

**A
Project report
On
“Telegram Controlled Home Automation System”**

Submitted to
Department of Computer Engineering
Government Polytechnic for Girls, Surat
2022-2023



Internal Guide:

Arti Chauhan

Prepared by:

GOVERNMENT POLYTECHNIC FOR GIRLS, SURAT

DEPARTMENT OF COMPUTER ENGINEERING



CERTIFICATE

This is to certify that **Ms. Jadav Radhika** from Government Polytechnic for Girls, Surat College having Enrollment No. **206150307180** has successfully completed **Project-2 (3360707)** on “**Telegram Controlled Home Automation System**” individually in a group consisting of 6 persons under the guidance of the **Mrs. Arti Chauhan**.

Date:

Sign of Internal Guide

Mrs. Arti Chauhan

Sign of H.O.D

Mr. J.N.Joshi

Acknowledgement

It is indeed a great pleasure and matter of immense satisfaction for us to express our deep sense profound gratitude towards all the people who have helped, inspired us in our project work.

First we would like to give our gratitude to **Mrs. Arti Chauhan (lecturer)** for the effort taken by her from the selection of the project to its completion. She spent her precious time whenever we were in need of guidance.

Moreover we would like to thank our honourable principal **Mr. S. K. Ganatra** for providing support and necessary facilities throughout the course to complete our project. We express our sincere gratitude to **Mr. J. N. Joshi** head of the computer engineering department for inspiring and permission to carry out our project.

GROUP MEMBERS

| ENROLLMENT | NAME |
|--------------|---------------------------|
| 206150307198 | Patel Saemabanu Muzammil |
| 206150307202 | Meriya Krishna Arshibhai |
| 206150307184 | Rana Vanshita Rajeshbhai |
| 206150307180 | Jadav Radhika Rakeshkumar |
| 206150307197 | Sali Ashvini Sanjay |
| 206150307181 | Shimpi Isha Kailas |

Abstract

Telegram Controlled Home Automation System using Raspberry Pi is used by everyone especially physically handicapped people. It is used mostly by people who cannot perform basic home activities efficiently. It is the idea which corresponds to the new era of automation and technology.

The main aim of Home Automation System is to make life easier. Mobile devices are very common for everyone due to its user friendly interface and portability features. In this project, we aim to control electrical home appliances by using Wi-Fi as communication protocol between Raspberry Pi and Android device. Raspberry Pi provides features of a mini computer, additional with its GPIO pins where these components can be easily connected. Raspberry Pi 3 becomes a better option for home automation via internet due to its features of inbuilt Wi-Fi and Bluetooth. The other hardware that is being used in this project is a four channel relay module. We will use Telegram for the software part. Telegram application is being used as a platform to give the command, which will be used to control home appliances.

Introduction

In today's day to day life, automation can play a major role. Automation makes things simple. The main attraction of any automated system is reducing human labor, efforts, time and errors due to human negligence. This system is beneficial to those who are not able to perform day-to-day activities efficiently. A Raspberry Pi is a credit card-sized computer which can be used for developing various applications.

In this project we are working on telegram application where a user will provide commands for controlling devices such as "Turn light on" which will be connected to raspberry pi and according to it the required process will work via Wi-Fi. This automation can be used majorly not only in home but offices and hospitals also. It allows controlling number of home appliances simultaneously. Python is used as the main programming language which is default provided by Raspberry Pi. This system requires micro SD card with an OS for Raspberry Pi. Using this we can say a regular home is converted to smart home technology which helps to control devices. The user could set a particular keyword which is given with the appropriate command for output. Home Automation is done by the raspberry pi using user's commands.

Features

- User can access the house-hold devices by connecting to the network and can control them using telegram.
- Remote access of home appliances from anywhere using app.
- Considerable reduction in electricity bills with efficient energy utilization.
- Handicapped people can easily access home appliances.
- Saves user's time as user can control devices remotely.
- It gives you the convenience to control different devices even when you are not home.

Problem Definition

There is a great energy crisis in current situation of our country. Moreover, people have become negligent in proper utilization of the available energy. People often forget to turn off the light sources and other home appliance while out from home. In those situations, application of home automation makes it possible to control them from a distant place in easy way with our Smartphone.

People are constantly running from place to place, working to accomplish everything on their never-ending “to-do” list. Because of the home automation system, we never have to worry about switching off the appliances. In short, we can save our precious time.

Feasibility Study

This project can be implemented using affordable electronic and software technology making it economically, technically and operationally feasible.

I. Economic Feasibility

This project is based on android phone based and few electronic components like Raspberry Pi, a credit sized computer, relay switch etc. which are affordable, making it economically feasible to implement.

II. Technical Feasibility

This project is based on embedded systems which are reasonably in phase with currently used technology. Therefore, it is very much favoured by the technology.

III. Behavioral Feasibility

This software will have very easy to use, user friendly interface so it will be pretty much operable by anyone having little experience of using android phone. It could be helpful for physically disabled person too, controlling home appliances with the click of a button. So it is behaviorally feasible.

Study of current system

Current Home Automation system is designed in a way that it can control home appliances by any Smartphone using Bluetooth. The automation system connects with the Smartphone through Bluetooth. The smart phone sends control signals to switch home appliances ON or OFF by an android app through Bluetooth interface.

Problem and weakness of current system

Current Home Automation Systems uses Bluetooth as interface.

Bluetooth Home Automation systems can have several disadvantages such as:

- It can lose connection in certain conditions.
- It has low bandwidth as compared to Wi-Fi.
- It allows only short range communication between devices.
- Security is a key aspect as it can be hacked easily.

Purpose

The Home Automation system implemented in this project can be used to control the home appliances remotely through the telegram application connected to Raspberry Pi. User can access to the household devices anytime by connecting to the network and can control them using telegram application.

Scope

The Home Automation is creating new automation technologies for houses that will make them smart using internet based technologies. These homes that use home automation technologies are Smart Homes. This field of home automation is fastly emerging in technology making safer and better places to live. Home Automation is better popular day by day making it the basic requirements for future homes which will be smart enough to provide the best possible comfort to people. This technology has a lot of scope.

