A PROJECT REPORT

ON

"Home automation Using Raspberry pi"

SUBMITTED TO THE MSBTE, MUMBAI
IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD

OF

DIPLOMA IN COMPUTER TECHNOLOGY

By

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Under the Guidance of

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2022 - 2023

CERTIFICATE

This is to certify that the project report entitled

“Home automation Using Raspberry pi”

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is a bonafide work carried out by them under the guidance of **Mrs. S.S.Rajmane**. and it is approved for the partial fulfillment of the requirement of MSBTE, MUMBAI for the award of the Diploma in Computer Technology

This project work has not been earlier submitted to any other Institute or University for the award of any degree or diploma.

Mrs. S.S.Rajmane	**M.C.Patil**	**A. A. Bhavtankar**
(Project guide)	**Head**	**Principal**
	Department Of Computer Technology	**S.E.S. Polytechnic,Solapur**

Place: Solapur.

Date: / /2023

DECLARATION

I hereby declare that this project work entitled **"Home automation Using Raspberry pi"** has been prepared by me during the academic year 2022 – 23 under the guidance of **Mrs. S.S.Rajmane**, Department of Computer Technology, S.E.S.Polytechnic,Solapur in the partial fulfillment of diploma degree prescribed by the college.

I also declare that this project is the outcome of my own effort, that it has not been submitted to any other university for the award of any degree.

Student Name & Signature

Mr. Viresh Kamlapure :

Mr. Sahilkumar Chouhan :

Ms. Mrudula Sadafule :

Ms. Komal Kudal :

ACKNOWLEDGEMENT

It gives us a great pleasure to present the project report entitled **Home automation Using Raspberry pi**

This project has given us a great learning experience in understanding the various aspects of the Android app designing. So we would like to acknowledge all the minds and hands that contributed in giving this project a proper shape.

We are grateful to our ***Hon.Guide Mrs. S.S.Rajmane*** our Project Guide for hers encouragement and guidance & keen interest throughout project. We are also thankful to our ***Head Of Department*** **Mr.M.C.Patil** and our ***Principal A.A.Bhavtankar*** for their moral support.

We are thankful to all the staff and non-teaching members of Computer Technology Department for their co-operation during the project work. We are very grateful to those who in the form of books had conveyed guidance in this project work.

CONTENTS

INTRODUCTION

1.INTRODUCTION

Internet of things is a technology of the future that has already started to touch our homes. Controlling the devices manually is totally outdated in today's world. In today's busy scheduled life each time human is not available to control devices manually so automation is batter option.

Now-a-days everything is advanced. The technology is at its peak. Now days mostly everything in our surrounding is being automated. In this project we have designed a software in which multiple home appliances are connected and controlled by the mobile by means of internet.

In which if a particular appliance is left in looking state we can access and switch off it from anywhere in the world.

1.1 BACKGROUND

Research on Home Automation devices have been going on for quite. Some time. These research have produced smart thermostats, switches And wireless controllable lights like Philips Hue. But these devices are Mostly out of reach of the general population mainly because of its high cost.

Introduction these smart electrical lights, switches have enabled us to control electrical appliances through our phones. These are low cost devices that can be used to control various electronics that have built-in microcontrollers and wireless connectivity. But sadly, traditional electronics do not contain either microcontrollers, nor have wireless capabilities. Our solution enables users control to everyday electronics just adding some additional simple components to their existing electronic switches and controls through Android phones.

1.2 PROBLEM DEFINITION

Earlier in the time, project for controlling home appliances we need to switch it manually to operate. But in today would everything fully advanced. So controlling home appliances are needed to be set to advanced level. The existing system consumes more power and have limited coverage area to control the appliances using raspberry pi. It was used using sensor, which range is very less. It's have high cost and consumes more energy to operate. So, internet is used to access it from smartphone which decreases cost effectivity and consumes very less energy and can be operated from anywhere through means of internet.

1.2.A. SOFTWARE/HARDWARE REQUIREMENT SPECIFICATION

- SOFTWARE

  1.Raspbian OS

  2.Visual Studio

  3.Programming Language: Python, html/css

  4.Geanny IDE

- HARDWARE

  1.Raspberry pi(version 3 or higher)

  2.IR SENSOR

  3.Memory Card 8 or 16 GB

  4.PCB

  5.Battery

  6.Diodes

  7.Jumper wires

  8.Resistors(220 or 100 ohms)

  9.Motor driver

  10.dc motor

  11.MQ 135 (smoke)sensor

  12.Servo motor

  13.Buzzer

1.2.B. PROJECT PLAN

Planned Date	Planned Work
August 4th week	Discuss about CPP project
September 1st week	Discussion of category of the project
September 3rd, 4th week	Selection and Finalization of team member and project
September 5th week	Create problem definition
October 2nd week	Prepare survey questions
October 3rd week	Create introduction and feature of project
October 4th week to November 1st week	Prepare diagrams
November 2nd , 3rd week	Analyze requirements related to project
November 4th week	Prepare I/O design
December 1st , 2nd week	Preparing project report
December 3rd , 4th week	Study of software programming language needed for our project
January 1st , 2nd week	Design the system with coding
January 3rd , 4th week to February 1st week	Model preparation
February 2nd week to March 2nd week	Implementation of system
March 3rd week	Connect frontend and backend(model)
March 4th week to April 3rd week	Test the modules developed
April 4th week to May 1st week	Overall testing of the system with hardware interaction

