

Screen less Display

Parimal S. Bhosale, Kulkarni Niraj Rajeev, Kurkute Shubham Sanjay

Department of Computer Engineering, Zeal College of Engineering and Research, Pune, Maharashtra, India

ABSTRACT

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The Screenless display which is an emerging new technology, has become a good prospect in the near future for a wide range of applications. As the name implies it deals with the display of several things without the use of screens using projector. It involves the following 3 different working principles. The Visual image, Virtual retinal display, Synaptic interface. This paper mainly illustrates and demonstrates how the screen less displays works and its applications in various fields of science.

This technology would bring about the revolution in the field of displays and monitors that are costly, huge and are proven difficult to manage the power requirements and constraints. It is also the futuristic technological innovation.

Keyword - Foot, Hologram, Hand, LCD, Screenless, voice.[1]



I. INTRODUCTION

Screenless display is the present evolving technology in the field of the computer-enhanced technologies. It is going to be the one of the greatest technological development in the coming future years. Several patents are still working on this new emerging

technology which can change the whole spectacular view of the screenless displays. Screen less display technology has the main aim of displaying (or) transmitting the information without any help of the screen (or) the projector. Screen less displays have become a new rage of development for the next GEN-X. Screenless videos describe systems for transmitting

visual information from a video source without the use of the screen. Screen less computing systems can be divided mainly into 3 groups: Visual image Retinal direct Synaptic interface.[2]

Screenless display is nothing but a display which can be shot at any place wherever the user wishes to have the screen. It can be at any direction or place such as on the wall or in the open space. Nowadays the technology is changing very rapidly in the existing machines and in the tools in order to solve the problem at the high level. It would be not wrong in saying that the Screenless display technology would be a life-changing concept and also one of the most interesting topics for the research. This technology also solves the problem of the 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 technology is the present evolving computer-enhanced technologies. [9]It will surely be the one of the greatest development in the field of technology in the upcoming future. Several patents are still researching on this new technology which can change the whole view of the displays. Screenless Display Technology was such an excellent thought that had come into many experts in order to solve the major problems related to the size of the device. For less space taking 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 help of screens. There are many types of Screenless display that are under development which are described below- * Visual Image display * Retinal Direct display.[3]

II. LITERATURE REVIEW

In 2013 screenless display market has witnessed factual growth and according to the MIT latest technology review, it has become a new rage of

development for the next GEN-X .Screenless display was first introduced by the mobile phone named OWASYS 2CC [8]. Google, Microsoft, Apple, Kapsys, Displair and Avegant are the key players in the global market, hence several researches renowned IT sector companies are being driven for the future development of this emerging new technology such as mobile phones for elderly, blind people, bionic contact lenses, virtual reality headsets and holograms [4]. Google is researching more on screenless tablet computers and smartphones, Google Glass and Cardboard Virtual Reality use the concept of screenless display. In cardboard, two polarized lenses show two images, which helps the brain combines to create a 3D image. Given the illusion of depth the brain offers a type of virtual reality. Goggle offers another wearable way to interact with screenless display which is named Google glass and anyone can wear it [9]. Therefore, using virtual retinal display several companies had already raised with the aim of commercializing personal gaming and cinema devices. In the field of the hologram projection screenless displays are also broadly applicable because holographic images can be generated in three dimensions [6]. Recently researchers at Swinburne University of Technology have discovered nanoscale pixels of refractive index through a photonic process and found the capacity of a technique using graphene oxide [5] and complex laser physics to create a pop-up tiny floating 3D holographic image which is visible to the opened eye. Graphene enabled floating display is based on the principle of holography because it is a two dimensional carbon material with extraordinary electronic and optical properties. Though there is no limitation for the up scalability of graphene 3D display it can allow images up to 1cm only.[10]

III. WHAT IS SCREENLESS DISPLAY TECHNOLOGY

The screenless display technology is used to transfer or display information without using a screen. The advancement in the field of screenless displays would lead to the replacement of touch screen displays by screenless ones in the near future. Screenless displays are a part of an emerging technology in the field of displays that are likely to be a game changer and would change the way displays are used. In due course of time, hardware component is expected to become economical. This technology is not developed fully till now and is available in a limited range of products.[9]



