

DIGITAL MIRROR FOR SMART LIFE

¹Payal Vijay Sharma, ²Suman Mahiman Rathaur, ³Bhagyashree Suryakant Shinde, ⁴Rajeshri Aneesh

¹Student, ²Student, ³Student, ⁴Assistant Professor

Department of Computer Engineering Pillai HOC College of Engineering and Technology

Abstract: Nowadays where everything is becoming digitalized smart mirror plays an important role. This paper is mainly based on the design and implementation of a Smart Mirror which is an intelligent mirror for our home environment as well as for trial rooms. The proposed system will collect real world data about the required information and the data will be transmitted which will be controlled by the Raspberry Pi. The Smart Mirror which is implemented with the help of various digital device which includes peripherals such as Raspberry PI, microphone for capturing voice, speakers, RFID, Monitor and two-sided mirror which provides the most basic information such as weather of the city, latest updates of news and headlines and time which we require to know about in our day to day lives. Smart mirror in trial rooms will perform additional functionality of displaying the texture, colour and sizes available of the attire being tried in front of the mirror. It will also take feedbacks from the customer. In this speech interaction is used to interact with the user. This interaction is possible with the use of verbal commands and functions and listens to the user's question and responds them adequately and accurately.

Key Words – Smart Home, intelligent mirror, raspberry pi, RFID.

I. INTRODUCTION

Mirror has now become a smart mirror, a digital mirror is basically an intelligent mirror with voice controlled interface. This project has been developed by taking into consideration the context of a time and the changes required to adapt within the environment, where every day we come across more and more smart and connected devices. The internet has adversely affected our lives and transformed it to connect through new things easily within a second. Mobile phones then became smart phones, TV became smart TV and many more, and from that time, this concept has erupted and taken a new shape named as Internet of Things. There are no end of objects that can be made "smarter" and digital. For example, Mirrors provides a large surface ideal for displaying information and other stuffs required to be done. Most people have mirrors at home so if it becomes digital, it only eases the life of an individual and this concept is very attractive and appealing from the name itself. Mirror is known by everyone. It is an object or a basic thing which is found in mostly everybody's homes. Mirrors helps us to show our own reflections. When we combine the idea of a mirror with the technology these may lead to many advancements. The main aim was to develop a device which would eradicate the idea of an ordinary mirror, and have a screen inside which you would be able to interact with the mirror by using voice commands and display the various instructions or information on the screen. This digital mirror is build with the help of Raspberry pi. In this context we make use of Raspberry pi3. It is made "smart or digital" by a simple LCD display or monitor of a computer or tablet which is placed behind the mirror and displays white use interface elements with a black background. When the display is on, we can see our reflection on the screen as well as the details which we want to display. In this case software plays a important role which allows to present relevant information on the screen while you get ready for the day. It is used to display the various information like weather, time, calendar, news, reminders and many more added features that could be included in it. It also uses the concept of RFID reader which can be used to scan a particular tag and display the information in the mirror, such as we can use this in the trial room of the malls where a customer tries his/her attire and when he scans the tag it will display the information on the mirror. The apt thing to do this is with the help of barcode scanner, which can be implemented in the realworld. Digital mirrors are part of the science fiction. They're part of a futuristic mirror that imagines a world where screens and data are everywhere, ready to feed you whatever information you need at a particular moment. Basically, the mirror is looks like normal mirror but when someone stand in front and the switch is switched on the scene changes. The mirror provides a functional, user friendly and interactive UI to its user for accessing their internet etc. It has widgets for displaying the current weather conditions, Time, Events, Latest news headlines. The Digital Mirror would help in developing smart houses with the use of artificial intelligence as well as for industrial purposes. Virtual dressing is a smart way of having trials with your attire is quite easy in malls. Having such intellectual and smart 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 assistant In our final design, we have included the following information to be displayed behind the mirror. This includes the time, date, and weather which is displayed constantly when the mirror is on, along with a screen that contains the headlines. Overall, the design is created to serve an environment that promotes efficient daily information, allow easy access to weather information and news headlines, and provides an user friendly and enjoyable enviroment. The LED which is placed behind the mirror will display all the contents which the user wants to view. This mirror can be used to make the home automated and contributes to the home automation system. The RFID tag which is present in the mirror will be used in malls, showrooms which will be present in the trial rooms of the shopping malls, so that when the user tries his/her attire can scan the RFID tag and get all the information related to his costumes that it will become easy for the customer to buy the attire. The digital mirror can be used in day to day life which will only help us easy the life of an individual. The main goal of this project is to develop a digital mirror that is user friendly and efficient. The device looks like a regular mirror but has a screen inside which would display the basic information and make it digital. The device will be of major use in making our day to day lives more digital and easies the life of the user using the mirror. This project has been developed with the idea of making home smart to savetime.

