

Smart Mirror Using Raspberry Pi

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Abstract: The world is moving fast and we are constantly in need wanting for time and find the things that can be postponed or cancelled just because we don't get all the time we need throughout the day. There is a popular saying that "Every second counts", we considered this saying the best of letter and spirit. Every day we normally spend 10-20 minutes in front of the mirror in our day-to-day life. Thus, we planned out to make this time also more interactive and productive and make it useful for the one using the mirror. Nowadays in the field of technology, many innovations happen almost daily and things are also getting smart such as smart phones, smart televisions, smart watches, smart locks, some smart home devices such as Amazon Echo, Alexa and many more. Thus, we proposed the idea to make an interactive smart mirror embedded with various features to make sure that every second is utilized properly. This smart mirror will be acting like our digital assistant providing with our to-do-lists for the day giving us the remainder's for our appointments, meetings and will also help us to keep a track of upcoming events important days, will give us the news, also it will update us with news, weather forecast, the one having investment in the stock market can keep a continuous track of it, and also helps a person to get current affairs happening around the world. The smart mirror is implemented using peripherals such as raspberry pi, LED monitor covered with two-way acrylic sheets. The microcontroller which is a part of raspberry pi makes a connection with the internet and can retrieve data from the internet which helps us to display all the mentioned things.

Keywords– Smart Mirror, Raspberry Pi.

I. INTRODUCTION

Nowadays the time management has become an important aspect in our daily routines. Humans have to aggregate throughout the day to maintain a profitable schedule. Thus, multitasking along with technology helps us to maintain an efficient schedule. Recent developments in technology have macadamized ways to automate things around us. In the 21st century, many smart things have been developed thus trying to save time and make life easier. Smartphone's, smart televisions, smart watches, smart locks, some smart home devices such as Amazon Echo, Alexa and many more have been discovered due to advancements in technology. Also, many devices in various fields are being invented which uses the concepts of multimedia communication.AI &IoT. Usually, the sole purpose of the mirror is for personal grooming, admiring oneself, decoration and architecture. Thus, every day we look at the mirror to check how we are looking while getting ready. So, doesn't the idea that a mirror can respond to our commands excites us. Here smart mirrors come into existence. These smart mirrors not only are interactive but also makes out life more enjoyable. Our daily routine includes reading newspaper, updating with news, getting stock updates, weather updates, reminders to-do lists etc. Imagine if it can all be embedded within a simple mirror. Yes, it is possible with the help of smart mirrors. This smart mirror is one step towards the development of industrial sectors as well as smart homes.

II. LITERATURE SURVEY

The paper presented by "Design and implementation of smart mirror as personal assistant using raspberry pi" concentrates on a system which is powered by Raspberry Pi 3. This proposed system is controlled by the powerful Raspberry pi 3. The final output in the form of Real Time Data feeds are displayed on LED fixed screen. The LED fixed screen which is further attached to a two-way mirror. This paper proposes a smart system which allows user to utilize a household object as an interactive interface providing customizable services. Life can be made easy and enjoyable by embedding more and more features on the mirror[1]. The paper "Smart Mirror - Digital Magazine for University implemented using Raspberry Pi" published in 2018 International Conference on Emerging Trends and Innovations in Engineering and Technological Research (ICETIETR) held by Institute of Electrical and Electronics Engineering (IEEE). The paper proposed a system that provides a natural user friendly interaction between user and the admin. The mirror display is provided by a flat LED display monitor which displays all the necessary information which is useful for the user. The paper further proposes a mirror that can be made more interactive by adding various features like digital magazines, API for viewing videos that can be easily navigated and also other basic API's that can be easily added[2]. The research paper "Smart mirror using raspberry pi" proposes the basic functionality of the mirror. The basic connections of the Raspberry Pi to the LED screen and the attachment of the LED screen to a two-way mirror. The paper also describes about various API's through which the mirror can be made more interactive with the user. The various API's used are calendar, music, news, Twitter, to-do-list, weather and time. The apps were unobtrusively displayed on the screen, hidden by the two-way mirror as to look like a seamless experience[3].From the research paper "Smart Mirror: A Journey to New World" we got all the basic and need things about the normal mirror which would help it to become a smart mirror, so that it can bring one more device added to the group of various smart devices around the world. Due to this mirror with basic API's like clock, calendar, to-do-list, weather, news feed our day to day life at home can also become more enjoyable, easy and interactive at home. Also it has various commercial uses. Paper further guides us for adding basic API's in the mirror[4].

