

IOT Based Smart Security and Home Automation System

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Abstract

Internet of Things (IoT) conceptualizes the possibility of remotely interfacing and observing real world objects (things) through the Internet [1]. With regards to our home, this idea can be appropriately joined to make it smarter, more secure and computerized. This IoT venture centers around building a keen remote home security framework which sends cautions to the proprietor by utilizing Internet if there should be an occurrence of any trespass and raises an alert alternatively. Furthermore, the equivalent can likewise be used for home computerization by making utilization of a similar arrangement of sensors . The use acquired by preferring this framework over the comparative sorts of existing frameworks is that the alarms and the status sent by the wifi associated microcontroller overseen framework can be gotten by the client on his phone from any separation independent of whether his mobile phone is associated with the internet . The microcontroller utilized in the present model is the TI-CC3200 Launchpad board which accompanies an installed small scale controller and a locally available Wi-Fi shield making utilization of which all the electrical apparatuses inside the home can be controlled and overseen.

Keywords—IoT, TI Wi-Fi CC3200 Launchpad, Internet.

INTRODUCTION

Objective

The fundamental goal of this venture is to mechanize the home machines as indicated by the environmental condition utilizing a solitary board PC "Raspberry pi 3" and couple of sensors i.e. the Light Dependent Resistor (LDR) and Temperature sensor. Every one of our apparatuses are associated and being controlled by Raspberry Pi 3. The light proportion and the temperature esteems are being watch and refreshed on the site page.

With the end goal to accomplish this, first thing is to learn about the engineering of Raspberry Pi 3, Linux essential directions, Linux OS activity and Basics of python programming dialect.



Fig.1.1 Development kit used to design and develop Home automation system

PROJECT DESCRIPTION

Project block diagram:

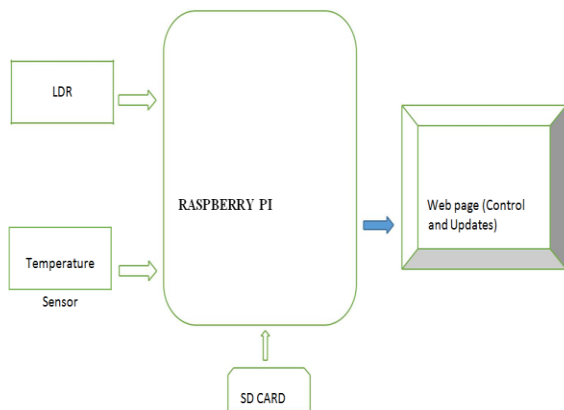


Fig. 2.1 Block diagram

Proposed system

Computerization of the encompassing condition of present day individual permits expanding the work productivity and solace. Imagine a scenario where we can control our home machines from anyplace utilizing a site page and

furthermore we can know the status and environment of our home from anyplace. This task clarifies you and give you a short depiction about how anybody can mechanize home and control home machines utilizing a solitary board PC Raspberry pi and a few sensors. Site page can be worked from any side of the world however we have some limitation for that it is possible that we require a static IP deliver or we have to purchase a distributed storage. In this task takes you through the Home Automation from a remote dimension (i.e. when you are associated with an equivalent system). You can get the refresh of the barometrical conditions around the house in any gadgets which is are in a similar nearby system.

Favorable circumstances

- This ease framework with least necessities deals with both home security and in addition home computerization
- This home security framework does not utilize any smartphone application or any sort of UI rather utilizes digits from the keypad on the phone, the framework is stage autonomous and consequently can be gotten to from an extensive variety of phones with various working frameworks.
- To work home security framework the client require not have information association empowered in his phone. The framework runs fine with the launchpad associated with wifi at home/office.
- The discretionary advanced cell application deals with the way that the client may likewise wish to control his

home machines without sensors being activated.