II. LITERATURE SURVEY

M. Anwar Hossain, Pradeep, K. Atrey and Abdulmotaleb El Saddik studied Smart Mirror for ambient home environment in the year 2008 [1]. It was represented as an unobtrusive interface. It was functioned as a natural means of interaction through which the residents could control the household smart appliances and access personalized services. Focus was mainly to ensure convenience in accessing those services with a minimum amount of user intervention. For example, face recognition-based authentication was included to automatically detect the user facing the mirror and provide widget-based interface to access data feeds and other services. A service-oriented architecture was adopted to develop and deploy the various services, where the mirror interface, the appliances, and the news and data feeds all used the web service communication mechanisms [1]. The functions of the mirror demonstrated an easily extendable home automation system that could facilitate the integration of household appliances. However, many problems were seen during its implementation. One of them was regarding XIO devices. Sadly, the XIO protocol is not as reliable as one expects, and hence commands were lost in the transfer, especially when there were multiple commands available which was sent to the same device and at the same time. Also, the COM port in the .Net framework (that we used as development platform) could be locked by the previous command sender. In order to correct them, a delay of one second was created when a command was sent to the device. Once the delay was done, the object through which the COM connection was created, was disposed, so that the COM port will be free. However, it was complex to implement it. Another issue with the XIO controllers are that in an environment with lots of interference, like a lab environment, the device controllers have to be kept quite close to the computer that runs the device drivers. Although, this might not be an issue in a normal home.

In October 2017 Muhammad Muizzudeen Yusri, Shahreen Kasim, Rohayanti Hassan and Zubaile Abdullah studied Smart Mirror for Smart Life [2]. The system works on Sonus technology as a medium of interaction between people and systems. So, to get the system's response users were supposed to provide verbal commands to the system. The methodological approach used in that project was The Evolutionary Prototyping that gathered all requirements and designs the system in a quick method. A prototype is provided to evaluate and deliver feedback. Improvements would be made to enhance the prototype, used to cater user's satisfaction. In Sonus technology sonus is a speech to text library that can quickly and easily add a Voice User Interface (VUI) to any hardware or software project. However, the system used sonus technology and faced problem of configuration of voice. It did not follow the instructions properly also controlling of lights often failed. Rotation of monitor, Disabling screensaver and removing panel was not successfully implemented [2]. Also the mouse during inactive mode was visible in mirror. Setting up Speech Recognition Failed. Motion Detection was not implemented.

On November 2017, Kang Wenato, Hong Zhihui, Shen Xin, Li Yingchunn studied Smart mirror based on ARM chip [3]. The Smart Mirror CPU used the Raspberry Pi 3 computer and framework that retrieved data from the web through the Wi-Fi connectivity. Through facial recognition and speech recognition model, Smart Mirror could identify the user. However, the functionality of the mirror wasn't expanded enough to connect with other home appliances, mobile devices, etc. Smart Mirror is a great example of how AI can be integrated into home appliances to make our life easier, efficient and more enjoyable. Smart Mirror could be made smarter by upgrading the AI. There is still a great scope to improve the AI. In maximum GPU speed, failure of voice recognition and slow responses was witnessed. AI entities was hard to train. The problem was while launching the system one had to make the AI understand the different types of entities, as the app was trained under wit.ai. The different entities in every launch was created as the amount of voice command as well as understanding level of AI was increasing. The AI wasn't taking any voice command due to the failure of ffmpeg and speech recognizer package [3]. Furthermore, the model was not fast enough as the RAM of the Raspberry Pi was only 1.0 GB and the processor was only 1.2 GHz. However, overclocking the pi processor was tried and came up with a good result. The GPU was decreased to get the maximum amount of speed from the Raspberry Pi.

TANG Li-Li in September 2013 studied Method to drive TFT color screen by means of FSMC interface on STM32 [4]. These interfaces were purely based mainly on graphic HMIs (human machine interface) using color LCDs. Due to its performance and flexibility, the FSMC was easily interfaceable with color LCDs that could serve to build multimedia applications. The FSMC suited the displays that required low-power and medium-resolution LCDs. Using the High-density STM32F10xxx FSMC, associated with the MCU performance, signal processing and control function capabilities, to directly interface LCD displays dramatically that reduced the application system cost and complexity. However the system was costly, high power consumption, high power consumption and a high MCU bandwidth usage [4].