IV. TYPES OF SCREENLESS DISPLAY TECHNOLOGY

1. Visual Image Screenless Display
2. Retinal Direct Display
3. Synaptic Display

Visual Image Screenless Visual Image screen less display includes any screen less image that the eye can perceive The following are few examples of the visual image display: holographic display, virtual reality goggles, heads up display, etc. The working principle of this display states that the light gets reflected by the intermediate object before reaching the retina or the eye.. By using the components like Helium Neon Laser, an object, a Lens, a holographic film and mirror, the Holographic Displays display the three dimensional (3D) images. A 3D image will be projected and appears to be floating in the air whenever the laser and object beams overlaps with each other.[14]

Hologram The most common example of Visual Image screenless display is Hologram. Holograms were used mostly in telecommunications as an alternative to screens. Holograms could be transmitted directly, or they could be stored in various storage devices (such as holo discs) the storage device can be hooked up with a holo projector in order for the stored image to be accessed.

Retinal Direct Display Retinal display as the name itself indicates the display of image directly onto the retina. Instead of using some intermediate object for light reflection to project the images, this display directly projects the image onto the retina. The user will sense that the display is moving freely in the space. Retinal display is commonly known as retinal scan display and retinal projector. This display allows short light emission, coherent light and narrow band color. The user sees what appears to be a conventional display floating in space in front of them. A virtual retinal display (VRD), also known as a retinal scan display (RSD) or retinal projector (RP), is a display technology that draws a raster display directly onto the retina of the eye.[10]

Synaptic Display Synaptic Interface screen less video does not use light at all. Visual information completely bypasses the eye and is transmitted directly to the brain. This technology is already tested on humans and most of the companies started using this technology for effective communication, education, business and security system. This technology was successfully developed by sampling the video signals from horse crab eyes through their nerves, and the other video signals are sampled from the electronic cameras into the brains of creatures.



V. SCREENLESS DISPLAY

Screenless display is the present evolving technology in the field of the computer-enhanced technologies. It is going to be the one of the greatest technological development in the coming future years [1]. Several patents are still working on this new emerging technology which can change the whole spectacular view of the screenless displays. Screen less display technology has the main aim of displaying (or) transmitting the information without any help of the screen (or) the projector. Screen less displays have become a new rage of development for the next GEN-X. Screenless videos describe systems for transmitting visual information from a video source without the use of the screen. Screen less computing systems can be divided mainly into 3 groups:

- Visual image
- Retinal direct
- Synaptic interface

A. VISUAL IMAGE

Visual Image screen less display includes any screen less image that the eye can perceive as shown in figure 1 and 2. The most common example of Visual Image screen less display is a hologram.



HOLOGRAM Holograms were used mostly in telecommunications as an alternative to screens. Holograms could be transmitted directly, or they could be stored in various storage devices (such as holodiscs) the storage device can be hooked up with a holo projector in order for the stored image to be accessed.[15]

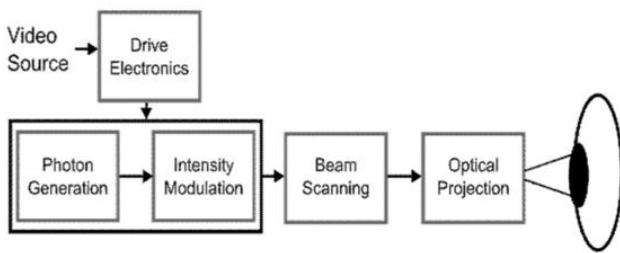


Debatably, virtual reality goggles (which consist of two small screens but are nonetheless sufficiently different from traditional computer screens to be considered screen less) and heads-up display in jet fighters (which display images on the clear cockpit window) also are included in Visual Image category. In all of these cases, light is reflected off some intermediate object (hologram, LCD panel, or cockpit window) before it reaches the retina. In the case of LCD panels the light is refracted from the back of the panel, but is nonetheless a reflected source. The new software and hardware will enable the user to, in effect; make design adjustments in the system to fit his or her particular needs, capabilities, and preferences. They will enable the system to do such things as adjusting to users' behaviors in dealing with interactive movable type.[12]

B. RETINAL DISPLAY

Virtual retinal display systems are a class of screen less displays in which images are projected directly onto the retina as shown in figure 3. They are distinguished from visual image systems because light is not reflected from some intermediate object onto

the retina; it is instead projected directly onto the retina. Retinal Direct systems, once marketed, hold out the promise of extreme privacy when computing work is done in public places because most inquiring relies on viewing the same light as the person who is legitimately viewing the screen, and retinal direct systems send light only into the pupils of their intended viewer.