- To work home security framework the client require not have information association empowered in his phone. The framework runs ne with the launchpad associated with wi at home.
- The discretionary advanced mobile phone application deals with the way that the client may likewise wish to control his home machines without sensors being activated [5].
- Since the launchpad sends a voice call to just a specific number which is available in the web API there is no compelling reason to stress over security spillage as the framework can't be gotten to by some other unauthenticated client. This thus expands the devotion of the security framework.
- The utilization of wifi empowered launchpad in the framework empowers the framework to be controlled from any piece of the globe as opposed to Bluetooth controlled or IR remote controlled existing home computerization arrangements that too with no net availability in the phone.
- Since a similar arrangement of movement sensors can be sent for home robotization and additionally security framework the framework is straightforward and modest.
- This framework does not require the client to physically trigger a caution yet it gives the client the upside of investigating the circumstance and afterward setting off the security alert remotely from his phone. This thought beats the basic

blame in numerous existing home security frameworks which causes important

humiliation by activating security alert because of the frameworks failure to pass judgment on an exceptional circumstance in which it ought not have set off the caution.

Working

This task is to interface the sensors i.e. LDR and Temperature sensor to the Raspberry pi utilizing an outer ADC converter i.e. MCP3008 (10-bit Analog-to-Digital converter) as Raspberry pi don't have inbuilt ADC. Associating the home machine i.e. a globe and a fan utilizing a hand-off circuit to the Raspberry pi. The Raspberry pi is a solitary board PC which we interface with our screen utilizing the VGA to HDMI convertor and associating the usb console and usb mouse to it. The program is composed utilizing Python programming dialect, a page is made utilizing HTML and PHP web structuring programs. The python code and website page is connected so that the information i.e. LDR and Temperature sensor simple qualities are changed over into computerized esteems and are given to the Raspberry pi. The python program and the HTML and PHP site page is programed so that the qualities are naturally refreshed on the page.

The procedure of this venture will be, first we need to dispatch our Raspberry Pi which is associated with the screen and furthermore with usb console and usb mouse. When Raspbian OS is propelled open the Terminal and execute the Python program which we have made by opening the order provoke, as our program is running, the procedure will occur as the

climate condition changes i.e. at the point when the room is dim the LDR will recognize the light force and send it to the Raspberry pi utilizing a 10-bit Analog to Digital converter i.e. MCP3008 and naturally the lights are ON as the room gets darker and OFF as the room light force increments. In the meantime if the temperature is high the sensor esteem will increment i.e. shows the high temperature and send to the Raspberry pi utilizing a 10-bit Analog to Digital converter i.e. MCP3008 and naturally the Fan is ON as the temperature expanded and OFF as the temperature diminished. We can likewise control the Bulb and Fan through the site page according to our necessity.

SOFTWARE DESCRIPTION

Raspbian OS

Raspbian is a free working framework dependent on Debian improved for the Raspberry Pi equipment. A working framework is the arrangement of fundamental projects and utilities that make your Raspberry Pi run. In any case, Raspbian gives in excess of an unadulterated OS: it accompanies more than 35,000 bundles, pre-ordered programming packaged in a pleasant arrangement for simple establishment on your Raspberry Pi.

The underlying form of more than 35,000 Raspbian bundles, enhanced for best execution on the Raspberry Pi, was finished in June of 2012. Be that as it may, Raspbian is still under dynamic improvement with an accentuation on enhancing the security and execution of however many Debian bundles as could reasonably be expected.

Note: Raspbian isn't partnered with the Raspberry Pi Foundation. Raspbian was made by a little, devoted group of engineers that are devotees of the Raspberry Pi

equipment, the instructive objectives of the Raspberry Pi Foundation and, obviously, the Debian Project.

In spite of the fact that we have numerous flavors which can be introduced in SD card with the end goal to begin our venture including NOOBS, RASPBIAN and furthermore third party working framework pictures, for example, UBUNTU MATE, SNAPPY UBUNTU CORE, WINDOWS IOT CORE and so on. The Operating System we are utilizing in this venture is Raspbian Jessie with PIXEL, download interface <https://www.raspberrypi.org/downloads/raspbian/>.

