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SCREENLESS DISPLAY-THE REALITY OF FUTURE

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Abstract-

This paper includes a review about the Screenless Display technology. It describes the system that enables the transmission of video data without using display screen, with (or without) using video source (light source). This system can be divided into 3 types of groups. 1.Visual image, 2.Retinal display, 3.Synaptic interface. This paper illustrates basic working principal of screenless technology, advantages and disadvantages about the technology. It also describes the future application of screenless technology. This is a new emerging technology, still under progress.

Keywords: Hologram, laser, optic nerve, raster – pattern

1. INTRODUCTION

Advancement in different technologies are making human life more and more comfortable day by day. Thus the improvement can be accomplished by upgrading the existing tools and machines. Today's touch screen technology which is adopted by almost all electronic gadgets will become history tomorrow. Screenless Display will replace these touch screen displays and will reduce the use of screens; ultimately hardware component will become cheap. Screen less display is one of the most interesting subjects in technologies and that's why number of renowned IT companies are working on projects concerning screenless display technology to prove themselves. The primary aim of Screenless technology is to transfer or display information/data without using screen at all. Google glass is the best example of screenless technology till date. The problem with this technology is that it isn't much developed yet and available in very limited range of products. though not currently, but it is sure to make a mark in the new era.

The technology is mainly classified into 3 types:

- Visual Image
- Retinal Display or Virtual Retinal Display
- Synaptic Interface or Direct Neural Interface

2. BACKGROUNG AND BASIC WORKING PRINCIPLE

2.1. Visual Image

In this type of screen less display our eye perceives the images that are formed in the air without using any kind of screens. One of the well-known example of visual image is Hologram. Holographic messages, from the movie 'Star Wars' are become true now. Visual image uses light and thus reflected light from the intermediate object is captured. Another example of visual image is heads-up display used in jet fight.

Fig. 1hologram

The technique which is used to create and generate hologram is called as holography. Just like a compact disk or tape record, a hologram is recorded(on a holodisk) first and then reconstructed whenever it needed. This can be achieved by capturing the reflected light from the intermediate object. It is also possible to generate 3D images now a day. The system focuses a beam of laser light so that it generates plasma medium in the environment using atmospheric nitrogen and oxygen. This medium is able to display holographic images [2].

A hologram (pronounced HOL-o-gram) is a three-dimensional image, created with photographic projection. The term is taken from the Greek words *holos* (whole) and *gramma* (message). Unlike 3-D or virtual reality on a two-dimensional computer display, a hologram is a truly three-dimensional and free-standing image that does not simulate spatial depth or require a special viewing device

WORKING OF HOLOGRAM:

Holographs can work by using a laser beam that can interfere with an object beam. When these two beams get in the way of one another, they can create what looks like a three dimensional image. This image can then be recorded for processing by recording the diffraction of the light and the way in which the beams interfere with one another.[1]

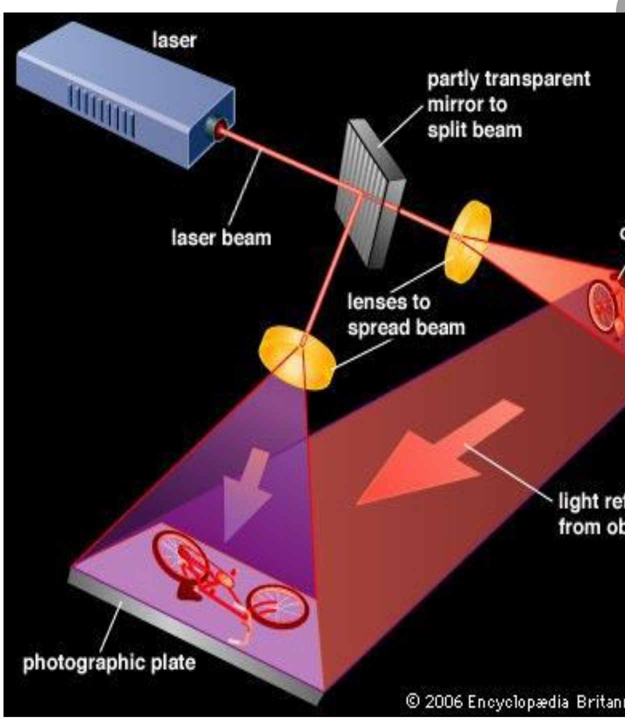

Fig.2.working of hologram

2.2 Retinal Display or Virtual Retinal Display.

This category of screenless display the images directly on the retina of humans eye. In this, the light is not reflected from any intermediate object, as it is directly projected on retina of eye. Thus this makes retinal display different from visual image. The visibility of images is limited to the aforesaid person only and the user feels that the images are floating in the air. Hence it can also be called as personal display. This property of retinal display makes it highly secure, safe and private. One of the best example of retinal display is Google Glass.