III. OVERVIEW

A. RASPBERRY PI 3

The raspberry pi 3 is a credit card-sized single-board computer developed in the UK by Raspberry pie foundation, which uses computer screens for display with the help of keyboard and mouse.

CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz

GPU: 400MHz video-core IV multimedia

MEMORY: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)

USB PORTS: 4

VIDEO OUTPUTS: HDMI, composite video (PAL and NTSC) via 3.5mm jack

NETWORK: 10/100 Mbps Ethernet and 802.11n wireless LAN

PERIPHERALS: 17GPIO plus specific functions, and HAT ID bus

BLUETOOTH: 4.1

POWER SOURCE: 5V via micro USB or GPIO header

SIZE: 85.60mm*56.5mm

WEIGHT: 45g (1.6oz)

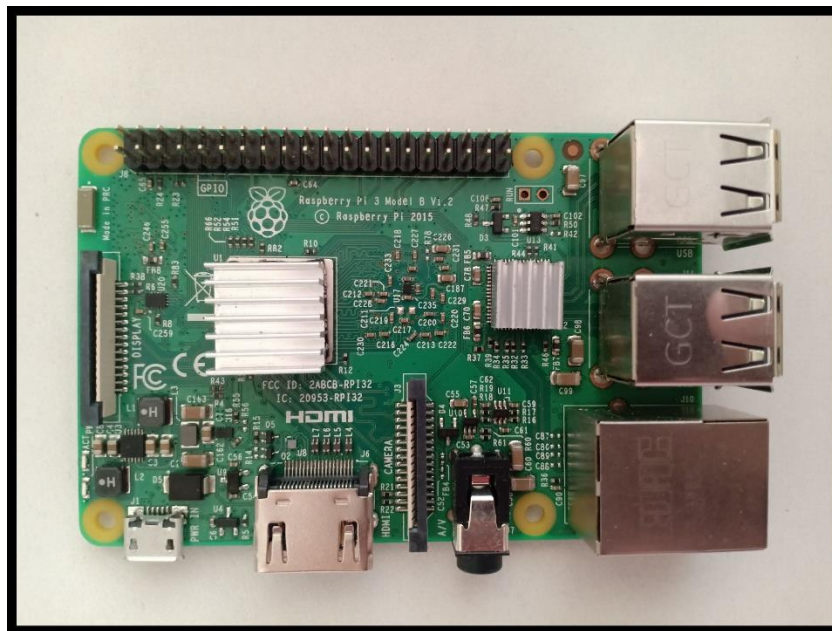


Fig1. Raspberry Pi 3

B. Display

We are using a two-way mirror for display purpose. Two-way mirrors provide dual functionality. It will be stacked above the monitor using a wooden frame to hold the whole system together. A monitor is connected to Raspberry Pi using HDMI cable. Thus, the two-way mirror acts as a normal reflective mirror when the monitor is switched off and data can be simultaneously displayed when switched ON.

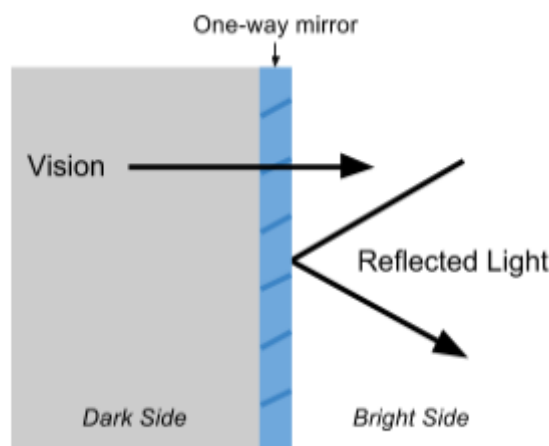


Fig2. Two way mirror

C. Primary Input Device

One mode of interaction with the smart mirror is through a mini keyboard or a remote control. While designing the mirror initially options like touch screen and voice control were considered, but as the touch screen display is too costly and brands like Amazon (Alexa) and Google (Google Assistant) made their services paid we decided to include a primary input device. In this project we are using Loopan i8 Mini Wireless keyboard and Touchpad.

