

# Smart Mirror using Raspberry PI

Prachi.R.Handa,Shailesh kumar,A.Kamble,Suvarna.L.Pawar,Neha.A.Salunkhe

Department of Electronics and Telecommunication,  
YSPM'S Yashoda Technical Campus, Satara

prachihanda001@gmail.com,sk93kamble.03@gmail.com,suvarnapawar3727@gmail.com,nsalunkhe966@gmail.com

**Abstract** – The project has a very broad scope covering some current popular topics in the IT sector such as the Internet of Things, Maker culture and home automation. The main idea of this project is to make a smart table which can display our schedule, events, mails, holidays, etc. Smart Mirror Table is one of the applications of Raspberry Pi. A computer screen embedded in mirror looks very futuristic. While looking at mirror you can look at various notifications from social sites as well news, weather forecast and more things. Such mirrors can be programmed to work as AI and control home appliances by voice input or touchscreen.

**Keywords** – raspberry pi 3 kit, motion sensor(PIR), monitor screen, mirror, mic, relay driver(ULN2803), relay switches.

## I. INTRODUCTION

Everyone knows what a mirror is. It is an object found in most people's homes. In mirrors we see our reflections. But what happens when you combine the idea of a mirror with technology? What possibilities are there and how smart could a mirror be? These are some of the questions that inspired our choice of final year project, a project which aimed to develop a smart mirror and a small operating system to power it.

The device was to look like a regular mirror but would have a screen inside and you would be able to interact with it using voice commands .

The main features the Smart Mirror would have would be showing basic weather and time information, being able to add alarms, news headlines, temperature, calendar, reminders or notes in a similar way we stick post-it notes on a fridge.

it is providing comfortable, secure and convenient personal services everywhere whether it is home or various industries and making a lot of users comfortable.

The Smart Mirror would help in developing smart houses with embedded artificial intelligence, as well as finding its applications in industries.

## II. LITERATURE REVIEW

L.C Eccaroni & X. verdaguer proposes a “Magical mirror”

[1]in 2005 stated an interface to provide basic services like specific weather data,interactive tv & searches. In addition ,we use open standards like web services to communicate with devices & will be displaying real time news headlines, temperature, calendar, date and time.

Mike Hanlon proposes a “Philips homelab ” [2] in 2004 stated an commercial product with lcd display integrated into unique polarised mirror that transfers almost 100 percent of light through the reflective surface and

provides only home automation & we have used combination of home automation and displaying real time parameters like news headlines, temperature, calendar, time & date.

Derrick Gold, David Sollinger, and Indratmo proposes a “SmartReflect”: A Modular Smart Mirror Application Platform.[3],in Nov 2016.here they have located a mirror by using of a camera (for face recognition) but it may not be suitable for a smart mirror installed in a washroom due to privacy reasons and it is been supported to the javascript only.

## III. PROBLEM STATEMENT

The goal of the smart mirror is to provide an access point for a person to receive all the information that could affect how they plan for the day for getting news updates and weather updates,a person will always have to switch on the television which is time consuming.

All the necessary information like weather and news can be accessed from one location.

## IV. PROPOSED WORK

System architecture: This system consists of raspberry pi 3 model B+kit,power supply,motionsensor,relay drivers,relay switches, mirror,monitor screen,microphone. The main aim of this project is to build a smart home device which can be used to control the home appliances via voice command and displays real time parameters .The smart mirror is a system that combines these task's in an efficient and enjoyable way to provide time saving for the user. we have used Raspbian is the “official” operating system of the Raspberry Pi. Raspbian is a version of LINUX built specifically for the Raspberry Pi. To encase the system we precisely modelled panel to construct the outer frame with mirror. Then used a Particular glass with a back frame.

## V. REQUIREMENTS

### 1. Hardware Components:

- Acrylic Mirror:** A special magic mirror known as a two way mirror or observation mirror is used in this project. A two mirror is special as compared to an ordinary household mirror for interact. Unlike a household magic mirror, the two way mirror is not painted with an opaque color on the back, instead it's left untouched. This gives the property of the mirror being reflective one side and transparent/translucent from the other side. Hence the two way mirror acts as a magic mirror as long as there is no light send from the back of the mirror.
- Raspberry Pi-3:** Raspberry Pi-3is a credit-card sized computer by the Raspberry Pi foundation .The Raspberry Pi has a Broadcom BCM2837 system on a chip (SoC), which includes 4 ARM Cortex-A53 1.2 GHz cores as the processor, Video Core IV GPU and with 1 gigabyte of RAM. It does not include a built-in floppy or solid-state drive, but it uses a micro SD card for booting and persistent storage. It also includes Bluetooth 4.1Low energy and a 2.4 Ghz 802.11n Wi-Fi .The Raspberry Pi- 3 is the back bone of this project and is used to achieve all computational necessities. The Raspberry Pi-3 computer has come out with various varieties over the years. Our project employs the use of Raspberry Pi 3 Model B. A micro SD card is used to store the operating system and all the software related code for the project.
- LED Monitor:** It's a smooth panel display, which use a array of light-emitting diodes as pixels for a video display. Their brightness allows them to be used outside where they are observable in the sun store signs and posters, and in recent years they have also become normally used in endpoint signs on public transference vehicles, as well as variable-message signs on Highways.
- PIR Sensor:**PIR stands for passive infrared sensor. it detect general movement ,but do not give information on who or what moved .For that purpose,an active IR sensor is required. This sensor detect human or particle movement in a certain range,by digitally changing voltage level based off if once hands had passed the capacitors on pir motion detector or not.
- Microphone:**The microphones are used to power the voice recognition capabilities of the device. USB microphone need to be used because the Raspberry Pi does not have a regular microphone input.
- Wooden Frame.**

