Android based Smart Mirror using Raspberry Pi

Sharvil Joshi
Sharvil.joshi16@vit.edu
Department of Electronics Engineering VIT

Omkar Gaikwad
omkar.gaikwad16@vit.edu
Department of ENTC VIT

Harish Algat
Harish.algat16@vit.edu
Department of Electronics Engineering VIT

Shekhar Waghmode
shekhar.waghmode16@vit.edu
Department of ENTC VIT

Akshay Metri
Akshay.metri16@vit.edu
Department of Electronics Engineering VIT

Guided by : Prof. Pooja Kulkarni

Abstract*— Nowadays all the information that is available to everyone is through television, newspapers, desktops, laptops and more. In order to access the information an extra level of interaction can always be helpful should go away from the traditional and old style of interaction with the devices as the technology is growing. Now one is relayed by information through mobiles, before mobiles computers before computers televisions, before that newspapers and radio. As mobile phones grew from being simple to diverse and complex but still user-friendly other regular devices or objects should also grow tried to take a step ahead in the future. This paper presents a simple still dynamic way of connecting with your morning newspaper and much more. This paper brings in front of you an idea, the Smart Mirror. The aim of this system is to deliver any information, entertainment lot more quickly and comfortably. While most appliances in this area require input through modules such as keyboards and do not have the facility of touch screen, this paper is here to present a model with a fully functional touchscreen facility and also voice operations. This project seeks to make one's morning routine lot more fun and anyone would be able to multitask in the morning. Taking out phone is not always desirable or phone needs battery and which is needed throughout the day and is not available for mostly in the morning. This will change the lifestyle of a larger audience base, as everyone nowadays wishes to accomplish tasks with more dynamic manner and in minimal time. This idea has many future applications, as it can be also be added with the new virtual or augmented reality devices.

Keywords*— Smart Mirror, Raspberry PI, Android, Google Play store,IR frame.

I. Introduction

The standards and quality of life are changed by wirelessly connected devices that are used in various regular activities. Due to this many new products and devices are now emerging. And these are providing secure, comfortable, convenient and superior lifestyle and personal services to people. This is not just limited to industries or workplaces but also at home. People interact with the mirror on daily basis, and one cannot lie that everyone expects a lot from it. Whether it is about how one's looks or attire. But people also use mirror for even different things that may take time such as shaving for men or makeup for women. This is an effort for making that time taking process much more interesting and a lot more fun and informative. This mirror will bring the mobile phone in front of everyone. It will allow people to play the news or even entertainment videos in the background while they are busy with their regular mirror activities. It will be loaded with the Google AI which will allow them to interact with it vocally. The rest of the paper is as follows. Paper will briefly present the theory and also on some related works that are done. It is followed by the description of the mirror which includes the design and architecture of the Smart Mirror followed by conclusion.

II. LITERATURE SURVEY

Phillips made a Mirror TV which had exactly same features as a smart mirror. It was basically a TV that was placed behind a two-way mirror so that it would behave as a TV when turned ON and as a mirror when turned OFF. They also had a product that had the glass bigger than the TV so that children would be able to brush their teeth while watching cartoons. This was done in the year 2003[6].

In 2005 Phillips introduced a product named MyHeart that was actually presented as a informative mirror. As their last product was just a mirror TV, this one was added up with some medical statistic that were displayed on the screen. But it required to be connected with the body to collect and analyze data which was displayed on the informative mirror[7].

A commercial smart mirror was developed by James Law Cyber tecture that is similar to what we are making today. It had the feature of accessing internet, act as a normal TV and also was able to display weather forecasts. It had various input methods such as remote controller, smartphone App, etc[8].

Toshiba in 2014 showcased a smart mirror which had gesture as input method. The mirror was able to customize itself according to different surroundings[9].

Microsoft in 2016 released some details on the smart mirror they are working on. They did not sell any product but released an idea of how a smart mirror should be and how owner should be able to assemble their own smart mirror[10].

Daniel Bessereretal in 2016 introduced a smart mirror that could add interactive fitness exercises into someone's morning routine. Their project utilized the Microsoft Kinectv2 for tracking gestures and a Wii Balance Board for presence detection[8].

III. Methodology

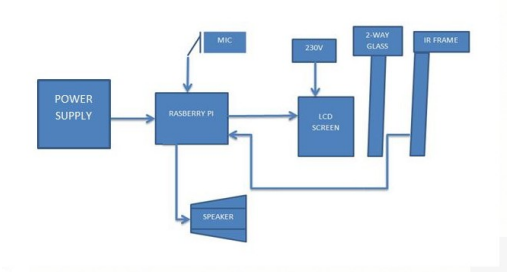

Figure 1 : Block diagram for smart mirror

The block diagram shown in Fig.1. represents the physical structure of the smart mirror. The LCD screen is placed behind the two-way glass so that it acts like a mirror whenever the screen is off. The IR frame is placed in front of the mirror and is exactly same in size of the two-way glass. The LCD screen is connect with the Raspberry pi and is also given 230V power supply. Microphone and speaker are connected with the Raspberry pi and also are given another power supply in case it is needed. a power supply is also given to the raspberry pi. The IR frame is also connected with the Raspberry pi using a USB cable.

