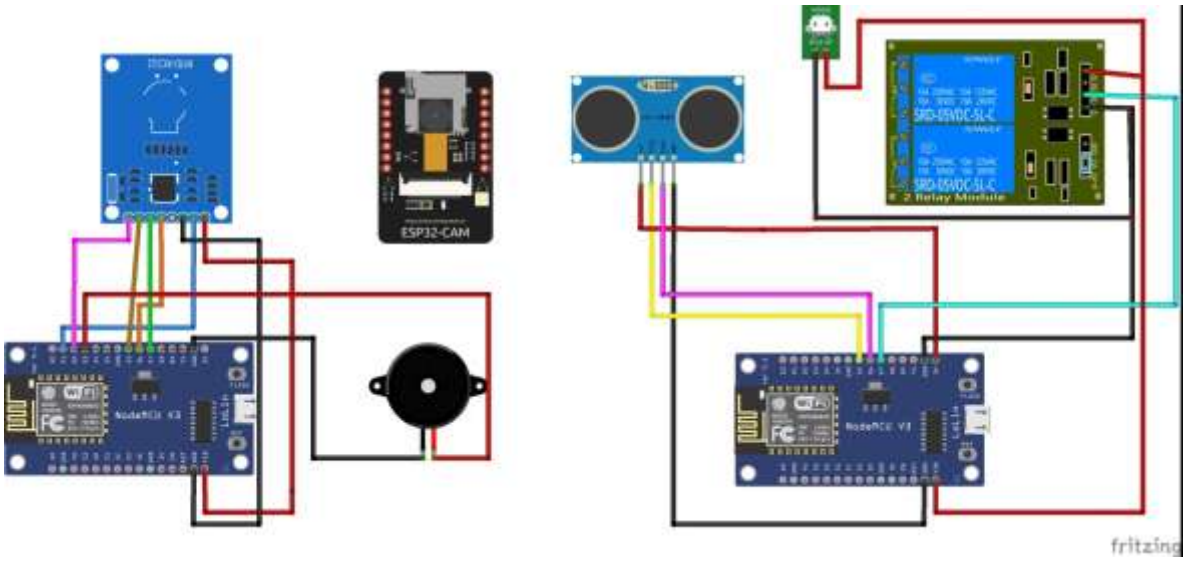

Figure21 :Wiring Diagrams of smart entrance

3.6 Schematic Diagrams:

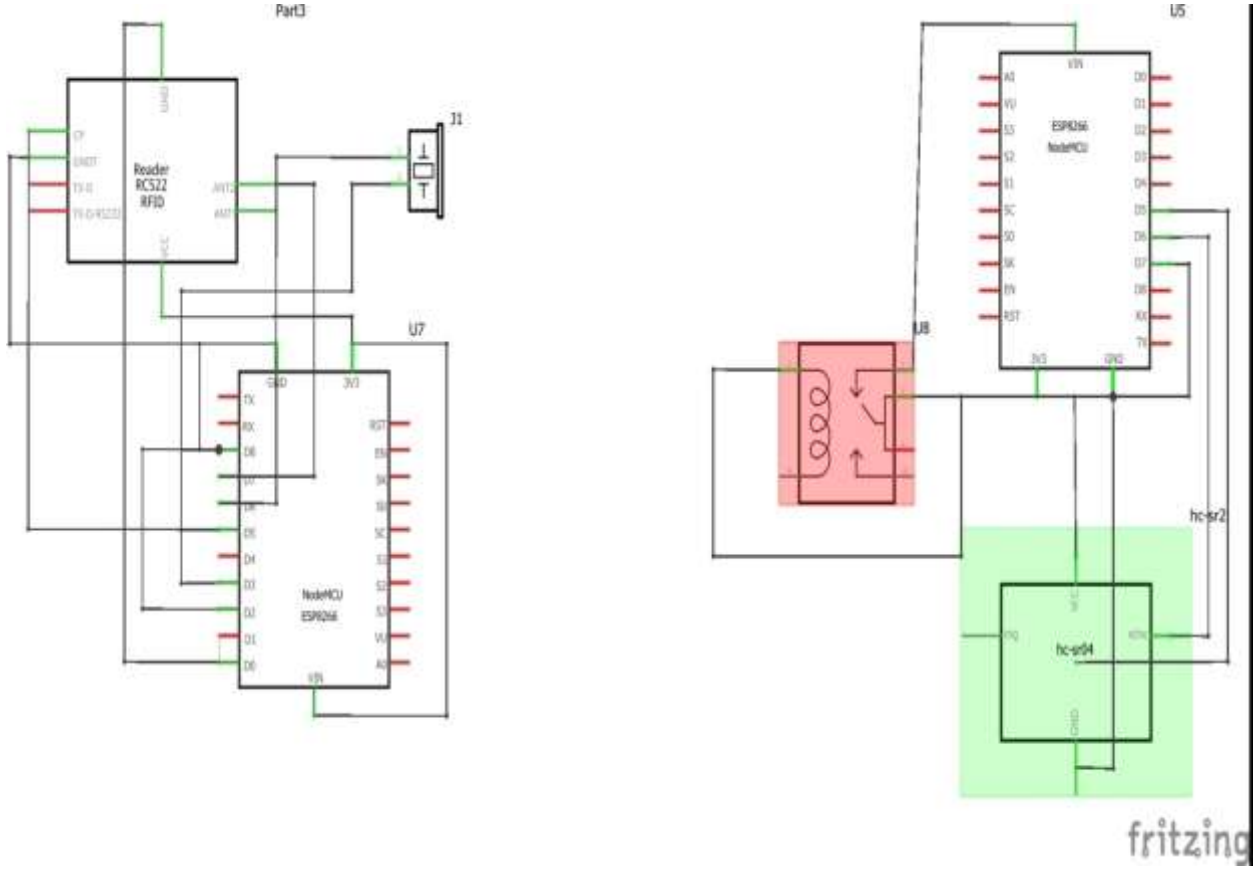

Figure22 :Schematic Diagrams

Chapter four: Software & Hardware Implementation

4.1 Overview

4.2 Operating System for mobile

4.3 Software Implementation tools

4.4 Hardware Implementation

4.5 Implementation Results

4.6 Implementation Issues

Software & Hardware Implementation

4.1 Overview

This chapter describes the implementation of the software and the hardware of this project, including the circuit connection, and programming of the microcontrollers.

4.2 Operating System for mobile

There were many operating systems for mobile to be used to handle the software and hardware resources of my system such as Android and IOS. I have chosen android OS rather than IOS OS because it is the world's familiar mobile operating system. In addition, it is easy to be used and work with an Android device, it needs only to download application in app inventor program with unity android support. However, IOS device needs a complex procedure[11].

4.3 Software Implementation tools

This section will provide some information about the main programs and software Technologies used in my project.

4.3.1 MQTT:

MQTT (originally an initialism of MQ Telemetry Transport) is a lightweight, publish-subscribe network protocol that transports messages between devices. The protocol usually runs over TCP/IP, however, any network protocol that provides ordered, lossless, bi-directional connections can support MQTT .It is designed for connections with remote locations where resource constraints exist or the network bandwidth is limited. The protocol is an open OASIS standard and an ISO recommendation (ISO/IEC 20922).