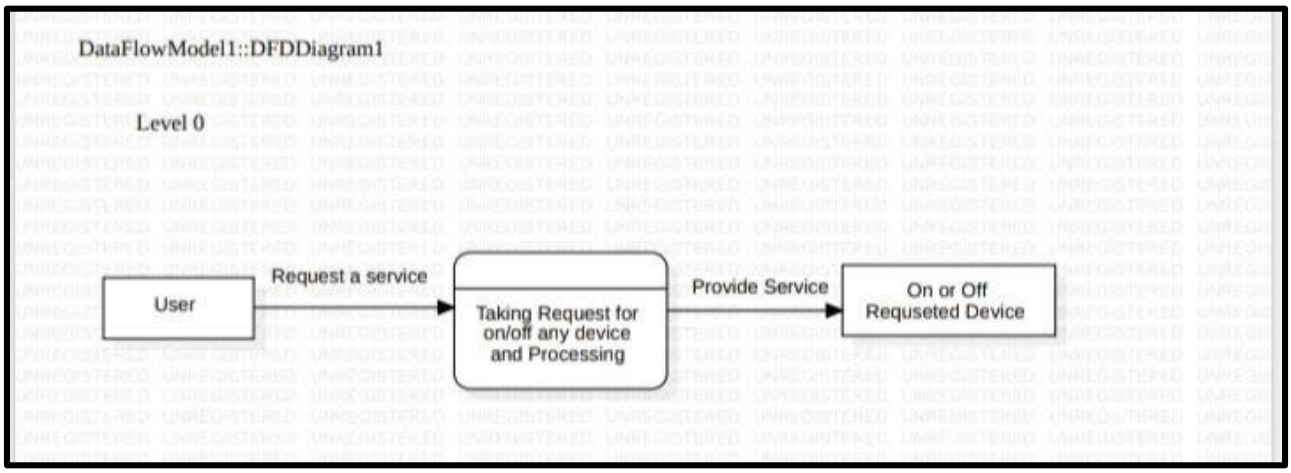
Table 1 : Project Plan

PROJECT ANALYSIS

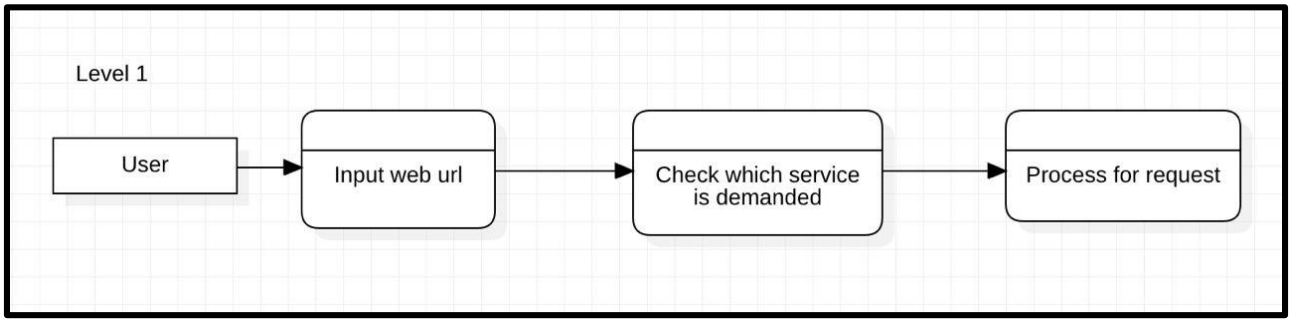
2.PROJECT ANALYSIS

2.1 DFD DIAGRAM

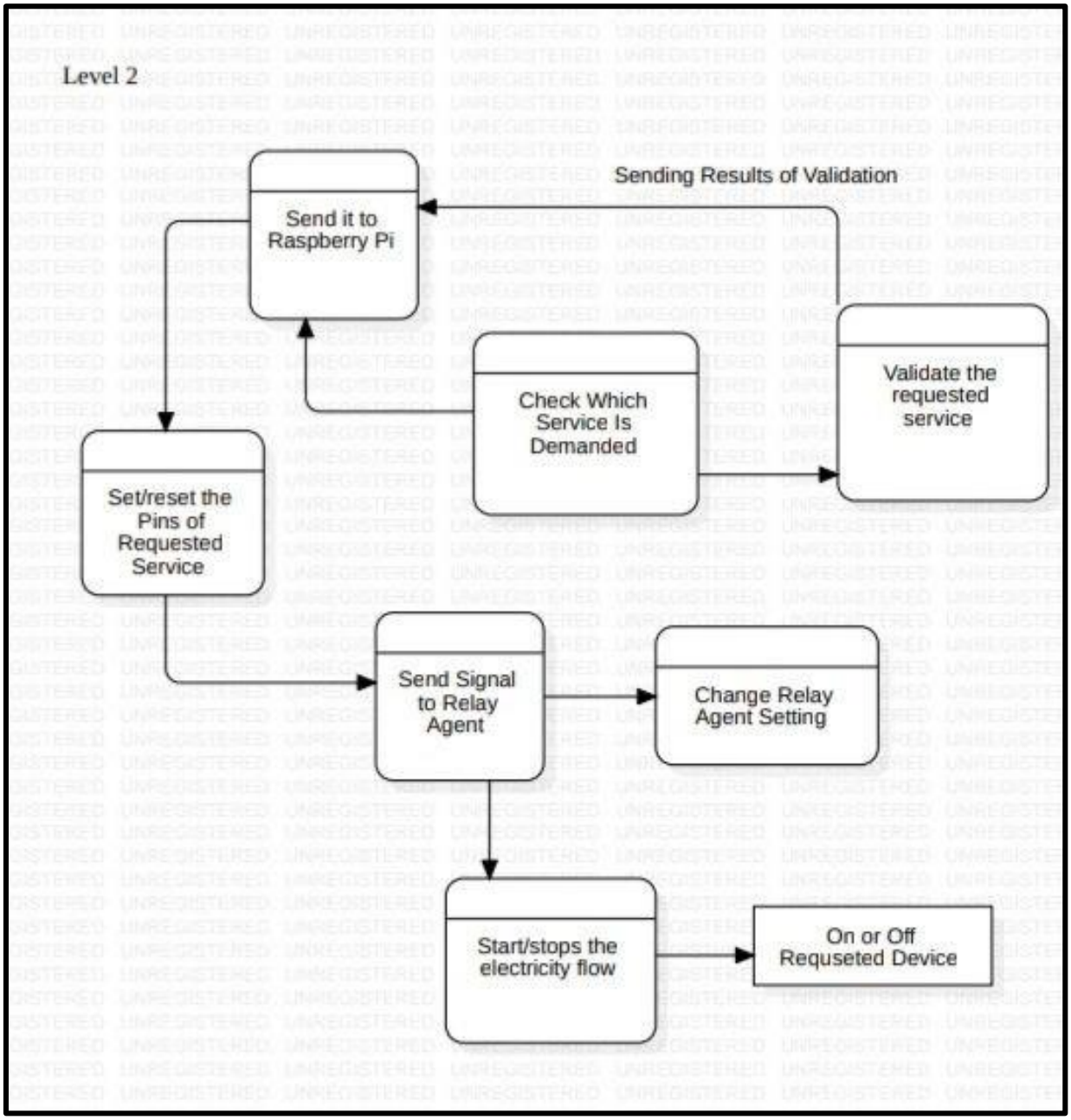
1. DFD Level 0



2.DFD Level 1



3.DFD Level 2


Level 2
Sending Results of Validation
Send it to Raspberry Pi
Validate the requested service
Check Which Service Is Demanded
Set/reset the Pins of Requested Service
Send Signal to Relay Agent
Change Relay Agent Setting
Start/stops the electricity flow
On or Off Requseted Device

PROJECT DESIGN

3.1 SYSTEM ARCHITECTURE

The objective of this project is to design and implement a home automation system using Raspberry pi.The system will consist of raspberry pi ,servo motor,LED light, motor driver ,DC motor,MQ 135 gas sensor and further components as per hardware specification.