4.1 I. Following are the hardware components used:

a. Raspberry pi 4:

Raspberry pi 4 is the latest version and has a edge above all the earlier variants. It is loaded with USB 3 and is also compatible with installation of android even if it is not stable on android but still it can be used[1].

b. IR frame:

IR frame is basically used for touch screen purpose. It works with identification of interruption in the beam of light. It basically has some senders and receivers which helps it to find out the place of contact. It can also be collaborated with any screen size if the screen is smaller than the frame[2].

c. Speaker and mic:

Any compatible speaker that already has a microphone is used cutting down in the cost. As raspberry pi has audio jack of two types that is HDMI and normal headphone jack any kind of speaker can be used.

d. 2- way mirror:

A 2-Way mirror is a complementary mirror and is moderately transitive and a little reflective.

e. LCD screen:

Any LCD screen with compatible size works fine.

4.2II. Software Design:

Software design for the smart mirror is fairly easy.

Step I: Installation of android on Raspberry pi 4:

Installation is pretty easy just download image trial or buy android image and then burn it into the raspberry pi using software like etcher[3].

Step II: Google play store activation:

If the image you are using a trial version you can always activate the developer option and then Google allows you top install Google play store.

IV. CONCLUSION

At the end one can build a smart mirror which has android installed in it. This means there is a mirror that can play news or YouTube while anyone can do their regular activities. As it has android installed it can always have Google AI which is very good option for voice control. It is loaded with touch screen using the IR frame which means it is completely water-resistant (on screen i.e mirror). It is better than having a separate AI or just having a mirror which displays time and weather. Or having a smart mirror which has gestures as input method which is confusing and not at all user-friendly.

V.ACKNOWLEDGEMENT

The authors express gratitude towards the assistance provided by Alta Tecnologia Solutions Pvt. Ltd. for the manuscript preparation.

REFERENCES

1. Mike Hanlon, "Philips HomeLab creates Mirror TV",*neweatlas.com*,June 04,2004,[Online],Available : https://newatlas.com/philips-homelab-creates-mirror-tv/2003/ [Accessed Feb 2,2020]

2. Joerg Habetha,"MyHeart:Fighting cardiovascular disease by preventive lifestyle and early diagnosis.",*2006 International Conference of the IEEE Engineering in Medicine and Biology Society*,New York,30 Aug.-3 Sept. 2006 [Accessed Feb 2,2020]

3. Lakshmi N M,Chandana M S,Ishwarya P,Nagarur Meena and Rajendra R Patil,"IoT based Smart Mirror using Raspberry Pi",CESC – 2018 (Volume 6 – Issue 13), *International Journal of Engineering Research & Technology (IJERT)* ,24 April 2018, [Accessed Feb 12,2020]

4. Eric Mack, ”Toshiba's smart mirror concept puts the future on display”, January 23, 2014,[Online], Available : https://newatlas.com/toshiba-smart-mirror -concept-ces-2014/30574/ [Accessed Feb 17,2020]

5. Andy Pavia, Stephanie Drescher and Melanie Richards , “Building an IoT Magic Mirror with Hosted Web Apps and Windows 10”,*blogs.windows.com,*MAY 31, 2016, [Online],Available : https://blogs.windows.com/msedgedev/2016/05/31/magic-mirror-hosted-web-app/ [Accessed Feb 27 ,2020]

6. RASPBERRY PI FOUNDATION,”Setting up your Raspberry Pi”,*rasberrypi.org*, [Online],Available : https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up [Accessed March 13,2020]

7. *Wilson Hurd and Ayu Piranti,* “What is Optical Imaging in Touchscreen?”,*nelson-miller.com* , MONDAY, 06 JUNE 2016 [Online], Available : http://www.nelson-miller.com/what-is-optical-imaging-in-touchscreen/ [Accessed March 13,2020]

8. Russell Barnes, “Running Android on a Raspberry Pi”, *The magpie magazine*, May 2018,[Online], Available : https://magpi.raspberrypi.org/articles/android-raspberry-pi [Accessed April 04,2020]

9. The GamePad Gamer, “How To Install Android On the Raspberry Pi 4 & Google Play Store” , *thegamepadgamer.com* , Jan 14, 2020, [Online], Available : https://thegamepadgamer.com/2020/01/how-to-install-android-on-the-raspberry-pi-4-google-play-store/ [Accessed April 04,2020]

