

Smart Mirror using Raspberry Pi-3B+

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Abstract – This project depicts the design and development of smart mirror using Raspberry pi that represents an elegant interface for glancing information that makes our daily life easier and time efficient. The smart mirror is a system that functions as a mirror with additional ability of displaying date, time, weather, daily news and also other needy information. The user can interact with the mirror by giving commands by the user. This mirror will help in developing smart house and provide unique environment to the users. To make this more interesting mirror, we can develop our products to include a variety of controls, as well as music and other entertainment.

Key Words: Smart mirror, Raspberry Pi-3B+, Two-way mirror, Weather, Time, calendar, News.

1. INTRODUCTION

In today's world, everyone needs a comfort quality life and they are always ready to access the information easily with wireless connected device that are being used in various day to day activities. The smart mirror is the moderation over the regular household mirror with associated smart digital devices and raspberry pi which provide advance functionality such as time, calendar, weather of the city, updates of news and headlines.

A common approach for building the smart mirror is to consist of high quality glass, LCD monitor, a wooden frame to hold the glass and monitor and motion sensor to detect the person in front of mirror. This paper will discuss design of Smart Mirror. The smart mirror is also providing voice service system will analyse commands from users and displaying accordingly.

2. LITERATURE SURVEY

The proposed Smart Mirror represents a natural interface that provides a platform to access general information and real time data updates. This project is aimed at contributing to design and implementation of Smart Mirror like interface as well as home environment where user can interact with the mirror interface. Here are some research and projects about smart mirror discussed about their related work in similar direction.

In 2003 Phillips surveilled their mirror TV product that was a normal TV behind two way mirror so that the TV would appear as a mirror when turned off and as TV when turned on. They also had an option to have a mirror be larger than TV. Later in 2005 Phillips announce about their research project MyHeart that built upon the idea of an instructive

mirror. While their original mirror TV was simply a TV that also works as a mirror, the MyHeart project would integrate a display to showcase various medical statistics.[11]

In 2017, a company called the New Kinpo Group launched their take on the intelligence mirror called Hi-Mirror. This mirror has a camera to monitoring the skin health that uses facial recognition to record your skin firmness, clarity, luminosity, texture and other which is related to your skin health. The Hi-Mirror scans your skin and tell us what to improve in our skin health.[12]

Another project named Magic Mirror as carried out by NUS student, these students created a mirror which can recommend you appropriate clothing on the particular event or occasion. The Magic Mirror will scan the user and it will recommend most suitable attire and other stylish options in the morning while getting ready.[10]

Chidambaram Sethukkarasi et al. (2016) created an intelligence mirror that identifies users based on facial recognition, recognize emotions, records health parameters and also gives clothing advice with suitable color. Their paper does not go in-depth on any of its subjects, but rather try to unite the ideas under the concept of an intelligence mirror.[5]

James Law Cyber texture (2011) developed a commercially sold smart mirror. The product consists of a 32"LCD-display covered by two way mirror. The display can show weather forecasts, stream internet, TV and various widgets. The Smart Mirror has a lot of input techniques such as remote controller, smart phone app and on screen virtual keyboard.

M. M. Yusri et al. created "Smart Mirror system" which allows to the users to access data easily such as time, date, traffic, location map and also control home appliances. Sonus technology is speech to text library that add quickly VUI (Voice User Interface) to any other hardware projects also software projects.[3]

3. PROPOSED SMART MIRROR

The "Smart Mirror" is a wall mounted mirror which displays relevant items to the user such as weather forecast, time, date, and news and other fields of interest. The proposed mirror aims to provide users with an interactive interface for simplified and personalized services in the comfort of the home for the user. Hence smart mirror makes it way for making a conventional mirror to work Smart as well as it is a user friendly solution.

3.1 Block Diagram

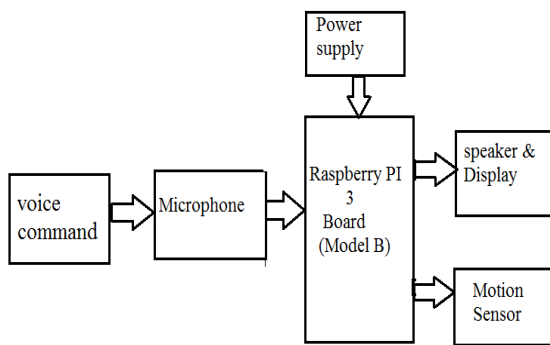


Figure -1: Block Diagram of Smart Mirror

Figure 1 Shows the block diagram of Smart Mirror is consist of USB microphone, Raspberry Pi 3B model, sensor, speaker and monitor display with two way mirror. The voice command is given by the user to the microphone it is attached to the Raspberry Pi 3 board. The power supply is already connected to the Raspberry Pi.

Smart Mirror will turn ON whenever there is a person in front of the mirror the motion sensor detects the person and display the information in accordance to the user command.

3.2 Methodology

The smart mirror displays the information in accordance to the user command as well as work as a regular conventional mirror. The monitor is connected to the Raspberry Pi 3B+, then required real time data update is accessed by the user via Wi-Fi. A wooden frame is attached to the LCD monitor.