III. SYSTEM OVERVIEW

Time management plays a vital role in our day to day life. Time management revolves around the various stuffs such as tools, skills, activities and mindset needed to work each day in a more efficient manner. It is hard to manage the daily activities and get yourself ready within a short span of time. Daily routine includes the activities like basic widgets for time, calendar and also the news. This activities looks pretty much small but are time consuming. Digital mirror is the device that combine the idea of a mirror with technology. This can basically help us to manage our time. Also it can be used in the trial rooms of the mall. It will only be beneficial for the customer if he gets to know all the information related to their attire. Integration of such types of technology into people's daily lives has made that time management possible.

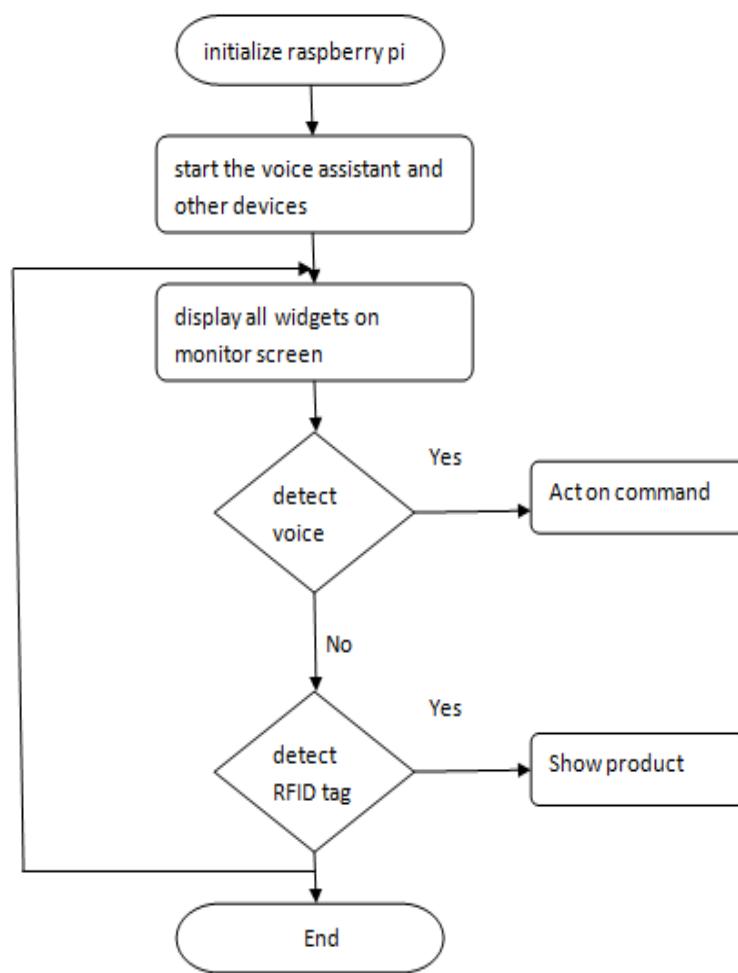


Figure: 3.1 Flow Chart

The process continues as we first install the raspberry pi and after initialization of that the digital mirror starts and it will display the necessary contents. The user can make use of the voice assistant to perform various operations such as surfing details from the net and many more things. Also the RFID tag can be used which is like the tag which we see in our clothes, if we scan it then it will display the information of clothes on the mirror.

IV.PROPOSED SYSTEM

The figure indicates the overview of the system. It indicates how the system will work. To design the system following information needs to be considered. The whole system needs to consider 4 steps in order to develop a system.

