An-Najah National University

Faculty of Engineering

SMART HOME

Supervised by:

Dr.Saed Tarapiah

Prepared by:

Tala Al-Ashqar

Mutaz Mardawi

بسم الله الرحمن الرحيم

"يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ"

صدق الله العظيم

{ المجادلة:11}

Dedication:

For Our Palestine …

For Our University …

For Our Teachers …

For Our Family …

We Present This Research …

ACKNOWLEDGMENT

First of all, whoever does not thank people does not thank God, in the beginning, praise be to God, who gave us the strength to complete this project, titled “Smart Home”.

A part of our effort and the successes of any project depends largely on the encouragements of others. We would like to start with a special gratitude to our university for the help and support provided in its facilities for the past five years.

We would like to thank our supervisor, Dr.Saed Tarapiah, for bringing the weight of his considerable experience and knowledge to this project. His high standards have made us better at what we do.

Finally, we also extend our heartiest thanks to our parents, friends, and well-wishers for being with us and extending encouragement throughout the project. helping us survive all the stress from this year and not letting us give up.

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ABSTRACT

The project is about smart home. A smart home refers to a convenient home setup where appliances and devices can be electronically controlled remotely from anywhere with an internet connection using a mobile or other networked device. 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. Smart home technology provides homeowners with convenience and cost savings.

The main objectives of the project are Intelligent Detection, Water Management, Security System and Smoke Detection and Alerts.Some of these applications will be controlled through mobile (WiFi)_and some of them via mobile application. we will use the Arduino Mega for software.

Chapter 1

Introduction

1.1 Overview

In the era of information technology, the elderly and disabled can be monitored with numerous intelligent devices. Sensors can be implanted into their home for continuous mobility assistance and non-obtrusive disease prevention. Modern sensor-embedded houses, or smart houses, cannot only assist people with reduced physical functions but help resolve the social isolation they face.

They are capable of providing assistance without limiting or disturbing the resident's daily routine, giving him or her greater comfort, pleasure, and well-being. This article presents an international selection of leading smart home projects, as well as the associated technologies of wearable/implantable monitoring systems and assistive robotics. The latter are often designed as components of the larger smart home environment. This report/study will conclude by discussing the concept of smart home and the whole process of it and some challenges faced and some applications for this modern technology.

1.2 Statement of The Problem:

Nowadays, we have remote controls for our television sets and other electronic Systems, which have made our lives really easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Of-course, yes but, are the available options cost-effective? If the answer is no, we have found a solution to it.

A new system has been created that is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone.

Time is very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people’s time we are introducing Home Automation system using wifi. With your mobile phone. you can turn on/off your home appliances within the range of wifi

.

1.3 Objectives:

The objectives of this project can be summarized as follows:

1- Implementing a low cost, reliable and scalable home automation system, that can be used to remotely switch on or off any household appliance.

2-Using a microcontroller to achieve hardware simplicity.

3-Low-cost short messaging service for feedback voice dial from phone to toggle the switch state.

1.4 Scope of The Work:

This project work is complete on its own in remotely and automatically switching On or Off an electrical appliance not limited to household appliances and sends Feedback message indicating the new present state of the appliance.

1.5 Importance of The Work:

The importance of the smart home lies in providing comfort and security so that the technology used to control the lighting and room temperature works remotely so that it is fully ready when you return, and it also saves time and effort because it allows you to control it using the phone remotely, and it also provides safety in a case of a fire or a gas leak, so the technology used will alert you immediately in any case of danger.

It also reduces electricity consumption, as the lighting turns off completely if no one is in the lighted room, as well as the heating system reduces electricity consumption more than air conditioning devices that are used currently, the smart home makes you feel in control.

1.6 Report Organization:

This study will be divided into five chapters as follows:

1-Chapter one: will contain Introduction, problem statement, importance of the study, the objective and scope of the study in addition report organization

2-Chapter two: will contain theoretical Background and Previous Work of the study subject (smart home).

3-Chapter three: will contain methodology and the data that has been used and the work process.

4-Chapter four: will contain results and analysis through summarizing the data collected and their statistical treatment and conclusions.

5-Chapter five: will contain discussion of the study and compare the results.

6- Chapter six: will contain conclusions and recommendation

Chapter 2

Theoretical Background and Previous Work

This chapter contains a background discussion and some previous work that address the current study object which is smart home.

Introduction:

A smart home" can be characterized as a home furnished with registering furthermore, data innovation which expects and answers the necessities of the inhabitants, attempting to advance their solace, accommodation, security and amusement through the administration of innovation inside the home and associations with the world past.

The full-blown concept of the smart home is the acme of domestic technology we can envisage at present. The concept, at one time only encountered in science fiction, has moved closer to realisation over the last ten years. Although the gap between reality and fantasy is still wide, it is important that we start to give proper consideration to the implications this technology holds for the way we will live in our homes.

“Smart home” concept; its present status in terms of consumer take-up, current research projects and academic literature; and its future prospects, both commercially and as a potential area for social science research. The field of smart home research (and domestic technology in general) is in its infancy and relevant literature is sparse. I have therefore drawn together information from a range of disciplines and speculated where necessary, particularly regarding the future.

