

Design and Development of a Smart Mirror Based On IOT

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Abstract: This paper describes and explains the uses and working of a mirror made with smart features called Smart mirror built using raspberry Pi 3. The smart mirror acts as an enquiry center, a personal assistant and displays important curriculum or college notices. It can answer basic questions like existing assistant Siri, Alexa, etc. It can display class timetable and show directions to various places of an institute. It could be linked to cloud for various IOT based tasks like task scheduling, home automation etc. This paper discusses Future on IoT based Smart Mirror which is useful in various fields of human life. Smart mirrors can be developed using Raspberry Pi or other microcontroller for further development. In future this technology will be useful to help us do their jobs such as in sports, learning, health and so on. To interact with smart mirrors, users can use face or voice recognition.

1. Introduction

Mirrors are part of everyday used items that have been so far eluded from the idea of being smart. The idea of combination of mirror with intelligence and technology, discussing further possibilities and uses are some objectives of this paper. The smart mirror may seem to be similar to that of various other smart devices available like smart phones, smart televisions, smart watch etc. but have some certain and specific advantages because of its usage as a mirror. This smart mirror is a still complex to that of an ordinary mirror, having a display inside a glass but in our project we didn't use display, that one can interact with, using voice commands. The mirror works with the help of a raspberry pi3.

Nowadays technology almost dominates all human life. Technology helps human life in various aspects. Nowadays technology is increasingly being developed, One of which is the Internet of Things (IoT). With this Technology, we can connect the internet with objects to Exchange information and our main goal was to achieve by making smart mirror smartly.

1. Personal Assistant: The mirror acts like a personal assistant. The mirror does various tasks like updating calendar, setting up reminders, updating date and time, displaying weather, daily news and other such general-purpose activities and our daily routines or daily schedules what we have to do which is more easier than writing a notes or schedule works. It can respond to some of the commands like time, technology updates, college notifications, weather, news, Gmail, birthday, jokes, life, etc.

2. Enquiry Centre: Basic questions related to any workspace are fed into the database. Such queries can be answered by the mirror. This enquiry center can be very helpful to people who are new to any workspace. These queries will be regarding finding the direction to any particular classroom, locating any professor etc. This can be an endless module as we can configure as many questions as we need. Thus, this can differ based on the workspace in which you are using this mirror.

3. Notice board: The mirror can be used for displaying various academic notices in the college. The product is linked with the android device of the administrator so that he can change the notice and information as and when required to be displayed, which is more easier work than typing a letter and pinning it on notice boards of colleges and schools. These notices are displayed according to various time slots.

2. Literature survey

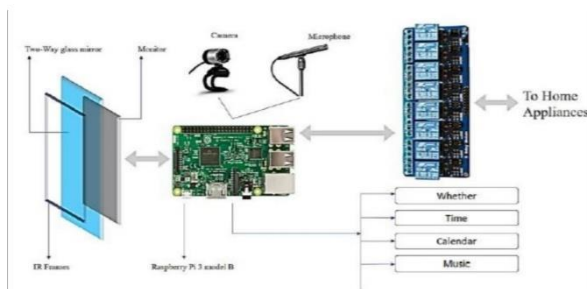
Literature survey is nothing but collecting information and Data which are related to our idea. These data should analyse With respect to our idea because we have to know the better Approach and ways, before beginning the analysis of project, We refer several analysis papers, documents, manuals which Are related to our idea of the project.

Michael Teeuw's was the first to build a smart mirror and first to use a raspberry pi for this purpose. The first smart mirror blog was posted back in 2014, since it was a very new product it gained a lot of attention back then. This mirror is built on raspberry pi 2 and uses monitor as the display. It displayed weather and time importing these from various modules which were linked to real time websites. It was just an information panel which didn't have the capability to interact with the mirror. A module-based interface was created and displayed weather, news, time or daily comic strip.

Ryan Nelwan in the year 2016 gathered much interest and developed a smart mirror much similar to the one developed by teeuw's. A new feature added to this was the touch feature which was a first of its kind. It serves mostly as a source of a entertainment system in which a user can use the touch controls to run different programs or control music, but did not have artificial intelligence.

Hannah Mittelstaedt made a home mirror. It was posted on reddit website. The mirror used a smart phone as the display screen. Since it was an android tablet so features of android were used to display time, weather, date, remainders. The software made use of android widgets but can be modified easily as it is open source. Anyone can modify it and develop a new version. Home Mirror is a kind of smart mirror that is easier to build than other mirrors as it requires just two main components, any android mobile phone or a tablet and a mirror. However, this too lacked any kind of intelligence or interaction.

3. Proposed methodology



The above figure shown is the schematic view of mirror with all other Components placed according to the requirement of our project. The monitor is placed behind the two-way mirror and the mirror Acts like a display for output when the monitor's light is on.

Our project Is divided in three main divisions;

- (1)Design
- (2)Microcontroller Programming,
- (3)Display Programming.

1.Design is most important part in any project without a design we cannot reach to output it's a very initial process in an any project. Most important part of our design phase was to decide size of mirror and monitor. We ended up selecting Hp monitor of 15inch.

2. Programming is most important thing to run any digital source Or digital devices. As our main criteria is to display the information on a mirror we have to code program and for that we have chosen microcontroller program language, and we went with raspberry Pi3 than choosing any other microcontroller for its popularity and efficient functionality.

3.These consist of the visual applications that we choose to form our display. From the project's inception we knew that, at minimum, we wanted to be able to display the date and time. However, we also thought it would be both functional and more worth adding day's weather forecast weekly and daily schedule shown as well. It was the combination of these that would ultimately make up our design.

