

VOICE CONTROLLED RASPBERRY PI BASED SMART MIRROR

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Abstract - This project expresses a novel design and implementation of an interactive mirror system, called "Smart Mirror". The Smart Mirror can be easily built by using one way mirror, concealed LED screen and microphone to make it interactive. The smart mirror makes use of the Google assistant software which allows us to activate multimedia devices through voice commands. The smart mirror can acts as a good friend who listens to the users query and as a matter of course responds to the requests, providing relaxation and consolation. The Smart Mirror was developed, starting with the software and finally integrating it with the hardware.

Key Words: Raspberry Pi, Monitor, One way Mirror, Interactive device

I. INTRODUCTION

In this world everybody keeps running behind the solace and comfort. Present day man has a diverse innovation for a similar purpose. Individuals are willing to access information effectively regardless of whether it is through the TV or web. A Brilliant Mirror is proposed which is an interactive system that makes the user to get updated of the day-to-day happenings. Imagine a scenario in which you can investigate the mirror and could see something more than yourself. It will inform the time and date each time you investigate it. It will be interesting if the Mirror recognizes the user and reminds the important meetings on that day. Imagine a scenario in which the mirror could disclose that it's drizzling outside and prescribes to take an umbrella? Sound fascinating, isn't that so? For this reason an Intuitive Mirror is presented. The smart Mirror gives a close experience that enables the user to simply stroll up and be greeted with information.

II. RELATED WORK

The existed Smart Mirror frameworks are developed just to show time, date, weather. After some updates it contained schedules, alerts and notices. Afterward, it got updated with music player voice acknowledgement¹. It may be customized according to the pre-requisites.

For the most part, smart mirror is created to show time, date and weather related data. It is rare to discover all the aspects on a solitary Smart Mirror. Particularly in India this idea has not gained ground yet.

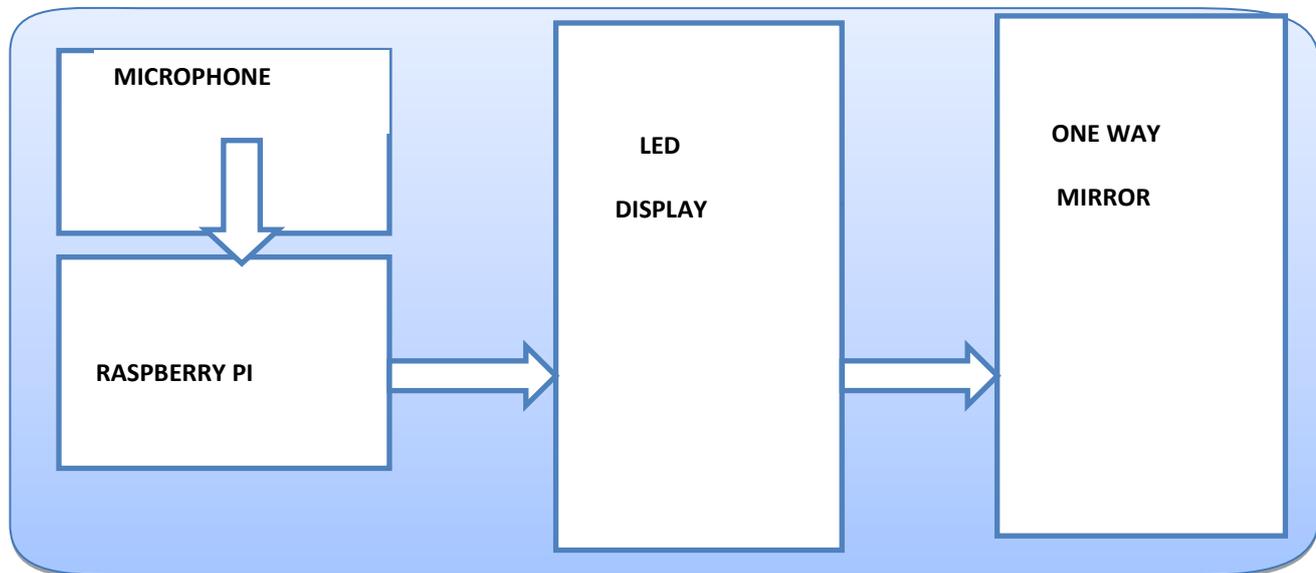
III. INNOVATIONS MADE

The Smart Mirror is manufactured by remembering each and every aspect and disadvantages of the existing system. The innovations made here are the voice recognition using Google assistant and updation of news feed, every day.