The term 'smart home home' is utilized for a home furnished with innovation that permits checking of its occupants as well as empowers freedom and the upkeep of good wellbeing. In this study, the term does exclude reference to offices intended to mechanize and streamline control of the home climate, for example, cooling and clothes washers. The motivation behind this segment is to look at the advancements used to assist individuals with beating reliance and medical conditions

The essence of a smart home is information and communication technologies (ICTs) distributed throughout rooms, devices and systems (lighting, heating, ventilation) relaying information to users and feeding back user or automated commands to manage the domestic environment

Regardless of the specific innovative design of a shrewd home, its motivation — as per innovation engineers — is "to work on the residing experience' 'here and there. This might be through new usefulness like controller and computerization of apparatuses,

through upgrade of existing usefulness such as warming administration, through superior security or through the arrangement of helped living administrations by checking, alarming and distinguishing wellbeing episodes (Pierce J, Schiano DJ, Paulos E ,2010)

Smart home is additionally the end-use hub of the brilliant energy framework that permits utilities to answer ongoing progressions of data on energy request took care of back by shrewd meters from a great many homes.

The Importance of Smart Home

Why the smart home? Why is the smart home a growing and potentially important field of research and development? Three broad views are evident in the literature: a functional view; an instrumental view; and a socio-technical view.

The functional view sees smart homes as a way of better managing the demands of daily living through technology. The instrumental view emphasizes smart homes' potential for managing and reducing energy demand in households as part of a wider transition to a low-carbon future. The socio-technical view sees the smart home as the next wave of development in the ongoing electrification and digitalization of everyday life.

Who Uses Smart Homes and How?

Analysis of reports, studies, websites and promotional material produced by smart home technology developers and service providers reveals a notable absence of user focused research (Hargreaves T, Wilson C 2013b).

User-oriented studies in actual smart home environments are notable exceptions rather than the rule. The resulting implicit (rather than explicit) understanding and representation of smart home users distinguishes: (1) who prospective users of smart homes might be; (2) how these users might interact with and make

on what they might want has contributed to the limited diffusion of smart homes to date: ''If the history of research into this area attests to anything, it is the narrowness of the appeal of smart homes to a wider population (Paetz A-G, Dutschke E, Fichtner W (2012).

Chapter 3

Literature Review

There are many projects under the name of the smart house, but they differ in the nature of the systems they contain. Some of the basic systems are found in every house and some are distinctive. We have added them as a new feature such as the interior lighting control system, which gives 255 colors, and closing the windows when raining and stairs lighting when going up and down.

When people think about home automation, most of them may imagine living in a smart home: One remote controller for every household appliance, cooking the rice automatically, starting air conditioner automatically, heating water for bath automatically and shading the window when night coming. To some extent home automation equals to smart home. They both bring out smart living condition and make our life more convenient and faster.

Beata Kolny in her research (YOUNG CONSUMERS TOWARDS SMART HOMES), discusses information on smart homes and its devices and the ways of coordination & connection between them. It also provides some comparisons about consumer's behavior.

Benjamin K. Sovacool (2018), in his article provides information about two terms "home" & "smartness" and how they can be combined through technology. Moreover, it defines smart home in different times and places.

Lili Liu , Eleni Stroulia , Ioanis Nikolaidis , Antonio Miguel-Cruz , Adriana Rios Rincon (2016), in their research shows level of acceptance of smart home among elderly people. It also supplies examples of how smart home makes elderly people lives more easy

T Maragatham (2021),this paper is summary purpose a control home apparatuses mechanization by using android application to control and monitoring the home apparatuses this way to control depends on internet of thing (IOT)every single device are worked without human intervention.the (IOT)is innovation that allow the client to control machine via computerizing through the web.in this project the client control house using Raspberry Pi4 Embedded controller furthermore Wi-Fi methodology.

Chapter 4

Methodology

3.1 Standards/Codes

The standards we used in our project:

1. IEEE 802.11 a/b/g/n WiFi Standards:

The 802.11 standards are a group of evolving specifications defined by the Institute of Electrical and Electronic Engineers (IEEE). Commonly referred to as Wi-Fi the 802.11 standards define a through the air interface between a wireless client and a base station access point or between two or more wireless clients, and the following table (1.1) clarifies these standards

Table1 (IEEE 802.11 a/b/g/n WiFi Standards)

Standard	Maximum Data Rate (Mbps)	Typical Throughput (Mbps)	Operating Frequency Band	Channel wide.
802.11b	11	5 Mbps	2.4 GHz	20 MHz
802.11g	54	8 (Mixed b/g) 25(Only802.11g)	2.4 GHz	20 MHz
802.11n	Up to 600	Up to 400	2.4 GHz & 5GHz	20 MHz or 40 MHz

3.2 Constrains:

The problems that we faced in the project were:

1-The high cost of the parts of the project, also we had difficulty in finding the right place to buy them, so we ordered them from online webstores like Alibaba website, and we also found that there is a large price difference for the geographical area in which they are

located, so we tried to ask help from a friend who is in the occupied interior to help us bring the parts

2-Internet problems that we face in the region that affect the work of the system, and it is possible that the problems will disappear if the network is developed, and this is what the companies that provide the Internet in the region are working on.

3-People are not aware of this system because it has no advertisement and it's not published in some areas such as Qalqilya, Tulkarem and Jenin, and this affects the success of the project.