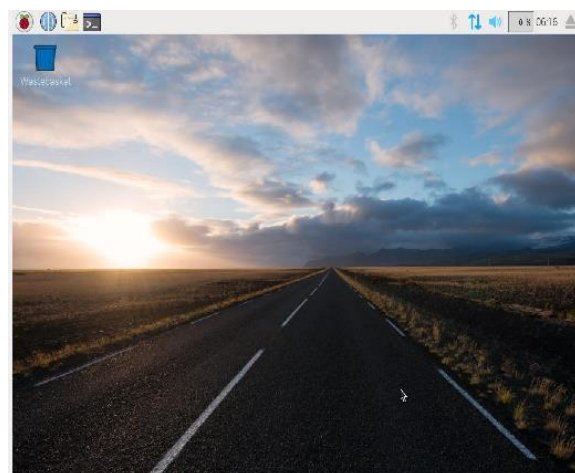


Fig. Raspbian OS snapshot

Python

Python is an abnormal state, deciphered, intuitive and protest situated scripting dialect. Python is intended to be profoundly clear. It utilizes English watchwords oftentimes where as different dialects utilize accentuation, and it has less grammatical developments than different dialects.

History of Python

Python was produced by Guido van Rossum in the late eighties and mid nineties at the National Research Institute for Mathematics and Computer Science in the Netherlands. Python is gotten from numerous different dialects, including ABC, Modula-3, C, C++, Algol-68, SmallTalk, Unix shell, and other scripting dialects.

Python 2 or Python 3?

There are two forms in python that is the Python 2 and Python 3. The short form: Python 2 is inheritance, Python 3 is the present and eventual fate of the dialect. Python 2 was discharged in 2000, and Python 3 was discharged in 2008. Python 3 is prescribed, however a few libraries have not yet been ported to Python 3 which is the reason Python 2 is as yet present and generally utilized. In this undertaking we will utilize "Python 2".

IDLE

In this task we will utilize Python IDLE, it is Python's Integrated Development and Learning Environment, where we will compose our code. Inactive has two primary window types, the Shell window and the Editor window. It is conceivable to have numerous editorial manager windows all the while. Yield windows, for example, utilized for Edit/Find in Files, are a subtype of alter window. They right now have indistinguishable best menu from Editor windows yet an alternate default title and setting menu. You can download Python IDLE from <https://www.python.org/downloads/webpage>.

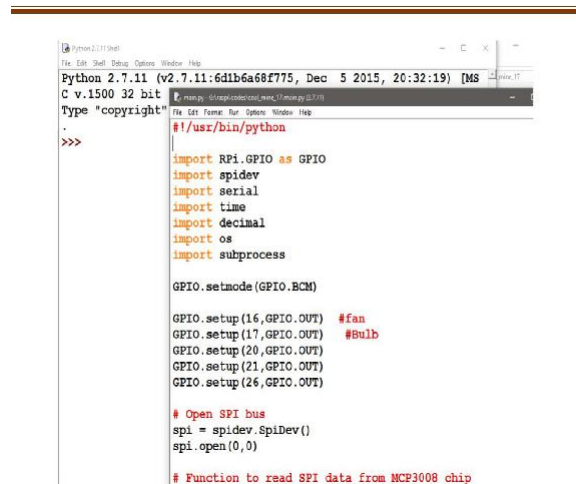


Fig. Python IDLE snapshot
FLOW CHART

5.1 Work flow

After completion of the hardware part and the connection let's begin with process of execution of the program. Steps to execute the program: Power on the Raspberry Pi, Raspbian os will boot and the following screen should be displayed.