Difference between MQTT and HTTP protocols :

Parameter	MQTT	HTTP
Abbreviation	Message Queuing Telemetry Transport	Hyper Text Transfer Protocol
Architecture	It works on publish/subscribe model.	It works on request/response model.
Complexity	It has less complexity.	It is more complex.
Runs over	It runs over Transmission Control Protocol.	It runs over Transmission Control Protocol (TCP) and can also adapted to User Datagram Protocol.
Protocol Design	This protocol's design is Data centric.	This protocol's design is Document centric.
Header Size	It is of 2 bytes.	It is of 8 bytes.
Data Security	It provides data security with SSL/TLS.	It does not provide security but Https is built for that.

4.3.2 App inventor:

MIT App Inventor is an intuitive, visual programming environment that allows everyone – even children – to build fully functional apps for Android phones, iPhones, and Android/iOS tablets. Those new to MIT App Inventor can have a simple first app up and running in less than 30 minutes[5].

application consists of 2user interfaces, which are:

1. **Login page:** You must enter the correct username and password in order to go to the main page as shown in the figure 18.

Figure 23:Login page

2. **Main page:** It contains a set of icons that show the connection of the system and show the values of the sensors used in the system (ultrasonic , RFID) It also shows the possibility of opening the camera and lock control is open or closed as shown in the figure19.