4-Frequent power outages in some areas, and this negatively affects the system, so that we lose communication with it, and we also lose the advantages of the system's work. To solve the problem, the house must be equipped with an electric generator, and this increases the cost

3.3 Software Implementation

It required a Programming Tools of mobile application & arduino Language to build a project

3.4 Arduino Language

Arduino programming language can be divided in three main parts: functions, values (variables and constants), and structure.as follows:

1-Functions: For controlling the Arduino board and performing computations

2-Variables: Arduino data types and constants

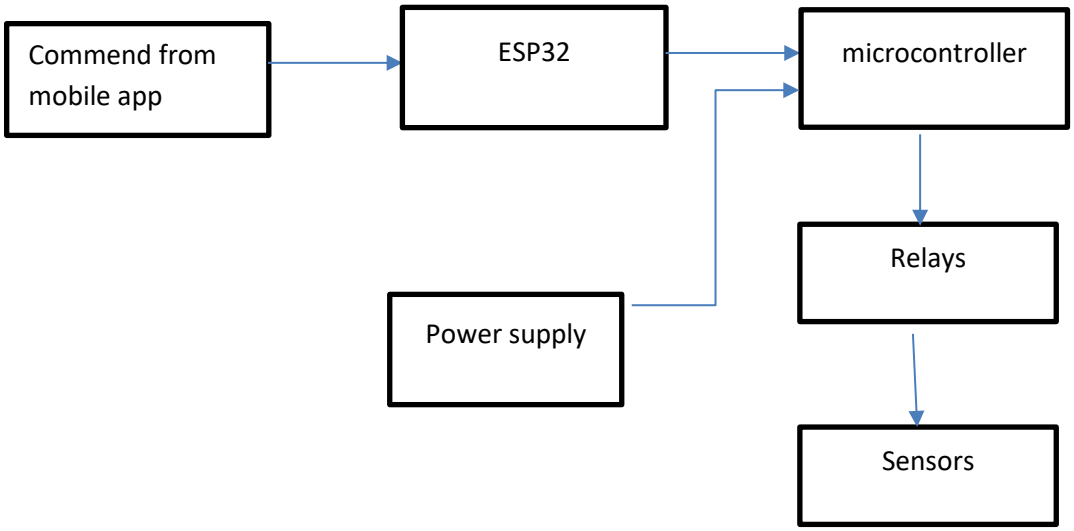
3-Structure: The elements of Arduino (C++) code.

3.5 Software Design

1-Schematic

The figures display all process that send data from (mobile app) to server to microcontrollers.

Figure4.1 (all process that send data from (mobile app) to server to microcontrollers.



The command will be sent from the client to the esp32cam to turn the sensor on or off

2-Home control

The flow chart of this process

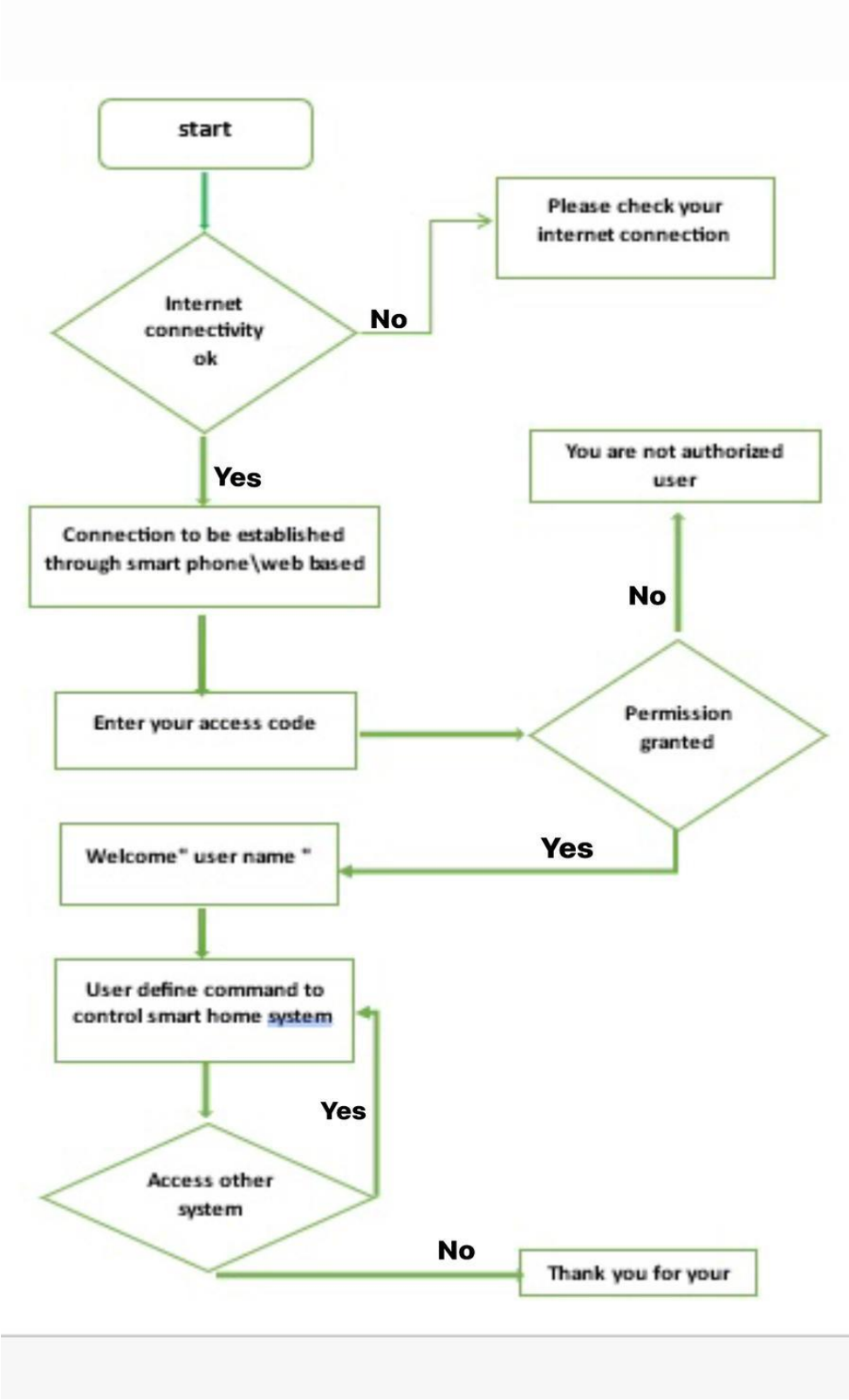


Figure 4.2 the flow chart process of home control

The command will be sent from the customer using the mobile application (BLYNK) to the microcontroller and pass the command to the sensors requested by the customer.

