IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 8, Issue 5, May 2019

Smart Glass

Er. Dhananjali Singh[1], Rohit Pathak[2], Sandeep Singh[3], Gaurav Mudgal[4]

Faculty, PG Dept. of ECE, R.B.S. Engineering Technical Campus, Bichpuri, Agra, India[1]

B. Tech, Final Year Students, PG Dept. of ECE, R.B.S. Engineering Technical Campus, Bichpuri, Agra, India[2,3,4]

Abstract: The smart glass project that we have designed is to make the information more accessible and incorporate the human vision with technology. The designed system makes the information access hands free. We have used Raspberry pi Zero as a microprocessor. It is a single board computer which has a system on chip. On the input side of the raspberry pi, there is a camera unit which is used to take the photos which is further processed by the raspberry pi. Using this camera, person is able to capture the photo of the view he/she is currently viewing as the photos are taken from the sight of view of the person. The other input component is the microphone, which helps in calling purpose.

Keywords: Raspberry pi, Smart Glass, LCD, SOC

I. INTRODUCTION

Smartglasses are wearable computer glasses that add information alongside or to what the wearer sees. Alternatively smartglasses are sometimes defined as wearable computer glasses that are able to change their optical properties at runtime. Smart sunglasses which are programmed to change tint by electronic means are an example of the latter type of smartglasses. Superimposing information onto a field of view is achieved through an Optical Head-Mounted Display (OHMD) that has the capability of reflecting projected digital images as well as allowing the user to see through it, or see better with it. While early models can perform basic tasks, such as just serve as a front end display for a remote system, as in the case of smartglasses utilizing cellular technology or Wi-Fi, modern smart glasses are effectively wearable computers which can run self-contained mobile apps. Some are handsfree that can communicate with the Internet via voice commands, while other use buttons.

Basically, these are computing devices worn in front of the eyes. Evidently their displays move with the users head, which leads to the users seeing the display independently of his or her position and orientation. Therefore smart glasses or lenses are the only devices which can alter or enhance the wearer's vision no matter where he/she is physically located and where he/she looks. The world is enhanced or augmented by virtual objects. The user can see the real world but also perceives virtual content created by a computing device and displayed by an additional light source which doesn't prohibit the perception of the real world. Interaction with those virtual objects is a way of communicating with the computing devices. Objects are subtracted from scenes by filtering the light reflected or emitted by those objects towards the eye. This is most often used in combination with augmented reality to replace the diminished objects by some virtual objects. Like other smart devices, smart glasses will also have a camera. Significant differences to other camera devices are that the pictures or videos are taken from the users point of view, there is no need for the user to hold the device in his hands and the vision of the user is not occluded. This camera can see what the wearer sees at any time. In combination with eye tracking technology the devices can determine exactly what the wearer is looking at. This allows the device to get crucial information about the users interests, activities, surroundings and occupation. Those fundamental differences to other computing devices are what makes smart glasses unique and interesting. They enable new applications which couldn't be as easily realized with other devices.

Objectives of our Project work - The main object of our project is to make the information more accessible and incorporating with blending the human vision with technology.

- The designed system should make the information access hand free
- The designed system should make the user to access the notifications
- The designed system should be able to make capturing of images and videos
- The designed system should make internet distance learning more effective with live video conferencing

II. LITERATURE REVIEW

It is found that the smart eyewear computing is a relatively new subcategory in ubiquitous computing research, which has enormous potential. In this paper they present a first evaluation of soon commercially available Electrooculography (EOG) glasses (J!NS MEME) for the use in activity recognition [1]. It is seen that with the growth of enthusiasm for the adoption of wearable technology in everyday life, the museum world has also become interested in understanding whether and how to employ smart glasses to engage visitors with new interpretative experiences [2]. The wearable

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319-5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 8, Issue 5, May 2019

devices, such as smart glasses, are nowadays easily available on the market; therefore, these devices could be used to evaluate more and more use cases in educational domain [3]. The recent introduction of smart glasses through media spurred new concepts of service support systems. Especially in the domain of Technical Customer Services (TCS), the opportunity to access information hands-free provides additional benefits [4]. Smart glasses are a new family of technological devices that share several characteristics with conventional eyeglasses [5]. We were able to implement the software to control the system and determine the future use of wearable devices in an on-site tourism context. Software, Hardware, Network & Infrastructure, Comfort & Embodiment, Functions & Usages, Reliability and Third Party Access were identified as the most influential factors [6]. We concluded & ideated the commanding mechanism of the smart glass & how the smart glass could make or accept the commands to make the all the features operational [7].

