



IOT BASED SMART MIRROR WITH NEWS AND TEMPERATURE

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Abstract

Nowadays information is available to our electronic gadgets. The one thing that concerns us is how to make tasks faster and easier. The product is similar to a regular mirror that can display weather reports, temperature, time and daily news. Raspberry pi stays at the back scene and controls the data displayed on the mirror while the LED display that is placed behind the two way mirror can serve various applications. Our proposed system allows us to build such mirrors that allow for mirrors to receive news online and display it on the mirror screen along with other details including current temperature from an open weather platform for a futuristic and modern lifestyle. Our system uses a raspberry pi based processor board along with displays that are interfaced together. We use a precisely modelled panel to construct the outer frame. Then we use specialized glass with a back frame to encase the system. The frame cavity is now fitted with precisely positioned mounts for the display housing to be fitted in the mirror. This is necessary to achieve the desired effect. Now we use raspberry pi to connect with the internet using an IOT circuit through the use of a Wi-Fi module. This allows us to receive data through the IOT platform.

1. Introduction

Smart mirrors are straight from science fiction. They're part of an optimistic vision of the future that imagines a world where screens and data are everywhere, ready to feed you whatever information you need at a moment's notice. Basically, the mirror is looks like normal mirror but when someone stands in front of it the scene changes. The mirror provides a functional, user friendly and interactive UI to its user for accessing their social sites, messengers, etc. It has widgets for displaying the current whether conditions, Time, Events, Latest news headlines The Smart Mirror would help in developing smart houses with embedded artificial intelligence, as well as finding its applications in industries. Switching home appliances becomes easy with mirror. Virtual dressing, a smart way of having trials with your fashion sense makes things quite easy in malls. Having such intellectual mirror will only surge the beauty of home. The raspberry pi is programmed using python and connects to a monitor with inbuilt speaker so as to provide an onscreen interface and voice assistance as well [1]. The term Internet of Things (IoT) is related with the connection of physical devices through Internet. The 'thing' in IoT could be anything that has the ability to collect and transfer the data over a network without any human's assistance. The devices are embedded with technology so that they can be controlled and monitored remotely. IoT is a larger part of home automation which controls almost all the devices used for domestic purpose remotely through internet. IoT basically emerged to ease human effort and make the device to perform the task by collecting information from surrounding environment. An example of IoT would be an alarm clock which wakes you 15 minutes late than the prior set time because it mapped the arrival time of train which would be delayed by 15 minutes. Another example of an IoT based home automation could be house walls that change its color according to a person's mood. Smart mirror is also developed to reduce human effort. Mirror is a basic thing that is available at everyone's home, taking advantage of this technology is embedded in it to make it smart and of more use. Now-a-days we get all the updates on our smart phone which we go through timely, but during morning rush hours it becomes a great haste to complete all morning routines. Smart mirror reduces this haste by providing you with the basic information you need to check in the morning such today's date, time according to your location, weather updates, news feed and today's schedule only by face recognition.

Smart mirrors can come in all sizes from small table mirrors, to full bathroom mirrors. Smart mirrors are sometimes called 'Magic' Mirrors, but they both refer to the same thing.

Smart mirror [2] is a wall mounted mirror which displays weather, time, news and other areas of interests. In recent years more and more devices are connected to the internet. The internet has played an important role in connecting more and more people across the world.

Devices started to become smarter a smarter, mobile phone became smartphones and most importantly internet was connected to a variety of devices and the concept came to be known as the 'Internet of Things'. Our project aims at exploring other fields where this technology can be used. It aims at including this technology in a mirror, because in general people spend a considerable amount of time in front of a mirror. We have seen clocks mounted on the wall, we have also seen displays at the airports, and similarly we aim at bringing this technology to our homes. This helps the user with security benefits. Smart mirror can also be useful for getting quick view of your Google feeds or accessing Gmail accounts by using face recognition. The smart mirror would help in developing smart houses by using artificial intelligence and finally finding a place in industries. The next section briefly comments on the literature review and the description of the components and software associated with it. It is followed with architecture of the proposed mirror. Conclusion and future scope of the mirror are also discussed in the paper.

