

A project report on

# **Smart Mirror**

by

**Deep Koyani (201902100410005)**

**Dhruv Patel (201902100410009)**

**Aalam Sameer (201902100410011)**

**Neha Manani (201902100410129)**

in partial fulfillment of the requirements for the degree of

**Diploma**

in

**Computer Engineering**

at

**Uka Tarsadia University**

**Under the guidance of**

**Ms. Jayshree Patil**



**Department of CE**

**Diwaliba Polytechnic**

**Mahuva, Surat**

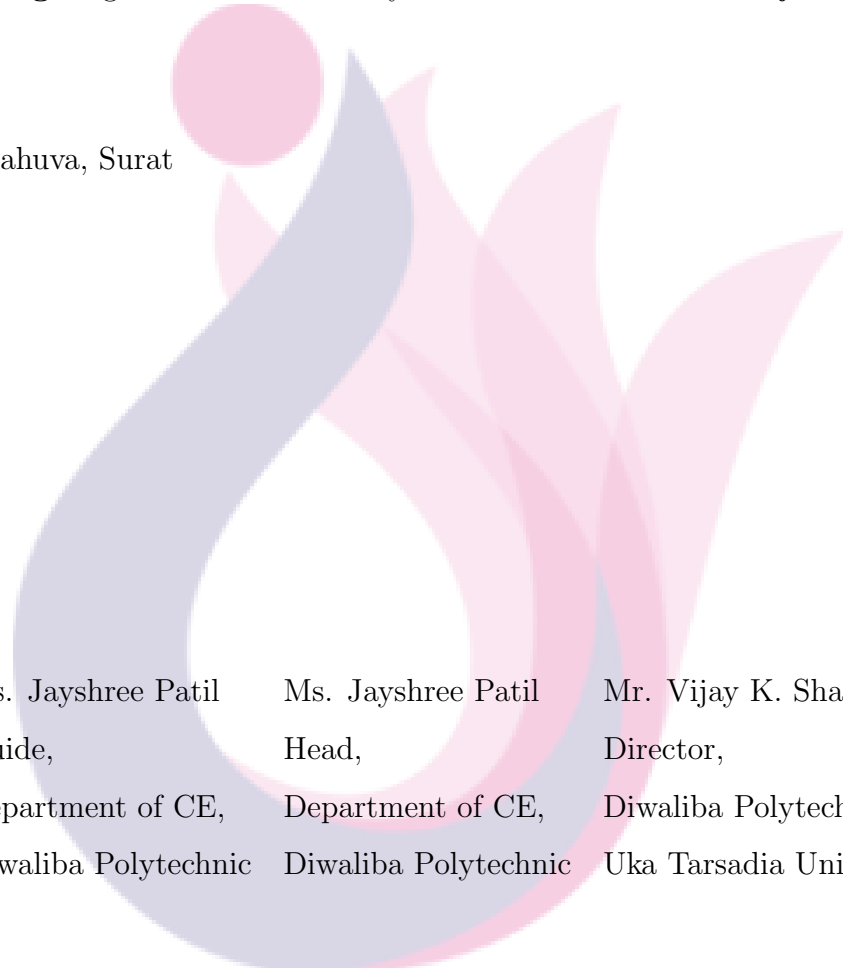
**November-2021**

# CERTIFICATE

This is to certify that the project report entitled “**Smart Mirror**” has been carried out by **Deep Koyani (201902100410005)**, **Dhruv Patel (201902100410009)**, **Aalam Sameer (201902100410011)**, **Neha Manani (201902100410129)** at **Diwaliba Polytechnic** for the partial fulfillment of **Diploma in Computer Engineering** degree to be awarded by **Uka Tarsadia University**.

**Date:**

**Place:** Mahuva, Surat



Ms. Jayshree Patil	Ms. Jayshree Patil	Mr. Vijay K. Shah
Guide,	Head,	Director,
Department of CE,	Department of CE,	Diwaliba Polytechnic
Diwaliba Polytechnic	Diwaliba Polytechnic	Uka Tarsadia University

Examiner's Signature

# ACKNOWLEDGEMENT

We have taken efforts in this project work. However, it would not has been possible without the kind support and help of many individuals. We are convey thanks to our project guide **Ms. Jayshree Patil**, Computer Engineering and Information Technology department, Diwaliba Polytechnic for providing encouragement, constant support and guidance which was of a great help to complete this project work successfully.

