

Smart Mirror

Lavin Amarnani¹ Dharmik Doshi² Prince Dwivedi³ Varun Dubey⁴

^{1,2,3,4}Student

^{1,2,3,4}Thakur Polytechnic, Mumbai, Maharashtra, India

Abstract— A smart mirror is a one or two-way mirror with a display behind the glass. The display can show information in the form of widgets, such as weather, time, date, and news updates and alerts.

Key words: Smart Mirror

I. INTRODUCTION

A. The Mirror

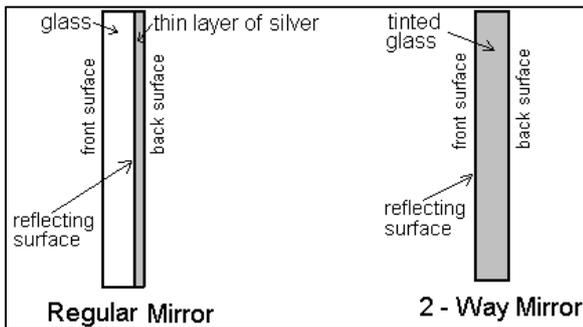


Fig. 1:

The smart mirror is made of a one or two-way mirror which is made for security and privacy applications in windows and interrogation rooms.

B. Raspberry Pi

- A Raspberry Pi is a small computer made for education, it is inspired by the 1981 BBC Micro.
- The Raspberry Pi is slower than a modern laptop or desktop but is still a complete Linux computer and can provide all the expected abilities that implies, at a low-power consumption level.
- The projects made with a Raspberry Pi are open source and uploaded to GitHub for you to download, modify and take inspiration from, to build your own project.
- The Raspberry Pi was designed for the Linux operating system, and many Linux distributions now have a version optimized for the Raspberry Pi.
- We have used the Raspbian Operating System, another Linux Distribution for the Raspberry Pi.

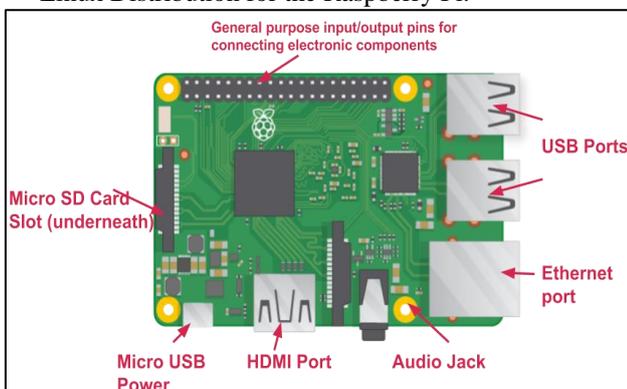


Fig. 2:

II. CONSTRUCTION

The trick of the two-way mirror is accomplished through manufacturing and lighting. To make this type of mirror, a thin layer of metal, usually aluminium, is applied to the front of a pane of glass. The layer is so thin that only half of the light that hits it is reflected the rest goes through the pane.

The glass is coated with, or has encased within, a thin and almost-transparent layer of metal (usually aluminium). The result looks like a mirror from one side that reflects light, but allows to pass light from the other side, too. Light always passes equally in both directions. However, when one side is brightly lit and the other kept dark, the darker side becomes difficult to see from the brightly lit side because it is masked by the much brighter reflection of the lit side.

There are reflective molecules spread over the glass in an even manner but only half of the glass is covered.

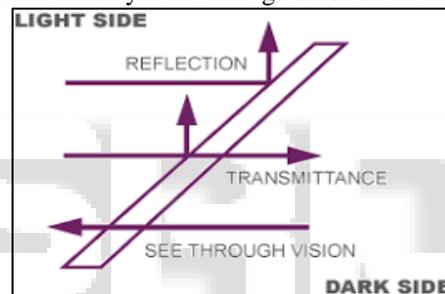


Fig. 3:

III. ASSEMBLY

- Firstly, remove the back panel of the monitor and the stand to keep the monitor in shape of rectangle order to reduce the weight of the final product. Further, remove the frame from the monitor.
- Secondly, use a wood box based on the size and measurements of the monitor.
- Using a one-way mirror would reflect light buy also show the monitor's content and make it appear as it's working as a normal mirror but with updated time, weather and news.
- Place the mirror inside the wooden frame and place the monitor above it.
- Take the raspberry pi and place it inside the wooden frame above the monitor, to prevent a mess of cables, cut the pi and monitor power cable and wire them together to create a single power cable source.
- After all this, seal the mirror with metal or wooden hinges, hard substances like m-seal can be used to seal and preventing the mirror from falling.
- Drilling ventilation holes in the wooden frame would be of big advantage to the raspberry pi to keep it functional.
- After final mounting of the mirror, install the pre-fetched Raspbian. Install final few modules required to display

the content on the mirror and the final product may be created.