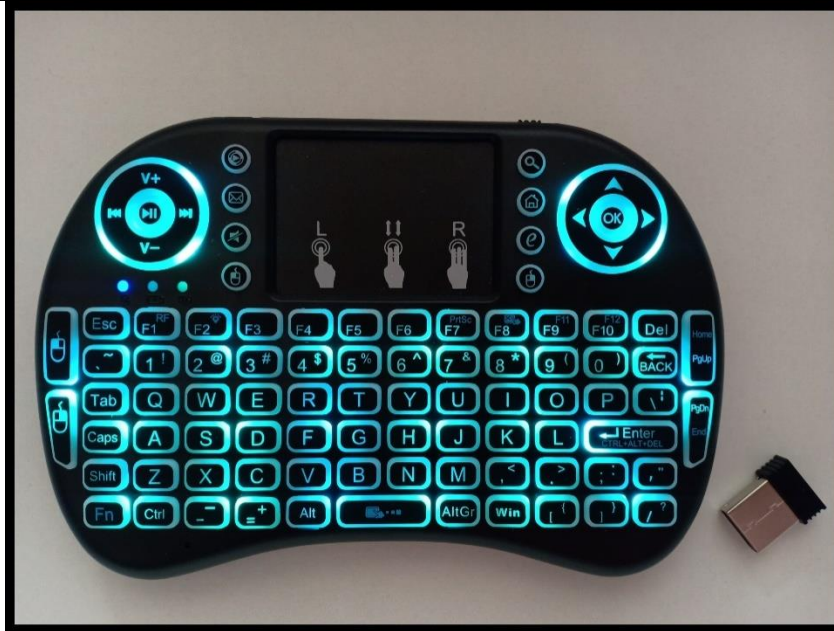


Fig3. Loopan i8 Mini Wireless Keyboard and Touchpad

D. Speaker

As our project is focusing on time management of the user so it's better that user hear the daily weather updates and stock market reading instead of reading the important content from screen these can help user to save time. Moreover these speakers are loud enough that its sound can reach 20-30m in a room. Speakers that we have used does not need any additional charging as it draws the power from raspberry pi using AUX port.



Fig4. Speakers used in project

For Software

A. RaspbianOS:

Raspbian OS is one of the official operating systems available for free to download and use. The system is based on Debian Linux and is optimized to work efficiently with the raspberry pi computer. An OS is a set of basic programs and utilities that runs on a specified hardware, in this case, the pi. Debian is very lightweight and makes a great choice for the pi. The Raspbian includes tools for browsing, python programming and GUI desktop.



Fig5. Raspbian OS

The Raspbian desktop environments known as the “Light Weight X11 Desktop Environment” or in short LXDE. This has a fairly attractive user interface that is built using the X Window System Software and is a familiar point and click interface.

B. Python

In this project we are using the python language which is very much easy to learn and a powerful programming language, besides it is very comfortable to use it with raspberry pi. The data structures , syntax are very basic to use and understand and also are very effective for scripting purposes as well as the development of many applications. Basically the python can be proved as one of the future proof language.

IV. PROPOSED SYSTEM

The proposed smart mirror aims at displaying the daily updates as well as providing customizable information. The smart mirror is created using Raspberry pi, two-way mirror, monitor. The two-way mirror is covered with the acrylics sheets so that it can act as a mirror and two was glass. The monitor is attached on the one side of the mirror. Thus, the display acts as a regular mirror when the monitor is placed. It simultaneously acts as a mirror also and displays the information when the monitor is switched ON. The monitor is powered by Raspberry pi 3 which is connected via HDMI cable. Speakers and raspberry Pi are connected to each other by using an AUX port which is available on both speaker as well as raspberry Pi. Communication between wireless keyboard and raspberry module is done with the help of wireless USB module which comes with Bluetooth installed. Raspberry is connected to internet using wifi so that smart mirror can access the information needed to user.