We are grateful to **Ms. Jayshree Patil**, Head of the Department, Computer Engineering and Information Technology, Diwaliba Polytechnic for giving us the support and encouragement that was necessary for the completion of this project.

We would also like to express our gratitude to **Mr. Vijay K. Shah**, Director, Diwaliba Polytechnic for providing us congenial environment to work in.

We would like to express our gratitude towards our parents and members of family for their kind co-operation and encouragement which help us in completion of this project.

We would like to thank all the faculty members for their patience, understanding and guidance that gave us strength and will power to work through the long tedious hours for developing a project and preparing the report.

Last but not the least, we would also like to thank our colleagues, who have co-operated during the preparation of our report and without them this project has not been possible. Their ideas helped us a lot to improve our project report.

**Deep Koyani**

**Dhruv Patel**

**Aalam Sameer**

**Neha Manani**

# ABSTRACT

*A smart mirror is a two-way mirror with an electronic display behind the glass. The primary motivation behind the smart mirror is to improve quality of life. The display can show the viewer different kinds of information in the form of widgets such as weather, time, date, and news updates. This product would be useful for busy individuals that want to multitask and stay informed while on the go. Instead of constantly pulling out a device, one could get informed while finishing daily grooming tasks.*

# TABLE OF CONTENTS

<b>CERTIFICATE</b>	<b>ii</b>
<b>ACKNOWLEDGEMENT</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>LIST OF FIGURES</b>	<b>vii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Overview . . . . .	1
1.2 Problem definition . . . . .	2
1.3 Scope . . . . .	2
<b>LIST OF ABBREVIATIONS</b>	<b>1</b>
<b>2 System Planning</b>	<b>3</b>
2.1 Project development approach . . . . .	3
2.2 Functional requirements . . . . .	3
2.3 Nonfunctional requirements . . . . .	4
2.4 Timeline chart . . . . .	4
<b>3 System Design</b>	<b>5</b>
3.1 Circuit Design . . . . .	5
3.2 Hardware Design . . . . .	5
3.2.1 Level 0 Design of Smart Mirror . . . . .	6
3.2.2 Level 1 Design of Smart Mirror . . . . .	6
3.3 Devices Interfacing with Computer . . . . .	7
3.4 Making Wood Frame . . . . .	8
3.5 Assembly . . . . .	8

3.6	Wood frame . . . . .	10
<b>4</b>	<b>Implementation</b>	<b>12</b>
4.1	System development environment . . . . .	12
4.1.1	Platforms . . . . .	12
4.2	Design screenshots . . . . .	13
<b>5</b>	<b>Conclusion and Future Work</b>	<b>16</b>
5.1	Conclusion . . . . .	16
5.2	Future work . . . . .	16
	<b>REFERENCES</b>	<b>17</b>

# LIST OF FIGURES

2.1	Timeline Chart . . . . .	4
3.1	Circuit . . . . .	5
3.2	Level 0 . . . . .	6
3.3	Level 1 . . . . .	7
3.4	Diagram of Devices Interfacing with Embedded Computer . . . . .	7
3.5	Making Wood Frame . . . . .	8
3.6	Assembly (One way mirror) . . . . .	9
3.7	Assembly (Monitor) . . . . .	9
3.8	Schematic diagram of one way mirror . . . . .	10
3.9	Schematic diagram of one way mirror . . . . .	11
4.1	Wooden mirror . . . . .	13
4.2	Mirror's look . . . . .	14
4.3	Output of mirror . . . . .	15

# Chapter 1

## Introduction

A smart mirror is a two-way mirror with an electronic display behind the glass.

The display can show the viewer different kinds of information in the form of widgets such as weather, time, date, and news updates.

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. It can respond to some of the commands like time, weather, news, technology etc.