10. Lincoln Spector,” Philips unveils Mirror TV”, *Networkworld*, JUN 12, 2003 [Online], Available : https://www.networkworld.com/article/2334241/philips-unveils-mirror-tv.html [Accessed May 04,2020]

11. Plagiarism : https://plagiarismdetector.net

Abstract— Nowadays all the information that is available to everyone is through television, newspapers, desktops, laptops and more. In order to access the information an extra level of interaction can always be helpful should go away from the traditional and old style of interaction with the devices as the technology is growing. Now one is relayed by information through mobiles, before mobiles computers before computers televisions, before that newspapers and radio. As mobile phones grew from being simple to diverse and complex but still user-friendly other regular devices or objects should also grow tried to take a step ahead in the future. This paper presents a simple still dynamic way of connecting with your morning newspaper and much more. This paper brings in front of you an idea, the Smart Mirror. The aim of this system is to deliver any information, entertainment lot more quickly and comfortably. While most appliances in this area require input through modules such as keyboards and mouse, have the facility of touch screen, this paper is here to present a model with a fully functional touchscreen facility and also voice operated interface. The project seeks to make one's morning routine lot more fun and anyone would be able to multitask in the morning. Taking out phone is not always desirable or phone needs battery and which is needed throughout the day and is not available for mostly in the morning. This will change the lifestyle of a larger audience base, as everyone nowadays wishes to accomplish tasks with more dynamic manner and in minimal time. This idea has many future applications, as it can be also be added with the new virtual or augmented reality devices.

Date: 2020-05-09

PLAGIARISM SCAN REPORT

Content Checked For Plagiarism

Keywords— Smart Mirror, Raspberry PI, Android, Google Play store,IR frame. I.Introduction The standards and quality of life are changed by wirelessly connected devices that are used in various regular activities. Due to this many new products and devices are now emerging. And these are providing secure, comfortable, convenient and superior lifestyle and personal services to people. This is not just limited to industries or workplaces but also to home. People interact with the mirror on daily basis, and one cannot lie that everyone expects a lot from it. Whether it is about how one's looks or attire. But people also use mirror for even different things that may take time such as shaving for men or makeup for women. This is an effort for making that time taking process much more interesting and a lot more fun and informative. This mirror will bring the mobile phone in front of everyone. It will allow people to play the news or even entertainment videos in the background while they are busy with their regular mirror activities. It will be loaded with the Google AI which will allow them to interact with it vocally. The rest of the paper is as follows. Paper will briefly present the theory and also on some related works that are done. It is followed by the description of the mirror which includes the design and architecture of the Smart Mirror followed by conclusion. II. LITERATURE SURVEY Phillips made a Mirror TV which had exactly same features as a smart mirror. It was basically a TV that was placed behind a two- way mirror so that it would behave as a TV when turned ON and as a mirror when turned OFF. They also had a product that had the glass bigger than the TV so that children would be able to brush their teeth while watching cartoons. This was done in the year 2003[6]. In 2005 Phillips introduced a product named MyHeart that was actually presented as a informative mirror. As their last product was just a mirror TV, this one was added up with some medical statistic that were displayed on the screen. But it required to be connected with the body to collect and analyze data which was displayed on the informative mirror[7]. A commercial smart mirror was developed by James Law Cyber tecture that is similar to what we are making today. It had the feature of accessing internet, act as a normal TV and also was able to display weather forecasts. It had various input methods such as remote controller, smartphone App, etc[8]. Toshiba in 2014 showcased a smart mirror which had gesture as input method. The mirror was able to customize itself according to different surroundings[9]. Microsoft in 2016 released some details on the smart mirror they are working on. They did not sell any product but released an idea of how a smart mirror should be and how owner should be able to assemble their own smart mirror[10]. Daniel Bessereretal in 2016 introduced a smart mirror that could add interactive ?tness exercises into someone's morning routine. Their project utilized the Microsoft Kinectv2 for tracking gestures and a Wii Balance Board for presence detection[8].