### 2. Software Tools:

#### • Raspbian OS

Raspbian is a free operating system optimized for the raspberry pi hardware,raspbian comes with over 35,000 packages,pre defined functions which helps in easy installation on a raspberry pi computer.



Fig .1.Raspbian.

#### • Python

Python is an easy to learn powerful programming language. It has efficient high level data structures and a simple but effective approach to object oriented programming.

Python's elegant syntax makes it an ideal language for scripting and rapid application development in many areas on most platforms.

#### • Block Diagram:

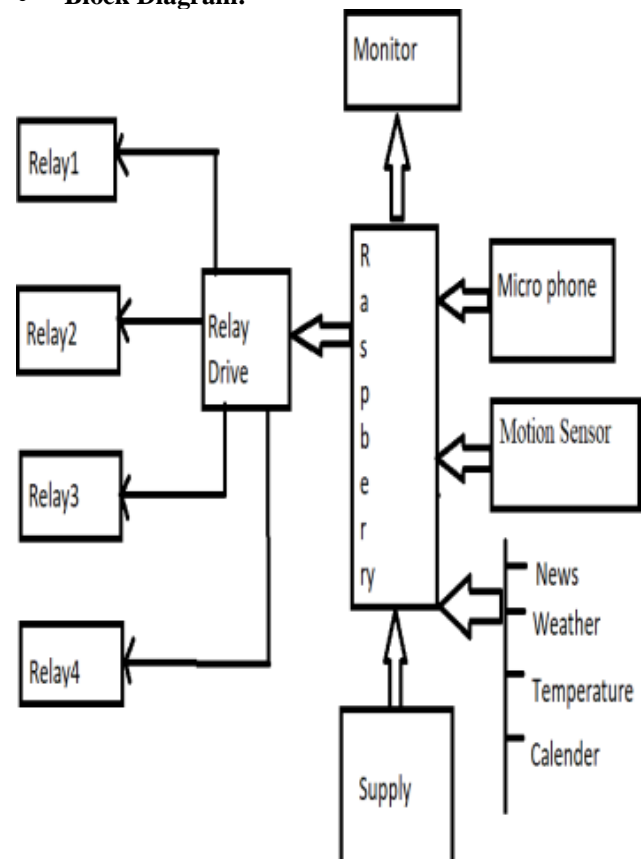


Fig .2. block diagram of smart mirror using raspberry pi.

• **Flow Chart of Smart Mirror:**

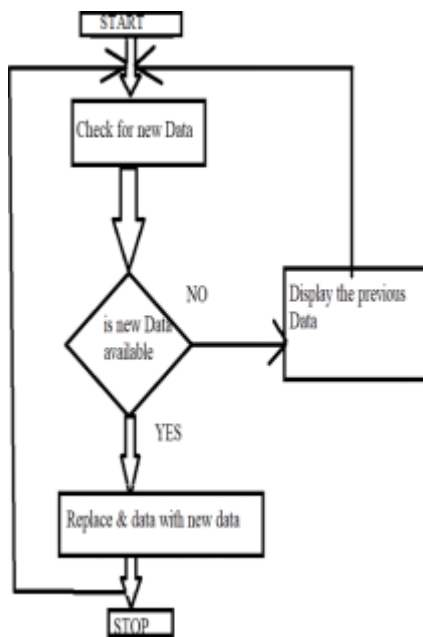


Fig. 3. flow chart of smart mirror.