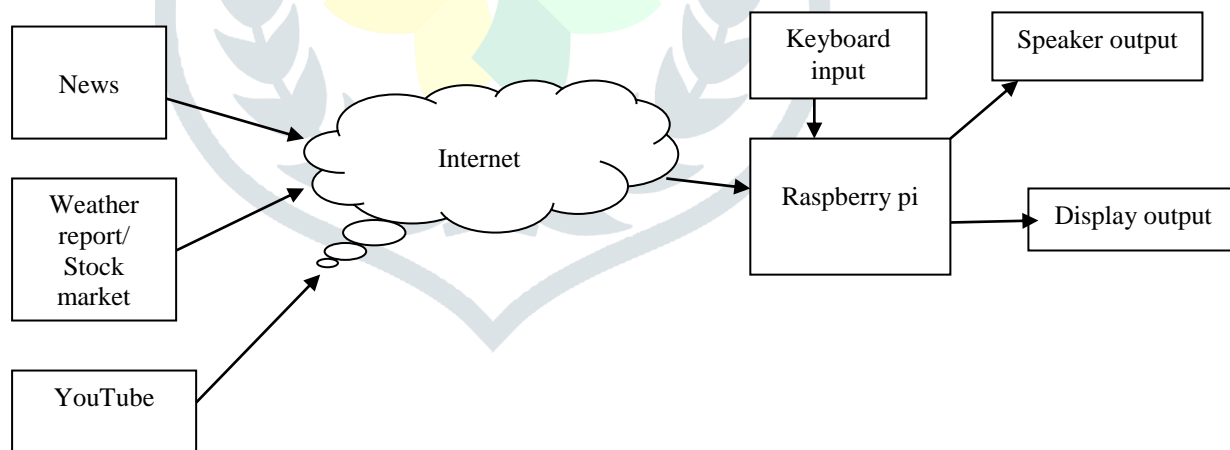


Fig 6. Proposed Model

Primary input device which is wireless keyboard have a wireless port that is connected to raspberry Pi USB port. Both the USB port and keyboard are connected to each other using Bluetooth, using these combination user can use keyboard within 100m of distance from mirror. With the help of keyboard user can have an access to the command he need in the mirror. When he choose any of the option e.g if user choose to know what’s the weather outside, raspberry will communicate over internet to find the weather outside the home and speaker will play its role. Speaker will tell the user exact weather outside his home and at the same time smart mirror will display weather condition on mirror. In these way whole communication between user and smart mirror occurs. Suppose user choose to play YouTube video smart mirror will display video on mirror and speaker will play the audio of video so that user can enjoy the video.

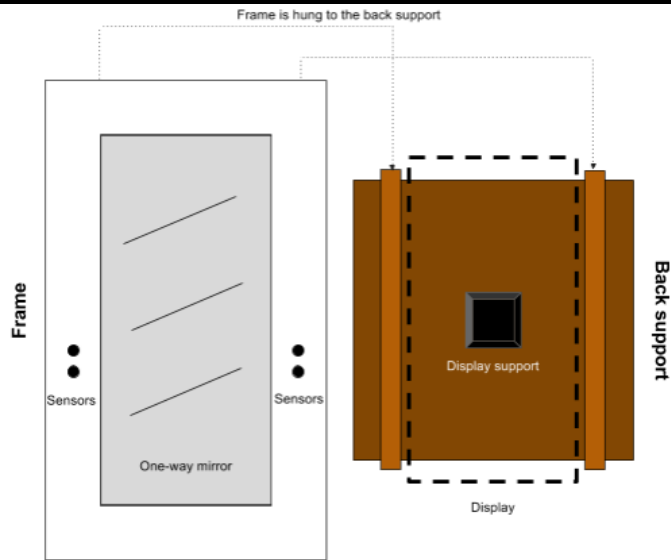


Fig7. Proposed Idea Diagram

V. RESULTS

So these is how the smart mirror displays weather and stock market price on display. It is also capable of displaying your day plans and can set alarm of your desired time.