### 1.1 Overview

In this project, We have put an effort to build an IoT device named smart mirror which is basically a one-way mirror (like we might have seen in Hollywood depictions of interrogation rooms), made “smart” by a simple LCD display which sits behind the mirror and displays white UI elements with a black background. When the display is on, we can see both our reflection and the white elements, allowing software to present relevant information while you get ready for the day

This product has great potential mostly in luxury markets due to current high costs. As of today, do-it-yourself electronic hobbyists produce most smart mirrors, aside from a few small companies. From a small survey, I concluded that it is extremely interesting to people and that they would be interested in purchasing one for their own home. Smart mirrors can be produced quite easily depending on how complex one wants to make it. This has given me great motivation to continue building smart mirrors for friends and family and possibly try to gain employment at Glance Mirror or a similar company.



## 1.2 Problem definition

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. The Smart Mirror can be connected to the home appliances, mobile devices, etc. which can expand the functionality of the mirror.

## 1.3 Scope

Smart mirror need electricity.

It is expensive compare to normal mirror.

It is little bit hard to shift the mirror from one place to another.

# Chapter 2

## System Planning

The main goals of my planning process were determining requirements, preparing the monitor, and creating a 3D model and blueprints for the mirror. We used the open source glass mirror platform to implement my mirror. The software runs on a Raspberry Pi 3 model B, a credit-card sized single-board computer. Raspbian, the Raspberry Pi Foundation's official supported Operating System, hosts the Raspberry Pi.

### 2.1 Project development approach

The objective of this project is to design and prototype a device that acted as a “Smart Mirror” by displaying the user's image and providing customizable information on the display. A “Smart Mirror” is a device that acts as a traditional mirror while also superimposing informational data, which can be customized by the user. The mirror also allows for touch free user interaction with some of the data displays. We are able to create a profile and customize the visual interface to display what specific data feeds we want.

### 2.2 Functional requirements

- **Raspberry PI 3 model B**

The Raspberry PI is the most vital part of the mirror.

- **Two way glass mirror**

The two way mirror is what gives the mirror its real identity.

- **Monitor**

The mirror is directly connected to raspberry pi via HDMI cable.

- **HDMI**

High – Definition Multimedia Interface is a proprietary audio/video interface for.

## 2.3 Nonfunctional requirements

- **Security**

There is no needs of security requirement in this project.

- **Portability**

The Device will be portable.

- **Reliability**

The capability to maintain the specified level of performance is what meant by reliability this application will run on the mirror only.

- **Availability**

The application will run 24\*7 if internet connectivity is there

## 2.4 Timeline chart

The Timeline Chart of our system is shown in figure 2.1.

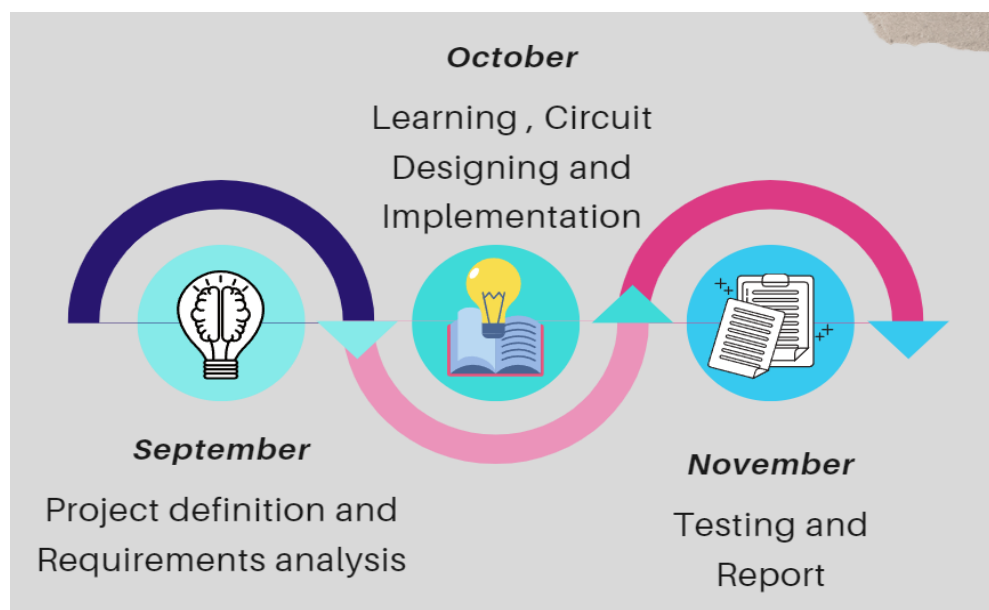


Figure 2.1: Timeline Chart

# Chapter 3

## System Design

In this chapter, we have included the Circuit diagrams of the Smart Mirror.

