



## Screenless Display-A New Computing Technology

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### ABSTRACT:

This paper discusses about a new computing technology i.e, Screenless display, has become a good prospect in the near future for a wide range of applications. The idea behind this technology is displaying the image without physical screens like projector, LCD etc. This paper is survey paper which demonstrates how the screen less displays works and its applications in various fields of science. Using this display, we can directly project images onto the retina of human, free space and to the brain of human. It does not require high weight device and it will provide privacy at a high rate.

**Keywords-** Hologram, VRD, LCD, Screenless.

### I. INTRODUCTION

Screenless display is nothing but a display that could be shot at anywhere the user wishes to have a screen. It can be anywhere such as on wall or in open space<sup>[1]</sup>. Nowadays technology is changing very drastically in existing machines or tools in order to solve problem at higher level. It can also be said that screenless display is a life-changing concept and also one of the most interesting topic for research. This technology solves the problem of space of display in one place. It is a system of displaying information/data through an electronic video source without using screen at all. Screenless display is the present evolving computer-enhanced technologies. It will surely be the one of the greatest technological development in the future years. Several patents are still researching on this new technology which can change the whole view of the displays.

Screenless Display was an excellent thought that came into many experts in order to solve the major problems related to the size of the device. Lower space screen displays have made the need of screenless displays more than ever. Screenless, by the word clearly means 'no screen'. So, Screenless Displays can be defined as a display which helps to display and even transmit any information without the aid of screens<sup>[2]</sup>.

There are several types of screenless display that are under development which will describe-

- Visual Image display
- Retinal Direct display
- Synaptic Interface

### II. HISTORY BEHIND SCREENLESS DISPLAY

Reto Meier, an "Android Developer Advocate for Google" recently laid out a fairly science-fiction account of where computer (or at least mobile) interfaces are headed<sup>[6]</sup>.

Working on the average laptop is like working on a desk that's as big as a sheet of paper. That's why all our "files" are quite inch high. The solution to productivity and immersion is more, bigger screens - hence the proliferation of external monitors, another secondary reading devices and even cellphones with improbably large screens. So-called "Pico" projectors that are named for their tiny size already exist and also the HD version of it exists. And there are lot many mobile phones, which have built-in picoprojectors such as the Samsung Show, - so outside of market demand there's nothing to stop this prediction from becoming a truth<sup>[3]</sup>.

### III. VISUAL IMAGE

Visual image are wise known as hologram, is display an image that is reflected by a substance than proceed by human eye. The display works on the principle that; light gets reflected by the intermediate object before it could reach to the retina<sup>[4]</sup>. The intermediate object can be holograms, windows, or even LCDs. Example of this type of display is Displayers' air screen technology-The Displayers' air screen projects images onto sheets of water droplets suspended in air, giving the illusion of a hologram. In cold fog projecting technologies, the images thrown by Displayer can be also respond rapidly

to multi-touch manipulation, as well as it can also allow taste and aroma to be incorporated. IO2 technology also develops a similar display called the helium display which uses a micro-size airbase media to create images in free space<sup>[8]</sup>.

Another example is Google Glass, which is virtual reality goggles. This technology is a type of augmented reality visual image display that displays images right in front of our eyes. Besides, we have expanded in developing the displays for wearable contact lenses<sup>[5]</sup>.



Figure 1. Visual image

#### A. HOLOGRAM

This form of photography provides a three-dimensional image, and some technologies now create images using lenses, helium neon and holographic film. The word *holography* comes from the Greek words *λόος* (*hólos*; "whole") and *γραφή* (*graph*; "writing" or "drawing")<sup>[3]</sup>. A 3D image will be projected and appears in the air whenever the laser and object beams overlap with each other. Holograms provide high-quality images and videos and the image can be viewed by human eye that does not need any special observation device<sup>[10]</sup>.

#### B. WORKING OF HOLOGRAM

Holograms 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.