In this we can control the devices connected to the raspberry pi with our mobile phone and the laptop, by just entering the web address that is generated after the execution of program.A motor driver is used to control the DC motor which is used as a reference of a fan.A MQ135 gas sensor to detect the leakage of LPG gas and the excess of the smoke in the house and set the buzzer on so that we can get alert.A servomotor is used to show the reference of the smart gate , which opens when the ir sensor detect the object want to enter inside.

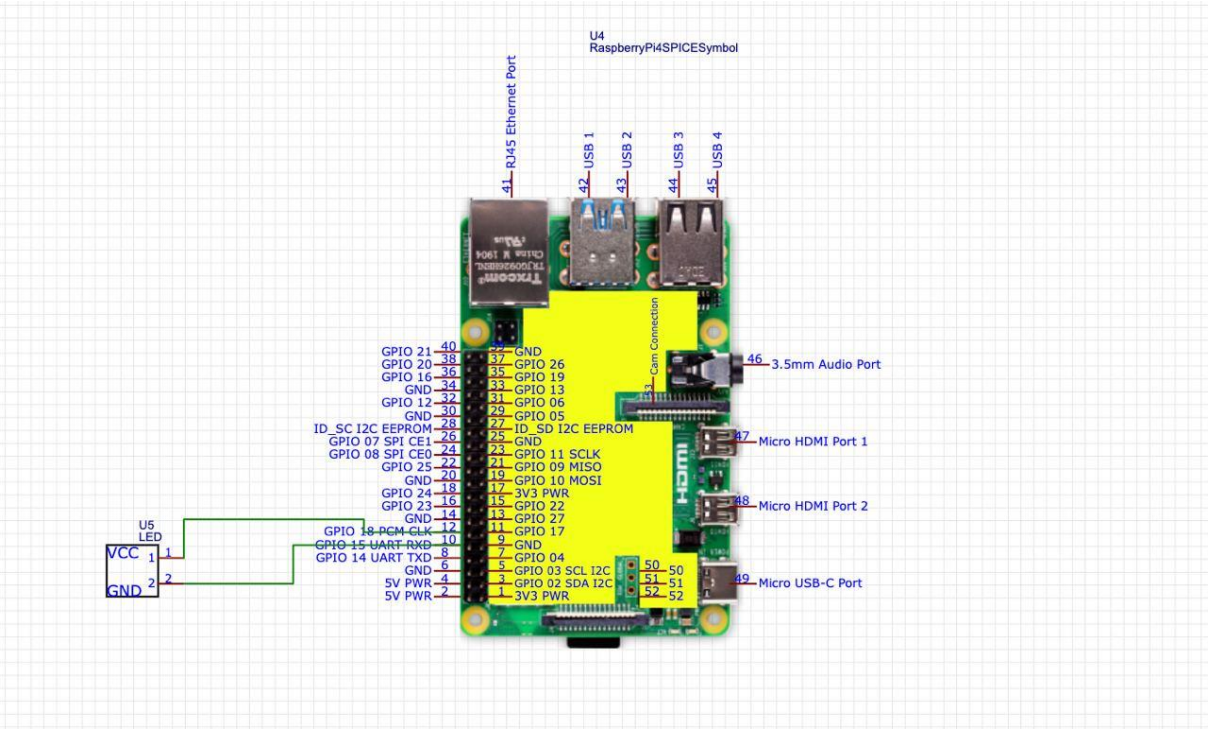


Figure 3.1 SYSTEM DESIGN (LED)