3.6 Hardware Design

1-Design The Home

At first, we drew a sketch of the house model we needed based on that systems that it contains, then we brought the cardboard and cut it to design the house as it is shown in fig.

Figure 4.3 design the house

2-ESP32 CAM

-ESP32CAM, to receiving orders from the customer via mobile app with Wi-Fi….and processing and implementation it.

-The board integrates WiFi, traditional Bluetooth and low power BLE , with 2 highperformance 32-bit LX6 CPUs. It adopts 7-stage pipeline architecture, on-chip sensor, Hall sensor, temperature sensor and so on, and its main frequency adjustment range from 80MHz to240MHz.

-Fully compliant with WiFi 802.11b/g/n/e/i and Bluetooth 4.2 standards, it can be used asa master mode to build an independent network controller, or as a slave to other host MCUs to add networking capabilities to existing devices

-ESP32-CAM can be widely used in various IoT applications. It is suitable for homesmart devices, industrial wireless control, wireless monitoring, QR wirelessidentification, wireless positioning system signals and other IoT applications. It is anideal solution for IoT applications.

Figure 4.4 ESP32 CAM module

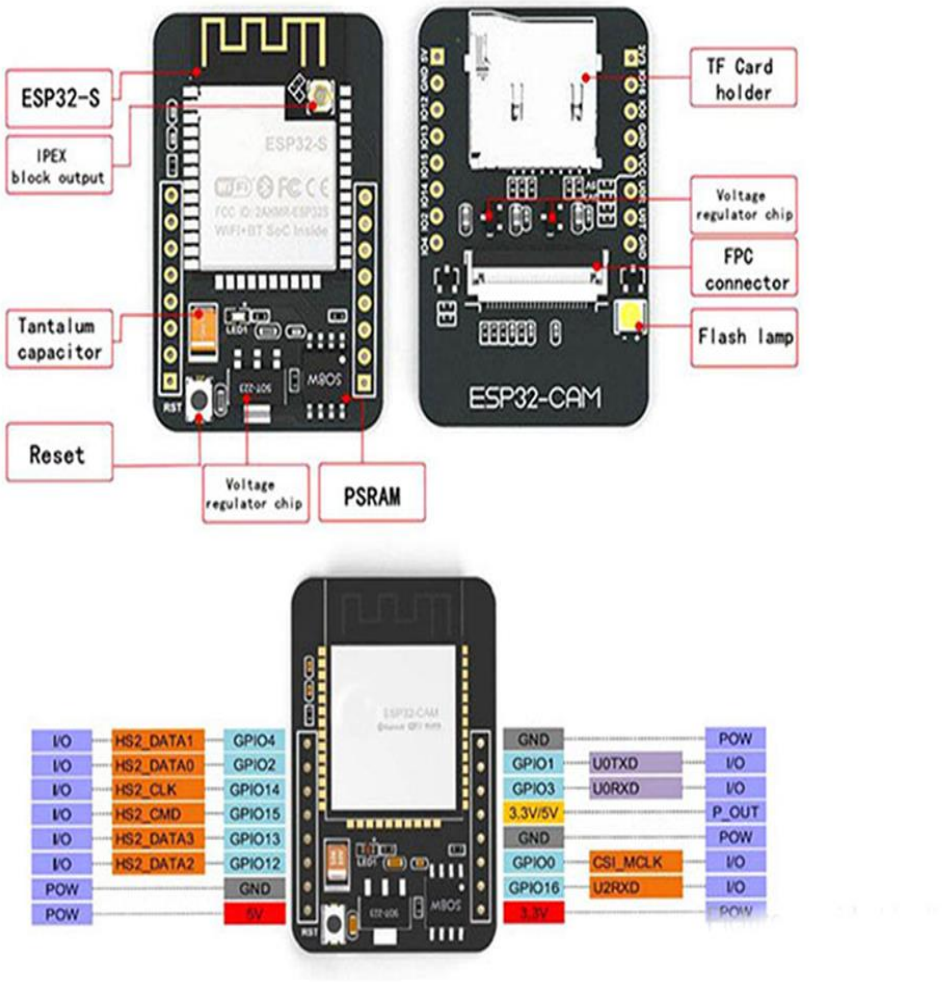


Figure 4.5 datasheet for ESP32 CAM module.

3.10Microcontroller Comparison

1-Microcontroller

In this project we have used an Arduino Mega2560 microcontroller, this controller was chosen based on several reasons, as shown in the table.

2-Projects Components:

After a long search and based on this comparison, we used the Arduino Mega, because it does the trick.