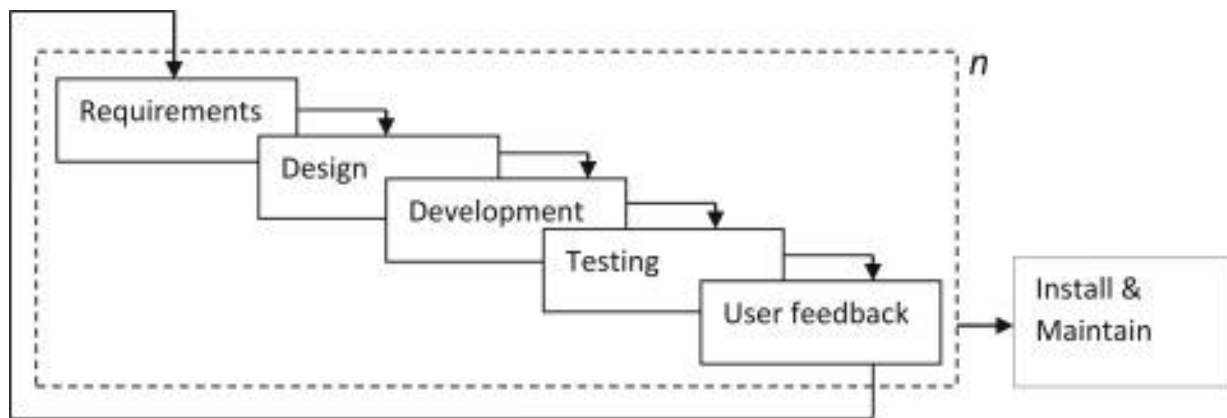
Requirement analysis

- The system should be as easy to use as possible and should allow the user to access all functionalities via telegram application.
- The system should be designed in a modular fashion. A modular system allows for easier implementation and well as easier modification at a later stage.

Problem Solving Technique

INCREMENTAL DEVELOPMENT MODEL

Incremental development is based on the idea of developing an initial incrimination, exposing this to user comment and evolving through several versions until a complete system has been developed. It interleaves the activity of specifications, development and validation. Developing a series of version (increments) with each version adding functionalities to the previous one.



We have closely followed this model of software development in our project. As the requirements change or new features are to be added to enhance the functionality as a whole, we integrate them as they come up. As for the hardware aspect of the project, there is limited flexibility in design and implementation. We cannot go on producing and then redesigning the end products upon changes or failures, so we model the complete design conceptually in diagrams plus in temporary, easy to integrate and disintegrate bread boards.

Requirements

Software Requirements

- Telegram Application
- Python
- Raspberry Pi OS

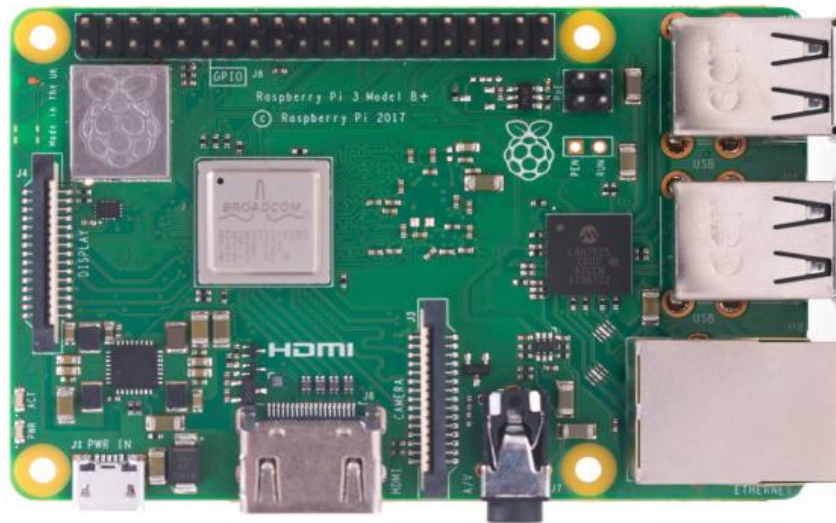
Hardware Requirements

- Raspberry Pi 3 Model B+
- Memory Card
- HDMI Display
- Four Channel Relay Module
- Jumper Wires
- Mouse
- Keyboard

Module Description

Raspberry Pi

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT. The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.



Raspberry Pi Specifications

- **Processor** : Broadcom BCM2837B0, Cortex-A53
64-bit SoC @ 1.4GHz
- **Memory** : 1GB LPDDR2 SDRAM
- **SD card support** : Micro SD format for loading operating system and data storage
- **Input Power** : 5V/2.5A DC via micro USB connector 5V DC via GPIO header Power over Ethernet (PoE)–enabled

Four Channel Relay Module

The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.



Jumper Wires

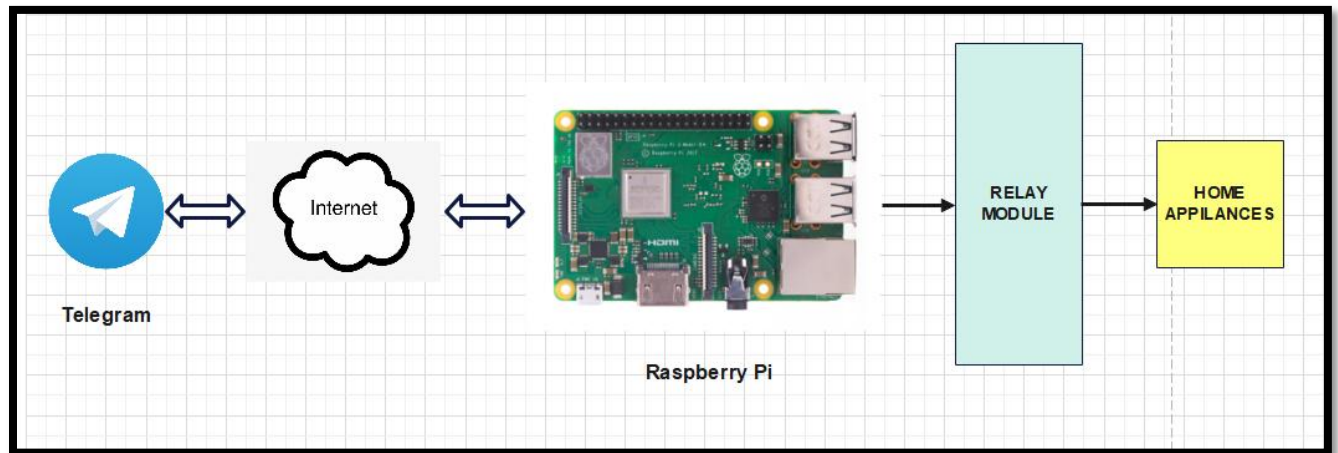
A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.