### 3.1 Circuit Design

The Circuit Design of our system is shown in figure 3.1.

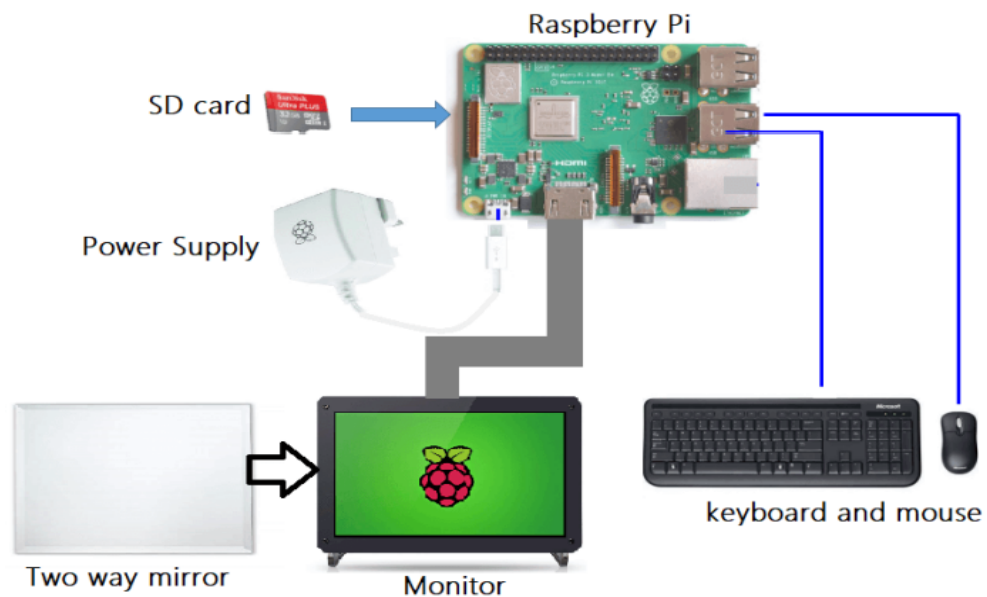


Figure 3.1: Circuit

### 3.2 Hardware Design

For making smart mirror we make two level design pattern .First we design initial design of the smart mirror. Then we design the first level design pattern of the smart mirror.

### 3.2.1 Level 0 Design of Smart Mirror

At first we design the level 0 design which is the initial design of the smart mirror. This is the initial idea of making the smart mirror then we expand it in level 1 design.

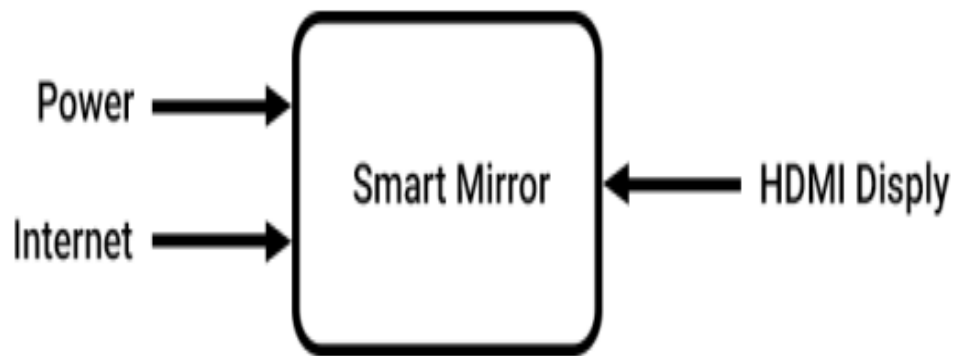


Figure 3.2: Level 0

### 3.2.2 Level 1 Design of Smart Mirror

After completing level zero level we design the first level design pattern. In first level design pattern we design whole idea and working procedure of the smart mirror.