The monitor screen is used to displays the required information for the user such as time and date, weather forecast, calendar, reminders and daily news updates or headlines are displayed on the mirror.

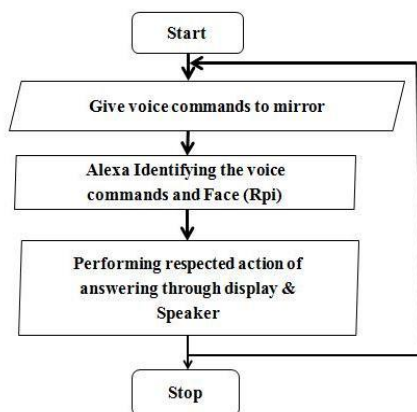


Figure 2: Flowchart

Figure 2 shows the flowchart of smart mirror, it is explained that when mirror is switched on the booting of Raspberry pi is takes place. Once raspberry starts user give a voice command to the mirror. Then raspberry pi identifying this user command and performing respected action on mirror. This process will continue in loop.

The smart mirror can perform various functionalities is as follows:

1. The mirror works as a normal reflective mirror so person or any user can use it as a conventional mirror.
2. Anyone can using this mirror will get real time data-updates of stock updates, news, date weather updates, time etc.
3. The user also able to give voice commands to the mirror using USB microphone. It is connected to the raspberry pi 3. In accordance to the user command the smart mirror displays the data.
4. With the help of motion sensor the mirror will automatically turn off if the person is left from the front of mirror.

4. COMPONENT OVERVIEW

- 1) Raspberry Pi 3B

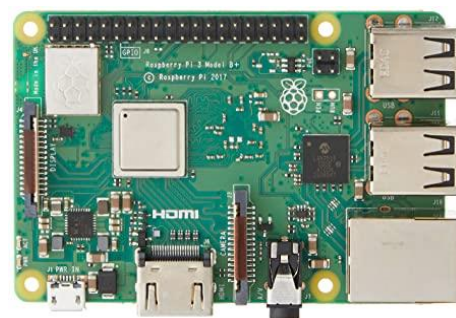


Figure 3:Raspberry pi 3B

Raspberry pi is credit card sized computer by raspberry pi foundation. Our project employs the use of raspberry pi 3B model. It's act as the major control center for this purposed model. The raspberry pi is provision with micro SD card which can be filled with operating systems like Raspbian.

It enrolls a 1.2 GHz quad core Arm Cortex-A3 CPU, has 1GB RAM, integrated 802.11n wireless LAN and Bluetooth4.1. The Raspberry pi 3model B+ was begins in March 2018. Its utilizes a 1.4 GHz 64-bit quad core Arm Cortex-A53 CPU, has 1GB RAM, GB Ethernet, integrated 802,11ac/n wireless LAN and Bluetooth.

2) Mirror



Figure 4: Two-way mirror

A two way mirror is special as compared to the household mirror. Two-way mirror is not printed a colour on back side. This gives the property of the mirror being reflective one side and transparent from other side. The data can be simultaneously displayed while the monitor is switched on otherwise it will act as reflective household mirror.

For the purpose of duplex functionality, we are using a two way mirror for the display. It will be attached to the monitor using a wooden frame to carry the whole system together.

3) PIR Sensor



Figure 5: Motion sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that is designed to detect motion and measure movement. PIR sensor is commonly utilized in security alarms automatic lighting applications.

Most PIR sensors have 3-pin attached at the base side. One pin will be ground, another will be output and the last pin will be power. Input voltage is +5V for typical application can range from 4.V-12V. It covers distance of about 120 degree and 7 meter.

5. EXPECTED RESULT

The smart mirror will display the daily news feed and provides other general information like time, date, weather forecasting as shown in figure. The figure shows the expected result of our project. The motion sensor will be in top of the mirror.

The algorithms and functions are set by the Python programming and according to that displays the information

on mirror. It will also successfully execute the voice commands by the user.



Figure 6: Wooden case attached to mirror and screen

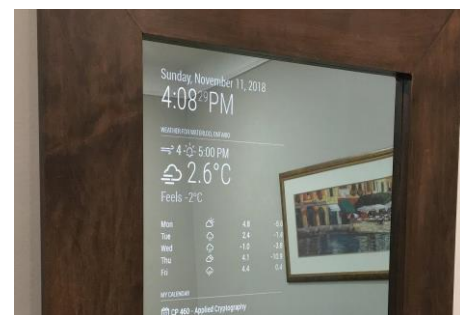


Figure 7: Real-time data updates on mirror

6. CONCLUSION AND FUTURE SCOPE

Our Smart Mirror will give instant access to relevant information in a convenient and time saving environment. The smart mirror system is interactive system for home and reliable. The user stay updated on the time, weather and news headlines while getting ready for the day with the full functional Smart mirror. We can reduce the power consumption by utilizing the motion sensor, since the mirror will display data only in the presence of a person in front of mirror.

In future this smart mirror project can be improved by adding interactive touch screen and some other feature like traffic updates, flight updates, etc. to make it more efficient.. The mirror will provide the information with little to no effort from the user command. The smart mirror can also be implemented in office, industries and home automation. The facial recognition technique used in the smart mirror

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