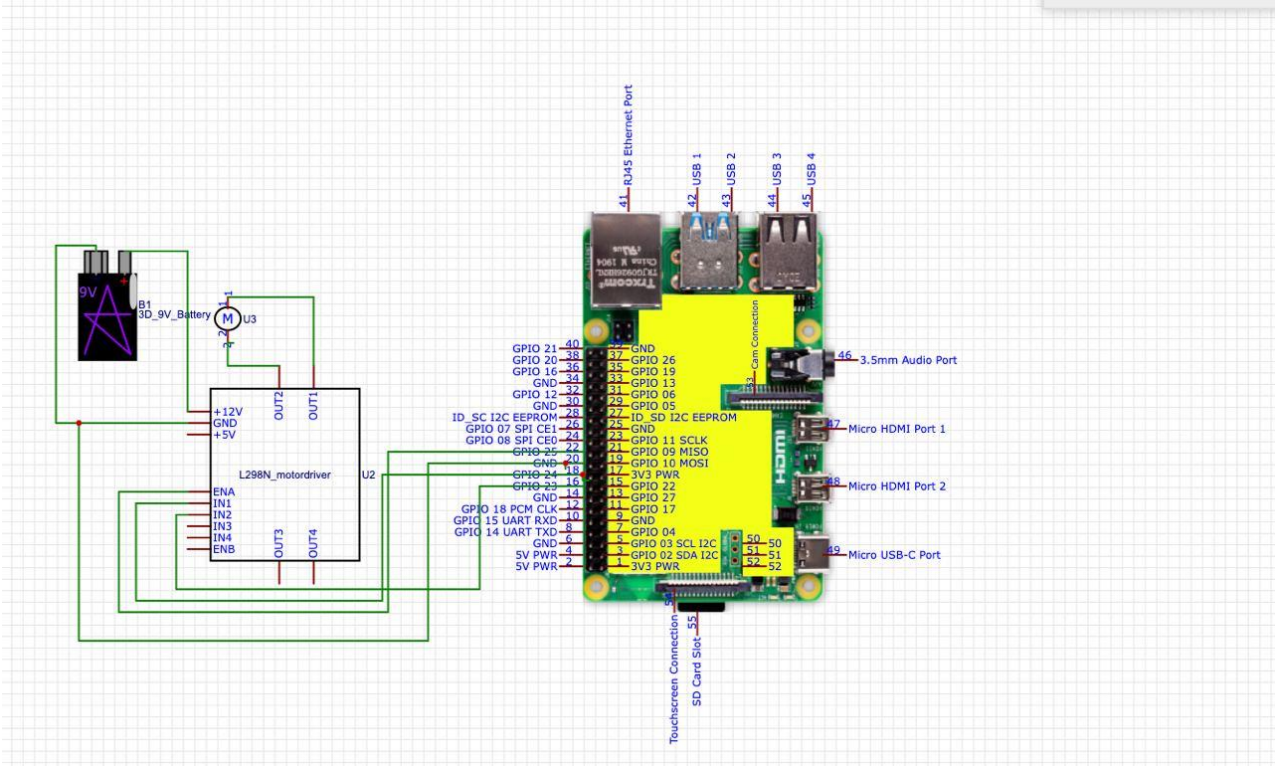


Figure 3.2 SYSTEM DESIGN (MOTOR)

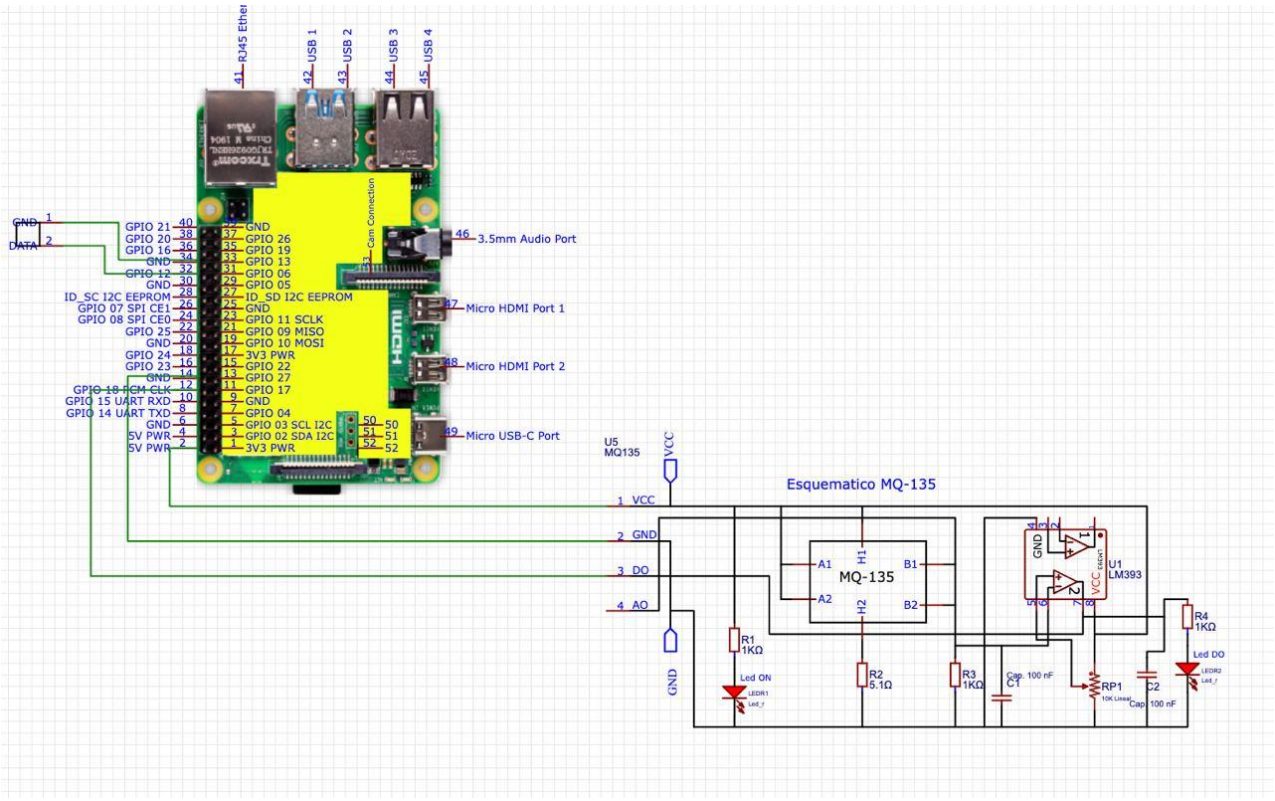


Figure 3.3 SYSTEM DESIGN (SMOKE SENSOR)