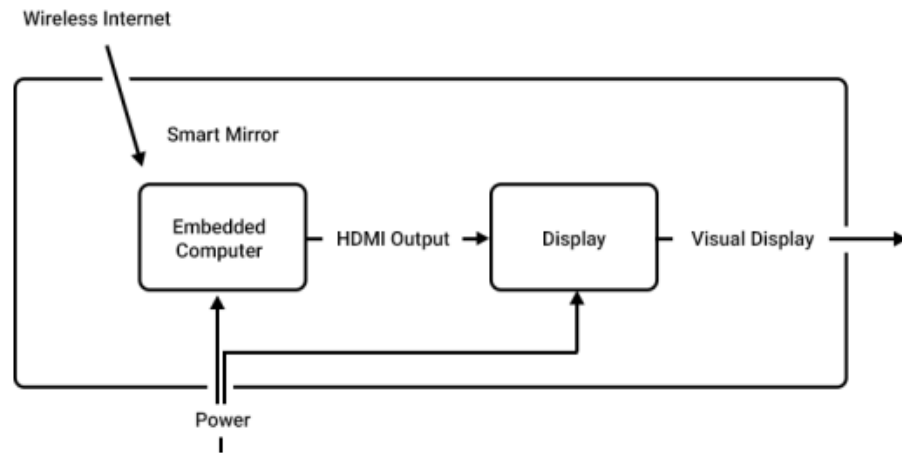


Figure 3.3: Level 1

### 3.3 Devices Interfacing with Computer

Based on the diagram, a minimum of two USB ports are required in order to get the Smart Mirror usable for a user without a keyboard and mouse. The mirror's display is connected through HDMI to prevent having to buy an HDMI to VGA/DVI adapter. A high display resolution is also required, meaning graphics processing capabilities are of high importance.

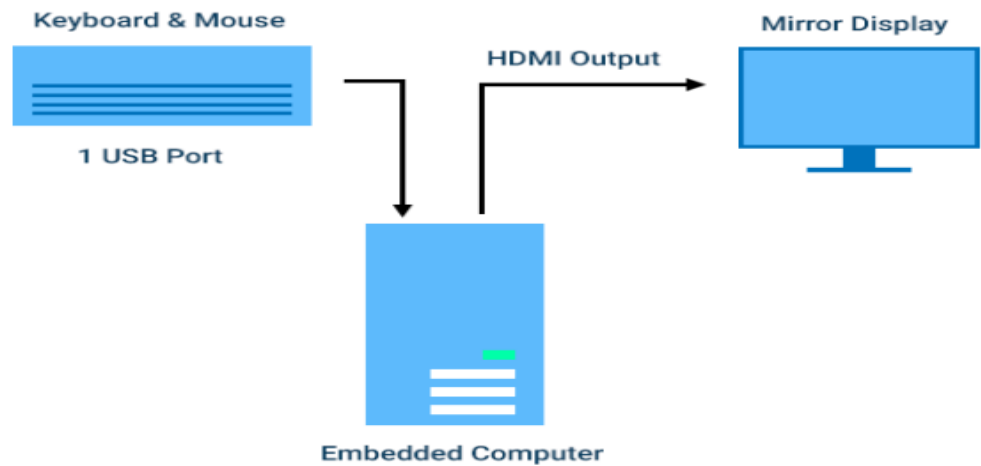


Figure 3.4: Diagram of Devices Interfacing with Embedded Computer

### 3.4 Making Wood Frame

We take the measurements for the frame and start cutting. We used both screws and glue to make sure it was sturdy enough, the final product weighs quite a lot. Put some air holes at the top and a hole for the cord at the bottom.

We also cut the "frame" in the front in an angle, just because we like it. Then we put the front on the frame and we are almost done. We make 4 small pieces of wood that we later can put behind the screen, to make sure it doesn't fall backwards.



Figure 3.5: Making Wood Frame

### 3.5 Assembly

We take the frame and put the mirror in the front. Place the screen behind it and plug in all the things we need. Start the Raspberry and make sure everything works. Then we turn it off and put the final 4 pieces behind the screen to make it stay up. Then we just plug everything in there and maybe use some cable ties to make it look a little nice. This was the most difficult component to find because of these technical requirements, but we make a one-way mirror Customly.