2. Literature Survey

1. While implementing a smart mirror, the first question which arrives is "What is the need of a Smart Mirror?" In the recent years technology has become an integral part in day to day lives. Technology has been incorporated in many electronic devices. But the motive of designing a 'Smart Mirror' is to bring technology in a traditional household mirror and making it smart. This brought in a new definition of a smart mirror: "a smart mirror is a mirror with additional features and functions, with the aim of introducing capabilities for human interaction". There was always a need of designing a device which would help in planning for a day's activities by doing other household activities. A mirror is one such place where we visit often and thus can get basic details such as time, daily news and events, etc.
2. "A Mobile-Programmable Smart mirror for Ambient IoT Environment" published at 5th International Conference on Future Internet of Things and Cloud Workshops in 2017 describes the design and development of Interactive Smart mirror that offers simplified and customizable services to the home environment [3].

3. The Smart mirror also controls home appliances with very less human intervention using a mobile application. For controlling home appliances the mobile needs to be paired with the smart mirror successfully. "Smart Mirror for Smart Life" published at IEEE Conference publication also describes about the monitoring and controlling of home based devices with the mirror. To ease the human tasks and develop interaction between people and system, the mirror system uses Sonus technology as a medium [4]. The Smart mirror takes voice commands as input to give response and Sonus is a speech to text library that can quickly and easily add VUI(Voice User Interface) to any hardware or software[4].
4. Security in IoT in developing but not much strong in order to make Smart mirror secure and to display information according to a person's choice facial recognition algorithm is implemented in it. The "Implementation and Customization of a Smart Mirror through a Facial Recognition Authentication and a Personalized News Recommendation Algorithm published at 13th International Conference on Signal- Image Technology & Internet-Based Systems (SITIS) in 2017 includes the above advancement. The daily news recommendation predictive model is implemented through the facial recognition algorithm. The "SmiWork: An Interactive Smart Mirror Platform for Workplace Health Promotion" describes about a multi-user Smart mirror that promotes wellness and healthier lifestyle [5].
5. The Method Is Used To Develop Smart Mirror Evolved. The Most Popular Is Internet Of Things (Iot).Each Idea Is Nearly Same But The Minor Difference In It. Iot Is Our Basic Part For Designing A Smart Mirror Is With Node Mcu, Raspberry Pi. The Implementation Of Iot Is Possible With A Cloud. [2].

3. Proposed Idea

Fig-1 below shows the block diagram of a smart mirror. The proposed smart mirror aims at displaying the customizable information. In the proposed design, a two way mirror will be used as a two-way mirror is made of acrylic and sits flush over the monitor, allowing the graphics on the monitor to come through while maintaining a mirror effect i.e. it is capable of displaying user relevant information such as current weather reports, local time and date, recent trending headlines, and personal appointment updates from the Google calendar. These information are taken either through internet. Hence we can say that this technology is IOT based as we are taking information through the internet.