• **Flow Chart of Automation:**

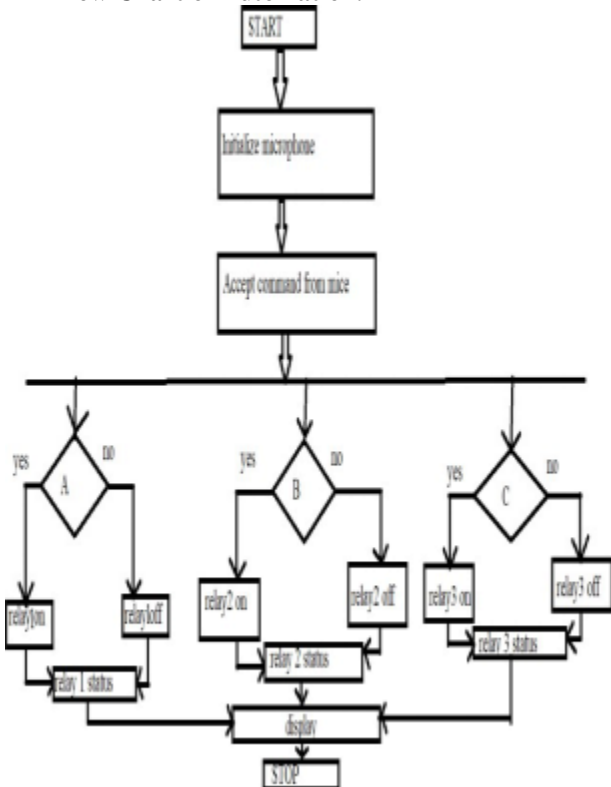


Fig. 4. flow chart of automation.

**VI. SYSTEM WORKING**

Motion sensor and microphone are connected to the raspberry pi 3 and we also used four relay switches for the

different lamps. Here we have powered a 6 volts supply for further actions to be performed.

The signal given by voice commands using mic are received by wifi module through the cloud and the further information collected by clouds are displayed on screen. . USB microphone had to be used because the Raspberry Pi does not have a regular microphone input. As per the instructions given by user, relay circuit switched ON/OFF the particular devices or lamps.. This device can also connected to an Android App which you can develop on your own using some applications like MIT App inventor etc.

**VII. PROPOSED SYSTEM IMPLIMENTATION**

STEP 1: Start.

STEP 2: Turn on the supply of both raspberry Pi and LED Screen.

STEP 3: Turn any Hotspot and link it with raspberry Pi-3.

STEP 4: Now to Screen the raspberry pi-3 link your device

to raspberry through VNC viewer it requires an ip address so we have to enter the correct ip address of raspberry pi 3 so it will be get connected.

STEP 5: Now we collect the information.

STEP 6: Show the details.

• **Result:**

The following image shows the required output we can see that it is displaying time,date,weather condition, news updates and Indian upcoming Holidays.

• **Advantages:**

Attractive light box.



Fig .5. result.

1. Very low power consumption.
2. Easy to communicate.
3. User friendly.
4. Saves time.
5. Used for handicapped people.(blind)

• **Disadvantage:**

The raspberry pi 3 is not compatible with other operating system such as windows(there are currently 1.3 billion windows user around the world).

## VIII. CONCLUSION

We have built a working model to demonstrate various functionalities of the mirror using voice command. There are many future possibilities for this project and hopefully it will be continued.

Benefit of this project is power utilities will not continue unnecessarily, as we have discussed earlier that PIR motion sensor is a automatic light control sensor.during the day a built in photocell sensor saves electricity by deactivating the screen. When a active presence of human body within a detection range/ coverage area is seen the sensor sense and turn on screen but as soon as this presence isolates the sensor goes to deactivate mode. And therefore this project will make people's lifestyle comfortable to the some extent.

## IX. FUTURE SCOPE

We can build advanced smart mirror using hand gestures, smartphones with MIT app inventor, pi camera and with touch–screen modes. It is also compatible with raspberry pi4. And we can too add reminders, alarm system etc.

The mirror also provides a picture in picture sub display to facilitate the display of services such as maps, videos via YouTube.

The mirrors can be better enhanced to be developed in beauty parlors,cloth shops,hotels,etc.

## REFERENCES

- [1]. L. Ceccaroni and X. Verdaguer. Magical mirror: multimedia, interactiveservices in home automation  
<https://pdfs.semanticscholar.org/ef12/cc8f05a140bcd8e05ed30395dcba50362d6f.pdf> Working Conference on Advanced Visual Interfaces (AVI 2004), pages 10-21, New York, NY, USA, 2004. ACM Press.
- [2]. Mike Hanlon proposes a “Philips homelab ” in 2004  
<http://www.research.philips.com//technologies/misc/homelab/index.html>
- [3]. Derrick Gold, David Sollinger, and Indratmo. SmartReflect: A Modular Smart Mirror Application Platform. IEEE Journal, Nov 2016.
- [4]. [https://www.researchgate.net/publication/310845534\\_SmartReflect\\_A\\_Modular\\_Smart\\_Mirror\\_Application\\_Platform](https://www.researchgate.net/publication/310845534_SmartReflect_A_Modular_Smart_Mirror_Application_Platform)