**BRIEF DESCRIPTION OF THE DRAWINGS**

**Hardware Design**

**5V Power**

**Supply**

**Raspberry Pi 3 Model B**

**Arduino Uno**

**10000maH power bank**

**L293D**

**Motor Controller**

**L293D**

**Motor Controller**

**12V**

**Pi Camera**

**Speaker**

**2.1Amp**

**1Amp**

**200rpm**

**motor**

**200rpm**

**motor**

**200rpm**

**motor**

**200rpm**

**motor**

**Power Flow**

**Data Flow**

**Purpose of each component:**

* **Raspberry Pi3 Model B(1)**:This is the heart our project. Voice commands will be sent from mobile browser to the server running in raspberry pi which will process the commands and respond accordingly. The configuration of raspberry pi(quad core 1.2GHz CPU, 1GB RAM) helps in high speed processing of the commands given to it. Also, the wifi interface helps us to connect our mobile to the raspberry pi and send commands through a local network. Since we have loaded the OS Raspbian into the raspberry pi it exempts us from the tedious task of entering our code in machine language format. The OS is loaded into a 32GB memory card. The available USB ports helps us to connect external devices like pen drives when desired in our project.
* **Arduino Uno(1)**:The Arduino Uno acts as the slave of Raspberry Pi. Pi and Uno performs the commands in master-slave relationship. Pi sends commands to Uno which in turn forwards the commands to the motor controllers. This is mainly done so that too much load is not exerted on the Pi. If the Arduino Uno chip is damaged only the locomotion function of the robot will become inactive but if the Pi gets damaged then the entire system will get damaged which is certainly not desired. So the intermediary Arduino Uno acts as a safety zone for raspberry pi. Moreover the pins of raspberry pi are digital whereas the motor controller takes analog input. Arduino acts as an interface between the two converting the digital signal to analog.
* **L293D Motor Controller(2)**:The motor controllers are supplied with external power source(12V) thus it does not put much load either on the Pi or the Arduino Uno. Motor controller also helps to control the speed of the motors. Two motor controllers are used, one for the left pair and other for the right.
* **10000maH power bank(1)**:This is a 5V power supply used to supply power to the raspberry pi as well as the speakers. It has two outlets. The 2.1amp current flows into the raspberry pi and 1amp current flows into the speakers.
* **12V power supply(1)**:It is used to supply power to the motor controllers.
* **200rpm motors(4)**:Used for moving the robot
* **Pi Camera(1)**:Pi Camera connected to raspberry pi fulfills the purpose of clicking pictures of the user and live surveillance
* **Speakers(1)**:Voice outputs are given through the speakers

**FlowCharts**

**ChatBot**

Voice Input

Mobile Browser

Raspberry

Pi

Server

Process

Speaker

Voice Response

The personal digital assistant has chatting facilities. When the user gives a voice input through his mobile browser for example “How are you?” or “What are you doing?” etc it will give an appropriate reply. The conversation between the user and the robot will be very natural and human-like. Thus the user can build a friendship with the robot by chatting. The robot will try to understand the users language as much as she can and will try to give as much accurate reply as possible. In case she doesn’t know the reply to a particular command, she will try to learn and use it for the next time. This is how machine learning is applied.

**Setting an event and giving a reminder**

Add Event Process

Event Check process

Speaker

You have an event <event>

Now the user gets busy doing other works and when the time comes, event is reminded

Your event has been added to the reminder list

Speaker

Remind me of <event>

on

<date> at <time>

Raspberry Pi

Server

Voice

Input

Mobile Browser

Date and time Check

Speaker

Invalid date or time

False

True

The user can set event on a particular day at a particular time. The personal assistant will remind him of that particular event at that very moment. It must be noted that since the digital assistant has the facility of multiple user accounts, it will notify the user about the event only when he is logged in to his account. Event will be set only when the user inputs a valid date and time.

**Live Surveillance**

Request for frames

Raspberry Pi

Surveillance process

Pi Camera

Render Frames

Mobile Browser

When the user enters into the live surveillance panel of the website he can see the live video frames rendered by the surveillance process. When we exit the page the Pi camera will automatically be disabled within 10 seconds.

