

Research Article

Smart Mirror Design and Development By Raspberry Pi

Tanuj Manglani¹, Debabrato Mukherjee², Bharat Gangal³, Mayur Sharma⁴,
Harshvardhan Nathawat⁵, Anjali Shyoran⁶, Prlyansh Tripathi⁷

^{1,2}Professor, Department of Electrical Engineering, Global Institute of Technology, Jaipur India.

^{3,4,5,6,7}B.Tech Scholar, Department of Electrical Engineering, Global Institute of Technology, Jaipur India.

I N F O

Corresponding Author:

Bharat Gangal, Department of Electrical Engineering, Global Institute of Technology, Jaipur India.

E-mail d:

bharatgangal1997@gmail.com

How to cite this article:

Manglani T, Mukherjee D, Gangal B et al. Smart Mirror Design and Development By Raspberry Pi. *J Adv Res Info Tech Sys Mgmt* 2020; 4(1). 1-4.

Date of Submission: 2020-04-20

Date of Acceptance: 2020-05-11

A B S T R A C T

This paper describes the designing and implementation of a "Smart Mirror Using Raspberry Pi". The device that works as a digital display showing the contents such as time, date, weather and news simultaneously. The user can interact with the mirror by giving commands to it, so it can also be referred as an interactive display. It has various applications like displaying real time information updates and appliances control.

Keywords: Smart Mirror, Raspberry pi, API, Automation, Python, Smart Homes

Introduction

Day by day, the world is moving towards automation. We often hear from technology entrepreneurs, futurists and some media outlets that automation will lead to a bright future. At the same time, there are a significant number of intellectuals, politicians and journalists depicting doomsday scenarios for our automated future. Many devices are being invented which uses the concept of multimedia communication, AI and IOT.

Everyday mirror is used to check how the person is looking or how his/ her attire is while getting ready. By this everyone is psychologically interacting with the mirror. So, the idea of a mirror which can responds to predecided commands can excite anyone.

This mirror is one step towards the development of smart homes including update, stocks, Our daily routine includes reading newspaper, weather updates, etc.¹⁻² As well as we can interact with the mirror with the help of voice command.

The connected effort in this project has important number of technologies that takes user towards automation and AI. The main features of this project is that. It can function both as a mirror and an interactive display, which demonstrates multimedia content such as news, date, time, weather and Instantaneously. It can be controlled by voice commands too.³

Literature Survey

The related work in this project has significant number of technologies that takes user towards automation and AI. The main features of this project is that. It can function both as a mirror and an interactive display, that displays multimedia content such as time, date, weather and news simultaneously. It can be controlled by voice commands too.³

Few examinations have been carried out in this area. By adding technologies in the mirror multiple tasks can be performed simultaneously. With advancements in Internet of Things and its applications, the mirror is designed such

that the residents are able to control their smart home appliances and they can also access personalized services while enhancing the user profile.⁴ Mirror can be embedded with various electronic features such as GPS inavigation, Bluetooth connectivity, wireless communication which enables voice recognition and hands-free calling.⁵

Smart Mirror can be applied in various fields like Hotels, Retail stores and also in workplace environment. It can be used in offices where it can be accessed by multiple users.⁶

It can also be used to monitor the health of elderly people at home by incorporating IOT. This IOT connected mirror provides updates and location of an elderly parent to their respective patient.⁷

Security can be ensured by using Speech Recognition based mirror for shelf security. PIR sensor can be used to identifying the users in front of mirror.⁸

Theory

Python programming is being used at the back end as Raspberry pi works only on python. Python is an high-level, general-purpose programming language. It was created by Guido van Rossum and first released in 1991. Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on various aspects.¹

For server to device connectivity is being used IOT platform. IOT offers some important parameters for communication to be established between devices which are device registry, data ingestion, message routing, storage and stream, analysis. These parameters give ease for business intelligence, command control, admin and management and better user experience in day to day work. Basically IOT offers two types of devices - Field gateway and cloud gateway. Field gateway consists of non IP devices, e.g. SCADA-RTU, PLC, etc. Cloud gateway allows devices having proxy, e.g. zigbee, etc.² Two types of commands are available in IOT- Device to Cloud and Cloud to Device.³

Proposed Work

Proposed work can be represented by the block diagram shown in figure 1.

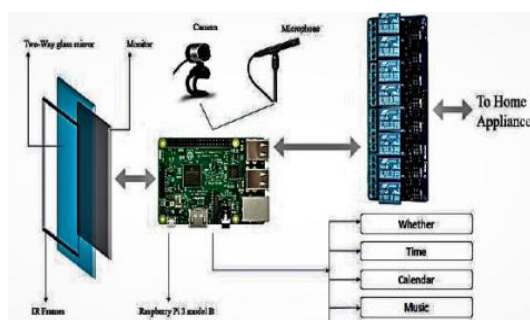


Figure 1.Design and diagram of Smart Mirror

Raspberry pi is a CPU for the whole system. In proposed work an interactive interface which can be used at homes as well as at work. It provides facilities to display real time updates and also can be controlled by voice commands.

The raspberry pi is powered by 5V/2A DC supply. Monitor s connected to it using HDMI cable.⁵

Raspberry pi 3 B +

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries.

CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz

GPU: 400MHz Video Core IV multimedia

Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)

USB ports: 4

Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack

Network: 10/100Mbps Ethernet and 802.11 in Wireless LAN

Peripherals: 17 GPIO plus specific functions, and HAT ID bus

Bluetooth: 4.1

Power source: 5 V via Micro USB or GPIO header

Size: 85.60mm × 56.5mm

Weight: 45g (1.6 oz)[6]

Display

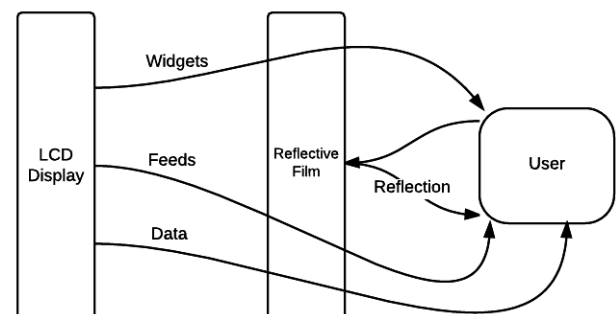


Figure 2.Principle of working

Two way mirror for display purpose is required. It is an important part because it helps in creating futuristic display. It will be attached at the top to a wooden frame which is used for the support to the monitor. A LCD monitor is being used which is connected to the raspberry pi using HDMI cable. One way to interact with the mirror is microphone. Voice commands for appliances control will be given using microphone. A webcam is attached to the raspberry pi 3 which detects the faces by making use of open cv. When the monitor goes into sleep mode it can be again turned on by detecting faces. This mirror acts as a normal reflective

mirror when the mirror is off and the data is displayed simultaneously when the mirror is turned on.⁷

The monitor is fixed into the perfect shaped wooden frame whose dimension depends upon the size of monitor in which one slot is for raspberry-pi. Two-way mirror is fixed for reflection purpose.

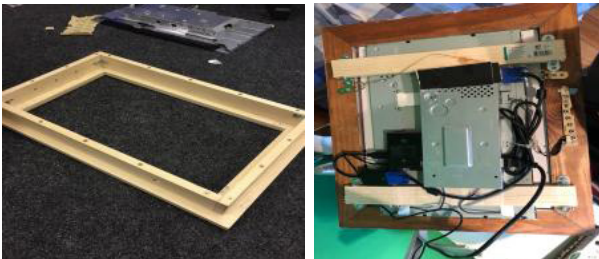


Figure 3. Constructional diagram of Smart mirror

Flowchart of this proposed work is shown below.

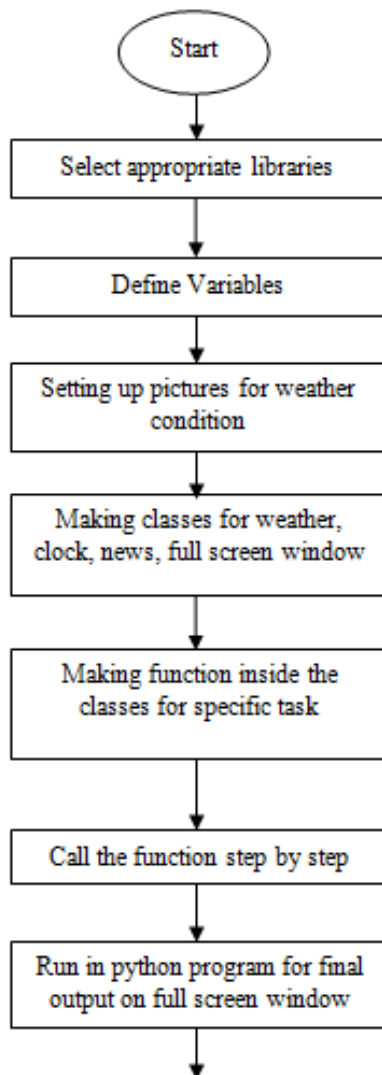


Figure 4. Flow chart of smart mirror

Algorithm is started by importing the useful libraries. Then the variables are assigned with latitude, longitude, API and other important features. The file exception handling is used with conditional statements to get the desired output. Several functions are made and called in the main loop. The functions are made with different workings so that they can be called as per need.⁸

Output

Figure 5 shows a smart mirror with various output parameters suggested in the work. In this mirror the image of a person is reflected along with the current date, day, time, temperature, weather report and news.

- Temperature (Updated after 5 minutes)
- News (Updated after 10 minutes)
- Date
- Day
- Weather Report (Updated after 60 minutes)



Figure 5. Output of screen

Conclusion

In this shows a smart mirror has been designed and developed using Raspberry Pi. It works as a normal reflective mirror so that the consumer can usage it as a regular mirror. The two way mirror acts both as a reflective surface as well as transparent to display the updates. Also, It acts as a display mirror real time update like day, date, time,

temperature and news and weather report. Hence the proposed mirror acts as a smart home appliance with personalized access. Everyone using this mirror will get real time updates.

References

1. Sun Y, Geng L, Dan K. Design of Smart Mirror Based on Raspberry Pi.
2. Bessemer D, Burley J. Fit Mirror: A Smart Mirror For Positive Affect n Everyday User Mornings Routines. 2016.
3. Maheshwari P. Smart Mirror: A Reflective nterface to Maximize Productivity. *International Journal of Computer Applications* (0975 – 8887) 2017; 166(9).
4. Ghazal M, Hadithy TA, Khalil TA et al. A Mobile-Programmable Smart Mirror for Ambient oT Environments. *IEEE* 2017.
5. George S Thandekkattu. Smart Mirror-Network Architecture Based on ot And Cloud Computing Technology.
6. Carmona OG, Mansilla DC. SmiWork: An nteractive Smart Mirror Platform for Workplace Health Promotion. Research Gate Conference paper, 2017.
7. Moon YB, Oh SW, Kang HJ et al. Smart Mirror Health Management Services based on IoT Platform. *Recent Advances on Computer Engineering*.
8. Athira S, Francis F, Raphel R et al. SMART MIRROR: A Novel Framework for nteractive Display. CCPCT, 2016.