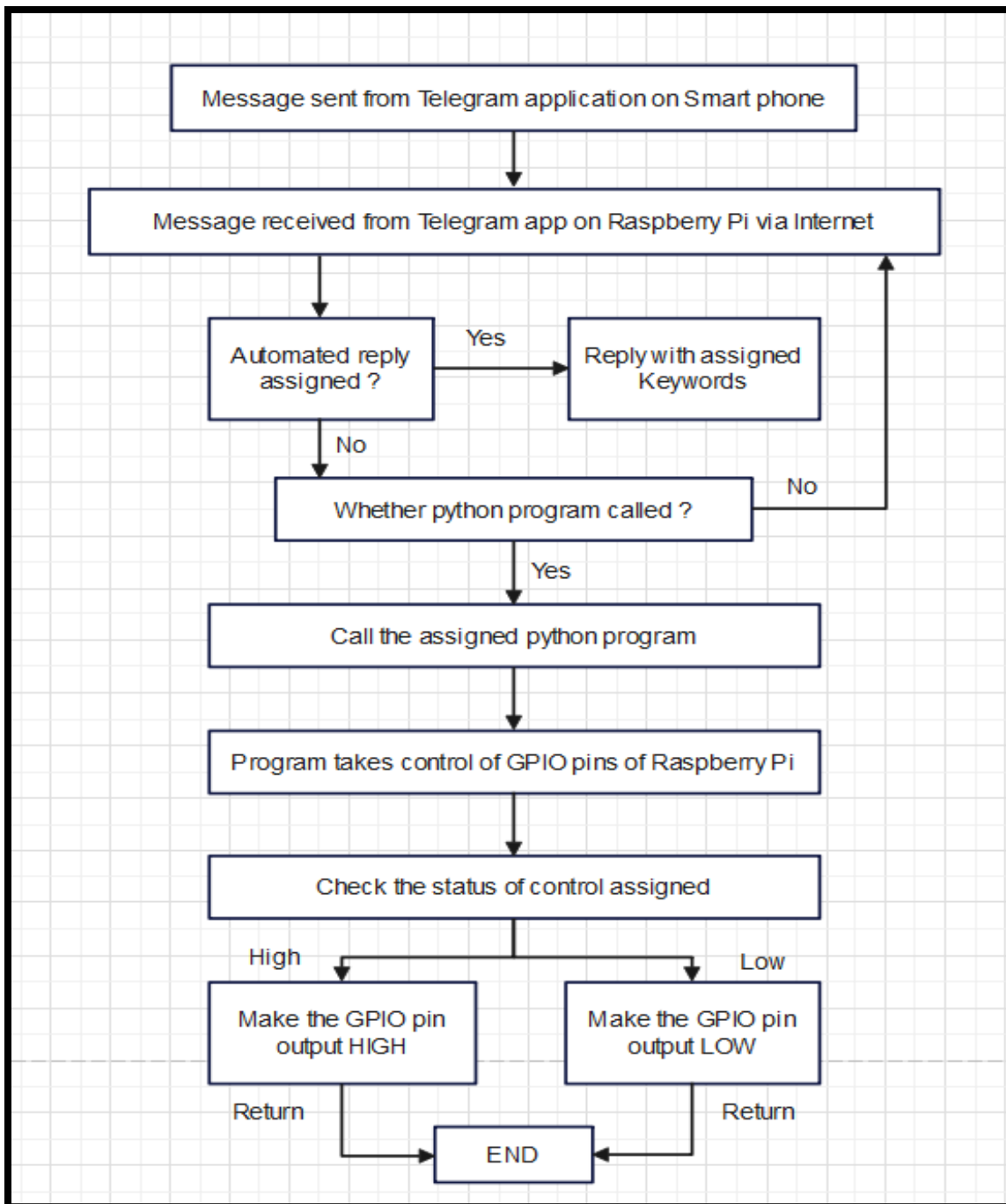
Python

To develop this project using Raspberry Pi and Python, we need to install two key libraries. One library is used for Telegram and the other is for GPIO Raspberry Pi pins. To set up libraries open terminal and type commands. Upgrade Raspberry Pi before installing libraries. Python is a widely used, powerful and easy-to-learn language. Raspberry Pi allows application in python. Python is portable and compatible with all platforms including Unix, Windows and Mac application. Raspberry Pi fully supports python editing and installation of python packages. The Python Library suggests a standard library that comes with a python that allows available modules to use python codes. Python also has many third-party libraries that allow the user to perform a variety of actions directly instead of coding, libraries that allow them to perform all the necessary steps.