This figure shows us the Arduino Mega

Table 2 Arduino mega

Microcontroller Comparison				
Name	Arduino Nano	Arduino Uno	Arduino Mega	Raspberry pi4
Price	8$_11$	10$_17$	21$_42$	35$_45$
Processor	ATmega168 ATmega328P	ATmega328P	ATmega2560	BCM2711B0
CPU Speed	16 MHz	16 MHz	16 MHz	700MHz
Analog In/Out	8	6	16	__
Digital IO/PWM	14	14	54	26
Memory	SRAM 2KB EEPROM 1KB	SRAM 2KB EEPROM 1KB	SRAM 8KB EEPROM 4KB	SRAM (1,2,4,8)GB
Operating Voltage	5V	5V	5V	5V

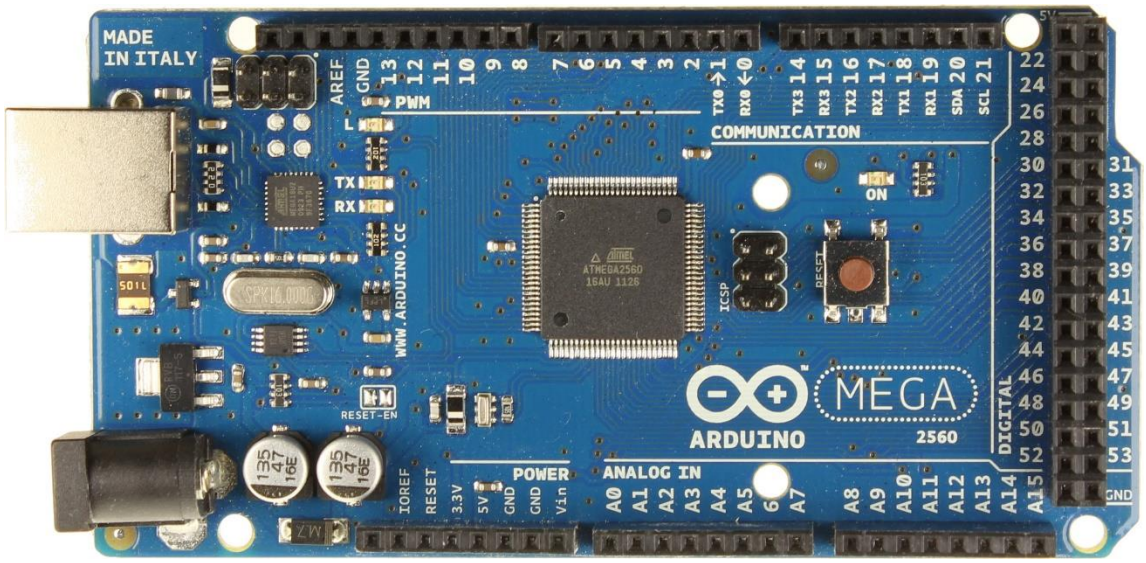


Figure 4.6 Arduino Mega 2560

The following table 3 shows us the specifications of the Arduino MEGA 2560 microprocessor:

Table 3 Specification of the Arduino MEGA 2560 microprocessor

Specification	Arduino mega 2560
Processor	ATmega2560
Program memory	256KB
Data memory	8KB
EEPROM	4KB
Device pins	100
Digital I/O pins	54
Analog inputs	16
PWM outputs	14
Serial ports	4

This figure shows us the details of the Arduino MEGA2560 components

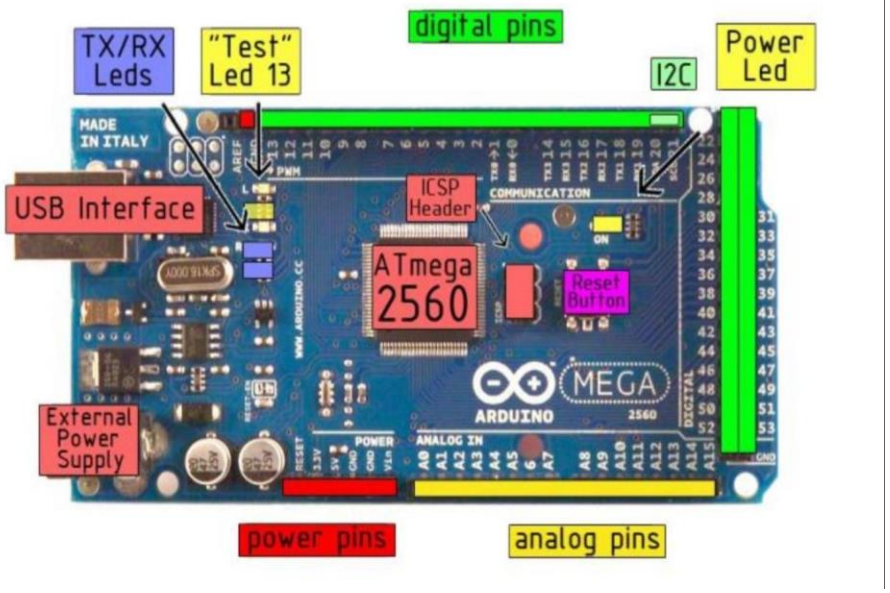


Figure 4.7 Arduino mega 2560 component

3-Outside Lighting

In the beginning, lighting outside the house is one of the most important factors that give the house aesthetics, so we made a lighting system using LEDs and added light sensors that detect the level of light outside the house, so the less lighting outside, the LED starts to work.

Figure 4.8 LDR

4-Interior lighting System

The interior lighting of the house is one of the basic and important matters. For this reason, we have added a motion sensor. If there is someone in the rooms, then when the condition is met, the lighting system works.

Figure 4.9 PIR Sensor

5-fire System

We used smoke detectors to detect fires inside the home and will program them to alert us if there is a fire

Figure 4.10 MQ-2

6-Heat System:

Keeping the house temperature moderate is one of the most important factors of comfort, so we used a sensor to measure temperature and humidity. In the event of a change in temperature, the air conditioning system works.