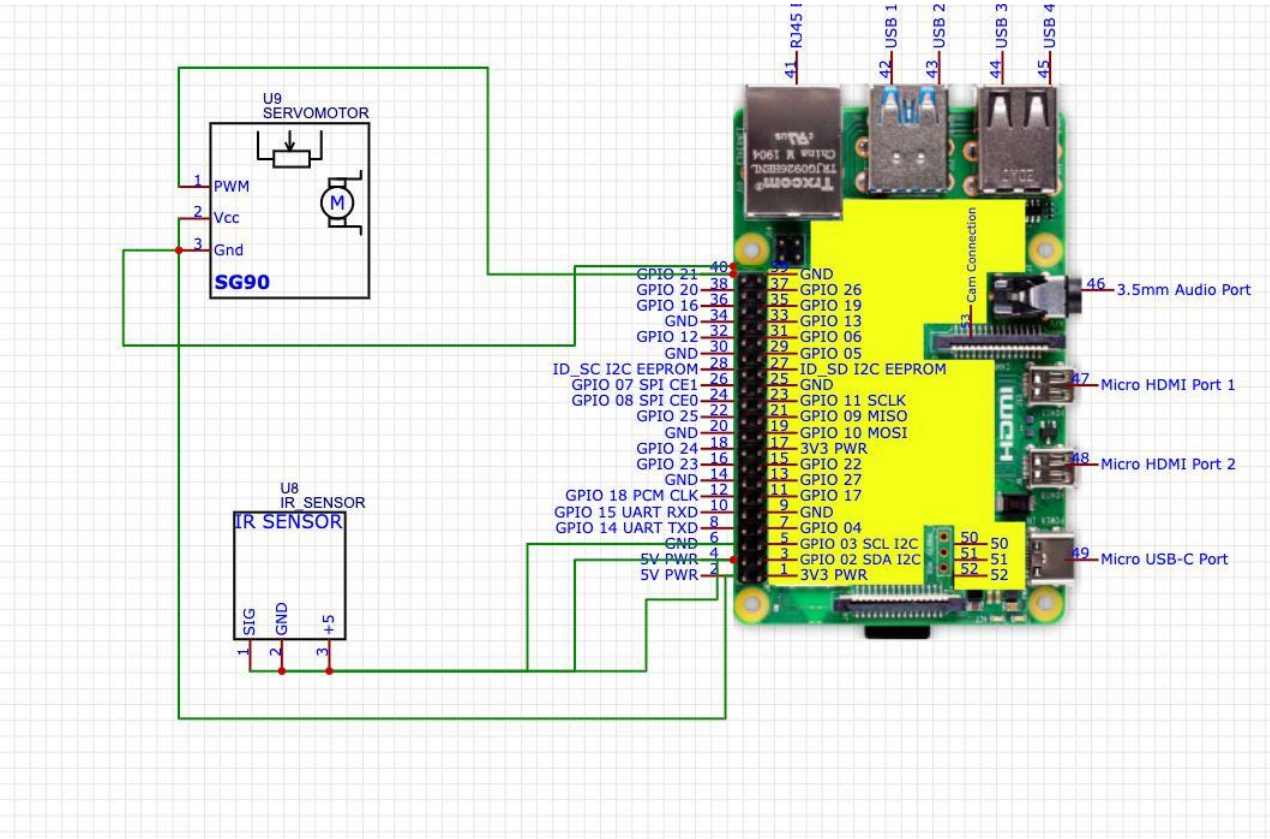


Figure 3.4 SYSTEM DESIGN (IR SENSOR)

The Component used in system :

- **Raspberry PI**

Raspberry Pi is a small, affordable single-board computer developed by the Raspberry Pi Foundation in the United Kingdom. It was designed to promote the teaching of basic computer science in schools and developing countries. The Raspberry Pi is about the size of a credit card and can be connected to a monitor, keyboard, and mouse to function as a basic desktop computer. It has a range of input/output pins that allow it to interact with other electronic devices and sensors, making it a popular choice for DIY projects and home automation. The Raspberry Pi runs on a variety of operating systems, including Linux-based distributions such as Raspbian. It having 40 GPIO (General Purpose Input/Output) pins.