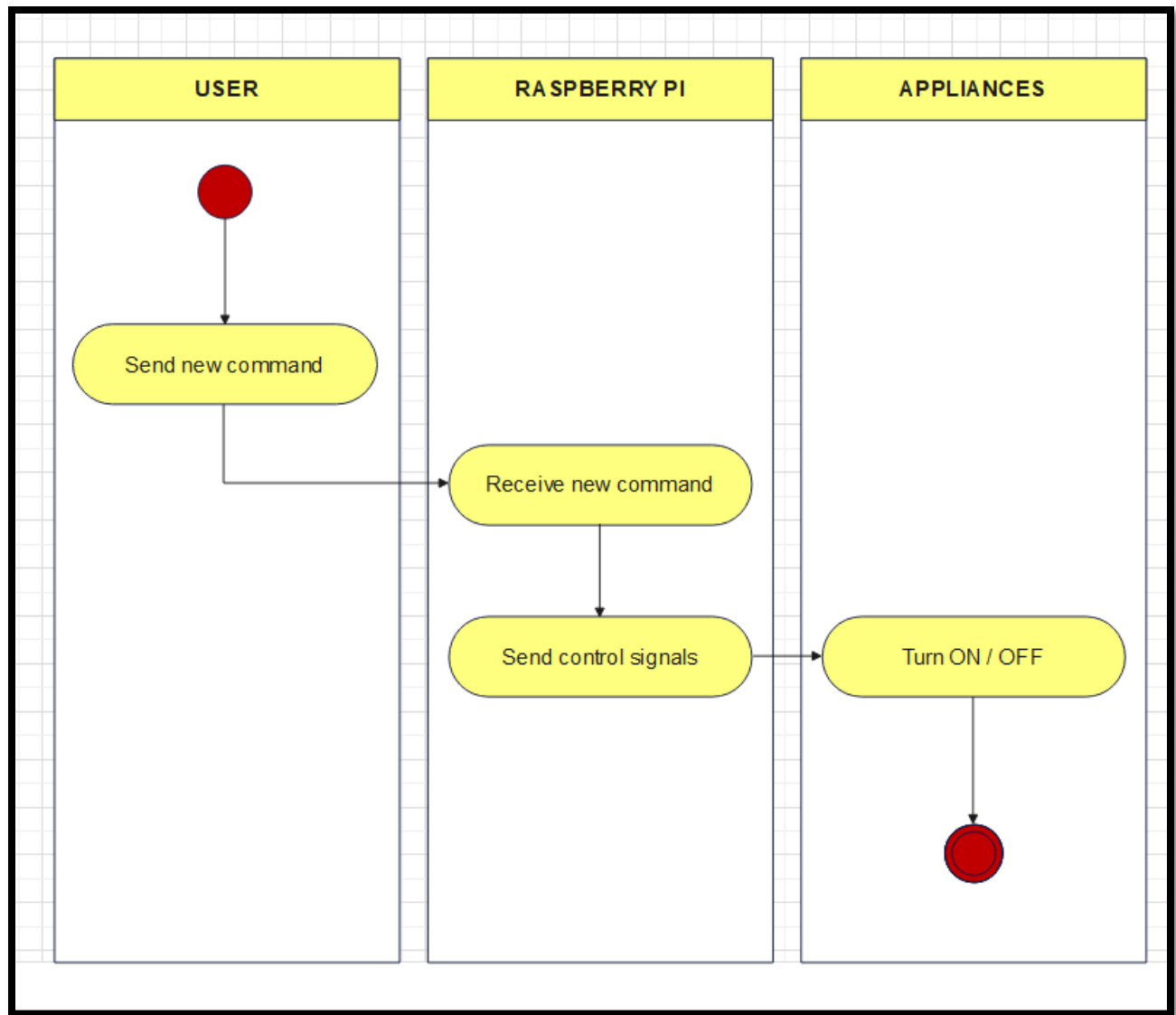
Block Diagram



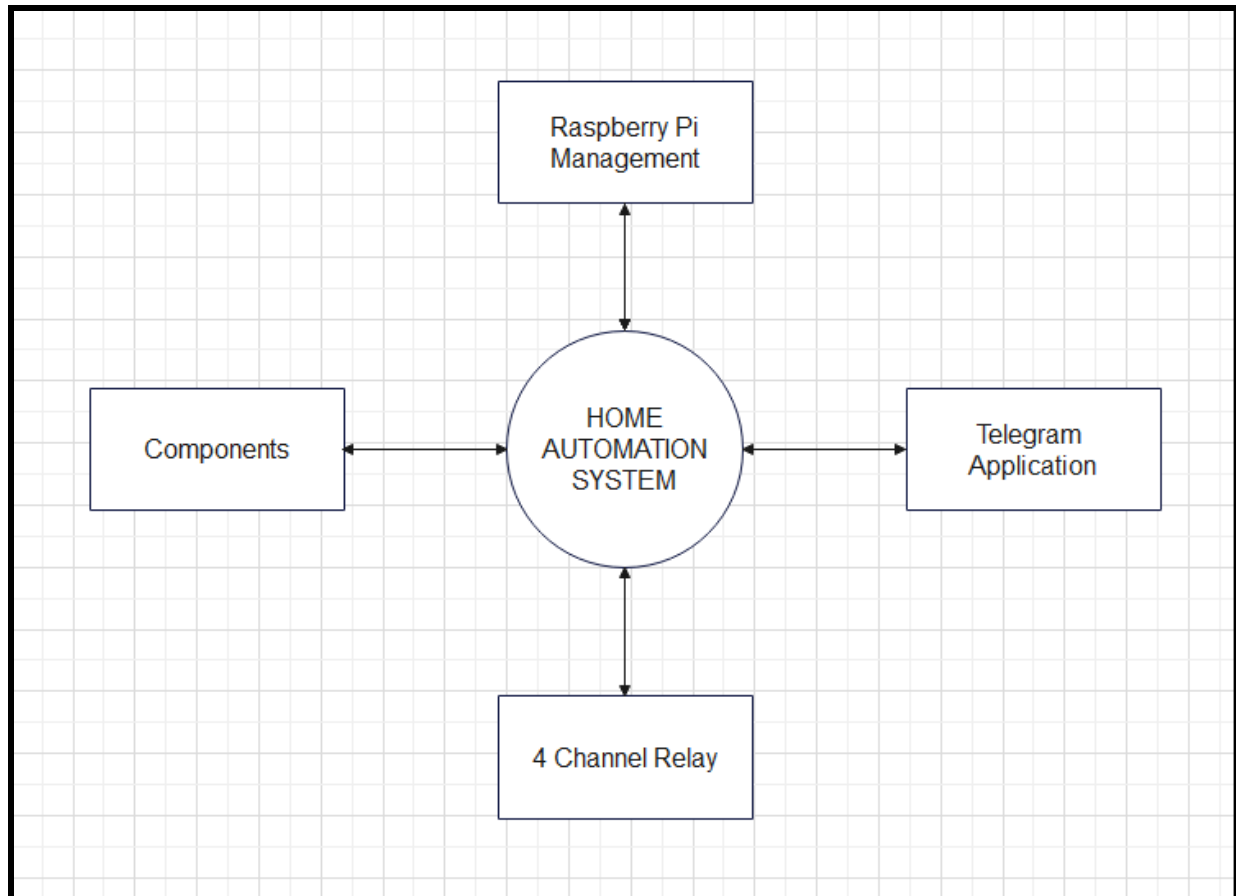
Flow Chart



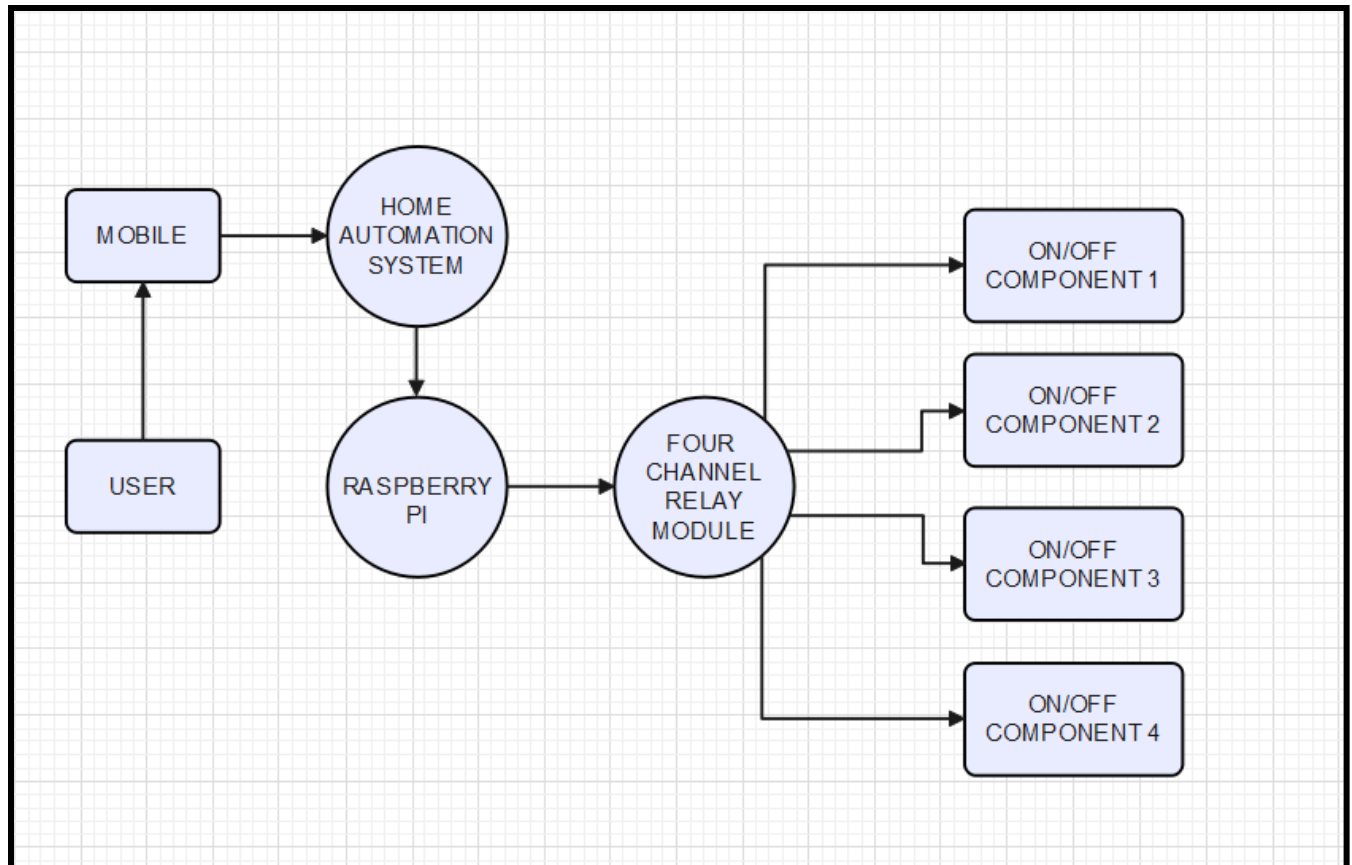
Activity Diagram



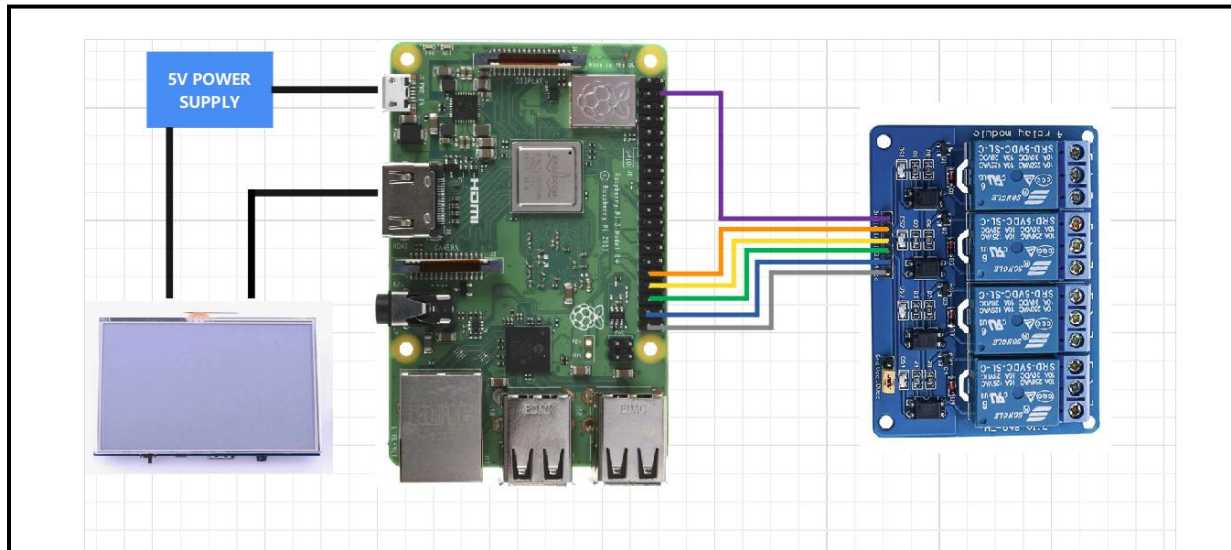
Data Flow Diagram (Level – 0)



Data Flow Diagram (Level – 1)



Wireframe



Work done

Hardware implementation

- Raspberry pi has 40 GPIO pins. These pins are used to control the home appliances. Relay module is connected to the GPIO pins of the Raspberry pi through the jumper cables.
- Connect HDMI cable from Raspberry Pi to HDMI display.
- Plug a mouse into the USB port on the Raspberry Pi.
- Connect the micro USB power supply with raspberry pi and HDMI display.