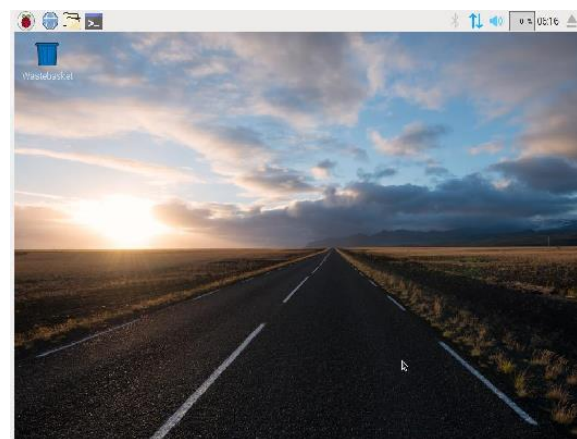


Fig. Raspbian OS.

Select the File Manager option i.e. the third icon on the top left corner.

Create a folder and a file in it by right click new -> folder, name the folder and then go into it right click new -> empty file and give a name ending with “.py”, as python programming extension is .py.

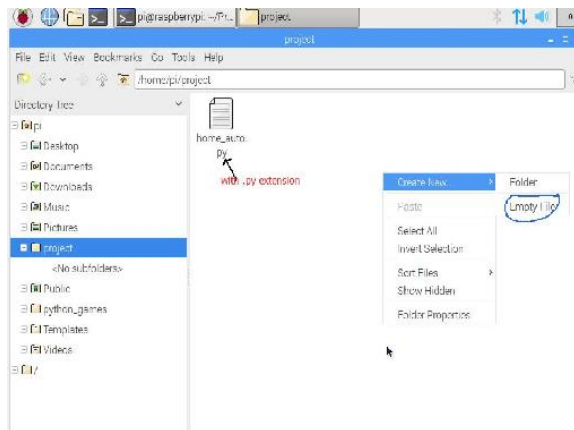


Fig. Creating a Python File.

Copy the code and paste in the respected created file. Go to the location of your directory and copy its path.

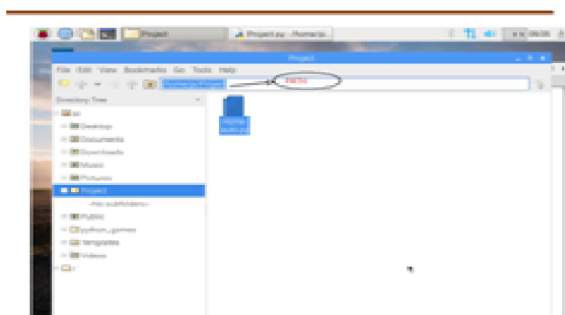


Fig. 5.2 Directory Path

Open the Terminal fourth icon top left corner, and type the command as described below, or you can type `cd` followed by space and then paste your directory location which you copied and press enter.

`cd /home/pi/Project`

Now type `ls` command and press enter to see the files in you directory.

As you can see your python file which you created earlier, type the following command and press enter to execute you program.

`sudo python home_auto.py`

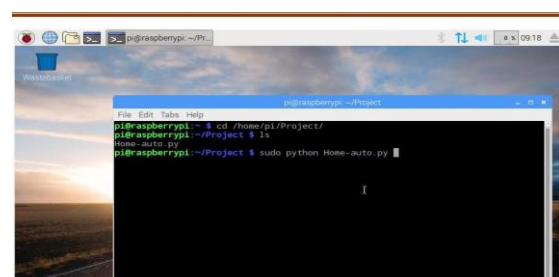
Fig. 5.3 Commands to Type

This are the commands which you have to type in order to execute the program. In the below section we will see the process taking place after the execution of the program.

5.2 Program flow

When the program is executed it will go into an unending while circle and begin printing the Light power in room utilizing LDR and temperature of the room utilizing temperature sensor and the Temperature on the terminal where the program has been executed and furthermore on the website page (which will be talked about in the following session). On the off chance that the LDR esteem is in excess of 500 i.e. less light power, Bulb will shine and if the Temperature sensor esteem is in excess of 150 i.e. temperature is more, Fan will be ON. On the off chance that the qualities are not as much as the other way around. Stream outline of the program is portrayed underneath pursued by the picture of the yield in terminal.