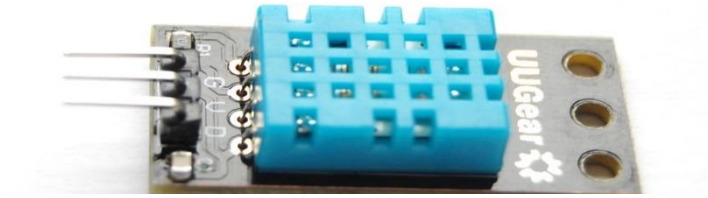


Figure 4.11 DHT11 Sensor

8-Main Door

This constitutes the main gate of the house, which is a servo motor controlled by the phone, which provides convenience and ease for the user compared to the main gates that have to carry a remote control for the gate, or the normal gates that do not contain any control system.

Figure 4.12 Servo motor

9-Garage Door

As for the garage door, which today has become a natural thing to operate automatically, it was designed in our house to open automatically when an object is detected near it for a certain period of time, through an IR sensor.

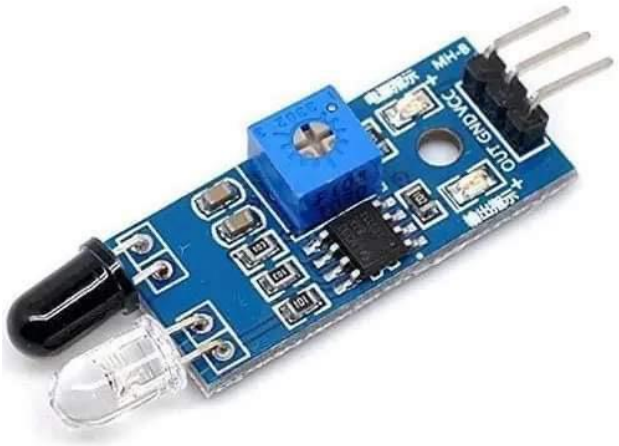


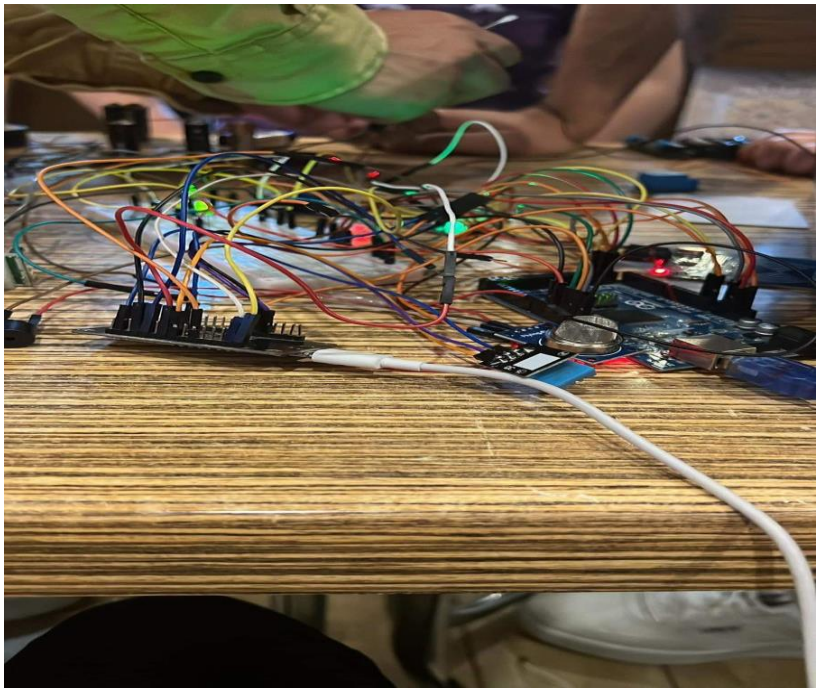
Figure 4.13 infrared sensor module

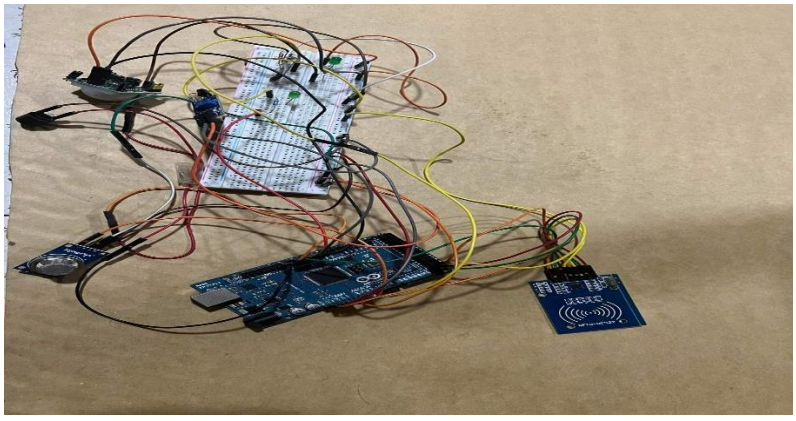
10-Door Card

And now the main house door, which is the most important, has been designed to work using its own card, it is read by RFID, and based on it the door is opened, and to ensure security, the door is opened only on this card.

Figure 4.14 RFID sensor

11-check out the tools





12-Lighting System

In this project, we used the lighting system, which is LED, because it saves electrical energy and gives more lighting to the house, and we protected the LED with protection resistors.

13-Android Mobile

For this project android application was selected. The decision was easy to make, due to all the senior design teammates' availability to an android device. This will help the team to do individual testing's and evaluations.

Furthermore, an android application can be designed using JAVA, which is a very robust and versatile programming language. There are plenty of references on-line in making the design process of the application easier.

Finally, the team tested out some sample android applications already available in the market with initial testing. The results from the tests done were all positive and gave the team a clean site that an android application for this project is very doable.