Google Glass is just like traditional glass. It consist of blockof glass on one eye that allows user to see amplified reality. Images as well as text and information about objects and places are displayed right in front of the user's eye. Retinal display is in its early stage of progress. Many companies are working on it to make it evolve.[3]

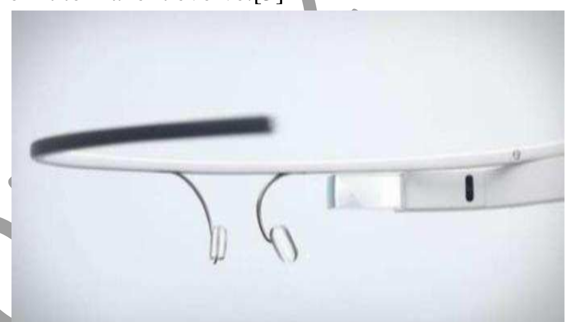

Fig. 3 Example of retinal display

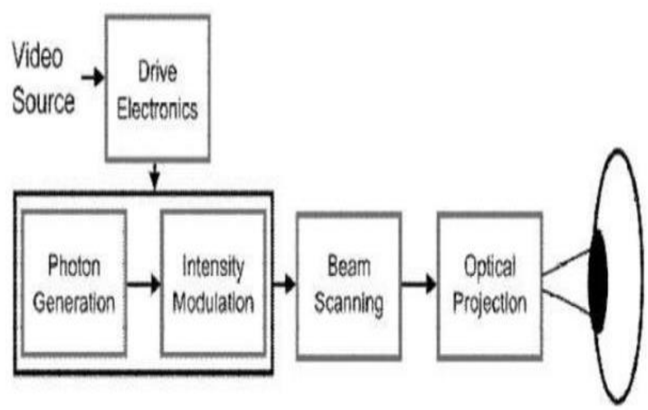

Fig.4Block diagram of retional display

A block diagram of virtual retinal display is shown above. Block diagram of the virtual retinal display consists of photon generation, intensity modulation, beam scanning, optical projection and drive electronics. Photon generation block generates the coherent beam of light; this photon source makes use of the laser diodes as coherent source with retinal display to give a diffraction onto the retina of the human eye. The light generated from photon source is intensity modulated. The intensity of the light beam gets modulated to match the intensity of the image.[4]

The resulting virtual image may be viewed by using an optical system as is the case with head mounted display or it can also be viewed directly. The virtual image is adjusted to make sure that the eye is able to focuses comfortably. A VRD produces the image on the retina of the users eye instead of projecting a real image.

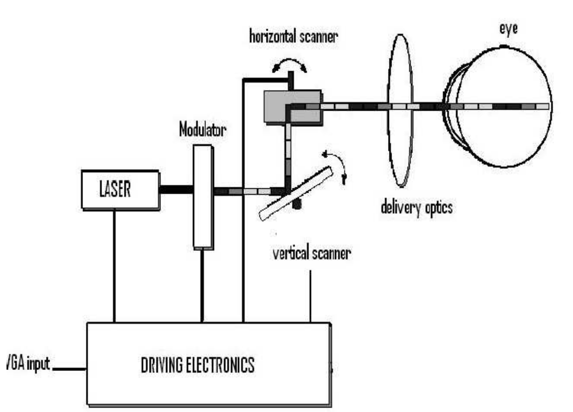

Fig.5 vrd system

A diffraction limited spot is drawn on the retina by the system allowed by the use of coherent source. The intensity of the image being rendered is matched to that of the light beam, by modulating the light beam. The beam is first generated and then modulation can be accomplished. The source can be modulated without delay if it has enough bandwidth, which can be often seen in case of a laser diode. Each pixel is positioned on the retina by scanning the resulting modulation beam.