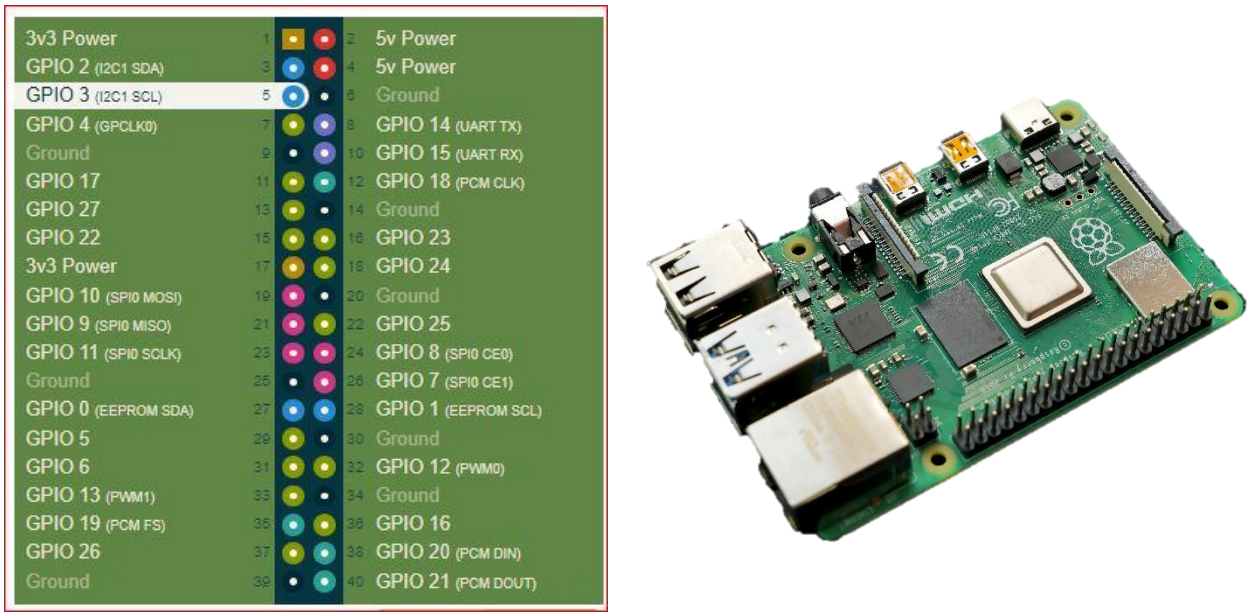


Figure 3.5 Raspberry PI Pin Diagram

The Raspberry Pi act as an intermediate between user commands and component . Once the user sends on command through a website the raspberry pi will read that command and set the pins as per high/low as per user choice .

- **IR Sensor**

  IR sensors are devices that detect infrared radiation emitted by objects. They can be used for various applications, such as measuring temperature, detecting motion, or identifying materials. IR sensors typically consist of an IR emitter and an IR receiver, which work together to measure the intensity and wavelength of the radiation.

These are the sensors that will detect the presence or absence of a vehicle in a at gate . The signal is sent to raspberry pi

Figure 3.6 IR Sensor

- **MOTOR Driver**

  The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.

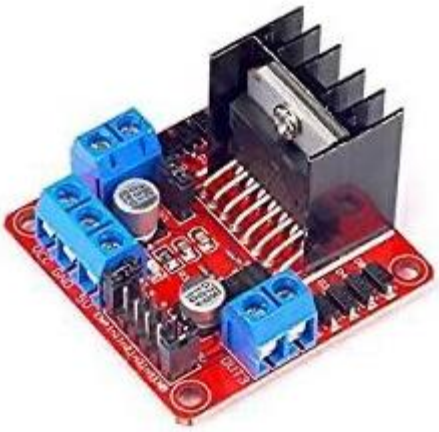


Figure 3.7 L298N Motor Driver

3.2 PROJECT COSTING

- **Component list**

Component	Quantity
Raspberry pi 3B	1
IR SENSOR	1
Memory Card 8GB	1
PCB	1
Battery	1
Diodes	1
Jumper wires	40
Resistors 220ohm	1
Motor driver	1
DC motor	1
MQ 135 (smoke)sensor	1
Servo motor	1
BUZZER	1

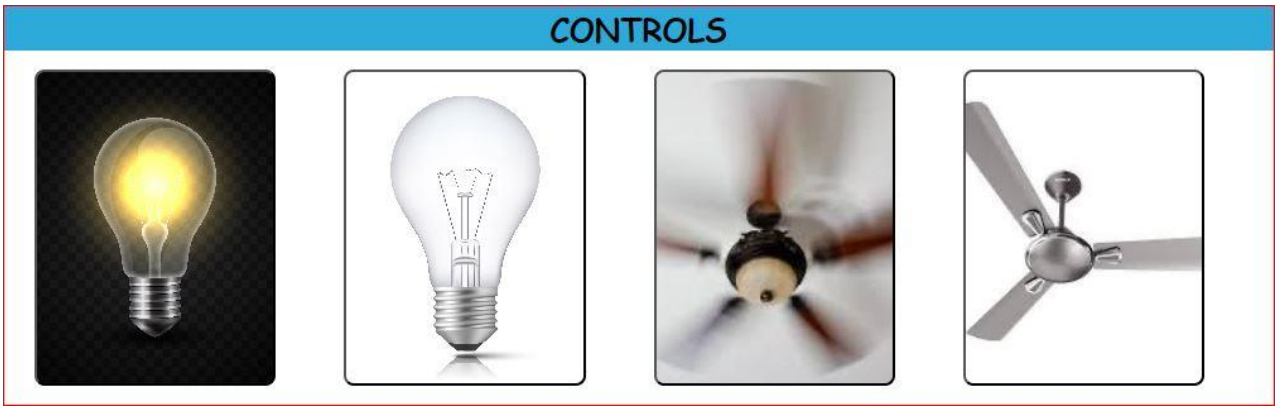
- **Component cost**

Component	COST
Raspberry pi 3B	4500
IR SENSOR	100
Memory Card 8GB	280
PCB	70
Battery	25
Diodes	5
Jumper wires	80
Resistors 220ohm	10
Motor driver	200
DC motor	120
MQ 135 (smoke)sensor	120
Servo motor	100
BUZZER	10
	5500

PROJECT IMPLEMENTATION AND CODING

4 PROJECT IMPLEMENTATION & CODING

4.1 GUI IMPLEMENTATION



In this project we have created a GUI when we are opening the web-url that we got after executing the program,

It contain the navigation menu to directly redirect to the specifies place and then there we have 4 buttons .

In which 2 buttons are for light on and off , and other 2 buttons are for fan on and off operation .When we click on the light on button it calls the /BON parameter and the other one has the /BOFF parameter which switch the light on /off. And same goes with the other 2 button they are there to perform fan on and off operation they though have their own parameter.