Chapter 5

Results and Analysis

We gathered the necessary information, read many research papers on smart homes, made a plan to work on it, spotted the tools that we will deal with to control the system, then examined each one separately, and searched for the best sources for electronic parts. at the best price. We also noticed the difference between the controllers and chose the appropriate one, and designed a webpage to send data from the ESP32 to the controller, because it saves money than buying other parts to design an app. Then we began to study the programming of electronic parts to provide the best performance for the smart home, and we also obtained satisfactory results

.

Chapter 6

Conclusions and Recommendation:

The system as the name indicates, ‘smart home ’ makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. WiFi is used as the communication channel between android phone and the Arduino .This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device’s display.

The approach discussed has achieved the target to control home appliances remotely using the WiFi technology to connect system parts, satisfying user needs and requirements. WiFi technology capable solution has proved to be controlled remotely, provided home security and is cost- effective as compared to the previously existing systems. Hence, we can conclude that the required goals and objectives of home automation system have been achieved.

In light of the electronic revolution that we live in and the development that we live every day, we are certainly working on developing the smart home, where solar cells can be added with batteries and a complete system for charging hybrid cars. The security system can also be developed so that the house supports communication with the security services and civil defense in the event of theft or fire in the house.

And in the end, we were able to finish this project and get results as we expected. It became easy for us to deal with control panels such as Arduino and sensitive electronic parts. We discovered that it is possible and easy to implement this mini- system in real life, but using larger tools.

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Appendix:

```
#include <ESP8266WiFi.h>
#include <DHT.h>
#include <DHT_U.h>
#include<SoftwareSerial.h>
#include <Servo.h>
SoftwareSerial esp(D3,D4);
// Replace with your network credentials
const char* ssid     = "Soul-Caffe-Guest";
const char* password = "10002000";
boolean fan=false;

// Set web server port number to 80
WiFiServer server(80);

// Variable to store the HTTP request
String header;

// Auxiliar variables to store the current output state
String output5State = "off";
String output4State = "off";

// Assign output variables to GPIO pins
int output5 = D1;
```

```
int output4 = D7;
int pin = D5;
int relayPin = D7;

DHT dht(pin, DHT11);
Servo myser;


// Current time
unsigned long currentTime = millis();
// Previous time
unsigned long previousTime = 0;
// Define timeout time in milliseconds (example: 2000ms = 2s)
const long timeoutTime = 2000;

void setup() {
  Serial.begin(115200);
  esp.begin(9600);
  // Initialize the output variables as outputs
  pinMode(output4, OUTPUT);
  // Set outputs to LOW
 myser.attach(output5);
  digitalWrite(output4, LOW);
```

```
  // Connect to Wi-Fi network with SSID and password
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  // Print local IP address and start web server
  Serial.println("");
  Serial.println("WiFi connected.");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
  server.begin();
}


void loop(){
  WiFiClient client = server.available();   // Listen for incoming clients
   float h = dht.readHumidity();
  // Read temperature as Celsius
  float t = dht.readTemperature();
 if(!fan){
  if(t>25){
    digitalWrite(output4, HIGH);
```

```
 }
 else{
  digitalWrite(output4, LOW);
 }
}

if(esp.available()>0) {
            String s=esp.readString();
            Serial.print(s);
            if(s=="y") {
              myser.write(180);
              delay(5000);
              myser.write(0);
             }
           }
 if (client) {                     // If a new client connects,
  Serial.println("New Client.");         // print a message out in the serial port
  String currentLine = "";               // make a String to hold incoming data from the client
  currentTime = millis();
  previousTime = currentTime;
  while (client.connected() && currentTime - previousTime <= timeoutTime) { // loop
while the client's connected
    currentTime = millis();
    if (client.available()) {            // if there's bytes to read from the client,
```

```
char c = client.read();           // read a byte, then
Serial.write(c);                  // print it out the serial monitor
header += c;
if (c == '\n') {                  // if the byte is a newline character
  // if the current line is blank, you got two newline characters in a row.
  // that's the end of the client HTTP request, so send a response:
  if (currentLine.length() == 0) {
    // HTTP headers always start with a response code (e.g. HTTP/1.1 200 OK)
    // and a content-type so the client knows what's coming, then a blank line:
    client.println("HTTP/1.1 200 OK");
    client.println("Content-type:text/html");
    client.println("Connection: close");
    client.println();



    // turns the GPIOs on and off
    if (header.indexOf("GET /5/on") >= 0) {
      Serial.println("Servo on");
      output5State = "on";
      myser.write(180);
    } else if (header.indexOf("GET /5/off") >= 0) {
      Serial.println("Servo off");
      output5State = "off";
      myser.write(0);
```

```
} else if (header.indexOf("GET /4/on") >= 0) {
  Serial.println("GPIO 4 on");
  output4State = "on";
  digitalWrite(output4, HIGH);
  fan=true;
} else if (header.indexOf("GET /4/off") >= 0) {
  Serial.println("GPIO 4 off");
  output4State = "off";
  digitalWrite(output4, LOW);
  fan=false;
}

// Display the HTML web page
client.println("<!DOCTYPE html><html>");
client.println("<head><meta name=\"viewport\" content=\"width=device-width, initial-scale=1\">");
client.println("<link rel=\"icon\" href=\"data:,\">");
// CSS to style the on/off buttons
// Feel free to change the background-color and font-size attributes to fit your preferences
client.println("<style>html { font-family: Helvetica; display: inline-block; margin: 0px auto; text-align: center;}");
client.println(".button { background-color: #195B6A; border: none; color: white; padding: 16px 40px;");
client.println("text-decoration: none; font-size: 30px; margin: 2px; cursor: pointer;}");
```

```
client.println(".button2 {background-color: #77878A;}</style></head>");

// Web Page Heading
client.println("<body><h1>Mutaz Web Server</h1>");

// Display current state, and ON/OFF buttons for GPIO 5
client.println("<p>Servo - State " + output5State + "</p>");
// If the output5State is off, it displays the ON button
if (output5State=="off") {
  client.println("<p><a href=\"/5/on\"><button class=\"button\">ON</button></a></p>");
} else {
  client.println("<p><a href=\"/5/off\"><button class=\"button button2\">OFF</button></a></p>");
}

// Display current state, and ON/OFF buttons for GPIO 4
client.println("<p>Fan - State " + output4State + "</p>");
// If the output4State is off, it displays the ON button
if (output4State=="off") {
  client.println("<p><a href=\"/4/on\"><button class=\"button\">ON</button></a></p>");
} else {
  client.println("<p><a href=\"/4/off\"><button class=\"button button2\">OFF</button></a></p>");
}
```

```
   client.println("<H3>Humidity / Temperature</H3>");
    if (isnan(h) || isnan(t) ) {
     Serial.println("Failed to read from DHT sensor!");

    }
   client.println("<pre>");
   client.print("Humidity (%)        : ");
   client.println(h);
   client.print("Temperature (°C)  : ");
   client.println(t);
   client.println("</pre>");
   client.println("</body></html>");

   // The HTTP response ends with another blank line
   client.println();
   // Break out of the while loop
   break;
  } else { // if you got a newline, then clear currentLine
   currentLine = "";
  }
} else if (c != '\r') {  // if you got anything else but a carriage return character,
  currentLine += c;      // add it to the end of the currentLine
}
```

```
    }
   }
   // Clear the header variable
   header = "";
   // Close the connection
   client.stop();
   Serial.println("Client disconnected.");
   Serial.println("");
  }
}
```