Figure 3.6: Assembly (One way mirror)

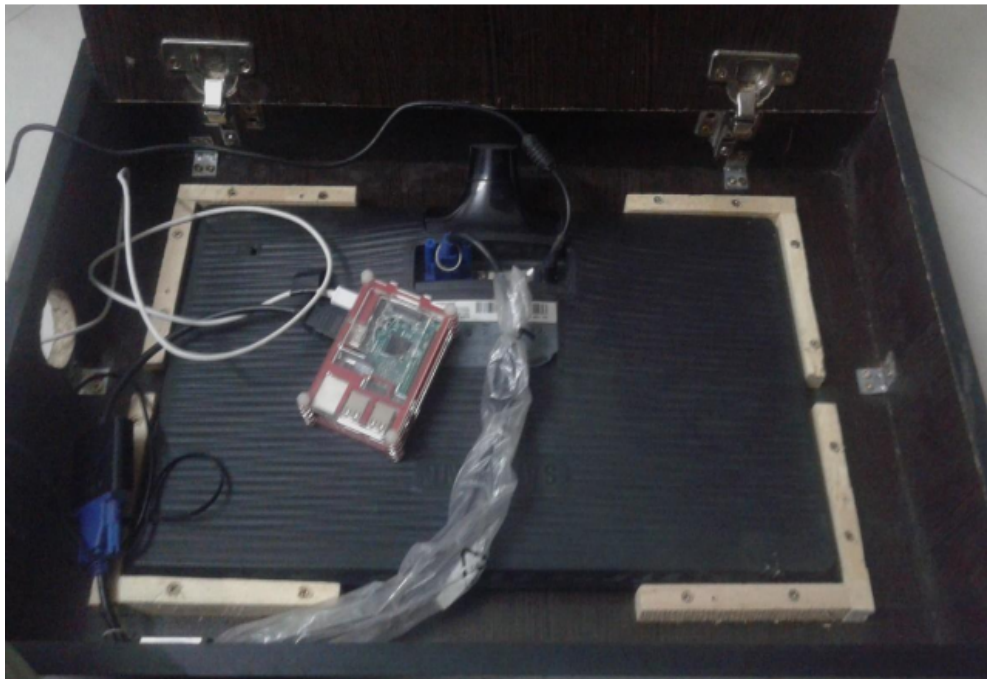


Figure 3.7: Assembly (Monitor)



The figure 3.6 shows probably the most important part of the hardware because it's responsible.

The figure 3.7 shows The size of the mirror is really dictated by the kind of monitor we get. We wanted to get something large as possible but also with a removable arm so it could fit inside of a case.

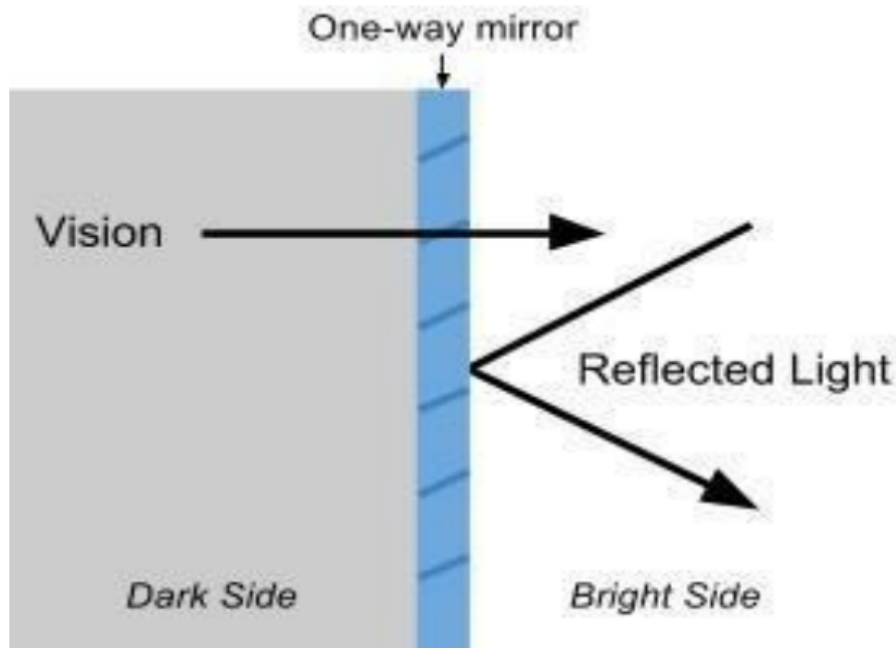


Figure 3.8: Schematic diagram of one way mirror

Figure 3.8 shows Schematic diagram of light reflection on a one-way mirror

### 3.6 Wood frame

Wood Frame is another important part of the Smart Mirror. How the whole project look like is depend on the wood frame. We make it reusable, enough scope for adding other sensor for future improvement of this project. How we design the wood frame given in below figure 3.9.