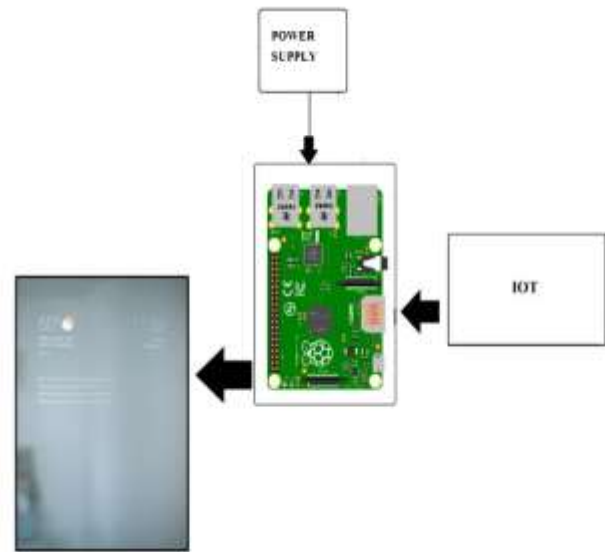


Fig -1: Block Diagram of Smart Mirror

Smart mirror is a Raspberry Pi (low powered minicomputer) based display when connected to internet it picks and displays the necessary information in the presence of the user. In the proposed system, a model B Raspberry Pi 3 is used which contains 512MB SDRAM, runs on Linux platform and needs 700mA. A two way mirror is placed on the LCD screen which acts as a regular mirror when there is no light behind it or act as a glass window where information is displayed. Only when the power is provided to the mirror the customized information will be displayed. In order to retrieve updated data from the web sources various data feeds can be used such as RSS feed.

A smart mirror which is a new real world provides interaction between the users. A flat LED display monitor would support the mirror to display the necessary sufficient information that the user will utilize.

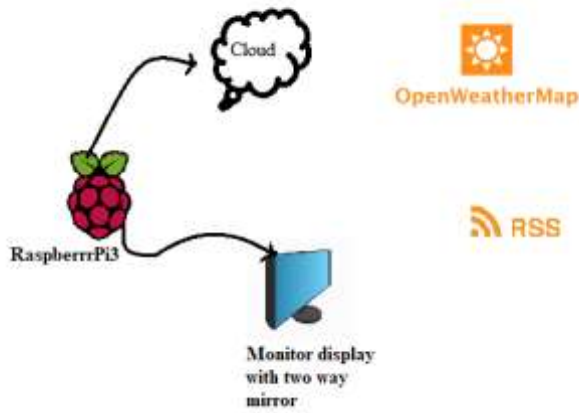


Fig -2: Architecture of Smart Mirror

The personal schedule of events and the updated weather reports can be obtained by using Google Calendar API and Weather API. For displaying these useful information Tkinter, a standard library GUI python module is used.

4. Hardware Components

- Raspberry Pi
- LED Display
- Two Way Mirror

Raspberry Pi

The **Raspberry Pi** is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboards and mice) or cases. However, some accessories have been included in several official and unofficial bundles.

LED Display

A LED display is a flat panel display that 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 for store signs and billboards.

Two Way Mirror

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.

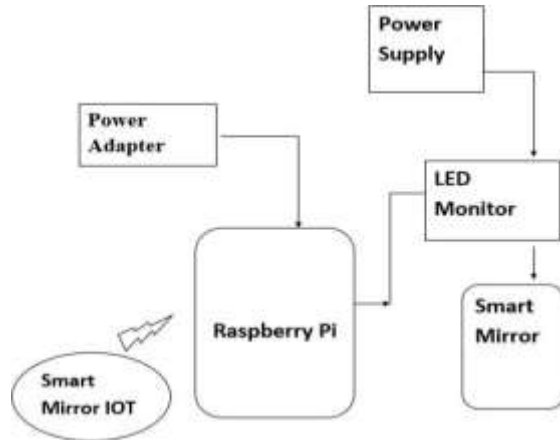
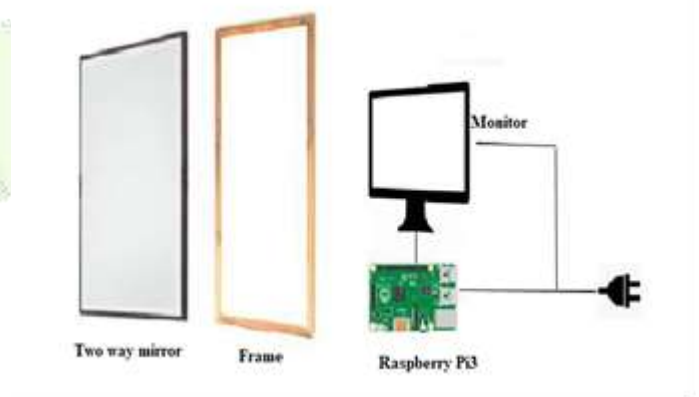


Fig -3:Block diagram for hardware description

5. System description



6. Working

The proposed Magic Mirror represents a natural interface that provides a platform to access information and data services in a more personalized manner. This project is aimed at contributing to the design and implementation of a Magic Mirror-like interface as well as the automated home environment where users can interact with the mirror interface.