4.2 CODE DETAILS

Index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>HOME-AUTOMATION</title>
    <style>
    *{
    margin: 0px;
    box-sizing: border-box;
    scroll-behavior: smooth;
}

.navbar{
    margin: 1px ;
    background-color: rgb(151, 255, 255);
    border-radius: 5px;
    position: fixed;
    width: 100%;
    opacity: 40%;
    visibility:unset;
}
.navbar ul{
    overflow: auto;

}
```

```
.navbar li{
    float: right;
    list-style-type: none;
    margin: 15px;
    margin-top:22px;
    padding: 6px;
}

h2{
    float: left;
    margin: 15px 4px;
    font-weight: bold;
    padding: 7px;
    color: rgb(247, 145, 12);
    font-family: Tahoma, Geneva, Verdana, sans-serif;
}

.navbar li a{
    text-decoration: none;
    color: black;
    font-weight: bold;
}

.navbar li a:hover{
    color: rgb(214, 16, 188);
}

.main{
    margin: 0px auto;
    width: 100%;
    height: 560px;
    background-image: url('../static/images/background.jpg');
    background-repeat: no-repeat;
```

```
    background-position: center center;
    background-size: cover;

    padding: 50px;
    padding-bottom: 0px;
    font-size: xx-large;
    /* text-align: center; */
    font-family: 'Times New Roman', Times, serif;
    font-weight: bold;
    /* display: inline; */
    border: solid 2px black;
}

.main h3{
    float: left;
    margin: 35px 1px 5px 24px;
    font-weight: bold;
    padding: 7px;
    color: rgb(247, 87, 12);
    font-family: Tahoma, Geneva, Verdana, sans-serif;
}
.main p{
    float: left;
    margin: 1px 1px 10px 24px;
    padding: 7px;
    font-family: Tahoma, Geneva, Verdana, sans-serif;
    font-size: 12px;
}
.msg
{
    width: 40%;
    height: 11%;
    background-color: orange;
    color: white;
```

```
    margin: 450px 1px 0px 450px;
    position: sticky;
    font-family: Tahoma, Geneva, Verdana, sans-serif;
    font-size: 20px;
    text-align: center;
    border-radius: 10px;
    padding:10px;
}

.title{
    text-align: center;
    font-family: cursive;
    font-size: 25px;
    font-weight: 800;
    background-color: rgb(45, 169, 218);
}
.concontainer {
    display:inline;
    height: 250px;
    width: 100%;
    margin: 5px;
    padding: 5px;
}

#btn1
{
    background-image: url('../static/images/BON.jpg');
    width: 19%;
    height: 250px;
    margin: 15px;
    background-repeat: no-repeat;
    background-position: center center;
    background-size: cover;
    cursor: pointer;
```

```
    border-radius: 8px;
}
#btn1:hover{
    box-shadow: -5px 10px 10px rgb(84, 110, 224);
}
#btn2
{
    background-image: url('../static/images/BOFF.jpg');
    width: 19%;
    height: 250px;
    margin: 15px;
    background-repeat: no-repeat;
    background-position: center center;
    background-size: cover;
    cursor: pointer;
    border-radius: 8px;
}
#btn2:hover{
    box-shadow: -5px 10px 10px rgb(84, 110, 224);
}
#btn3
{
    background-image: url('../static/images/FON.jpg');
    width: 19%;
    height: 250px;
    margin: 15px;
    background-repeat: no-repeat;
    background-position: center center;
    background-size: cover;
    cursor: pointer;
    border-radius: 8px;
}
#btn3:hover{
    box-shadow: -5px 10px 10px rgb(84, 110, 224);
```

```
}
#btn4
{
    background-image: url('../static/images/FOFF.jpg');
    width: 19%;
    height: 250px;
    margin: 15px;
    background-repeat: no-repeat;
    background-position: center center;
    background-size: cover;
    cursor: pointer;
    border-radius: 8px
}
#btn4:hover{
    box-shadow: -5px 10px 10px rgb(84, 110, 224);
}

.info{
    margin: 11px;
    font-family: Tahoma, Geneva, Verdana, sans-serif;
    font-size: 23px;
    text-align: center;
    background-color: rgb(100, 221, 120);
}

footer{
    justify-content: center;
    text-align: center;
    margin: 0px 2px;
    padding: 5px 5px;
    background-color: black;
    color: white;
}
    </style>
```

```
</head>
<body>
    <header>
        <nav class="navbar">
            <ul>
                <h2>HOME-AUTOMATION</h2>
                <li><a href="#about">ABOUT</a></li>
                <li><a href="#concontainer">CONTROLS</a></li>
                <li><a href="#home">HOME</a></li>
            </ul>
        </nav>
    </header>

    <section class="main" id="home">
        <div class="container">
            <h3>Building More Than Your Dream Home With Us</h3>
            <p>Lorem ipsum dolor sit amet consectetur adipisicing elit. Et, eveniet atque eos repre-
henderit aspernatur nihil.</p>
        </div>
        <div class="msg">
            It's Time For Smart Living
        </div>
    </section>

    <div class="title">CONTROLS</div>
    <div class="concontainer" id="concontainer">

        <a href=\BON><button id="btn1"></button></a>
    </div>
    <div class="concontainer">
        <a href=\BOFF><button id="btn2"></button></a>
    </div>
    <div class="concontainer">
        <a href=\FON><button id="btn3"></button></a>
```

```
    </div>
    <div class="concontainer">
        <a href=\FOFF><button id="btn4"></button></a>
    </div>
    <div class="title">ABOUT</div>
    <div class="about" id="about">
        <p class="info">Welcome to our home automation website! We are dedicated to providing you with the latest and greatest in smart home technology. At our core, we believe that home automation should be easy, intuitive, and seamless. That’s why we offer a wide range of products and services that can be tailored to your unique needs. Whether you’re looking to control your lighting, thermostat, security system, or entertainment center, we’ve got you covered.Thank you for considering our services for your home automation needs. We look forward to working with you and helping you create the smart home of your dreams!</p>
    </div>
    <footer>
        <p>All rights are reserved &amp;copy;</p>
    </footer>
</body>
</html>
```

home_automation.py