**Send Mail**

Gmail id

and password

Raspberry Pi

Configures the user’s Gmail account

Configure Gmail Account

Mobile Browser

Gmail Configured

Add Contact

Mobile Browser

Contact name

and email id

Raspberry Pi

Adds contact to the user’s contact list

Contact Added

Mobile Browser

1.Send Email

3.Recipients’ names

6.Message

Not Exists

Speaker

2.To whom should I send the email

Abort

4...bort

Speaker

5.What is your message?

Exists

Speaker

7.Mail Sent

Voice

Input

Raspberry

Pi

Send Mail Process

To send mail the user first has to configure his Gmail account. Once he has done this he will have to add contacts to his contact list. Now, when he gives the command to send mail, the robot asks to whom it should be sent. On giving a correct recipient list the robot then asks for the content of the message. When the user provides it the mail is sent to the desired receivers from the user’s Gmail account.

**Calculator**

Expression

Voice Input

Mobile Browser

Raspberry Pi

False

True

Expression Checker Process

Evaluation Process

Speaker

Speaker

The value of the expression is <answer>

Invalid Expression

**Google Search**

Voice Input

Mobile Browser

Google

1.<Query>

2.Result

Google <Query>

3.Result

Raspberry Pi

Google Search Process

Speaker

Result

**Weather Search**

Voice Input

Mobile Browser

Weather.com

1.Query

2.Result

Weather Report of a particular city

3.Result

Raspberry Pi

Weather Search Process

Speaker

Result

**ToDo List**

Add To-do List Process

Job was added to the to-do list

Speaker

Add to the todo list of

<date>

<job>

Raspberry Pi

Voice

Input

Mobile Browser

Date Check

Speaker

Invalid date

False

True

Add to the to-do list

Check Todo List Process

Tells the jobs to be done on that day if any

Speaker

Check to the todo list of

<date>

Raspberry Pi

Voice

Input

Mobile Browser

Date Check

Speaker

Date not valid

False

True

Check to-do list

**Locomotion**

Movement Process

Mobile Browser

Moving Direction

Raspberry Pi

Arduino Uno

Motor Controller1

Motor Controller2

Motor3

Motor4

Motor2

Motor1

**Nickname**

Call me <nickname>

Ok, <nickname>. I will keep that in mind

Speaker

Set Nickname Process

Voice Input

Mobile Browser

Raspberry

Pi

**Calendar and clock**

1.What is the time now?

2.What is the date of <weekday>

3.Which day is <date>?

1.The time is <time>

2.Date of <weekday> is <date>

3.<date> is on <weekday>

Speaker

Clock and

Calendar

Process

Voice Input

Mobile Browser

Raspberry

Pi

Mobile Browser

Abort

Response

Retake

Take a picture

speaker

No Response

Camera is ready. Are you ready to pose?

Start camera and wait

Click Picture

Preview the picture on the website

speaker

Close Camera

Save

Raspberry Pi

Retake Process

Retake Process

Picture saved

Voice

Input

Leave it

Check Response

Yes/Ready

Gallery Updated

**Take Picture**

**Play Music**

**Music Playing Zone**

Music Player

Ignore

Other Commands

Stop

Speaker

Remove this song

Check Command

**Music Not Playing**

**Zone**

Playlist/music not found

Not found

1.Play Music

2.Play <category> Music

3.Play <music name>

Voice Input

Search Playlist

Found

Speaker

Music Played

Song left to be played?

No

Stop

Next

Delete Song Process

Mobile Browser

Command

Yes

Raspberry Pi

**Play From USB**

**Music Not Playing Zone**

3.What is the name of the song?

5.Select a genre

**Music Playing Zone**

Music Player

Ignore

Other Commands

Stop

**Music Not Playing**

**Zone**

Speaker

Add this song to the playlist

Check Command

No song exists in USB drive

Not found

1.Play songs from USB

Voice Input

Search Song from USB

Found

Speaker

Music Played

Song left to be played?

No

Stop Playing

Next

Stop Playing

Mobile Browser

2.Command

Yes

Add Song Process

Voice Input

Speaker

Speaker

Mobile Browser

Raspberry Pi

4.<song name>

Genre exists?

yes

no

6.<genre>

7.Song Added

Raspberry Pi

5.Select among the available genre

Change date and time

Date and time changed

Request for change date and time

New Date Time

Mobile Browser

Change date and time process

Raspberry Pi