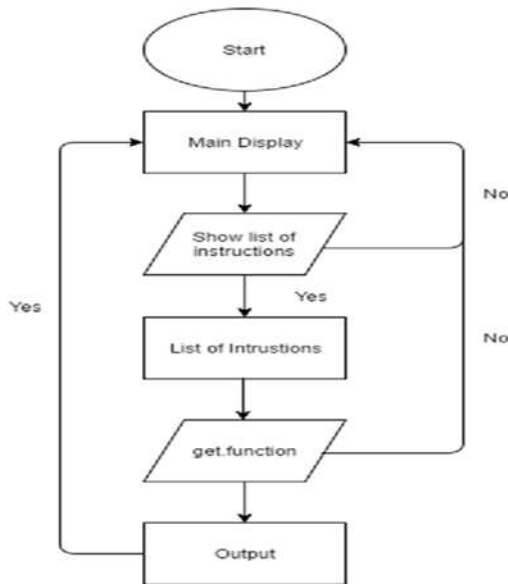


Fig -3: Flow Chart of the Process

The working of each component in a smart mirror is explained in this section. Let's talk about them one by one:

6.1 Two-Way glass mirror:

The two-way mirror is what gives the mirror its real identity. It's really a magic mirror as it has a reflective surface at one side and also it's transparent for light with good intensity. The mirror stays at the front where the user can watch him/her in the mirror at the same time that allows the light from the monitor to pass through it and make available the UI.

6.2 Monitor:

The monitor is directly connected to Raspberry Pi via HDMI interface thus providing display.

6.3 Raspberry Pi 3 Model B:

The raspberry pi is the most vital part of the mirror, it forms the processing unit of the mirror. The Pi is like a motherboard having all the required constituents which forms a great CPU. Its size of a credit card and still it can perform like a full-fledged computer. The programming of Pi is done using Python language. The programs can be first developed and compiled on windows or any other platform and then can run on Pi. The Pi also has its own inbuilt IDE to program in languages like C++, Python, C, Java, etc. Installation of OS on Raspberry Pi is quite a simple process. First you have to download NOOBS along with Raspbian which is a great OS of Raspberry Pi for beginners. The Raspbian is just a flavour of Debian OS. The Raspberry Pi has inbuilt Wi-fi and Bluetooth for connectivity purposes as well as it allows 4 USB devices to be plugged in.

On start after giving power supply to mirror the raspberry loads the OS and directly runs the UI of the

mirror, it may take while to load the weather and other internet based widgets to display the information completely depending on the speed of the home Wi-Fi network. On fully loading the information required the mirror now shows notification from different social sites as per the user has logged in. The events are loaded from the calendar and reminded to the user.

7. Result

Smart mirrors are interactive devices that help you check updates easily. We can do things at the same time in morning like brushing our teeth while catching up on the latest stock updates, weather or traffic.

Smart mirrors can help you save time and just multitask. They have great potential to enhance user experience of accessing and interacting with information. Not only do they allow users to see relevant information effortlessly, they can also be integrated as a thief detection system. It is also easier to access information. In today's society, security is of crucial importance. By keeping this in mind we have integrated a thief detection system into our smart mirror.

We have designed a futuristic smart mirror that provides natural interaction between users and the ambient home services. The mirror display is provided by a flat LED display monitor which displays all the necessary information which are useful for the user. The mirror also provides a picture-in-picture sub-display to facilitate the display of services such as maps, videos via YouTube. We have developed a functional prototype to demonstrate our work. Overall, the prototype provides an easily extendable framework that can be utilized to provide even more functionality to the user. A completed and functioning Smart Mirror is now ready for presentation. As the preceding section has shown, the project has wrapped up behind schedule but well under budget, having met most of the goals laid out in our original Scope Statement.