Arduino Code

```
#include <SoftwareSerial.h>


#include <SPI.h>
#include <MFRC522.h>
#include <Servo.h>

SoftwareSerial esp(10,11);

#define SS_PIN 53
#define RST_PIN 5
// Define the gas sensor pin
int gasSensorPin = A0;
```

```
int buzzerPin = 8;

// Set the gas threshold level (adjust this based on your gas sensor)
float gasThreshold = 0.2;

// Define the PIR sensor pin
int pirSensorPin = 2;

//Define led pin
int ledPin = 6;

// Define black led pin
int blackLed = 3;

int ldrPin = A1; // LDR is connected to Analog pin A0
int ldrValue = 0; // Variable to store the LDR value
const int IRSensor = 7;
MFRC522 mfrc522(SS_PIN, RST_PIN);   // Create MFRC522 instance
String card="";

Servo servo;
int servoPin = 4;
void setup() {
  Serial.begin(9600);   // Initialize serial communications

  esp.begin(9600);
```

```
  SPI.begin();         // Initialize SPI bus
  mfrc522.PCD_Init();   // Initialize MFRC522 RFID module
  Serial.println("Ready to read RFID tags!");
  Serial.println("Place your tag near the reader...");
  servo.attach(servoPin);
  servo.write(0);
  pinMode(buzzerPin, OUTPUT);
   pinMode(pirSensorPin, INPUT);
   pinMode(ledPin, OUTPUT);
   pinMode(blackLed, OUTPUT);

}

void loop() {
  // Check for new RFID tags
  if (mfrc522.PICC_IsNewCardPresent() && mfrc522.PICC_ReadCardSerial()) {
    // Read the tag UID
    String uid = "";
    for (byte i = 0; i < mfrc522.uid.size; i++) {
      uid += String(mfrc522.uid.uidByte[i] < 0x10 ? "0" : "");
      uid += String(mfrc522.uid.uidByte[i], HEX);
    }

    Serial.print("Detected RFID tag with UID: ");
    Serial.println(uid);
    card=uid;
    // Halt PICC and stop reading
```

```
  mfrc522.PICC_HaltA();
  mfrc522.PCD_StopCrypto1();
}
int statusSensor= digitalRead (IRSensor) ;
if(((card=="423a3b1b")||(card=="721f231b")) && (statusSensor==0)) {
 esp.print("y");
delay(5000);
 esp.print("n");
card="";
}
 // Read the analog value from the gas sensor pin
int gasSensorValue = analogRead(gasSensorPin);

// Convert the analog value to voltage
float gasSensorVoltage = gasSensorValue * (5.0 / 1023.0);

// Print the voltage and raw analog value to the serial monitor
Serial.print("Gas Sensor Voltage: ");
Serial.print(gasSensorVoltage);
Serial.print("V  |  Raw Analog Value: ");
Serial.println(gasSensorValue);

if (gasSensorVoltage >= gasThreshold) {
  // Sound the buzzer alarm
  digitalWrite(buzzerPin, HIGH);
} else {
  // Turn off the buzzer alarm
```

```
  digitalWrite(buzzerPin, LOW);
}

 int pirSensorValue = digitalRead(pirSensorPin);

// Print the PIR sensor value to the serial monitor
Serial.print("PIR Sensor Value: ");
Serial.println(pirSensorValue);

if(pirSensorValue == HIGH) {
  digitalWrite(ledPin, HIGH);
}

else {
   digitalWrite(ledPin, LOW);
}

ldrValue = analogRead(ldrPin); // Read the LDR value from the analog pin
Serial.print("LDR value: ");
Serial.println(ldrValue); // Print the LDR value to the serial monitor

if(ldrValue<=100) {
  digitalWrite(blackLed, HIGH);
}

else {
  digitalWrite(blackLed, LOW);
```

```
  }
  delay(500);



}
```