Fig. 5.3 Commands to Type



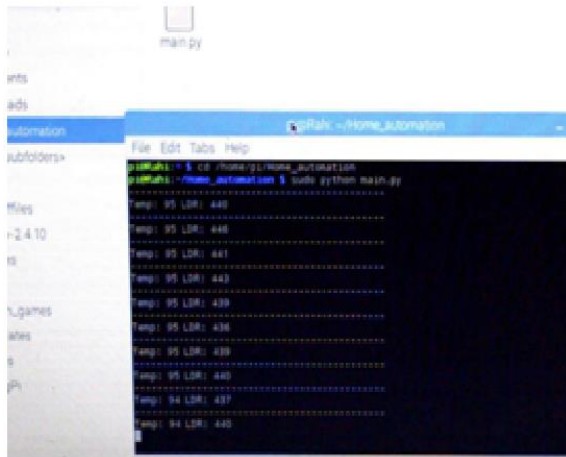


Fig. Output on the Terminal Web Page (Installation and Connecting)

Designing a web page depends on the individual web designing language skills, we will go through basic web page without any style using HTML and PHP language. Before starting with web designing, some software has to be setup and install in our raspberry OS. Ensure that you have the internet connection. The software's are:

Apache HTTP server: It is a server which is designed to create Web servers that have the ability to host one or more HTTP-based websites. Open your terminal and type the command to install :

sudo apt-get install apache2

Be sure with the commands all should be small letters, Linux is case sensitive and if u give capital letter it will through an error. Also when the software start installing it will say additional space will be added, Do you want to continue press “y” and enter as shown below

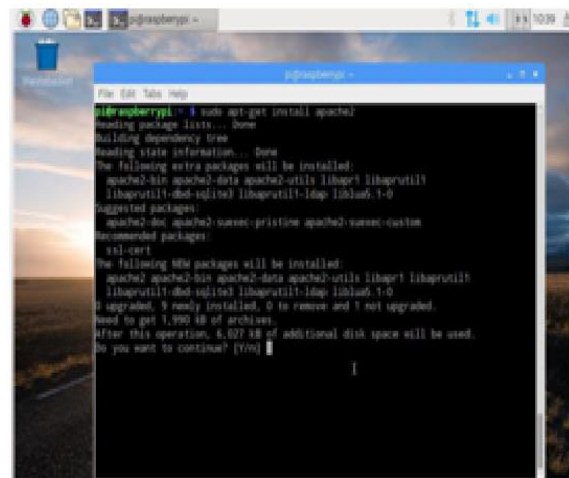


Fig. Software installation

NOTE: Wait till the ‘\$’ symbol comes again as shown in the below image.

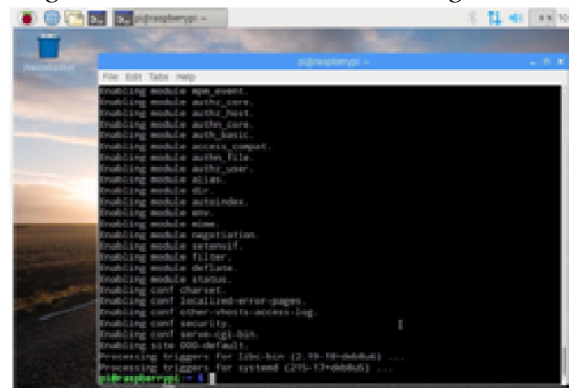


Fig. 5.6 Software Successfully installed

Then have to install PHP in our system but before that it is good to update your system.

sudo apt-get update

sudo apt-get install php5

To connect our python program to the web server we have to install another program name WiringPi, before that we have to initialize the git-core to download WiringPi. Type the following commands one by one.

After installing the software successfully, type `/var/www/html` in the upper box as

shown below and press enter to open the apache sever location.