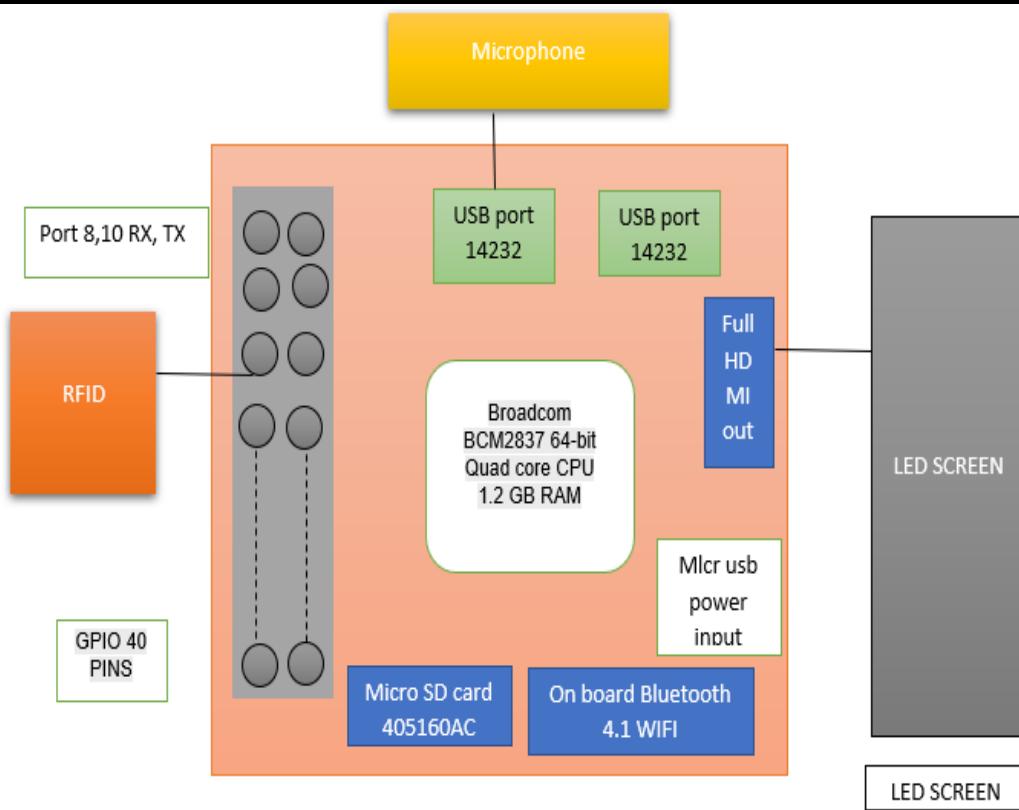


Figure 4.1 Block diagram smart mirror

a. Steps to process the system

i. Installation of Raspberry Pi.

Raspbian comes with many pre-installed software for programming, educational and general use. Raspberry Pi has Python, Scratch, Mathematica, Sonic Pi, Java and more. ZIP archive is over 4GB in size is contained in the Raspbian with Desktop image. This means that these features used by the archivesthat are not supported by older unzip tools on some platforms. If you find that the downloaded files have been corrupted or it is not unzipping correctly, please try using Unarchiver (Macintosh) or the Zip (Windows). Both are been tested to unzip the image correctly and are free of charge.

ii. Displaying information on the mirror

On supplying the power to the mirror raspberry pi will load the OS and runs UI directly. Depending on WIFI network, weather and other internet based widgets will be displayed. The events are loaded from calendar and reminded to the user. The user can view the time, date before leaving home on the mirror. This will help the user to manage time especially in the morning when everyone is in a hurry to leave for his work. The user can directly view the data which is essential for him. It has a greeting pane which automatically prints greeting message. A user who is aware of the working of system well can extend the ability of the system by adding more feature to it. This will be an enhancement in the home automation system

iii. Use of RFID tag :

To automatically identify and track the tags attached to the objects, radio-frequency identification uses electromagnetic fields. The tags contain electronically-stored information. Energy from a nearby by RFID readers interrogating radio wave are collected by passive tags. Active tags may operate several meters from RFID reader and have a local power source. In RFID, tag need not be within the sight of the reader, it can be placed in the tracked object. Automatic identification and data capture (AIDC) uses RFID methodology. The RFID tags will contain information about the material of the attire. This RFID tags can then be scanned with the help of mirror. Once the user will the scan the RFID tag in front of the mirror all the information related to the attire such as the material of the cloth, its quality, price everything thing will be displayed. First we have to interface the RFID module over python or C language. Then we need to program the few sample items for the RFID readout.

iv. Voice Assistant

Voice is taken as input through the hardware named mike. Voice assistant is a digital assistant that uses a verbal commands which is helpful to interact with the user. It helps us to navigate through the internet and makes it more user friendly.

V. RESULT

In this section, we present the results from testing the efficiency of the proposed method. Even when mirror was stranded in sunlight or tube light the widgets in monitor screen were well-read. It was observed that system did perform the corresponding action with the input voice provided. Even with multiple input commands output was provided effectively. Users using Digital mirror for the first time could also catch up with it easily. The speed of processing and displaying the output was quick and amazing! The power consumption used by the mirror was much less than the previous systems. The system was less bulky and efficient to use.