Date: 2020-05-09

PLAGIARISM SCAN REPORT

Content Checked For Plagiarism

Figure 1 : Block diagram for smart mirror The block diagram shown in Fig.1. represents the physical structure of the smart mirror. The LCD screen is placed behind the two-way glass so that it acts like a mirror whenever the screen is off. The IR frame is placed in front of the mirror and is exactly same as the size of two way glass. The LCD screen is connect with the Raspberry pi and is also given 230V power supply. Microphone and speaker are connected with the Raspberry pi and also are given another power supply in case it is needed. a power supply is also given to the raspberry pi. The IR frame is also connected with the Raspberry pi using a USB cable. 4.1 I. Following are the hardware components used: a. Raspberry pi 4: Raspberry pi 4 is the latest version and has a edge above all the earlier variants. It is loaded with USB 3 and is also compatible with installation of android even if it is not stable on android but still it can be used[1]. b. IR frame: IR frame is basically used for touch screen purpose. It works with identification of interruption in the beam of light. It basically has some senders and receivers which helps it to find out the place of contact. It can also be collaborated with any screen size if the screen is smaller than the frame[2]. c. Speaker and mic: Any compatible speaker that already has a microphone is used cutting down in the cost. As raspberry pi has audio jack of two types that is HDMI and normal headphone jack any kind of speaker can be used. d. 2- way mirror: A 2- Way mirror is a complementary mirror and is moderately transitive and a little reflective. e. LCD screen: Any LCD screen with compatible size works fine. 4.2II. Software Design: Software design for the smart mirror is fairly easy. Step I: Installation of android on Raspberry pi 4: Installation is pretty easy just download image trial or buy android image and then burn it into the raspberry pi using software like etcher[3]. Step II: Google play store activation: If the image you are using a trial version you can always activate the developer option and then Google allows you top install Google play store. IV. CONCLUSION At the end one can build a smart mirror which has android installed in it. This means there is a mirror that can play news or YouTube while anyone can do their regular activities. As it has android installed it can always have Google AI which is very good option for voice control. It is loaded with touch screen using the IR frame which means it is completely water-resistant (on screen i.e mirror). It is better than having a separate AI or just having a mirror which displays time and weather. Or having a smart mirror which has gestures as input method which is confusing and not at all user-friendly.

ACKNOWLEDGEMENT The authors express gratitude towards the assistance provided by Alta Tecnologia Solutions Pvt. Ltd. for the manuscript

Date: 2020-05-09

PLAGIARISM SCAN REPORT

Content Checked For Plagiarism

REFERENCES Mike Hanlon, “Philips HomeLab creates Mirror TV”,neweatlas.com,June 04,2004,[Online],Available : https://newatlas.com/philips-homelab-creates-mirror-tv/2003/ [Accessed Feb 2,2020] Joerg Habetha,“MyHeart:Fighting cardiovascular disease by preventive lifestyle and early diagnosis.”,2006 International Conference of the IEEE Engineering in Medicine and Biology Society,New York,30 Aug.-3 Sept. 2006. [Accessed Feb 2,2020] Lakshmi N M,Chandana M S,Ishwarya P,Nagarur Meena and Rajendra R Patil.“IoT based Smart Mirror using Raspberry Pi”,CESC – 2018 (Volume 6 – Issue 13), International Journal of Engineering Research & Technology (IJERT) ,24 April 2018, [Accessed Feb 12,2020] Eric Mack, “Toshiba's smart mirror concept puts the future on display”, January 23, 2014,[Online], Available : https://newatlas.com/toshiba-smart-mirror-concept-ces-2014/30574/ [Accessed Feb 17,2020] Andy Pavia, Stephanie Drescher and Melanie Richards , “Building an IoT Magic Mirror with Hosted Web Apps and Windows 10”,blogs.windows.com,MAY 31, 2016, [Online],Available : https://blogs.windows.com/msedgedev/2016/05/31/magic-mirror-hosted-web- app/ [Accessed Feb 27 ,2020] RASPBERRY PI FOUNDATION,”Setting up your Raspberry Pi”,rasberrypi.org, [Online],Available : https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up [Accessed March 13,2020] Wilson Hurd and Ayu Piranti, “What is Optical Imaging in Touchscreen?”,nelson-miller.com , MONDAY, 06 JUNE 2016 [Online], Available : http://www.nelson-miller.com/what-is-optical- imaging-in-touchscreen/ [Accessed March 13,2020] Russell Barnes, “Running Android on a Raspberry Pi”, The magpie magazine, May 2018,[Online], Available : https://magpi.raspberrypi.org/articles/android-raspberry-pi [Accessed April 04,2020] The GamePad Gamer, “How To Install Android On the Raspberry Pi 4 & Google Play Store”, thegamepadgamer.com , Jan 14, 2020, [Online], Available : https://thegamepadgamer.com/2020/01/how-to-install-android-on-the-raspberry-pi-4-google-play-store/ [Accessed April 04,2020] Lincoln Spector,”Philips unveils Mirror TV”, Networkworld, JUN 12, 2003 [Online], Available : https://www.networkworld.com/article/2334241/philips- unveils-mirror-tv.html [Accessed May 04,2020] 11. Plagiarism : https://plagiarismdetector.net

Date: 2020-05-09

PLAGIARISM SCAN REPORT

Content Checked For Plagiarism