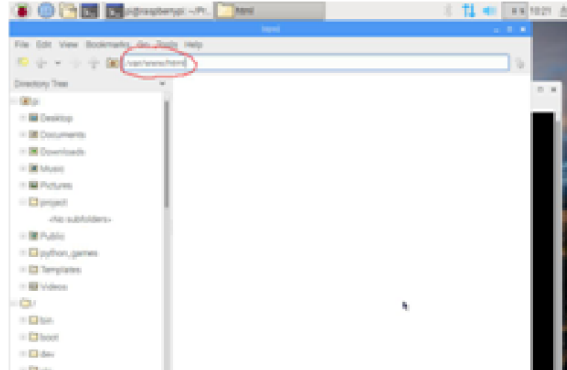


Fig. 5.7 Apache Server Location

Before creating a file you should give administration permission, to do sotype the following command in the terminal.

sudo chown pi: /var/www/html

Now create a file with an extension of **.PHP** and paste the source code and save it.

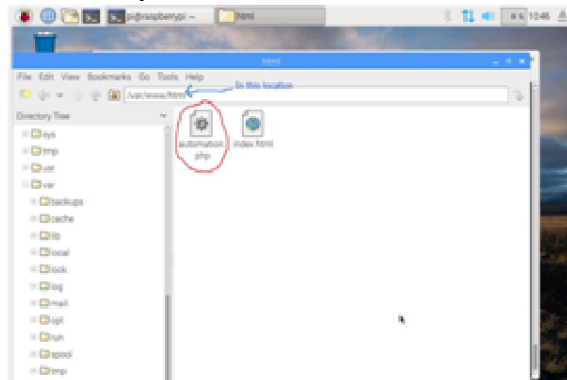


Fig. 5.8 Creating .php File

Follow the steps to run the python program as mentioned in the previous section.

Now to open you web page first you should know you **IPADDRESS**, for that type the following command in the terminal

Ifconfig

Ensure that if you are connected to Ethernet you ipaddress will be under eth0 and if you are connected to wifi it will be under wlan0. I am connected to Ethernet for now

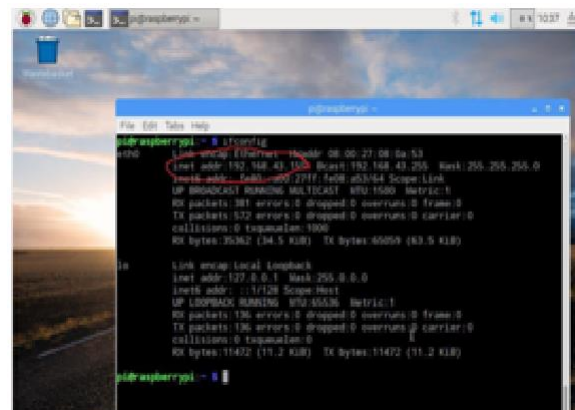


Fig. 5.9 IP address

Now open you web page and type you ip address followed by your .php file in my case it is automation.php.

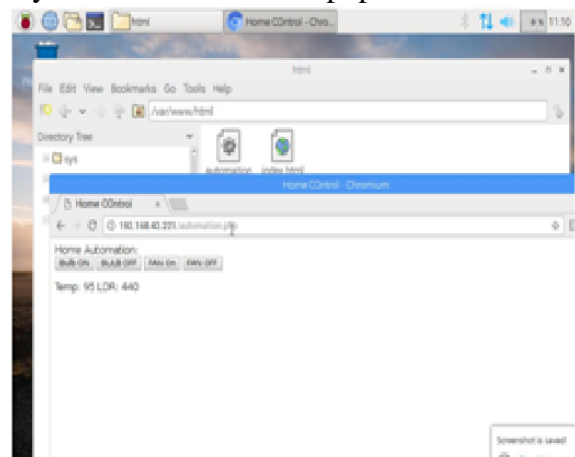


Fig. Web Page

In the event that you are associated with a similar system you can control and see refresh on any gadget associated with a similar system by simply composing the IP address pursued by .php record name as appeared previously.

