



Smart Mirror: A Multipurpose IOT based Smart Mirror using Raspberry PI

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ABSTRACT

The IOT based smart mirror on raspberry pi device, in this system, the live telecast of news, assistant can be displayed on the mirror screen. Using WI-FI module we can connect device to the internet. In this smart mirror we implemented google assistant for the smart mirror and you will get the information about the everything connected with internet. We can search any information. After searching you will get the correct information. Any person can get the date, news, and another information the assistant is at your help.

This system is also designed to get the voice recognition mode which is kindly brilliant. A smart mirror is a device that function a mirror with additional capability of displaying multimedia data such as text, videos and images. This device allows users to access an internet with contextual information such as weather data, seamlessly as part of their daily routine.

Keywords: Sanjay Ghodawat Polytechnic (SGP). Internet of Things (IOT), Smart Mirror

1. Introduction

Man has spent thousands of years perfecting the interior. More and more practices have been carried out to make it attractive and comfortable over the years. To make this happen we have re-introduced the concept of Smart Mirror as Surface Computing which incorporates Home Automation. In the past decade, Home Automation using the emerging IOT technologies has become an attraction for many people. Numerous devices that perform multiple functions have been introduced. All these devices have certain physical properties and occupy extra space in household, to overcome this problem, we needed surface computing capabilities with combination of IOT. In our daily life, in rush of the morning, every day we check date, time, weather, today's agenda etc. Daily people spend at least 5 minutes of their time in the morning looking in the mirror. Everyone needs to manage their time efficiently. We present a Smart Mirror that provides basic information about time, date and agenda and can provide Home Automation.

A common approach to building a smart mirror is to use a pane of two-way glass, a monitor, a frame to hold the glass and monitor, and a web browser with JavaScript to provide the software features and drive the display. The main limitation of this setup is related to the use of a browser as the display's method of information presentation. A browser creates a sandbox for the code that runs within it, that is, all interactions and processes are isolated from other running processes and hardware interactions on the computer. Furthermore, web applications are typically driven through user events generated on a web page (e.g., mouse clicks). This feature poses limitations in smart mirror applications. First, user events cannot be generated naturally in a browser when one interacts with the browser as one would with a mirror. Second, a sandbox limits the use of external hardware to generate events based on typical user-mirror interaction. Third, only JavaScript runs natively in a browser.

That being said, a web browser is still a necessary feature for providing and displaying information, as it has built-in support for multiple media formats, such as text, images, and videos. The information presentation can be made interactive with JavaScript and is customizable with CSS (Cascading Style Sheets). Furthermore, hyperlinking and web connectivity allows for borrowing and sharing of resources.

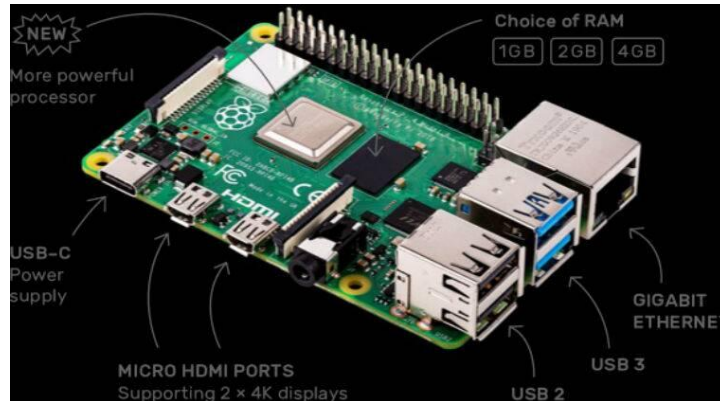


Figure1.1: Raspberry Pi 4b

2. Literature Review

In this paper, an intelligent mirror based on raspberry pi is designed for the home of Internet of things. The intelligent mirror is made of raspberry pi as the host controller. In working condition, the system by raspberry pi is connected to the network through WIFI, and obtain information about the weather forecast from the API network interface specified dressing index, time, date and other information, and then through the information displayed on the plasma display. The user can interact with the mirror, such as asking the mirror the weather, news, time, the mirror can automatically obtain the corresponding information network and broadcast. The designed intelligent mirror has the advantages of small size, simple operation, low cost, and has broad application prospects. The disadvantage of this kind of mirror that it won't support gesture control so as to make the mirror more interactive.[9]

Lakshmi N M, Chandana M S and Ishwarya P proposed a smart mirror system that represents an elegant interface for glancing information and also used for thief detection in a home environment. A smart mirror is a system that functions as mirror with additional capability of displaying date, time, current temperature, weather details. To design a smart mirror that receives an online news and display it using Internet of Things (IoT) circuitry and to detect thief when nobody is in home.[7]