III. METHEDOLOGY

In our project Smart glass, we have used Raspberry pi Zero as a microprocessor which is used as a processing unit in the project. It is a single board computer which has a system on chip. On the input side of the raspberry pi, there is a camera unit which is used to take the photos which is further processed by the raspberry pi. The specialty of this camera is the photos taken will be of the sight of view of a person which helps the person to take the photo of the view which he is currently viewing the other input component here is the microphone which helps in calling purpose.

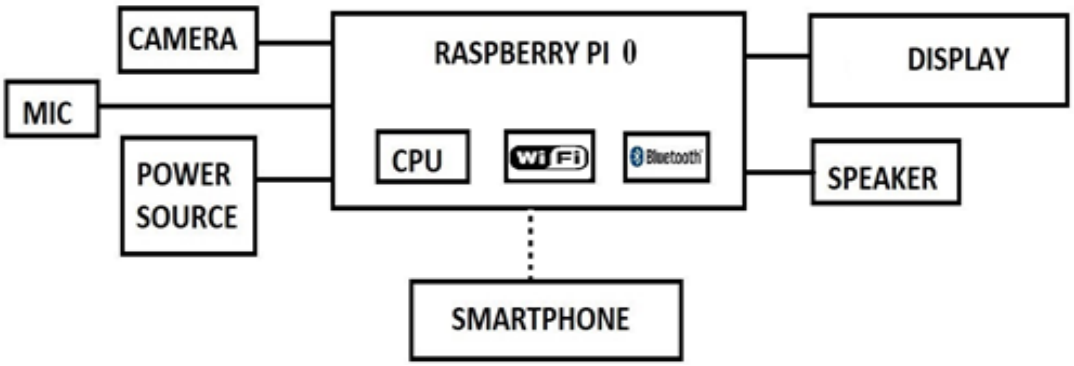

Fig. 1 Block Diagram of Smart Glass

- Raspberry pi: generally falls in to the system on chip category of electronics devise, means it is a whole system on a single chip to process the data and gives the result on the on the go here we have use the soc raspberry pi to process the high quality images sand videos to facilitates the system in video conferencing.
- Pi camera: it has some especial compatibility with the raspberry pi it functionalizes the system and helps in capturing the image and videos.
- Microphone simply its captures the sound around it to make the system to have proper voice commands
- Speaker: it is there in the system to have the sound outputs.

IV. WORKING OF THE SYSTEM

1. The camera's sensor has been configured and is continually streaming frame lines over the CSI-2 interface to the GPU.
2. The GPU is assembling complete frame buffers from these lines and performing post-processing on these buffers (we'll go into further detail about this part in the next section).
3. Meanwhile, over on the CPU, myscript.py makes a capture call using picamera.
4. The picamera library in turn uses the MMAL API to enact this request (actually there's quite a lot of MMAL calls that go on here but for the sake of simplicity we represent all this with a single arrow).
5. The MMAL API sends a message over VCHI requesting a frame capture (again, in reality there's a lot more activity than a single message).
6. In response, the GPU initiates a DMA78 transfer of the next complete frame from its portion of RAM to the CPU's portion.
7. Finally, the GPU sends a message back over VCHI that the capture is complete.
8. This causes an MMAL thread to fire a callback in the picamera library, which in turn retrieves the frame (in reality, this requires more MMAL and VCHI activity).

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 8, Issue 5, May 2019

Since the raspberry pi zero has a inbuilt Wifi and Bluetooth, hence it will be connected to the smartphone through the Wi-Fi and Bluetooth. Here, the Wifi connectivity is for the internet connection to the raspberry pi while the Bluetooth connectivity is to receive the data from the smartphone. Through the Bluetooth connectivity, the device can also access the calls which we are getting on the smartphone.