RESULT

Today we are living in 21st century where mechanization is assuming essential job in human life. Home robotization enable us to control family unit machines like light, entryway, fan, AC and so on. Home robotization had made a pattern in new

innovation Internet of Thing (IOT). Utilizing a solitary board PC Raspberry Pi and computerizing home apparatuses control, for example, fan and knob utilizing a less cost sensor, for example, LDR and Temperature sensor.

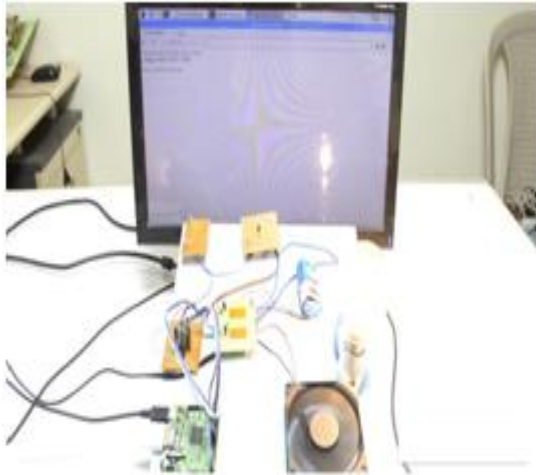


Fig. Project Output



Fig. 6.2 Web Page Output

SOURCE CODE

7.1 Python program (save with .py file extension)

```
#!/usr/bin/python
import RPi.GPIO as GPIO
import spidev
```

```
import serial
import time
import decimal
```

```
import os
import subprocess
```

```
GPIO.setmode(GPIO.BCM)
```

```
GPIO.setup(16,GPIO.OUT) #fan
GPIO.setup(17,GPIO.OUT)#Bulb
```

```
# Open SPI bus
spi = spidev.SpiDev()
```

```
spi.open(0,0)
```

```
# Function to read SPI data from
MCP3008 chip
```

```
# Channel must be an integer 0-7
def ReadChannel(channel):
```

```
# Function to convert data to voltage
level,
# rounded to specified number of decimal
places.
```

```
def ConvertVolts(data,places):
    volts = (data * 3.3) / float(1023)
    volts = round(volts,places)
    return volts
```

```
# Function to calculate temperature from
# TMP35 data, rounded to specified
# number of decimal places.
```

```
def ConvertTemp(data,places):
```

```
while True:
    X_val= ReadChannel(0)
```

```
    Y_val = ReadChannel(1)
```

```
    # Print out results
```

```
    Print -----
```

```

print(("LDR: {} ".format(X_val)) +
("Temp: {} ".format(Y_val)))

data = ("LDR: {} ".format(X_val)) +
("Temp: {} ".format(Y_val))

if(X_val > 500):

    print'Low lighting'
    GPIO.output(17,True)
else:

    GPIO.output(17,False)
if(Y_val > 150):
    print'High temperature'
    GPIO.output(16,True)
else:
    GPIO.output(16,False)
f=open('/home/pi/log.txt','w')

f.write(data)
f.close()
data = ""

time.sleep(1)
# Web Page Code (save with .php
extension)
<html>

<head>
<meta          name="viewport"
content="width=device-width" />
<title>Home COntrol</title>

</head>
<body>
Home Automation: <br> <br>

<form          method="get"
action="gpio.php">

    <input type="submit"
value="Bulb      ON"
name="bon">    <input
type="submit"

value="BULB      OFF"
name="boff">
    <input
type="submit"
value="FAN      On"
name="fon">    <input
type="submit"
value="FAN      OFF"
name="foff">
</form>
<?php

$setmode17          =
shell_exec("/usr/local/bin/gpio -
g mode 17 out"); $setmode16 =
shell_exec("/usr/local/bin/gpio -
g mode 16 out");

    if(isset($_GET['bon'])){

        $gpio_on          =
        shell_exec("/usr/local/bin/g
pio -g write 17 1");
        echo "Light On";
    }
    else if(isset($_GET['boff'])){

        $gpio_on          =
        shell_exec("/usr/local/bin/g
pio -g write 17 0");
        echo "Light Off";
    }
    if(isset($_GET['fon'])){

        $gpio_on          =
        shell_exec("/usr/local/bin/g
pio -g write 16 1");
        echo "FAN On";
    }
    else if(isset($_GET['foff'])){

        $gpio_on          =
        shell_exec("/usr/local/bin/
gpio -g write 16 0"); echo
"FAN Off";
    }
?>
<?php

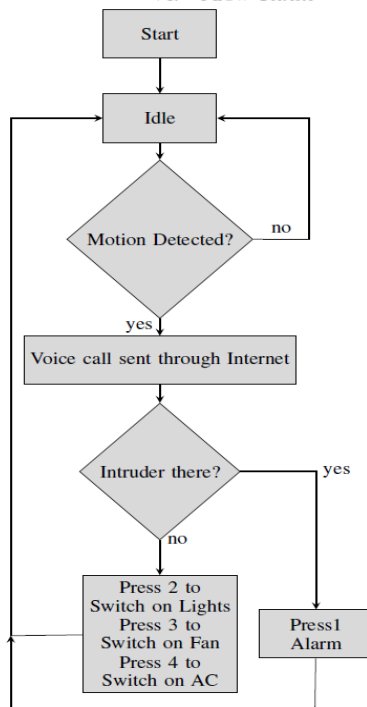
```

```

$myfile = fopen("log.txt",
"r") or die("Unable to open
file!");          echo
fread($myfile,filesize("log.t
xt")); fclose($myfile);
?>
</body>
</html>