C. SYNAPTIC INTERFACE

Synaptic Interface screen less video does not use light at all. Visual information completely bypasses the eye and is Transmitted directly to the brain. While such systems have yet to be implemented in humans, success has been achieved in sampling usable video signals from the biological eyes of a living horseshoe crab through their optic nerves, and in sending video signals from electronic cameras into the creatures' brains using the same method as illustrated in figure 4.

VI. ADVANTAGES AND DISADVANTAGES OF THE TECHNOLOGY

ADVANTAGES:

Low power requirements- Only six diodes are required and a few of a watts to deliver their images to the user's eyes.

Higher resolution images- The pixels in the images projected by the diodes can be made smaller than is possible with any CRT or flat panel display, so higher resolution can be achieved. With retinal projectors, the only limitation in the resolution of visual images will be the resolving power of the users' eyes.

Greater portability- The combination of diodes, lenses, and processing components in a retinal projector system will weigh only a few ounces.

Wider angle of view- Retinal projectors will be able to provide a wider field of view than is possible with display screens.

More accurate color- By modulating light sources to vary the intensity of red, green, and blue light, retinal provide a wider range of colors and more fully saturated colors than any other display technology.

Greater brightness and better contrast- Retinal projectors can provide higher levels of contrast and brightness than any other display system.

Ability to present 3D images- With their capability of presenting high definition image-pairs, retinal projectors can deliver the most highly realistic stereoscopic movies and still pictorial images to their users.

Ability to present far-point images- The human visual system is a far-point system. With today's desktop and laptop computers users must employ their near-point vision. The excessive use of our near-point vision in using computers, reading, sewing, playing video games, etc., is making myopia a very common impediment. The use of the far-point images that can be provided by retinal projector systems could reduce the incidence of myopia and, hence, the growing need for and use of eyeglasses see.

Lower costs- The present cost of retinal projector systems is high. Nevertheless, there are no hard-to-overcome manufacturing problems in mass-producing and low-cost components, so inexpensive systems will soon become available. Environmental and disposal costs of these tiny delivery devices will also be minimal because toxic elements such as lead, phosphorus, arsenic, cadmium, and mercury are not used in their manufacture.

Disadvantages:

The principle disadvantage is that Virtual retinal display:

- The (VRD) is not yet present in the significant quantity.
- Prototypes and special experimental models are now created, but their cost per unit is high.
- The VRD technology comes under the progress and Development.

VII. FUTURE ENHANCEMENTS

For the futuristic development of this evolving new technology, several researches are being organized

and the several well-known IT sector companies and the other best labs that are present in the world are handling over the project of the Screenless display technology.

- In year 2001 Microsoft had begun to work on an idea for an Interactive table that mixes both the physical and the Virtual worlds. · Multi touch is an interaction technique for human - computer and the hardwired devices that apply it, which allows users to compute it without any conventional input devices.
- Development & enhancement of the micro vision also gives the revised and the futuristic view of the screen less displays. This technology of the micro vision is the very well useful in the Artificial Retinal Display properties.
- Japanese scientists have invented the pair of intelligent Glasses that are able to remember last time where people saw their keys, Hand-bags, iPods, and mobile phones.
- Some laboratories are working under progress on the electron beam lithography which includes the advanced improvement of the innovative screen less display.
- Adobe systems are also working on development and arrangement cross stage of the several applications which are to be viewed without the real screen.
- Cool Google is developing the compact video camera which films everything the wearer looks at and it directly sends the information to the glasses hence there is no need of any screen or projector.
- Multi touch is a human computer interaction technique and the hard-wires devices which allow the users to compute without any original input devices.[10]

VIII. MARKET SEGMENTATION

The global screenless display market is segmented on the basis of technology, application, end-user. On the

basis technology the market is segmented as visual image, retinal display, synaptic interface.

On the basis of application the market is segmented as holographic display, head-up display, head-mounted display. On the basis of end-user the market is segmented as healthcare, aerospace, consumer electronics, automotive, others.

IX. CONCLUSION

The report has elaborately discussed screenless displays which is one of the most emerging computer technologies and has become a new exciting rage for the upcoming generations as a field of the futuristic technology. Due to the ability of having several advantages which are involved in the making, designing, coding of the screenless, this needs plenty of knowledge and process for the development is still under the improvement. May be in the future the world may be dominated with the screen less display technologies and this enriches the world of technological empowerment in the field of the computer technology. Screenless displays promises the cost effective aspect and also brighter future in the computer technology.

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