Software implementation

- Place a SD card into the SD card slot on the Raspberry Pi.
- The raspberry Pi needs to be booted with the default Raspberry Pi operating system. The pi needs to be connected to the internet for the system to be able to be controlled remotely.
- Download and install python in Raspberry Pi.
- Run the code.

➤ Creating a telegram bot

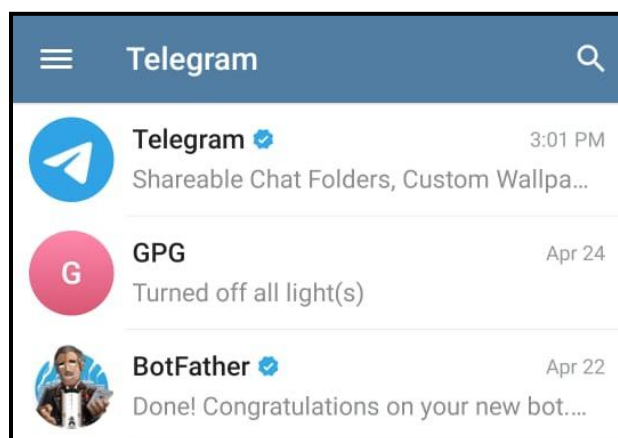
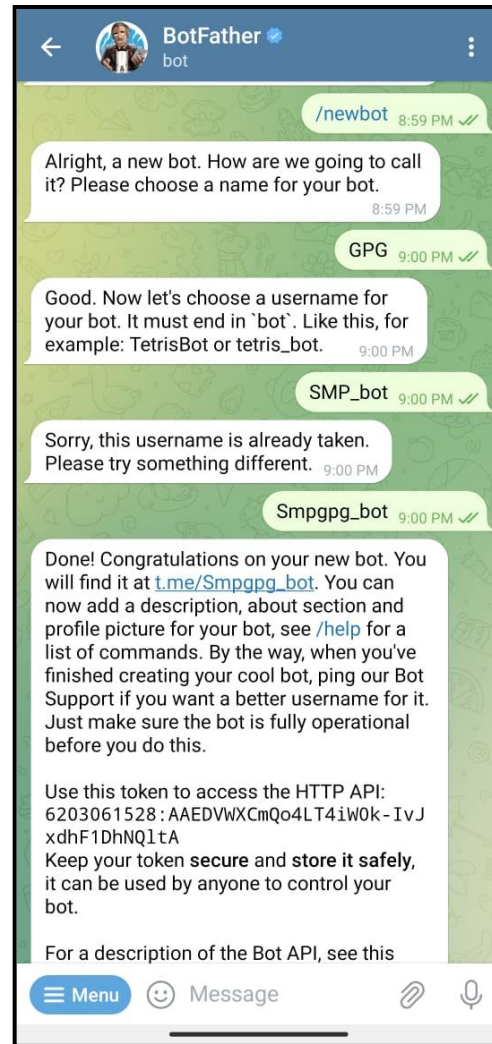
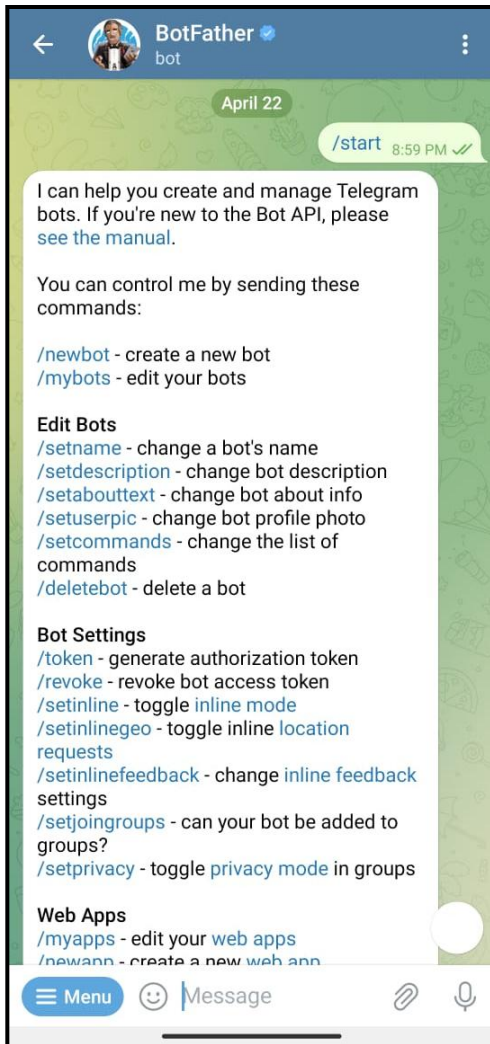
The first thing you need to do is tell Telegram that you want to create a bot. For this, you'll need a Telegram account – install their app on your phone, and get it set up.

Next, start a conversation with the “BotFather”. This is a bot that Telegram themselves run, and it controls the creation and registration of bots on their platform.

Steps to create a telegram bot

1. Open the telegram application on your mobile phone.
2. Tap the “Search” icon near the top right.
3. Type “botfather”.
4. Tap on the “@BotFather” that appears. Make sure it has a blue checkmark next to it.
5. It will display a welcome message.
6. Click the “Start” button.
7. Send it a message “/newbot”
8. It will ask for a name for your bot. We're going to call it “GPG”.
9. Next it will ask for a username; We'll use “Smpgpg_bot”
10. If all goes well, it will print out a message telling you that the bot was created. There's one important bit of information in there that you'll need for later: the token to access the HTTP API. It will be a long string of alphanumeric characters, maybe with a colon in it.