```

VI. FLOW CHART



FURTHER SCOPE

As the framework is subject to the client's carefulness and judgeability of the circumstance (regardless of whether it is a visitor or an interloper going into his home) the utilization of a camera associated with the microcontroller may help the client in taking choices whether to initiate the security framework or welcome the visitor [9] [10].The

caught image of the visitor or interloper after face recognition, can be sent to the client. The client can additionally forward a similar photo to the police headquarters in

the event that he wishes. Further the framework might be made more synchronized by coordinating the voice call highlight inside a similar advanced cell application

through which the client can even control his home machines with no voice call being activated to his phone.

REFERENCES

- [1] M. N. N. A. Asghar, M.H., "Principle application and vision in internet of things (iot)," in *Communication Technologies (GCCT), 2015 Global Conference on*, may 2015.
- [2] A. R. . C. Y. . O. K. Withanage, C., "A comparison of the popular home automation technologies," pp. 1 – 11, may 2014.
- [3] B. R. Pavithra, D., "Iot based monitoring and control system for home automation," pp. 169 – 173, April 2015.
- [4] M. J. H. B. T. A. M. K. T. Baig, M.Q., "Artificial intelligence, modelling and simulation (aims), 2014 2nd international conference on," pp. 109–114, November 2014.
- [5] B. S. S. Tharaniya soundhari, M., "Intelligent interface based speech recognition for home automation using android application," pp. 1 –11, march 2015.
- [6] F. M. G. K. D. Sukmana, Husni Teja, "Wireless and mobile (apwimob), 2015 ieee asia pacific conference on," pp. 183 – 187, august 2015.
- [7] S. E. T. B. C. A. Urfaliglu, O., "Signal processing, communication and applications conference, 2008. siu 2008. ieee 16th," pp. 1–4, april 2008.
- [8] E. A. Elkamchouchi, H., "Design and prototype implementation of sms based home automation system," pp. 162 – 167, november 2012.
- [9] O. N. C. S. A. P. B. Sahani, M., "Circuit, power and computing technologies (iccpct),



2015 international conference on,” pp. 1–6,
March 2015.

[10] T. Ming Zhao, Chua, “Automatic face
and gesture recognition, 2008. fg ’08. 8th
IEEE international conference on,” pp. 1–6,
September 2008.