More importantly, the Smart Mirror is used to implement voice recognition System². This will display the all multimedia services from internet when the voice is detected. It is made interactive by using the Google Assistant software. Google Assistant is an artificial intelligence powered by virtual assistant. Google assistant allows users to activate and modify vocal shortcut commands in order to perform actions on the device. The "OK Google" or "Hey Google" side covers voice commands, voice searching and voice activated device control.

In addition to time, date, and weather forecast related information, the smart mirror is used to display feed news headlines from various sources. The News headlines that are displayed in the official website of news channels are collected in the RSS format. It is now made to be displayed on the Smart Mirror page by linking it with the news feed module of Smart Mirror.

IV. SYSTEM ARCHITECTURE



The microphone is connected to the Raspberry pi through a USB port. It is used to provide the voice commands as input to software. Google Assistant is used to provide the action required. The Raspberry Pi is the brain of Smart Mirror. It is connected to the LED display with a HDMI (High Definition Multimedia Interface) cable. The output video signals from the Pi reach the display via, HDMI cable³. The LED monitor is placed in contact with the One Way Mirror. The Smart Mirror needs a Wi-Fi connection to connect with the internet. This is provided by the in-built Wi-Fi in the Raspberry Pi. The news update and weather information are accessed from the internet in RSS format. Once the Smart Mirror module runs all the aspects are displayed in the mirror. Thus the mirror not only shows the reflection but also the time, date, weather and news updates. Each user gets tired of the current system and might want for a system that will include extra adaptability and keep running with the same normal applications⁴. The main idea of the proposed system is to make the normal mirror something more intelligent. The aspects added to the mirror are climate, time, updates and news along with the sight of human.

V. HARDWARE DESCRIPTION

RASPBERRY PI 3

The Raspberry pi is a little, credit card sized PC that controls the entire thing, showing the Magic Mirror interface and running the Google Assistant, the voice-control system. The Raspberry Pi is a solitary board PC which includes a quad core Arm cortex A-5 processor, with the capacity to run Linux based working system. The Raspberry Pi 3 has a coordinated LAN port which can be utilized to associate with the web⁵. It accompanies GPIO (Broadly useful Input Output) pins which can be used for interfacing it with wide input and output devices. Debian based Raspbian OS is installed on the Raspberry Pi. Download and introduce node.js for the bundles.

ONE WAY MIRROR

The One Way Mirror is also known as two way mirror. It is made of acrylic and sits flush over the screen, permitting the designs on the screen to come through while keeping up the monitor impact⁶. The thicker mirror (3/16") is used to avoid the "funhouse mirror" impact. When one side of the mirror is brighter and the other is dark, it allows viewing from the darkened side but not vice versa. If there is white text over a dark background the white letters will be seen as an overlay with the user's reflection in the background.

DISPLAY UNIT

A LED monitor is used for negligible power utilization, most extreme crispness and to anticipate mirror gleam at night. The required data for the client will be shown on the LED screen. LED is a flat screen computer monitor or television. It has a very short depth and is light in terms of weight. The actual difference between LED and LCD is the back lighting

MICROPHONE

The mode for voice commands to reach the Raspberry Pi is the Microphone It processes the voice signal into the electrical signals using acoustic effect and delivers the input required by the Raspberry Pi.

FRAME

The frame provides house for every component necessary to build the smart mirror. It is made of wooden blocks and clamps are provided in appropriate places to hold the devices in position. It gives the smart mirror a visual treat. The frame could be designed as per the user's wish.

SPEAKER

Speaker is used to get the output from the Google Assistant. User's query will be answered through the Google Assistant via, speakers.

VI. SOFTWARE DESCRIPTION

The software used in the project are Raspbian OS, Magic Mirror module and Assistant MK-2.

OPERATING SYSTEM

The operating system used here is the Raspbian. The Raspbian image is downloaded from the internet. As, Raspberry Pi does has an internal memory a separate SD card is used. The Raspbian image is first etched into the SD card using the Etcher and then inserted into the SD card slot⁷. The Pi is booted by turning ON the power supply. The Raspbian has a terminal, in which each command is executed. The default terminal is the LX terminal.