TELEGRAM CONTROLLED HOME AUTOMATION SYSTEM



➤ **CODE:****Telegram.py**

```
# Import the time library to allow us to use the sleep function
# Import the datetime module using import datetime module
import time, datetime

# Import RPi.GPIO module
import RPi.GPIO as GPIO

#Import telepot python library
import telepot

from telepot.loop import MessageLoop

#Declare and initialize variables to store the GPIO number on which we connect the
relay

LED = 26

FAN = 19

BULB = 13

TUBELIGHT = 6

#Store the current date and time in variable(now)

now = datetime.datetime.now()

#Set the BCM mode

GPIO.setmode(GPIO.BCM)

# Disable warnings

GPIO.setwarnings(False)
```

#LED

#set the pin number (GPIO 26) to output

GPIO.setup(MYLED, GPIO.OUT)

#LED initially off

GPIO.output(LED, 1)

#FAN

#set the pin number (GPIO 19) to output

GPIO.setup(FAN, GPIO.OUT)

#FAN initially off

GPIO.output(FAN, 1)

#BULB

#set the pin number (GPIO 13) to output

GPIO.setup(BULB, GPIO.OUT)

#BULB initially off

GPIO.output(BULB, 1)

#TUBELIGHT

#set the pin number (GPIO 6) to output

GPIO.setup(TUBELIGHT, GPIO.OUT)

```
#TUBELIGHT initially off

GPIO.output(TUBELIGHT, 1)


#define function (action)

def action(msg):

    chat_id = msg['chat']['id']

    command = msg['text']

    print 'Received: %s' % command


    if 'on' in command:

        message = "Turned on "


        if 'LED' in command:

            message = message + "LED "

            GPIO.output(LED, 0)


        if 'FAN' in command:

            message = message + "FAN "

            GPIO.output(FAN, 0)


        if 'BULB' in command:

            message = message + "BULB "
```

```
GPIO.output(BULB, 0)

if 'TUBELIGHT' in command:

    message = message + "TUBELIGHT "

    GPIO.output(TUBELIGHT, 0)

if 'all' in command:

    message = message + "all "

    GPIO.output(LED, 0)

    GPIO.output(FAN, 0)

    GPIO.output(BULB, 0)

    GPIO.output(TUBELIGHT, 0)

message = message + "light(s)"

telegram_bot.sendMessage (chat_id, message)

if 'off' in command:

    message = "Turned off "

    if 'LED' in command:

        message = message + "LED "

        GPIO.output(LED, 1)

    if 'FAN' in command:

        message = message + "FAN "
```

```
GPIO.output(FAN, 1)

if 'BULB' in command:

    message = message + "BULB "

    GPIO.output(BULB, 1)

if 'TUBELIGHT' in command:

    message = message + "TUBELIGHT "

    GPIO.output(TUBELIGHT, 1)

if 'all' in command:

    message = message + "all "

    GPIO.output(LED, 1)

    GPIO.output(FAN, 1)

    GPIO.output(BULB, 1)

    GPIO.output(TUBELIGHT, 1)

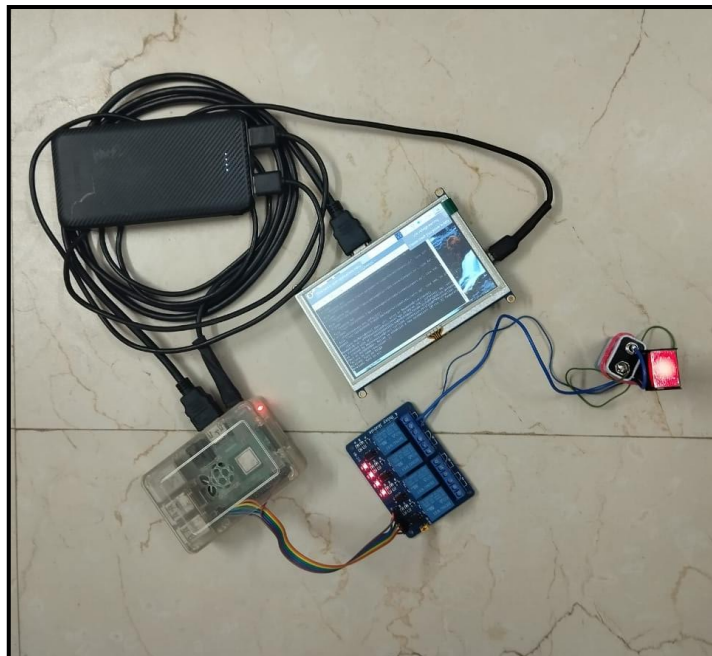
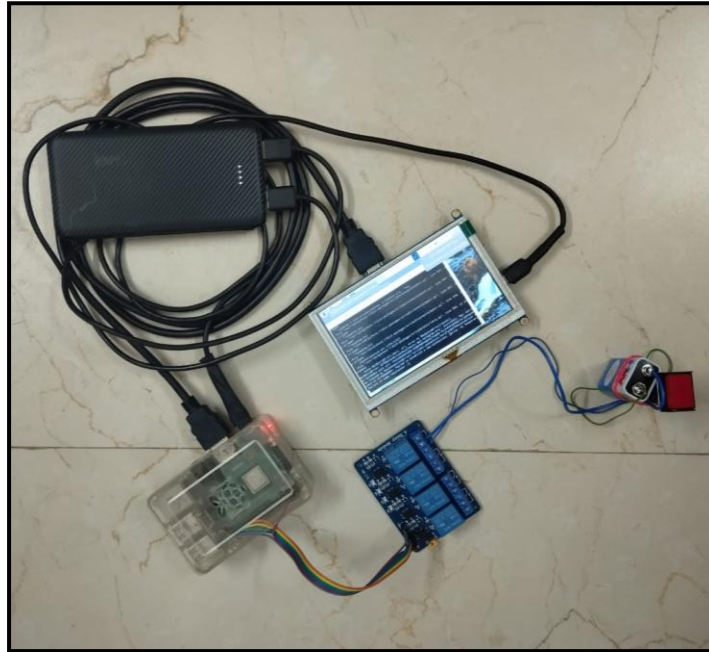
message = message + "light(s)"

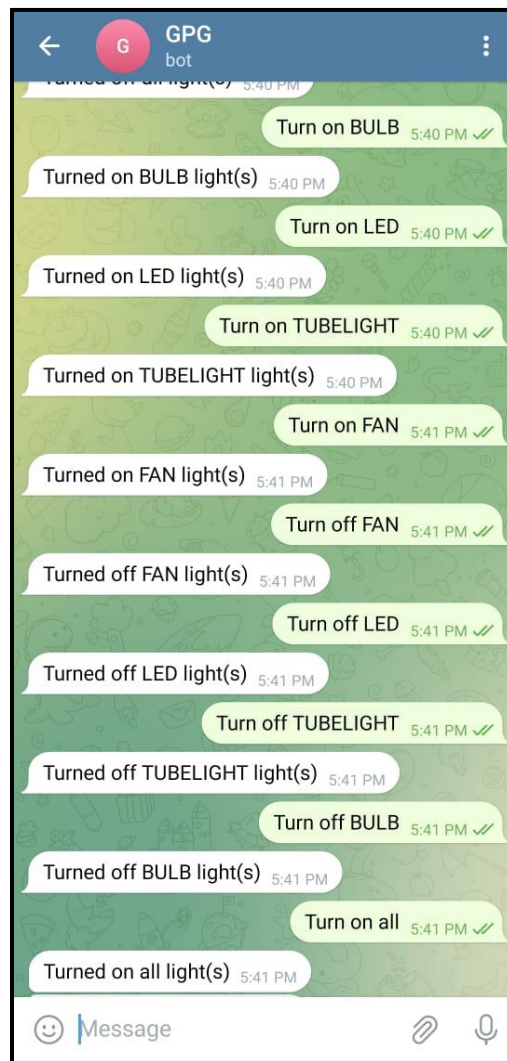
telegram_bot.sendMessage (chat_id, message)

telegram_bot = telepot.Bot('6203061528:AAEDVWXCmQo4LT4iW0k-
IvJxdhF1DhNQltA')
```

```
print (telegram_bot.getMe())  
  
MessageLoop(telegram_bot, action).run_as_thread()  
  
print 'Code GPG Home automation is Up and Running....'  
  
while 1:  
    time.sleep(10)
```