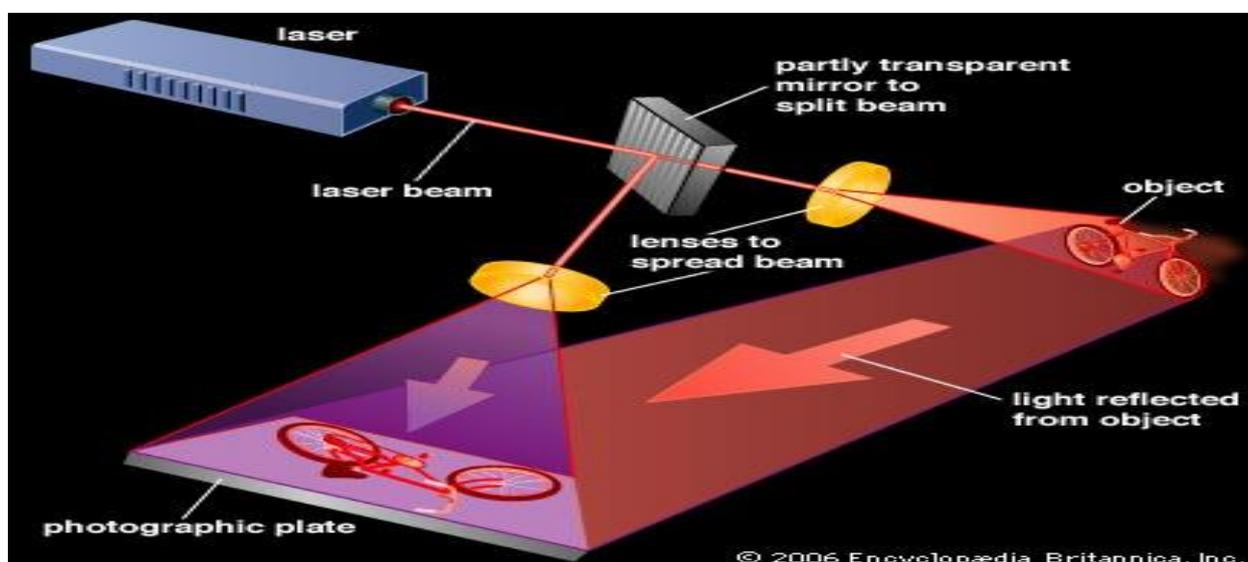
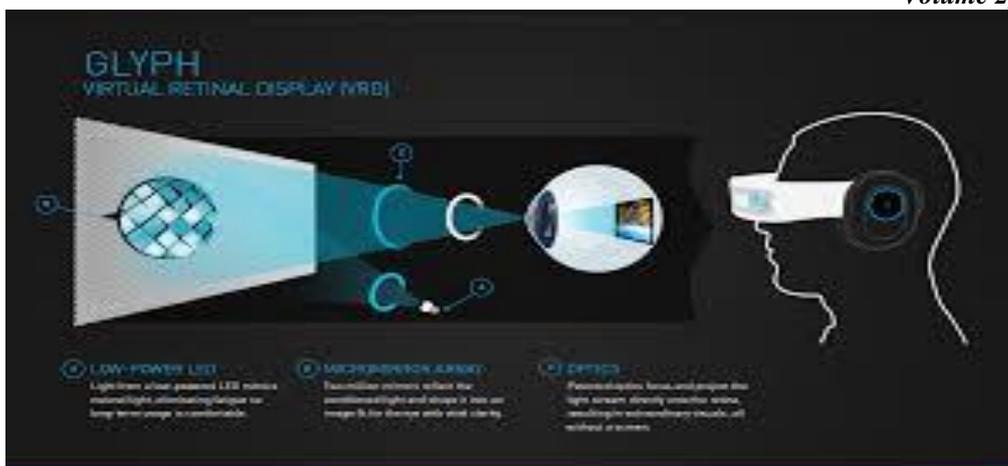


Figure 2. Working of Hologram

#### IV. RETINAL DISPLAY

Retinal display (VRD) is a screenless display that projects light directly on to the eyes mechanism of sight- the retina of the eye, instead of image being reflected by any substance. This can create an effect of viewing an image from several feet away or a wider and clearer view of any object using special lasers or LEDs to scan light essentially into the optic nerve by mixing primary colors<sup>[7]</sup>. The same concept applies to the computer monitor which focuses the viewed image onto the retina to be converted into signals for the brain by the optic nerve however VRD is more efficient and effective<sup>[9]</sup>.

Glyph has also developed a Virtual Retinal Display. It also uses a MEMS (microelectromechanical system) type system. As shown in the figure 3.



**Figure 3. Glyph - Virtual Retinal Display**

#### **A. APPLICATION**

- 1) **Medical field:** By allowing the physician to view a virtual X-Ray of infected areas information concerning the patient during surgery. Virtual images produced by VRD could be layed-down with the patient by tracking the view of the physician in relation to the position of the patient.
- 2) **Manufacturing field:** The same concept as that is used in medical field can be used in manufacturing environment by viewing virtual blue print that uses C3 images to identify parts placement and operation information.
- 3) **Transportation system:** It can be beneficial in any transportation system by proving the display that can project virtual map of the surrounding area therefore insiding vision of providing reference state train characteristics and craft instrumentation

#### **V. SYNAPTIC 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<sup>[10]</sup>. 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.



**Figure4. Synaptic Interface**<sup>[10]</sup>

#### **VI. 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.

## **VII. CONCLUSION**

These displays are the future that would reach the world of all organizations and institutions by presenting the brighter and efficient and cost effective means of communication, fundamentally revolutionizing the approach to comprehending information. It will going to bring a revolution in the field of displays and will replace the current display technology that is touch-based. And also this screenless display technology promises of cost effective devices which will provide better privacy as compare to the present display devices.

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