MODULES FOR SMART MIRROR

JavaScript is a scripting language, which is used to make the web pages interactive. In JavaScript node.js is an engine for server side applications.

Several modules are created separately for each parameter such as time, date, weather and news feed to be displayed on the screen. The time and date related information is accessed from the Pi's configuration. The information such as weather and news feed require internet connection. For the weather to be displayed, open weather map website is used. First, an account is created in the website. An API key will be given for each account which is used to get the updated weather information from the internet⁸. There are thousands of sources for the news feed, it is necessary to choose the required source. After the selection, news headlines are converted in the RSS format. The link is copied to the code written in news feed module. Each time, a user appear in front of the mirror motivational quotes are displayed to develop a positive vibration in them⁹. Quotes used such as "You look cool ", " Fantastic day to go" brings confidence to begin one's day.

MODULE FOR ASSISTANT MK-2

To make the Mirror interactive Google assistant software is required. The module of Assistant MK-2 is downloaded and it is linked with the Magic Mirror by using the PubNub platform¹⁰. An account is created in the PubNub platform and linked with the Mirror. The next to proceed is to open an account in Google Console Cloud to obtain the Google API key. By using the API key, secret client id is received which is used to obtain the website for make the Google assistant function.

After installing all the modules required to implement the Magic Mirror, the Raspberry Pi is updated to get all the packages. Once the Pi is updated, the command npm start is used to run the Smart Mirror module. For convenience the module is made to auto boot once the Pi is powered.

VII. IMPLEMENTATION

There are several steps to be implemented to obtain the smart mirror.

Update the Pi for the Magic Mirror interface. Download the modules required for implementing Magic Mirror. Configure the modules based on the requirements. Download the Assistant MK-2 modules to make the Smart Mirror interactive. Pubnub Surface is created to interface the Assistant module with the Smart Mirror module.

For implementing the Smart Mirror, casing is created and all the hardware components are integrated together.

VIII. EXPERIMENTATION & RESULTS

After completing the installations of the module, it is made to run on the device using commands. The output of the code is shown below



Fig 3 Magic Mirror UI

The date and time displayed at the top left of the screen are accessed from the Pi's configuration. The weather information at the top right of the screen is accessed from the API key obtained from the Open Weather Map website. The news feed is obtained from the RSS file of the HINDU news.



Figure 3: Wooden Frame

The above figure illustrates the wooden frame prepared for the Magic Mirror. All the Hardware components are placed in the Frame and connections are given between them using the suitable cables.

Once the power is turned ON, the Magic Mirror shows the reflection as well as the aspects such as time, date, weather and news feed. The mirror reflects to a maximum level during the day time because, the amount of light available in the surrounding is huge. The Smart Mirror provides a room for the user to get updated with all the basic information necessary in day-to-day life.



Figure 4: The Smart Mirror

When the hardware is interfaced with the software it looks something like Fig-4. The smart Mirror is used to make the life smarter and it is also used in implementing smarter home.

IX. CONCLUSION AND FUTURE SCOPE

The Smart Mirror was intended to decrease time required in a user's day-to-day schedule. Power is saved because mirror is not powered all the time, it is only awakened by the voice commands like "OK Google" or "Hey Google". The Smart Mirror is dependable and simple to utilize. It has been focused on interactive systems for home. There exist numerous advantages for the intelligent Mirror.

The future model is ready with potential and most likely hearty as far as usefulness is concerned. It uses facial detection to push up customized information including wellbeing status, a date book, news source and other data applicable to the user's morning schedule. It utilizes voice directions to switch between each view and motions to collaborate with substances. Instead of limiting it to home, it's can be extended to several places. So that it can have a wide scope of uses everywhere.

By using face detection technology it can be used to detect a particular member and can be used in health care. The skin parameters of a particular person is loaded in the smart mirror earlier and when the face is detected it gives advices to apply suitable creams. Smart mirror can be used along with the IOT for enhancing more applications such as home automation.

Besides home, smart mirror can be used in clothing shops, beauty shops, Barber shops and many more. Smart mirror is more an artificial intelligence which is going to become a part of everyday life.

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