At minimum, the project set out to have a mirror that could display a dynamic date and time. This was our minimum criteria for success, and we are happy with the display that resulted. Unfortunately, time and the difficulty of programming some other elements forced us to shelve this particular feature. Knowing what we know now, we would be excited to attempt this in the future.

However, aesthetically the mirror looks exactly as we had envisioned it, and the trim we ended up using (for both function and decoration) was in fact better than the original design.

The hardware is simple, and elegant enough to demonstrate our widget structure. Our final project has a few demonstrations of the widget class, such as the weather widget and the RSS feeder widget. These widgets, while simple, do demonstrate the feasibility of being able to create most ideas in JavaScript.

As of right now, our platform is able to support simple JavaScript applications, and because of its scalability, it can be run on more than just our current hardware model. Eventually, we settled on the idea of focusing on the creation of the open source platform, specifically tailored for DIY developers.

We felt that there was no effective open source projects that allowed for a hobbyist to create their own mirror, similar to ours, and thus we focused on creating a model that would allow for easier application development. We feel that our goal in creating such a model was achieved, as the feedback we have received helps confirm that this platform looks and feels easy to develop with.



Fig -4: Design and Hardware Implementation of the Smart Mirror.



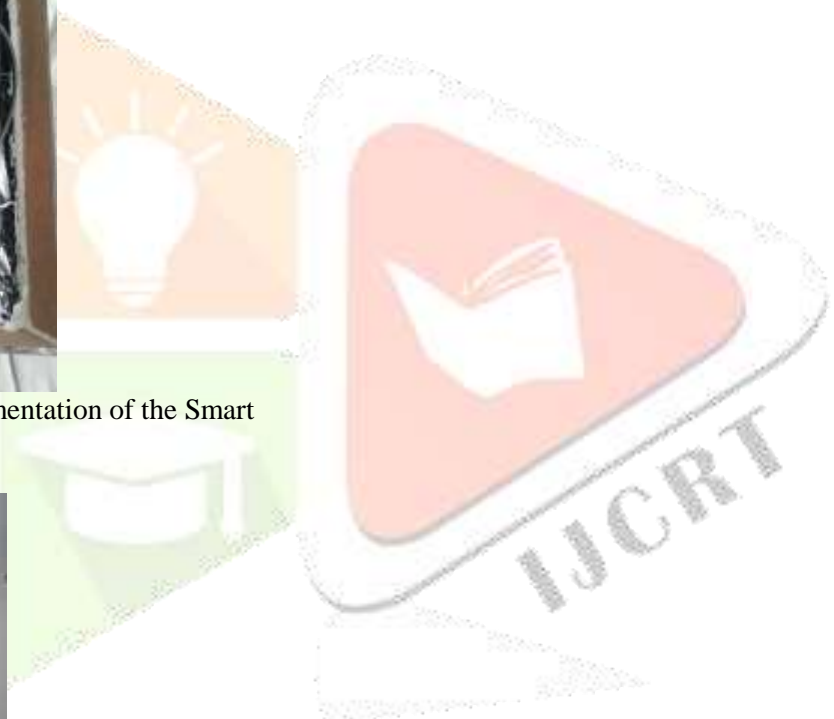
Fig -5: Main Display

8. Conclusion

Smart mirrors have great potential to enhance user experience of accessing and interacting with information. Not only do they allow users to see relevant information effortlessly, they can also be integrated as a thief detection

system. Our smart mirror saves time and makes it easier to access information.

In our future work we will investigate how the surrounding context of the user and the environment can be utilized in order to provide optimal service experiences in the home environment. The system can be made much more useful to the users by adding more functionality like integrating light settings, speech processing, etc. Efforts have been made to build an efficient and intelligent smart mirror that optimizes our time of doing works and increases our daily productivity. The Smart Mirror will play an important role in the field of IoT and home automation. Not only this can function as a normal mirror but can also provide other functionalities like weather forecast, calendar, time, etc. which makes it more desirable. The functionality of the mirror can be expanded by connecting it to other home appliances, mobile devices, etc.



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