V. RESULTS AND DISCUSSION

Some of the objectives being taken our project has fulfilled successfully and we have designed a prototype of the smart glass in which the information will be present on the display.

- To capture the image of the sight of view of a person, one need to press the button on the keypad.
- Once the image of the sight of view is captured, it will be quickly saved in to the file manager of the raspberry pi zero.
- We can extract these images from the raspberry pi either by connecting the pen drive through the OTG cable to the raspberry pi or by connecting the raspberry pi directly to the desktop or laptop.
- The clock feature will be always present on the home screen of the display which can be easily seen by the user.
- Clock feature will be always present on the home screen of the display which can be easily seen by the user.

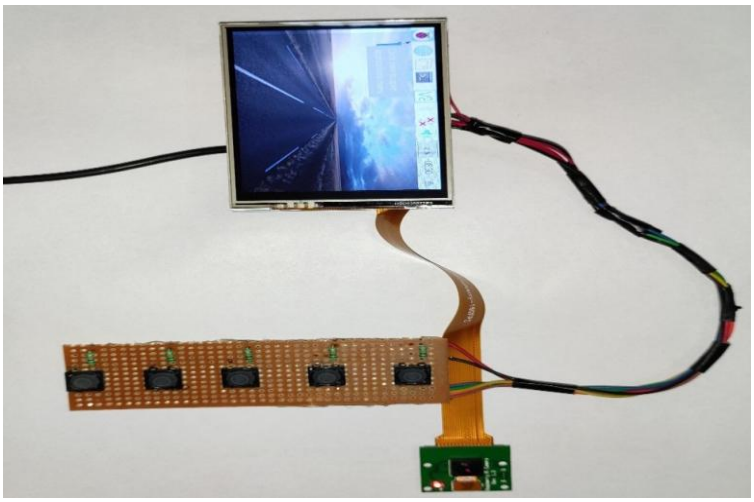

Fig. 2 Final prototype of the Project

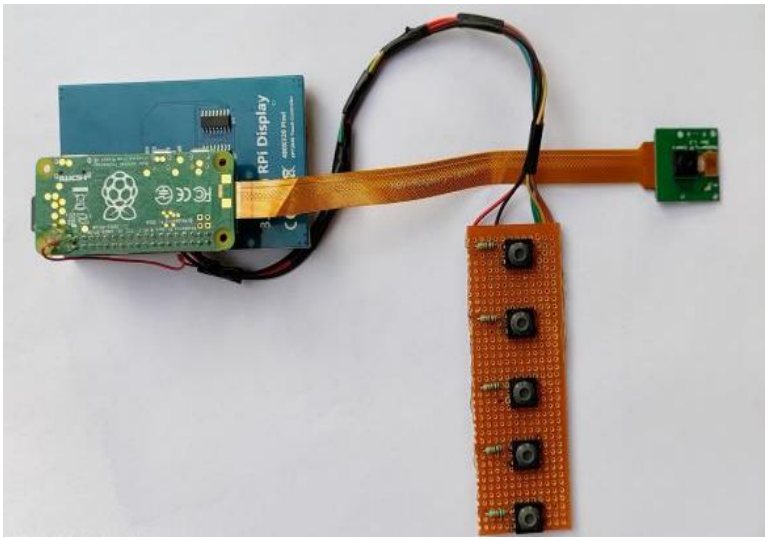

Fig. 3 Final prototype of the Project

Observations: As we connect the power supply to the raspberry pi zero, first it will take few seconds for the booting process as shown in the Fig. 4