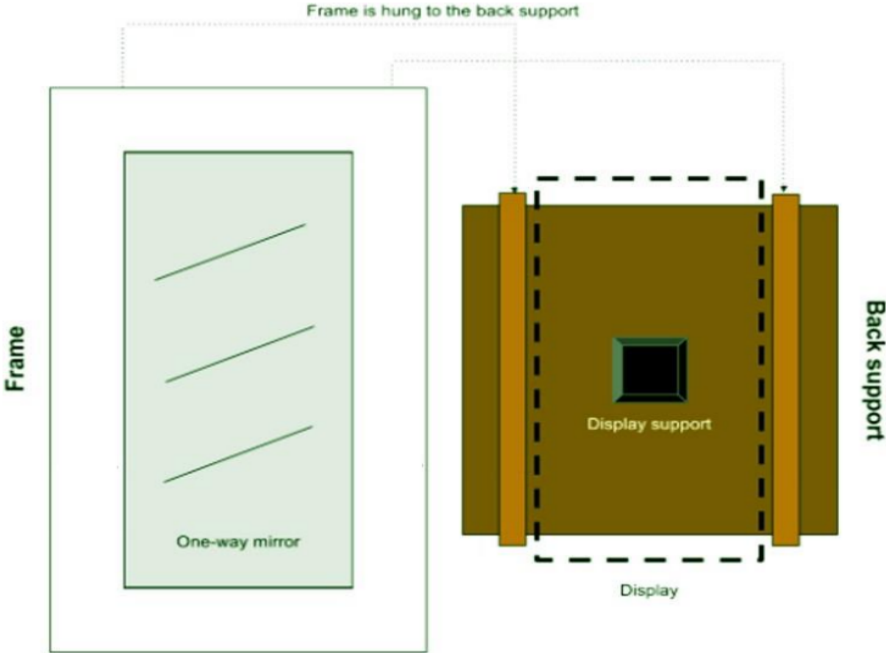


Figure 3.9: Schematic diagram of one way mirror

# Chapter 4

## Implementation

In this chapter we have include technology that we use for system.

### 4.1 System development environment

#### 4.1.1 Platforms

1. **Raspberry Pi OS(Software):**

Raspberry Pi OS (formerly Raspbian) is a Debian -based operating system for Raspberry Pi.

2. **Raspberry pie 3 model b+(Hardware):**

These Raspberry Pi smart mirrors can tell you the time, date, weather, and more.

3. **Two way acrylic glass mirror(Hardware):**

This is a high quality two way mirror (sometimes referred to as one way mirror), which reflects on one side and allows light to pass through on the other.

4. **Monitor(Hardware):**

It display any modules or content anywhere you want on the entire smart mirror.

5. **HDMI Cable(Hardware):**

Wired screen mirroring involves the use of an HDMI cable that connects your device to a TV.

## 4.2 Design screenshots



Figure 4.1: Wooden mirror

Figure 4.1 Shows smaller wooden frames to support the monitor and the glass.