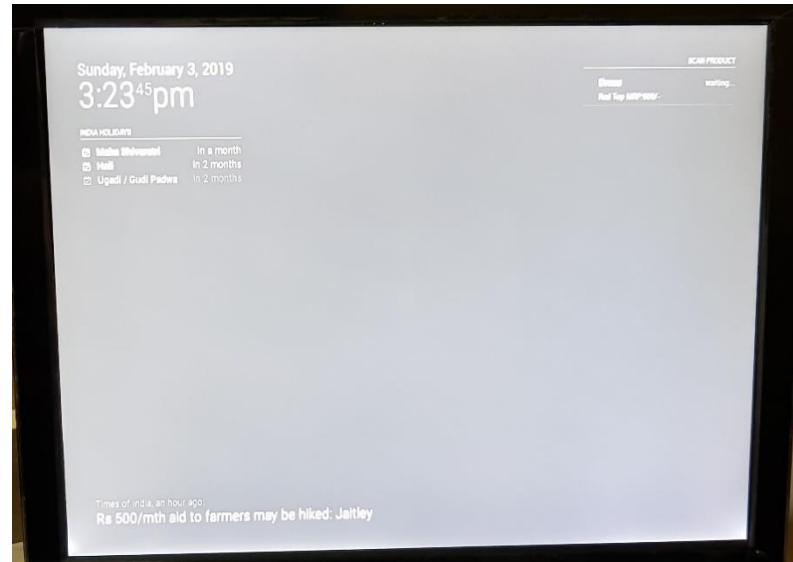


Figure 5.1: Display of digital mirror

Table : Comparison of existing system with the proposed system.

Existing System	Proposed system
Implementing the system is complex.	Implementing the system is comparitively easy
During inactive mode mouse is visible. Under bright light, widgets in monitor screen are not well-read.	During inactive mode mouse is not visible. Under bright light, widgets in monitor screen are well-read.
System does not makes use of voice assistant	System makes use of voice assistant
RFID concept is not used to take feedbacks from customer.	RFID concept is used to take feedbacks from customer

VI. CONCLUSION

Digital Mirror idea is created to provide better time management that means to access the information in asuitale and time-saving environment. The goals of the Digital mirror isto reduce time needed in a user's daily routine to check their PC, tablet, or smart phone for the information they need. The smart mirror did the thinking for the user with intelligent, that displays weather, news, Date and Time, to-do-list. The aim of the digital mirror is to increase a users productivity and efficiency by saving time. Despite of the fact this information is found on users other devices , it is time saving . The best strategy for time managementinvolve being able to findtime where there was no time before.

VII. FUTURE SCOPE

To increase the productivity, digital mirror can be used in shopping malls . This type of mirrors can be used in offices to schedule the meetings. Smart home technology may include motion sensors to detect the presence of the moving object to provide the security. By integrating organic light emitting diode in smart mirrors adoption of smart mirrors in elevators, hotels and public restrooms can be increased

IX. REFERENCES

- [1] M. Anwar Hossain, Pradeep K. Atrey ,Abdulmotaleb El Saddik, “Smart Mirror for ambient home environment”, 3rd IET International Conference on Intelligent Environments (IE 07)
- [2] Yusri, M. M., Kasim, S., Hassan, R., Abdullah, Z., Ruslai, H., Jahidin, K., & Arshad, M. S. (2017). “Smart mirror for smart life”. 2017 6th ICT International Student Project Conference (ICT-ISPC).
- [3] Kang Wenato, Hong Zhihui, Shen Xin, Li Yingchunn, “Smart mirror based on ARM chip”, 2018 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS)
- [4] TANG Li-li, HUANG Wei, Zhixing, “Method to drive TFT color screen by means of FSMC interface on STM32” .
- [5] Holler J., Tsatsis V., Mulligan C., Avesand S., Karnouskos, S., Boyle D. M2M to IoT—the vision: from M2M to IoT From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence 2014 1st chapter 2, section 2.2 Oxford, UK Academic Press1418 Google Scholar
- [6] Internet of Things Global Standards Initiative 2015 Geneva, SwitzerlandITU: Committed to connecting the world
- [7] K. Fujinami, F. Kawsar, and T. Nakajima. AwareMir- ror: A personalized display using mirror. In Pervasive, pages 3 15-332, 2005
- [8] L. Ceccaroni and X. Verdaguer. Magical mirror: multimedia, interactive services in home automation. In Proceedings of the Workshop on Environments for Personalized Information Access - Working Conference on Advanced Visual Interfaces (AVI 2004), pages 10-21, New York, NY, USA, 2004. ACM Press.