The below mentioned topics are our featured output that would display on a two way mirror ;

1.Notice:

Here we included some things like it displays any random activities of college or school events which is easier than writing in a sheet and pinning them on walls. And good wishes like good morning, good evening, etc.,

2.Newsfeed:

Our module is also has capability to show the news feeds that is headlines of any current affairs that is running currently and shows important news and messages for daily life

3. Clock:

Our module also shows the current date and time. The information will be updated real time. It displays time in 24-hour time format. The time zone Asia/Kolkata is used for displaying time.

4. Current Weather:

Our module shows the current weather, the sunset or sunrise time, the temperature in degree Celsius and F°. Including location. The location feed for the weather information is Bangalore, Karnataka, India. The weather information is obtained from Open Weather Map. It is an online service that provides weather data, including current weather data and forecasts.

6. Weather Forecast:

Our module shows the weather forecast for the coming week, including an icon to display the current conditions, the minimum temperature and the maximum temperature. The URL used for this module is same as that of current weather module.

7. Weekly Schedule:

The main important thing I'm our module is we can schedule our daily activities or hobbies into it and while passing near mirror or u can just check your schedule work what to be done on this time. Which makes easy for us to do work without forgetting to do as in today's generation it has become an hobby to stand and see ourselves in the mirror.

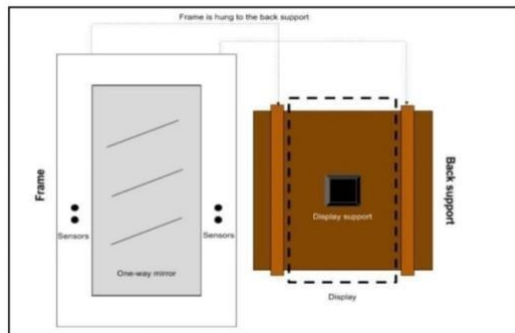
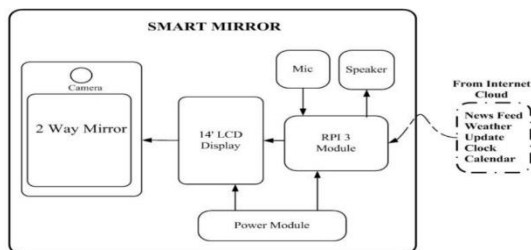
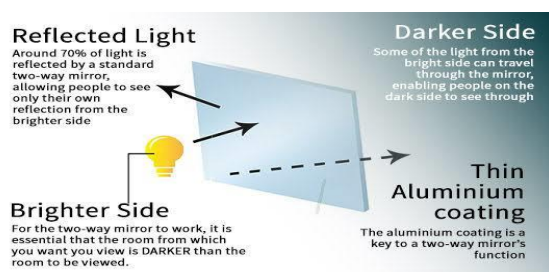


Figure 3-Hardware design



➤ Two-way mirror



Two-way mirrors work on a principle of light intensity.

Also known as two-way glass, a two-way mirror is glass that is reflective on one side and clear on the other, giving the appearance of a mirror to those who see the reflection but allowing people on the clear side to see through, as if at a window.

Below Figure is a two-way mirror ;

- Display:



For the display hp 15 Inch LCD Monitor is used. The monitor is much smaller than the mirror so a black tape/sticker is used to cover the parts of the glass which are not covered by the display. An HDMI to VGA cable was used to connect the display to the Raspberry Pi for video and audio.

- Raspberry Pi:



The Raspberry Pi is a kind of micro computer developed by the Raspberry Pi foundation in the UK. The Pi does not work out of the box. It lacks a hard drive and it does not come with a preinstalled operating system. To install an OS microSDcard prepared with an OS image is needed. Hence we used raspbian buster as the OS .And because the software that runs on the mirror is coded on the same device at least a screen, a keyboard and a mouse are required for any modifications in the working of the smart mirror

- Microphones and Speaker



We didn't want the size of the speaker and microphone affecting the design of the smart mirror, therefore we used zebronic Pluto 5w mini speaker and mini USB microphone

One mode of interaction with the smart mirror is through microphone. USB microphones is used because the Raspberry Pi does not have a regular microphone input. Speaker can easily be connected with the output jack port of the raspberry pi

Result



After facing some difficulties we were able to make the smart mirror capable of displaying the date, time, weather, music along with voice recognition and personal assistant. The mirror does various tasks like updating calendar, setting up reminders, updating date and time, displaying weather, daily news and other such general-purpose activities and our daily routines or daily schedules what we have to do which is more easier than writing a notes or schedule works. It can respond to some of the commands like time, technology updates, college notifications, weather, news, Gmail, birthday, jokes, life, etc.

4. Conclusion

The smart mirror which acts as a smart home control platform is a futuristic system that provides users with an easy-to-use mirror interface, allowing users access to customizable services in a highly interactive manner, while performing other tasks simultaneously. The main strengths are that this is a new kind of smart device that people don't see every day and it looks very spectacular. The mirror works both as a normal mirror as well as a mirror showing daily notifications to the authorized user. There are lots of feeds or notifications that the user can view on the mirror like Facebook, Gmail, news etc. The mirror is also used to display time, weather, date etc. The mirror also acts as a personal assistant as well as displays important notices and is also an enquiry center. The user can interact with the mirror using voice commands. Also, a PIR sensor is attached which turns on the screen only when the user is in the proximity range of the mirror. This reduces power wastage. Smart mirror design has the advantages of small size, simple operation, low cost, high degree of user friendly, personalized user interface and many other advantages which is suitable for many applications like college, home, offices etc. Overall, the proposed smart mirror system incorporates various functionalities to grant users access to personalized information services. \

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