➤ IMPLEMENTATION:





➤ ACTIVITIES WITH TIMELINE FOR THE COMPLETION:

| Sr. No. | Activity | Month |
|----------------|--|--------------|
| 1 | Topic selection | Aug-22 |
| 2 | Discussion related to problem | Sep-22 |
| 3 | Research work for solution | Oct-22 |
| 4 | Market survey for selection of hardware and software | Nov-22 |
| 5 | Initial prototype for single device | Jan-23 |
| 6 | Documentation prepared | Feb-23 |
| 7 | Final prototype for 4 device | Mar-23 |
| 8 | Final documentation | Apr-23 |
| 9 | Feedback and completion of all project work | May-23 |

Future Enhancement

By interfacing various sorts of sensors, we can program the automatic controlling of the appliances. As for example, using temperature sensors to log the current temperature of a room, we can control the automatic turning on/off of the heater or fan. Likewise, for the continuous streaming of video, we can set up our own video server. This is surely to cost a lot. We could also interface Arduino to raspberry pi so that we can increase the number of appliances that can be controlled remotely.

Conclusion

Nowadays, technology is growing rapidly and it is same goes to the home automation. As for this project it highly recommended for everyone in this world especially for a user who is with disabilities and for the householder too. This recommendation will lead to a green world which is it can help to save and reduce on electricity bills. Plus, it will help and lead the disable person to work independently and help them to manage their house in more organized way.

Self appraisal Form

| SELF APPRAISAL FORM | | | | | |
|---------------------|---|-------------------------------------|-------------------------------------|---|---|
| | As a UDP Group | A | B | C | D |
| 1 | All students of group understood and agreed on how the whole project was broken down into sub-tasks. | <input checked="" type="checkbox"/> | | | |
| 2 | Work was distributed according to the skills and knowledge and capacity of each student. | <input checked="" type="checkbox"/> | | | |
| 3 | All students were clear about the time frame and their own responsibilities. | <input checked="" type="checkbox"/> | | | |
| 4 | All students involved understood that their work would contribute to the group's success. | | <input checked="" type="checkbox"/> | | |
| 5 | Individual difficulties experienced by individuals were discussed in the group and other students helped to resolve the difficulties. | <input checked="" type="checkbox"/> | | | |
| The Task Execution | | | | | |
| 6 | The work was perfectly & clearly distributed among all students. | <input checked="" type="checkbox"/> | | | |
| 7 | The timing and sequencing of sub-tasks done to progress stage by stage . | | <input checked="" type="checkbox"/> | | |
| 8 | Survey and data collected were organized systematically for later use. | <input checked="" type="checkbox"/> | | | |
| 9 | On-going checking throughout the process was made to ensure that everything was on the right track. | | <input checked="" type="checkbox"/> | | |
| 10 | Appropriate corrective majors were taken to handle unexpected problems. | <input checked="" type="checkbox"/> | | | |
| 11 | The quality of work produced was assessed regularly during the process and also at the end. | <input checked="" type="checkbox"/> | | | |
| 12 | Systematic survey and literature study done. | <input checked="" type="checkbox"/> | | | |

TELEGRAM CONTROLLED HOME AUTOMATION SYSTEM

| | My role in the UDP Group | | | | |
|----|--|-------------------------------------|-------------------------------------|--|--|
| 13 | I tried my level best to accomplish the part I taken and time. | <input checked="" type="checkbox"/> | | | |
| 14 | I tried my level best to complete UDP and produce good quality solution. | | <input checked="" type="checkbox"/> | | |
| 15 | I fell strongly that the group success is my own success. | <input checked="" type="checkbox"/> | | | |
| 16 | I feel that this UDP is a real life problem. | <input checked="" type="checkbox"/> | | | |
| 17 | I learned from other students of the group. | <input checked="" type="checkbox"/> | | | |