```
from flask import Flask
from flask import Flask,render_template
import RPi.GPIO as gpio

app=Flask(__name__)
light1=17
fan=24
in2=23
en=25

gpio.setwarnings(False)
gpio.setmode(gpio.BCM)
gpio.setup(light1,gpio.OUT)
gpio.setup(in2,gpio.OUT)
gpio.setup(en,gpio.OUT)
gpio.setup(fan,gpio.OUT)
gpio.output(light1,0)
gpio.output(fan,0)
gpio.output(in2,0)
p=gpio.PWM(en,1000)

p.start(25)
print ("Done")

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/BON')
```

```
def light1_on():
    gpio.output(light1,1)
    return render_template('index.html')

@app.route('/BOFF')
def light1_off():
    gpio.output(light1,0)
    return render_template('index.html')

@app.route('/FON')
def fan_on():
    print("P")
    while(True):
        gpio.output(fan,1)
        gpio.output(in2,gpio.LOW)
        return render_template('index.html')

@app.route('/FOFF')
def fan_off():
    gpio.output(fan,0)
    return render_template('index.html')

if __name__ == "__main__":
    print("Start")
    app.run(host="0.0.0.0",port='5010')
```

ir,py

```
import RPi.GPIO as gpio
from gpiozero import AngularServo
from time import sleep

gpio.setmode(gpio.BCM)
servo = AngularServo(21,min_pulse_width=0.0008,max_pulse_width=0.0023)#gpio pin no used

servo.angle=0
gpio.setup(2,gpio.IN)
gpio.setup(21,gpio.OUT)

while(True):
        val=gpio.input(2)
        if(val!=1):
                servo.angle=90
        else:
                servo.angle=-90
```

sensor.py

```
import RPi.GPIO as gpio
from time import sleep

gpio.setmode(gpio.BCM)
gpio.setup(18,gpio.IN)
gpio.setup(12,gpio.OUT)

try:
        while True:
                if gpio.input(18)!=1:
                        print("detected")
                        gpio.output(12,gpio.HIGH)
                else:
                        print("not detected")
                        gpio.output(12,gpio.LOW)
                sleep(1)
finally:

        print("hello there")
        gpio.cleanup()
```

PROJECT TESTING

5.1 UNIT TESTING

Unit testing fouces first on modules,independetly of one another to locate error. This enables the tester in coding and logic that contained within module alone.those resulting from intergration between modules are initally avoided in this testing individual programs were run and sample data was fed so to check whether the desire output was achieved or not.

Test case ID	Test Case Description	Steps	Test Data Input	Expected Result	Actual Result	Status
UTC_1	To Test The Raspberry PI	1 connect the power to raspberry pi 2 boot and setup 3 write sample led blub program	-	LED should blink	LED blinked	pass
UTC_2	To test the dc motor L98N	1 connect the motor through motor driver L298N 2. Run the sample program to on fan	Sample program to turn on the fan	Motor should be rotated	Motor Rotated	pass
UTC_3	To test the IR sensor	1 connect the IR sensor to pins of raspberry pi 2 Run sample code to check the sensor	Sample program to check the ir sensor	IR should detect the object	IR sensor detected object	pass

Test case ID	Test Case Description	Steps	Test Data Input	Expected Result	Actual Result	Status
UTC_4	To test the MQ135 smoke sensor	1 connect the sensor to raspberry pi 2 set the sensitivity level 3Run the sample program to test the Sensor	Sample program for smoke sensor	MQ135 sensor should detect the smoke	Smoke detected	pass
UTC_5	To check the website is working or not	1 Run the flask program 2 copy the URL 3 Paste it into browser 4 check the response	Click a button on website	Led on	Led on	pass

5.2 SYSTEN TESTING

Test case id	Test case description	Steps	Test data	Expected result	Actual result	Status
tc_1	Test if the system can open and close the main gate with help of ir sensor	1.Pass the car infront of ir sensor 2.check whether the servo motor opens the gate of not 3. Check whether the gate closes after the car pass through the gate	Pass the car in front of the ir sensor	Gate should open and get close	Gate opened	Pass
tc_2	Test if the system can sense the smoke and buzzer makes sound	1.give the smoke as a input to mq 135 sensor. 2.Check whether the sensor detect the smoke and the green light gets on. 3. The buzzer should get on after the smoke is detected and should make the alert	Give the smoke as a input to the smoke sensor	The green light should get on and the buzzer should make sound	The smoke Is detected and the buzzer is on.	Pass
tc_3	Check whether the light gets on / off after providing input from the website	1.run the program and copy the url 2.paste the url in the browser 3.check whether the light goes on/off after clicking the button	Click the button on the webpage after opening the link	The light should go on/off after clicking the button	The light is switching from on state and its vice versa	Pass

CONCLUSION

6. CONCLUSION

Humanity has long desires of smart homes. The main purpose of making the home smart is to save time and money. So we are here presenting a home automation project of IOT using raspberry pi this system will help us to access of my appliances and control them from your phone. The main objective of this project is to make the on smart and to make every thing to the modern welfare without causing any damage to the nature. The home automation system is a great way to improve the saving of time and to save money, it is initiative way to make something more helpful for the young age, old age and for the handicapped persons. Also, this software can be further developed in many initiative ways to to more ease the human life.

BILBOGRAPHIY

7.BILBOGRAPHY

BIBLIOGRAPHY for Home automation using raspberry pi

This bibliography List some sources of the home automation system using raspberry pi that we have used for the reference purpose. Resources like books, reference, books, magazines and the YouTube videos has been taken as a reference in a Projects those are listed below

- Book Referred

- Advanced Home Automation using Raspberry pi

  by-Rishabh Jain

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  -Video Referred

  - ek Aaho Raspberry pi (MARATHI)

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- IOT based home automation using raspberry pi

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