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 8, Issue 5, May 2019

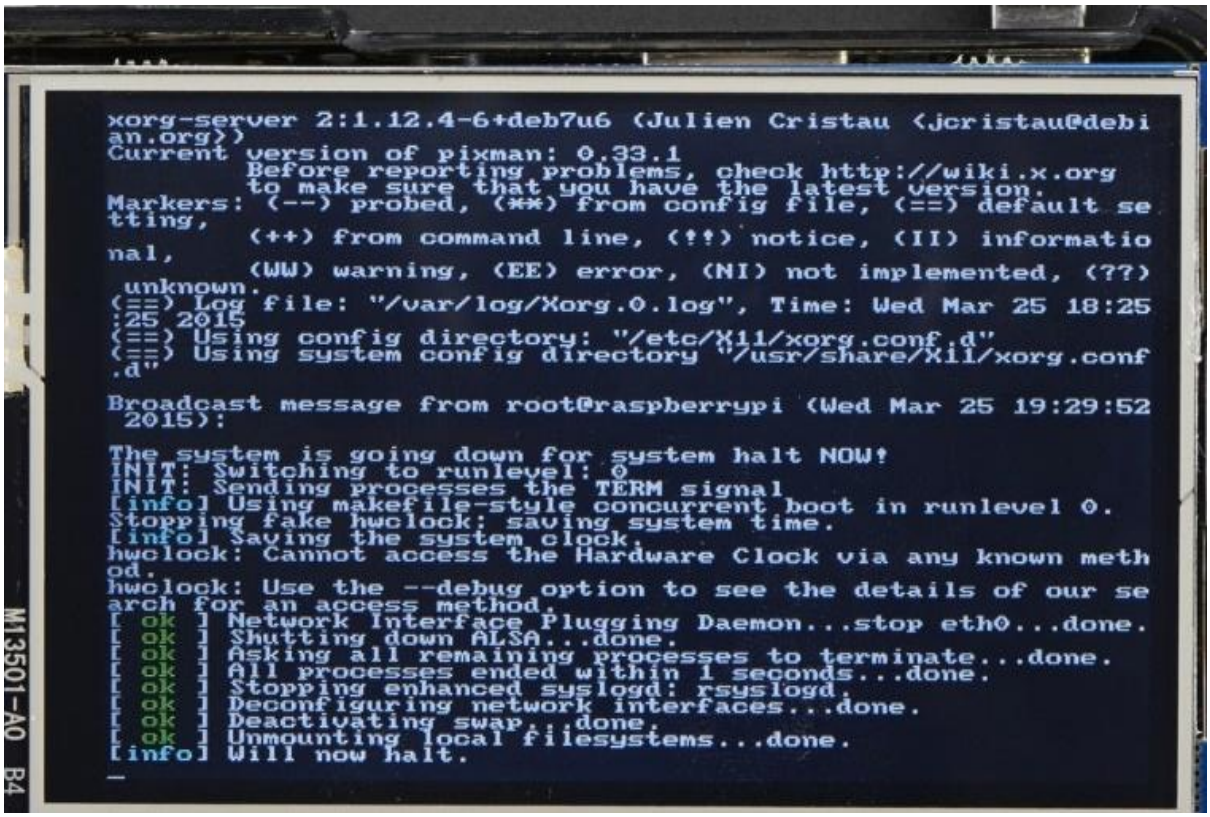

Fig. 4 Image of booting raspberry pi zero

After the booting process, we need to wait for few seconds until the red LED on the camera blinks, it shows that now the camera is ready to take pictures. When we press the button to click the image then it will be showed into the file manager of the raspberry pi zero.