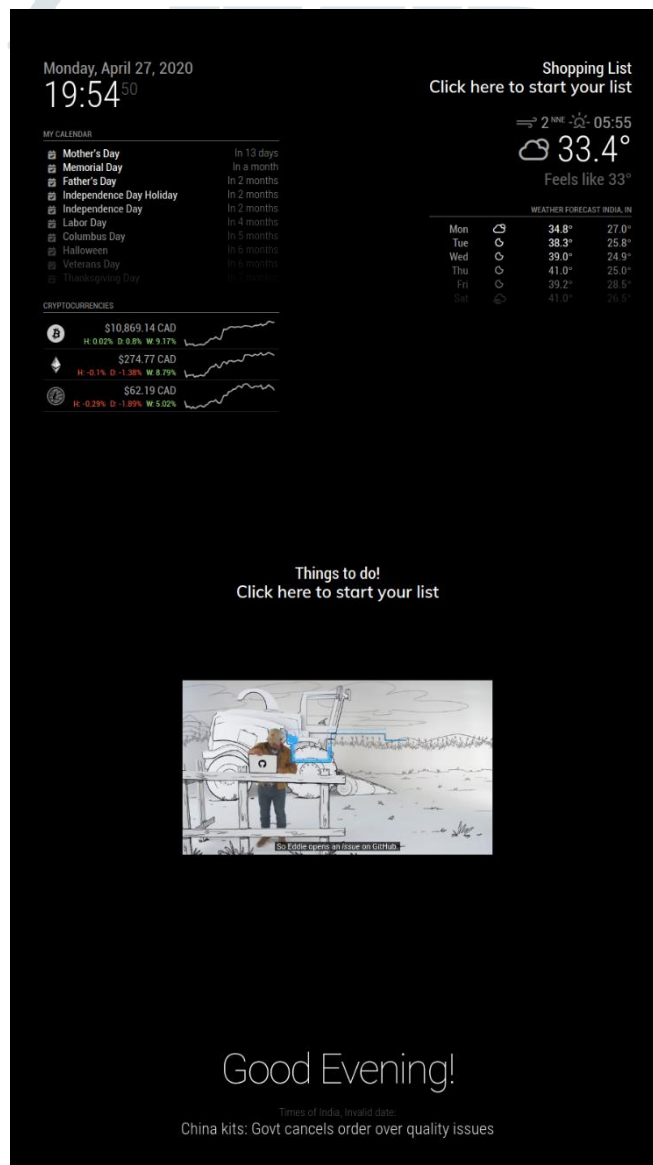


Fig8. Mirror Output

The figure above displays the front screen of mirror with all the functions such as compliments, date & time, weather forecast, stock market, calendar, to-do list, news and YouTube video being displayed.

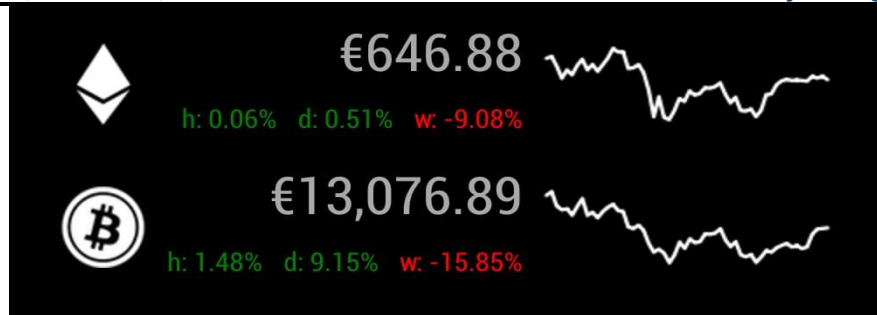


Fig9. Stock Market Display

The figure above shows stock market details on the selected unit being displayed on the mirror screen.