There are numerous scan patterns. For ex. the scanner can be use in a raster mode like a TV or in a calligraphic mode in which lines that form the images are direct drawn. The VRD can be driven by standard video sources by using the raster method. This is done by moving the beam to draw a row of pixels by using horizontal scanner. Another row of pixel is drawn where the vertical scanner moves the beam to the next line.

The optical beam must be accurately projected into the eye, after scanning. it is also mandatory that the exit pupil of the VRD to be in the same plane with the eyes pupil of the eye and only then image will be formed on the eye. The image position is determined by the angle of incidence to eye. The scanners determine this angle, while brightness is controlled by the intensity modulation. The persistence of eye forms auninterfaring image which is continually rechecked by the modulations. Thus the drive electronics synchronizes the intensity of modulator and the scanners with incoming video signals in such a way that a stable and well organized image is obtained.

2.3 Synaptic Interface or Direct Neural Interface

Synaptic interface deals with sending information directly to the human brain without using any light. This technology was tested on horse shoe crabs.

Synaptic Interface allows direct interaction between the human brain and external devices such as computer or otherelectronic device. Hence is also called as Brain Machine Interface

Synaptic display is a type of screenless display that does not display an image in free media or onto the retina. It displays by transmitting the signals directly into the brain through the optic nerve. There are no light involved, basically electrical impulses. This method is tested on horseshoe crabs by recording nerve images. Therefore, furthering the neural code transmitted to the brain by the optic nerve. This display offers the possibility of providing sight for the blind by using implanted electronics to bypass nonfunctional parts of the eye[] . It can give users the benefit to view images in greater coordination and complexity than the eyes capable of producing. However the method requires more research and development for further production of worldwide application can be implemented.

Fig .6 synapthic interface

PROFESSIONAL IMPACT :
Screenless display technology offers to enable:
- Corporations
- Businesses
- Health-care systems
- Government institutions
- Non-profit organization

To dynamically share the information as it relates to its specific environment. The edge of virtual information being confine to deices of staginess' single monitor display can be replaced by screenless method. That provides the information that is
- Highly portable
- Versatile
- Interactive

The technology can be applied to any production environment by integrating test specific information that will greatly increase the access security of knowledge thereby, generating an efficient and effective manufacturing process which can also provide faster updates of performance matrix and changes.
Screenless display consumes less power which offers in an economical benefit over standard monitor displays. They use less material to produce and no toxic elements like lead, arsenic, mercury and cadmium. The cost of the environmental impact by disposing displays is significantly less. Also virtualized meeting can be organized that saves time and expenses

3. ADVANTAGES &DISADVANTAGES
3.1. Advantages
- 3D images are possible.
- Ability to present far point images.
- High quality and large angle of view are the other vital advantages.
- Light weight and hence greater portability.
- Lower power requirement.

3.2. limitation
- Yet not available in significant number. And is still under progress.
- Cost per unit is high. But is not a permanent disadvantage as the further the technology will develop, the more its cost will be reduced.

APPLICATIONS OF THE SCREENLESS DISPLAY:
1.The main use of the screen less displays are used for the
development of the mobile phones which are mainly used by
the old and blind people as shown in figure . This type of the
invention of the screen less displays was first done on the
mobile phone named OWASYS 2CC. This model is very useful
for the old, blind, and even for the people with less vision power

Fig.7 mobile technology

2.Screen less display's major working principle can also be
implemented in the emerging of the new screen less TV's.
Imagine that watching the TV picture that seems to be
magically appearing in the thin air. The picture just floats on in
front of the viewer; this would be a latest emerging technology
in the future as depicted in figure

Fig.8 magical display in the air

4. CONCLUSION

This paper discusses the benefits and drawbacks of virtual and screenless displays and the technology which it incorporates. Though the current technology is crude, one may expect great advancements in the near future. Its advantages are light weight, portable, lower power requirement. Yet, looking at the flip side of the coin, its disadvantages are presently only in rudimentary stages, heavy on the pocket. Its uses confirms the fact that it will be a new outlook to the virtual world, which includes- hardcore gaming, heads up displays and scientific research. This technology is constantly evolving, thus it signifies the great advancements that humans are making in everyday science. With all that it will revolutionize, screenless displays look ready to start a generation in the lineage of projections, the screenless generation!

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