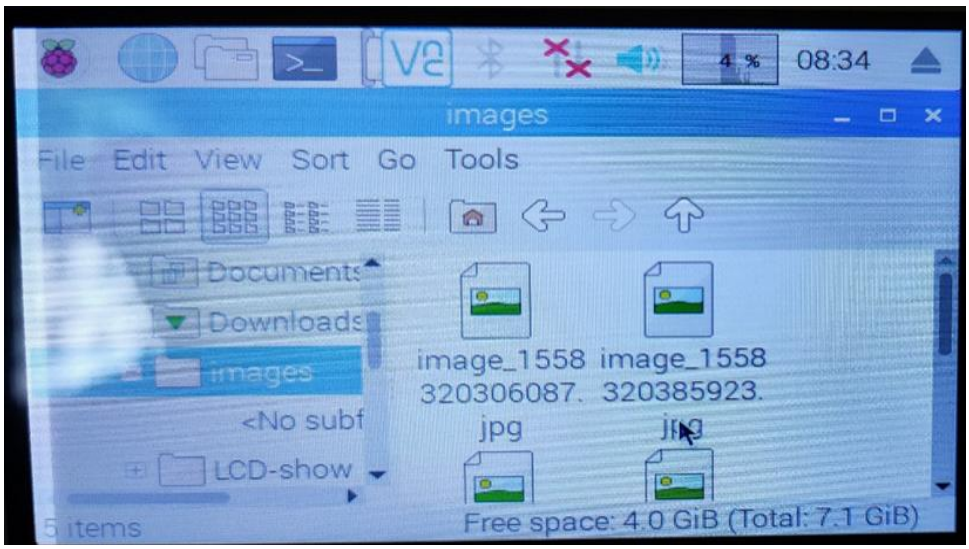

Fig. 5 Image saved in the raspberry pi zero

Challenges Faced: There were some of the challenges we faced while working on the projects and these challenges are raspberry pi zero is not easily capable of receiving the data from the smartphone through the bluetooth connectivity as when we install the library for this in the raspberry pi zero it takes more than 48 hours to install and then ends up in hanging problem in raspberry pi zero. The another one is the display problem as there is no such a small display or mini projector available in the market which can be easily fitted in front of the eye and is compatible with the raspberry pi because large display will loss the eyesight. The other problem is we have attached the buttons to the raspberry pi through the GPIO header to access the various features like gmail, weather status, mapping but the problem is when we press the more key than one, then this features keep overwriting the other and fails the other features to perform.

VI. CONCLUSION

In the designed system for our project, we can easily access the information on the LCD display like the clock or the photos. Since now a days we are so much habitual of getting the information from the smartphone for which even to access the minute information we need to take out our smartphone where the google glass will reduce these efforts and will show all the important info. on the display of the raspberry pi. Also if we want to take the photos of the things which we are actual seeing then we need to use the smartphone, which do busy our hands but through the smart glass we are able to click the photo of these view directly on a single click and also we can easily extract these images from the raspberry pi either by connecting the pen drive to the raspberry pi through the OTG cable or by directly connecting the raspberry pi to the desktop.

VII. FUTURE SCOPE

- Our project is especially focused use to blend information technology with human vision . But by adding some more features we can make it use for augmented reality with the help of which we can easily get the information about any object or thing which is in sight of the Smart Glass wearer like its basic information its speed if the object is moving, GPS navigation etc.
- Also blending the smart glass technology with virtual reality can facilitates the user to be more understanding the deep about the thing with what user is looking at.
- As the smart glass user has to press the al the four buttons to navigate the allt he feature and its very difficult when our Hand has to press the buttons over the head or the glass, so to remove this time taking button we can use advance gesture technology to navigate n the feature and displaying the images and video and all the information on the screen feature with our system.

REFERENCES

[1]. Anna syberfeldt, Oscar denielsson, Patrik gustavsson, “Augmented Reality Smart Glasses in Smart Factory: Product Evaluation Guidelines and Reviews of Available products”, Institute of Electrical and Electronics Engineers, Vol. 5, pp no. 9118-9130, 2017.
[2]. Bijker, W., Pinch, T. & Hughes, T. The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology. Cambridge, Mass: MIT Press, 2012.
[3]. Brock, D. C. & Moore, G. E. Understanding Moore’s Law: Four Decades of Innovation. Philadelphia, Pa: Chemical Heritage Foundation, 2016.
[4]. Christina Niemoller, Dirk Metzger, Michael Fellmann, Deniz Ozcan, Oliver Thomas, “Shaping the future of mobile service support systems - Ex-ante evaluation of smart glasses in technical customer service processes”, GI-Jahrestagung, 2016, pp no. 753-767.
[5]. Christina Niemoller, Dirk Metzger and Oliver Thomas, “Design and Evaluation of a Smart-Glasses-based Service Support System”, 13th International Conference on Wirtschaftsinformatik, St. Gallen, Switzerland, pp 106-120, 2017
[6]. Dvorak, J. L. Moving Wearables into the Mainstream: Taming the Borg, 2010.
[7]. Fabian Quint, Frieder Loch, “Using Smart Glasses to Document Maintenance Processes”, A. Weisbecker, M. Burmester & A. Schmidt (Hrsg.): Mensch und Computer Workshop band, Stuttgart: Oldenbourg Wissenschaftsverlag, pp no. 203-208, 2015.