M. M. Yusri et al. created Smart Mirror system which allows users to access information and also control the lights in the house. Relevant information can be traced such as time and date, weather, warning, traffic, and location map. The system applies Sonus technology as a medium of interaction between people and systems. So, users need to provide instructions to the system orally to acquire the system's response. Sonus is a speech to text library that can quickly and easily add a VUI (Voice User Interface) to any hardware or software project. With this Smart Mirror system, users can manage their daily activities at ease as well as solving many problems in managing some house chores.[3]

Vaibhav Khanna, Vash Vardhan, Dhruv Nair and Preeti Pannu proposed the interactive mirror with proper embedded intelligence for offering enhanced features such as weather of the city, latest updates of news and headlines and local time corresponding to the location. The Smart Mirror would help in developing smart houses with embedded artificial intelligence, as well as finding its applications in industries. Ambient Artificial Intelligence (AmI) is technology used in proposed smart mirror.

O. Gomez-Carmona and D. represents the design and implementation of a multi-user smart mirror system conceived to promote wellness and healthier lifestyles in the work environment through persuasive strategies. The interactive mirror recognizes different users through their personal corporate ID card, which allows them to have access to their personalized user-interface. The smart mirror provides workplace's indoor environmental conditions (thermal, humidity and light), personal physical exercise data obtained from wearable devices and general-purpose information (e.g., weather and daily news). Additionally, motivational advice related to physical performance is supplied through request by applying speech-based recognition techniques.[5]

This paper mainly focuses on the connectivity and the enhancements that will take place between the mirror and the internet. There are this micro-controller cards on-board, these systems, which can connect to the internet and take data from the internet, can show this information on the places located on the mirror. In the study, the developed intelligent mirror system includes the weather information, time and location information, current event information, user information, and camera image taken from web services using Raspberry Pi 3 micro-controller card. Some equipment can be controlled by voice commands via the microphone on the smart mirror.

3. Objective and Scope of project

3.1 Objective of Project

- To design and develop a magnificent functional smart mirror.
- This smart mirror aims to reduce and possibly eliminate the need for the user to make time in their daily morning or nightly routine to check their PC, tablet, or smartphone for the information they need. The mirror will provide the information with little to no effort from the user with the goal of not being a burden that he or she must maintain. The mirror wouldn't be another activity, rather an enhancement to the already common use of mirrors in most modern bathrooms.

3.2 Scope of Project

- A Face Recognition can help the mirror to identify the particular individual by which the user can access is own information. By incorporating the Face Recognition security can be maintained in the means of information. Various users have various demands and taste. In case of unauthorized user try to access the mirror will notify on the authorized person's email. This feature helps in achieving high security such as unwanted user in the house can be notified to the user.
- In terms of aesthetics the mirror can be made more thinner which can make it more portable and can be installed wherever needed. For the home automation purpose, the device is placed in a home environment where the place taken by the device should be low, it must not of the space. The device should blend in within the home furniture to make it useful in everyday course.

4. Methodology

4.1 Smart Mirror as a Mirror

A mirror is an object that reflects an image. Light that bounces off a mirror will show an image of whatever is in front of it, when focused through the lens of the eye or a camera. Mirrors reverse the direction of the image in an equal yet opposite angle from which the light shines upon it. This allows the viewer to see themselves or objects behind them, or even objects that are at an angle from them but out of their field of view, such as around a corner. Natural mirrors have existed since prehistoric times, such as the surface of water, but people have been manufacturing mirrors out of a variety of materials for thousands of years, like stone, metals, and glass. In modern mirrors, metals like silver or aluminum are often used due to their high reflectivity, applied as a thin coating on glass because of its naturally smooth and very hard surface.

We can see our view as we can see it in a natural mirror while looking and grooming with the help of one-way mirror with high concentration of aluminum content. Two-way mirrors are incredibly expensive, but give the best possible quality for your smart mirror. The other option is to buy a regular pane of glass, then stick two-way film onto the glass.

4.2 Smart Mirror as a information system

Information systems, often abbreviated as IS, are the collection of hardware, software, and telecommunications networks that people build and use to collect, process, create, and distribute useful data. This data is typically found in organizational settings but can exist in personal and household settings as well.

In this mirror we can get Time, Date, weather details and news are fetched from online using predefined URL. News is fetched from websites like CCN, BBC etc.

4.3 Smart Mirror as Security System

The most basic definition of any security system is found in its name. It is literally a means or method by which something is secured through a system of inter working components and devices.

