

Smart Mirror Embedded with Google Assistant using Raspberry Pi

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Abstract - As technologies are increasing day by day, there's also an increase in various requirements that ease the work of humans. Smart Mirrors or intelligent mirrors are one such piece of technology that provides valuable information to the users by acting as an interface between the users and computer-aided services. Smart Mirror as the name suggests is used to perform smart operations which are majorly used to save a lot of human time and effort. In this scope of the study, the developed Smart Mirror is used to display all the necessary information such as Date and time, Weather forecasts and temperature, Calendar as well as Indian Public holidays, News Headlines, display Spotify songs that are played on the Spotify account and last but not least it also displays live Cryptocurrency Market. All the above modules can be displayed on the mirror using various web services and Raspberry Pi 3 microcontroller card. The smart mirror can also be controlled by connecting various devices to Raspberry Pi like the microphone or web camera to pass the voice commands from the user and the Google Assistant responding to those voice commands.

Key Words: Smart Mirror, Internet Of Things (IoT), RaspberriPi, Cryptocurrency, Acrylic Mirror

1. INTRODUCTION

Internet of Things (IoT) comprises things that have unique identities and are connected to the Internet. The scope of IoT is not limited to just connecting things (devices, appliances, machines) to the Internet but also to communicate and exchange data while executing meaningful application towards a common user or a machine goal. In other words, IoT can be further defined as "A dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual things have identities, physical attributes and virtual personalities that use intelligent interfaces and are seamlessly integrated into the information network, often communicate data associated with users and their environments". The IoT device used for this project is the Raspberry Pi 3 since this device is widely accessible, inexpensive and available from multiple vendors.

2. OBJECTIVE

The main objective of this project is to develop a smart mirror that saves a lot of human time and effort by displaying valuable information such as date, time, news

headlines, calendar and public holidays, Cryptocurrency market status, display the song playlist of Spotify and temperature and weather forecast. It is also embedded with the Google assistant where the user can interact with the mirror via voice commands while doing multiple tasks.

3. PROBLEM STATEMENT

In the existing system, there is a wastage of human time as many people waste their time by grooming in front of the mirror and then later performing their daily chores like reading news. The existing system is just a mirror with no smart functionalities. This project has been developed in order to save time where the user can directly interact with the mirror and get all the necessary information required via the Google Assistant as well as the various modules embedded on the Raspberry Pi.

4. BRIEF DESCRIPTION

The entire project is divided into four major sections which are

- The Raspberry Pi
- Acrylic Mirror/Two-way Mirror
- Web Camera
- LED Monitor
- Speakers for output

The above sections are briefly described as follows:

4.1 Raspberry Pi

Raspberry Pi is a low-cost mini-computer with the physical size of a credit card that runs on Linux and can perform almost all tasks that a normal desktop computer can do. The following are the configurations of the Raspberry Pi 3 used in the project:

- **Processor & RAM:** Quad-Core 1.2GHz Broadcom BCM2837 64bit CPU, 1GB RAM BCM43438 wireless LAN.
- **Graphics:** 400MHz VideoCore IV multimedia
- **Expandability:** 40 general purpose input-output pins
- **USB:** Four USB 2.0 with 480Mbps data transfer
- Camera Serial Interface (CSI)
- Display Serial Interface (DSI)

4.2 Web Camera

A web camera is another important part of the project wherein the user voice commands are taken as input by the web camera via the Raspberry Pi. Without the Web Camera, the Raspberry Pi can neither take the commands as input nor can even process it.

4.3 Two Way Mirror

A two-way mirror is typically used as an apparently normal mirror in a brightly lit room, with a much darker room on the other side. People on the brightly lit side see their own reflection—it looks like a normal mirror. It is used to depict the image of the person or an object in the project apart from showing the functionalities of the Screen on the other side.

4.4 LED Monitor

An LED display is a flat panel display, which uses an array of light-emitting diodes as pixels for a video display. Their brightness allows them to be used outdoors where they are visible in the sun store signs and billboards, and in recent years they have also become commonly used in destination signs on public transport vehicles, as well as variable-message signs on Highways.

4.5 Speakers for output

A 3.5mm audio jack speaker is required in order to get the output to the voice commands from the Google Assistant.

5. PROPOSED SYSTEM

In the proposed system, the user can directly interact with the Google Assistant with the voice commands and apart from getting access to the news, date and time, temperature uses can also get access to the financial information like the Cryptocurrency details value of Bitcoin, Ethereum and Ripple. This information wouldn't be thrown directly on the face of the user but displays the information on the edges of the screen to allow the user to use it as an actual mirror.

It also allows the user to note down the notes or to remind any daily tasks via the Google Assistant irrespective of day, time and night. This mirror provides very common information that is available on the smartphones and also used to display the playlist of the user's Spotify account. It performs all the tasks with a cinch.

6. RESULTS

The following are the images that depict the output from the smart mirror displaying the date, time, calendar, news, Cryptocurrency details and current song playing on Spotify.

Output



Fig1: Smart mirror output

The following image depicts the date, time and Spotify song modules



Fig2: Date, time and Spotify Song modules



Fig3: The Cryptocurrency Module

7. CONCLUSION

The goals of the smart mirror are to ease the work of the user by saving time and effort and to retrieve all the useful information by skipping the daily chores. The smart mirror did the thinking for the user with intelligent, commonly used applications. Apps like calendar, music, news, cryptocurrency, to-do lists and weather will be available. The apps were unobtrusively displayed on the screen, hidden by the two-way mirror, as to look like a seamless experience. A good project can't be produced without proper research first. Similar projects and products were analyzed for similarities, improvements, and flaws. Proper research was done and later the project was implemented with all the required devices (hardware and software) as well as an estimation of project expenses and the time to complete the project.

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