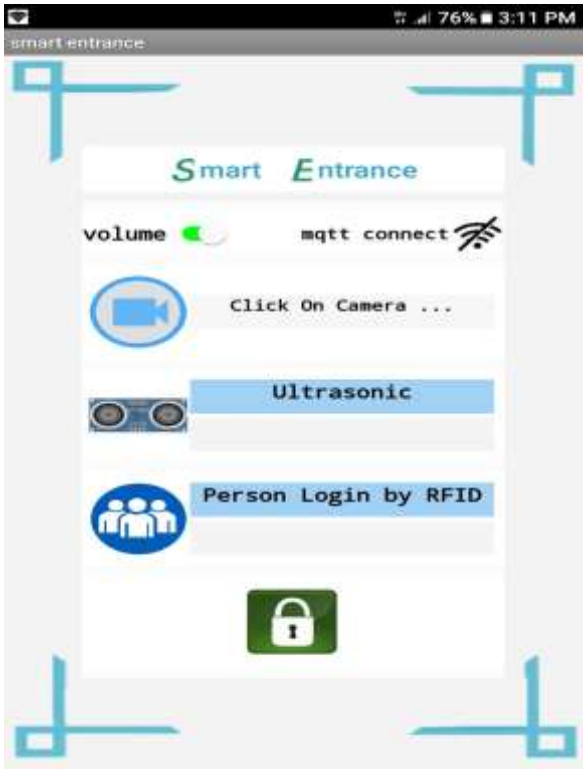

Figure 24:Main page

4.4 Hardware Implementation

This section will provide some information about the hardware implementations of project.

One important thing to notice about ESP8266 is that the GPIO number doesn't match the label on the board silkscreen. For example, D0 corresponds to GPIO16 and D1 corresponds to GPIO5.

The following table shows the correspondence between the labels on the silkscreen and the GPIO number as well as what pins are the best to use in your projects, and which ones you need to be cautious.

Label GPIO	Input	Output	Notes
D0 GPIO16	no interrupt	no PWM or I2C support	HIGH at boot used to wake up from deep sleep
D1 GPIO5	OK	OK	often used as SCL (I2C)
D2 GPIO4	OK	OK	often used as SDA (I2C)
D3 GPIO0	pulled up	OK	connected to FLASH button, boot fails if pulled LOW
D4 GPIO2	pulled up	OK	HIGH at boot
D5 GPIO14	OK	OK	SPI (SCLK)
D6 GPIO12	OK	OK	SPI (MISO)
D7 GPIO13	OK	OK	SPI (MOSI)
D8 GPIO15	pulled to GND	OK	SPI (CS) Boot fails if pulled HIGH
RX GPIO3	OK	RX pin	HIGH at boot
TX GPIO1	TX pin	OK	HIGH at boot debug output at boot, boot fails if pulled LOW
A0 ADC0	Analog Input	X	

Table 5:esp8266 pin

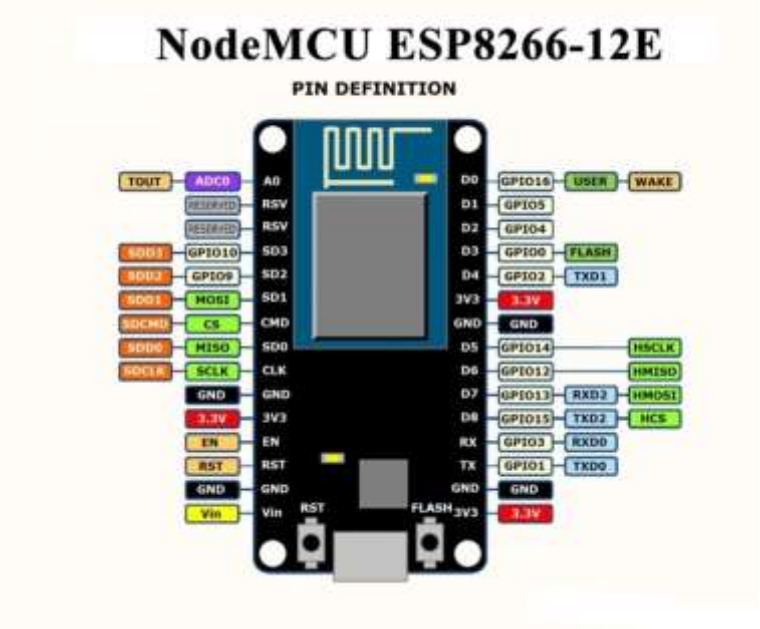

Figure 25:esp8266 datasheet

we designed a smart entrance to see if there are people trying to enter the house illegally through the use of a number of sensors and a camera. show in figure26:

Figure 26:Hardware Implementation

4.5 Implementation Results

The results of the project are to know the working mechanism of each sensor on the project model, where the camera is used to see if there is a person in front of the entrance or not show in figure 27.

The RFID sensor has been installed to open the door lock. There are two cases here. If the swipe card is correct, the lock is opened show in figure 28. If the card is wrong, an alarm is given and notifications are sent on the mobile phone application.

The Ultrasonic sensor was used to determine the presence of a person in front of the entrance through a certain distance determined by the sensor, and to send notifications to the phone in case of danger.

The lock was connected with the relay in order to open and close the door by connecting it with the esp8266 controller and we have programmed it to work the functions correctly.