When there is nobody in home it can be switched into security system by using VNC viewer to detect human presence. When someone enters into room, PIR sensor will detect the movement of the person when he passes by the mirror and capture the image and stores it in the drop box. Also informs the owner by updating captured image in the dropbox, by this way smart mirror system can also be used as a security system.

5. Flowchart

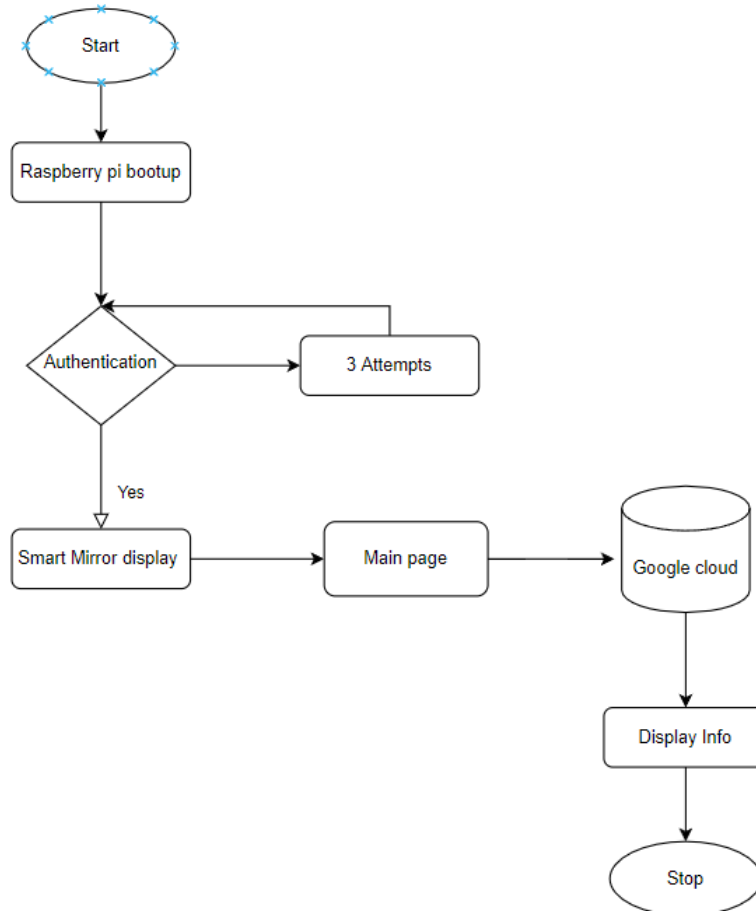


Figure 5.1: Flowchart

6. System Configuration

6.1 Hardware Requirement

- Processor - 1.5 GHz Broadcom 2711
- Speed - 1.1 GHz(min)
- RAM - 2 GB(min)
- Hard Disk - 16 GB(min)
- Digital screen
- 2-way mirror
- Mic
- Camera
- HDMI to VGA converter
- Speaker

6.1 Software Requirement

- Operating System -Raspbian OS
- Languages - JavaScript, Node.js and Python.
- Raspberry pie Compiler
- Browser -Chrome,Firefox,Operaetc.

7. Advantages and Disadvantages of Purposed System

7.1 Advantages

- Smart mirror saves our time by helping us to daily certain technicals.
- It is like a personal assistant which keeps us updated like giving us news,date,weather and is ready for your voice to give you any other information.
- Smart Mirror is the developing idea in this quick transforming IT world.This is the greatest advantage of the smart mirror, which prompts a protected driving condition and less use of the smartphone.
- The security of this smart mirror will be sufficiently maintained because the login system uses face recognition. With this login system, user's data will be secured because only user will be able to access it. This feature will ensure the security of user's personal data.

7.2 Limitations

- One of the main challenges in the conception of the smart mirror was to provide built-in user customization capabilities. Then, raspberry is a microcontroller with confined execution and limit. The synchronization of every one of these highlights into Smart Mirror is one of the challenges. Force issues, delays in content conveyance are a portion of the watched issues. Sometimes SD card might be defiled.
- Different burdens are cost and the strength of the equipment gadgets.

8. Conclusion

We have shown interactive mirror that provide date, and regional time corresponding to the location, weather of the metropolitan, the latest updates of news and headlines. The mirror will also play music and show our daily schedule. For security purpose we use face recognition of that particular user for daily schedule. It can communicate with voice commands, functions and listen user questions and respond them adequately. We use PIR sensor instead of Ultrasonic and IR sensor because PIR required direct line of sight between sensor and user in a space. Ultrasonic sensor work using sound waves as a result they can detect people behind obstacles and IR is proximity sensor, it does not work in darker environment

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