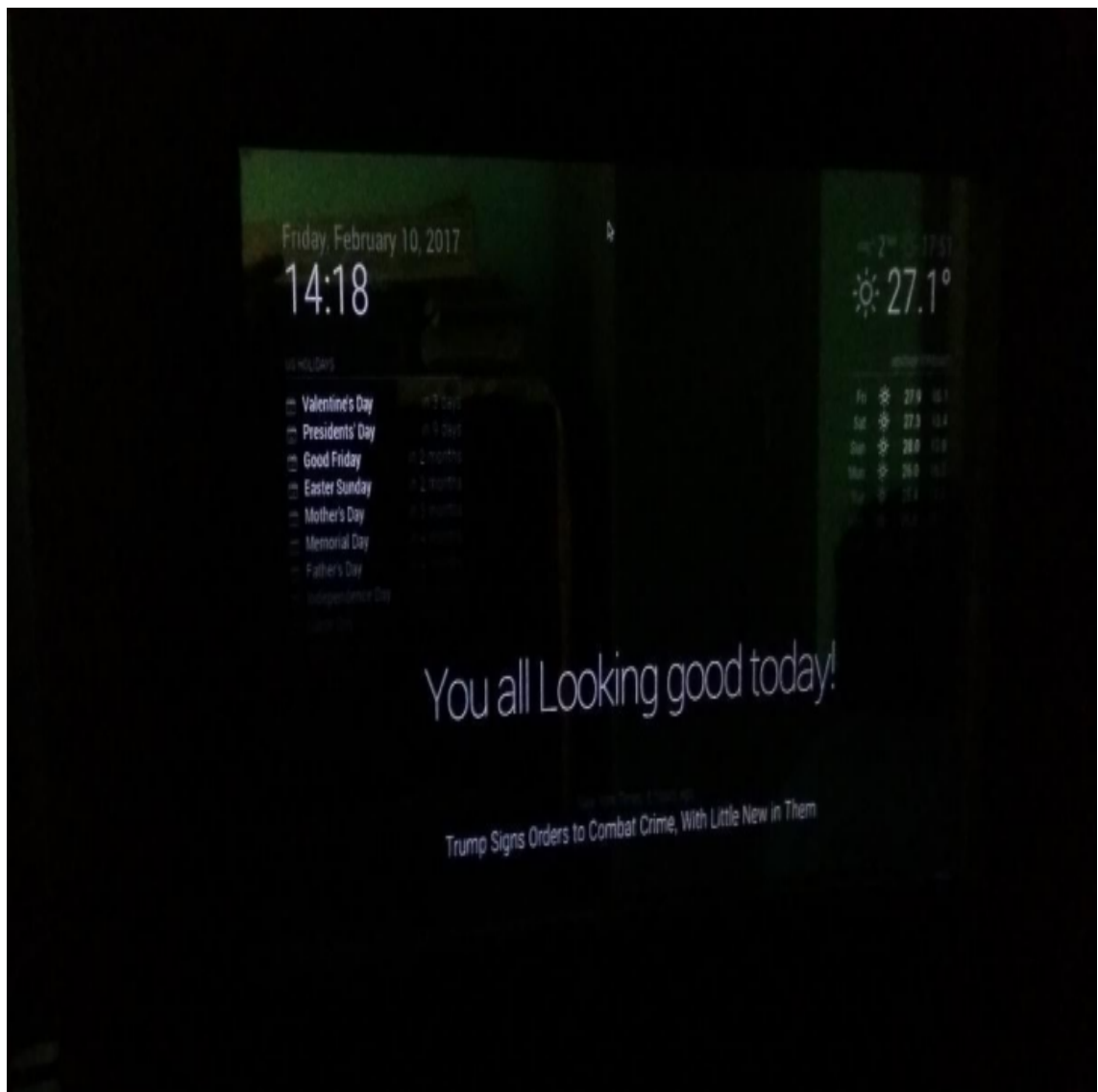


Figure 4.2: Mirror's look

Figure 4.2 Shows Date, Temperature, Time, Day.



Figure 4.3: Output of mirror

Figure 4.3 Shows the final look of our mirror.

# Chapter 5

## Conclusion and Future Work

### 5.1 Conclusion

The Smart Mirror has scope in the field of IoT and home automation. The Smart Mirror can be connected to the home appliances, mobile devices, etc. which can expand the functionality of the mirror. The facial recognition technology used can be future enhanced as a means of security.

### 5.2 Future work

Our future plan is adding facial recognition so that after setting up a profile and sending a picture of themselves to the Cognitive Services database, everyone would be able to step in front of the mirror and get a personalized display showing the information based on our preferences. Our mirror is not hundred percent reflective we will try to make this more reflectives.

# References

- [1] Zhou, L., Haas, Z.J.: "Securing Ad Hoc Networks", IEEE Network 13 (1999) 24–30.
- [2] Yu, S., Zhang, Y., Song, C., Chen, K.: "A security architecture for Mobile Ad Hoc Networks", Proceedings of Asia-Pacific Advanced Network(APAN), 2004.