This mirror construction is for a basic mirror, you could also add few more modules and create your own one, this mirror assembly was taken into consideration as it's easy to construct and gives owner a user-friendly environment to live in.



Fig. 4:

IV. APP CONNECTIVITY

We have developed an application called “Mirror Connect” to control the mirror wirelessly from a device connected to the same network as the Raspberry Pi.

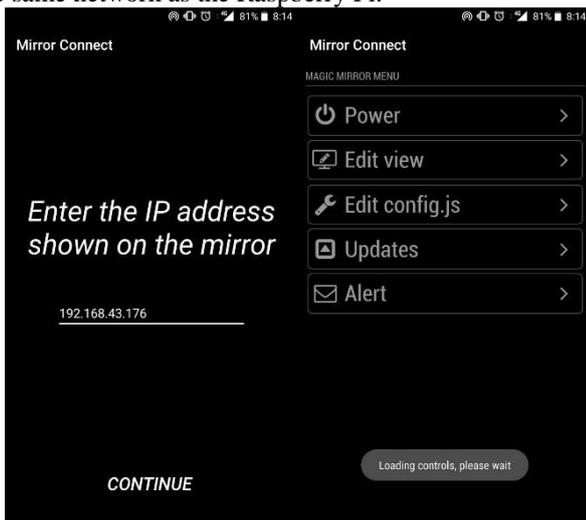


Fig. 5:

For that, we have used these languages:

- Frontend: XML, CSS
- Backend: Java, JavaScript, HTML.

The application connects to the mirror via the local IP address of the Raspberry Pi displayed on the mirror itself. With the app, we can turn the power on or off, change the visibility of modules, edit the main config file, update the modules or send alerts and notifications to the mirror's screen.

V. MODULES

- The mirror at start is already acquainted with few modules which help in all the basic screening of the mirror.
- This means that whatever we see on the mirror i.e. the date, weather, news etc. is done by the help of these modules.

- The modules used can be created by you or be created from a valid code developer to create a module that satisfies your need.
- Open source templates are also available on the internet.
- Creating a module will help in personalizing and make your mirror look cleaner and more user-friendly.
- A minimum of effort is needed to create a module, basic programming and HTML and CSS skills are needed.
- You can also make your modules open source so that others can use them and integrate them to their smart mirrors
- Even if you don't know any programming languages, any code developer can develop it for you in a minimum amount of time or you can also learn to code them which takes some effort, but it'll help you integrate your mirror and upgrade it in the future.



Fig. 6:

A. Weather

The weather module shows a graphical and textual representation of the current weather. It fetches data from OpenWeather using an OpenWeather API key specified in the config. It also shows the data for the next 3 days.

B. Time

It fetches the current time from the Raspberry Pi system time. The module can be configured to show analog, digital or both versions of the clock.

C. Calendar

The calendar shows the next 3 holidays, the data for which is stored in an '.ics' file locally.

D. Compliments

This module shows you some greetings and compliments based on the time of day and weather.

E. Alert

This module is used to display alerts on the screen. It is integrated into the mobile application.

F. News

This module shows a ticker of the current news and fetched new news articles every 10 minutes from a specified RSS feed.

VI. APPLICATIONS

- It can be used for advertisement of products.
- It can be used in promotions of Movies, Brands and whatever the users need.
- It can be used in hair and beauty salons for checking out the new trends which perfectly matches their needs.
- It can be used in colleges as a notice board.
- One can also see weather forecast and time.
- One can also see real time updates from the preferred news channels.
- It can be used for setting remainder, alerts, notifications.

VII. FUTURE SCOPE

In the future the smart mirror can talk with the one standing in front when it detects any motion, it can also wish the person with the current time and read the latest news updates and weather forecast. It can also help in suggesting clothes to buy.

VIII. LANGUAGES USED

We have used the following languages to build the modules for the Smart Mirror and display them on the screen:

- 1) Front End - XML, CSS
- 2) Back End – JavaScript

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We would also like to thank our parents who helped us a lot in finalizing this project within the limited time frame.

REFERENCES

- [1] Based on an open source project MagicMirror² by Michael Teeuw.
- [2] Raspberry Pi Documentation.