Figure 27:Implementation Result

Figure 28: case of correct RFID card

4.6 Implementation Issues

During the implementation of the project, we faced many obstacles and we had to take Several issues to achieve the most appropriate design for the system and access to the best features Related to the objectives of the project. These issues and results are summarized as follows:

1. Connection between mobile application and hardware device: we used mqtt.
2. Correct synchronization of readings for all sensors used.
3. Set the correct libraries for each sensor.

4. Find the best type of camera with high accuracy.
5. Correct connection of electronic parts.
6. The appropriate design of the entrance in order to put the pieces on it in an appropriate manner.
7. Find out the correct ports of the esp8266 that he can use.

Chapter five: Result & Testing

5.1 Overview

5.2 Result

5.3 Software Testing

5.4 Hardware Testing

Result & Testing

5.1 Overview

In this chapter we will discuss the testing of all component of the system and the results obtained. We test all the parts to ensure that all of the functions work perfectly and without errors.

5.2 Result

After making sure of the electronic parts needed for the project and doing a test for each one separately, we combined the parts and their codes in order to reach the main goal of the designed project, which is to make a smart entrance to protect the house from intrusions and infringements and use the best protection system where we used each of these sensors(RFID, ULTRASONIC,BUZZER,2ESP826 ,ESP-CAM, ELECTRONIC ARDUINO DOOR LOCK,RELAY) to design the best protection system for home entrances.

5.3 Software Testing

5.3.1 Testing mobile application

we used App Inventor to build fully functional apps for Android phones, iPhones, and Android/iOS tablets. to check and test the functionality of the project :

1. Internet connection
2. Determine the ultrasonic value
3. Determine the RFID value
4. open camera .
5. show the lock is open or close.
6. volume (on or off).

First cases:

When testing the mobile application, it gives two cases, the first according to the figure 30, which shows the value of the ultrasonic and the value of RFID.
(Ultrasonic : احدهما اغلق الحساس , RFID : حبيب)

Figure 29: mobile test1

Second cases:

When testing the mobile application, it gives two cases, the first according to the figure 31, which shows the value of the ultrasonic and the value of RFID.
(Ultrasonic : يوجد شخص امام الباب , RFID : شذى)

Figure 30:mobile test2

5.4 Hardware Testing

In this section we will discuss the testing of components test and code.

- **Test code esp8266->relay +ultrasonic:**

  Both ultrasonic and relay were connected to the first esp8266, and the pieces were checked with each other and made sure that they perform the required function according to the designed project. In the figure 32, the code we used to program the electronic parts.

Figure 31:Test code esp8266->relay+ultrasonic:

- **Test code esp8266->RFID +buzzer:**

The RFID and Buzzer were connected to the second esp8266, and the pieces were checked with each other and made sure that they perform the required function according to the designed project. The figure 33 shows the code that we used to program the electronic parts.

Figure32 :Test code esp8266->RFID+buzzer

- **Test code ESP-CAM:**

The ESP-CAM was also used, and the figure shows the code used to check the camera and make sure that it performs the correct function according to the designed project.

Figure33 :Test code ESP-CAM

Chapter six: Conclusion & Future work

6.1 Overview

6.2Final Result

6.3Futures Works

6.4 Conclusion

6.5 Recommendations

Conclusion & Future work

6.1 Overview

In this chapter, we will conclude the challenges, final result and future work of our project.

6.2Final Result

1. An integrated system was made between hardware and software.
2. The system determines the presence of people in front of the entrance.
3. The system unlocks the entrance using RFID CARD.
4. The application determines if the door lock is open or closed.
5. The system works to give notifications in case of danger.
6. The application run buzzer in case the RFID card is wrong.

6.3Futures Works

The system can be developed in the future by adding new sensors, and use devices in a smart home are interconnected through the internet, allowing the user to control functions such as security access to the home, temperature, lighting, and a home theater remotely.

6.4 Conclusion

The main objective of this system is monitor entrance house where we worked on find out if there were people trespassing on the entrance house by sending notifications on the home owner's phone and also knowing if it was opened house door or not ,In addition to a camera through which he can watch the people standing in front of the entrance to the house and give an alert in the event of a danger.

The project can be developed so that new technologies are added to it and widely disseminated by countries and used by all people.

6.5 Recommendations

In this section we have some recommendation to be taken in consideration for future development and improvement for this project and/or other similar project.

1. Ultrasonic can be replaced with infrared sensors.
2. RFID can be replaced with touch sensors.
3. Make sure that all components are working under normal conditions mentioned in their datasheets.
4. Some parts need 5 volts in order to work, so the voltage must be checked.
5. The system can be developed by making a website uploaded on the Internet by purchasing hosting from hosting companies.
6. The mobile application can be developed by making an automatic phone call in case of danger.

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