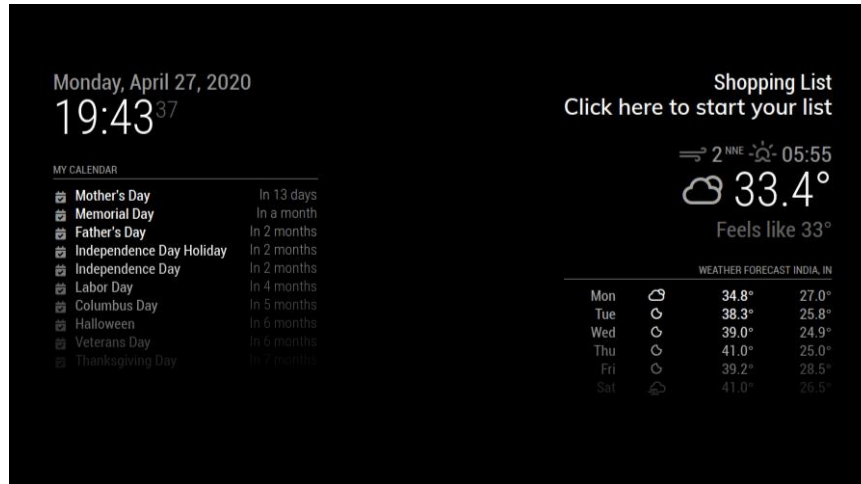


Fig.10 Mirror Screen Upper half

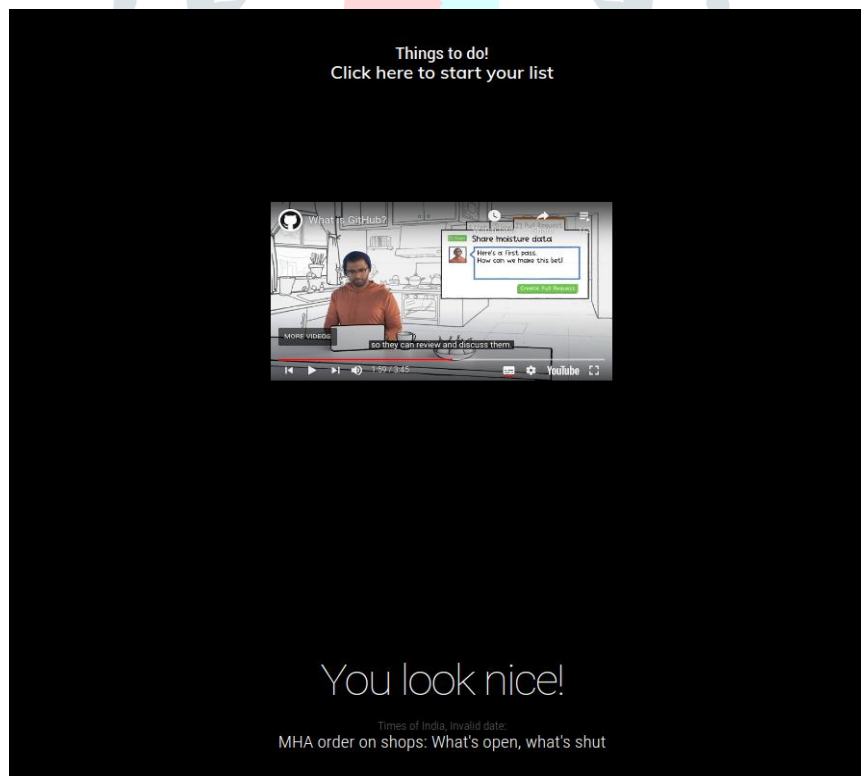


Fig11. Mirror Screen Lower Half

VI. Conclusion and Future Work

Thus, we have designed a smart mirror providing the interactions between the user and the mirror. The mirror displays all the important information's such as day and date, news, YouTube videos, stock market updates, to-do-lists, also helps to remember events through the calendar.

There are many future possibilities with the advancement in this project and hopefully, it will be updated. As this smart mirror is a new and emerging concept in the field of technology and advancements. It provides strong impact on technological developments. In future, this mirror can be made more interactive by embedding it with voice and facial recognition can also be made touch responsive, also can be made capable of video calling over Wi-Fi and many more.

VII. ACKNOWLEDGEMENT

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