



An Emerging Trends of Holographic Technology and its Future

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Abstract—Holography term comes from the Greek word. HOLO means whole and GRAPHY means to write or to project something. Actually it is the development of Hologram. Holography is the technology which maps the real world into imaginary 3D model. This technology gives the 3D projection of any model without geographic locations. It uses in various movies, Political campaign, medical field and at so many other places. It is going to be the best technology of future.

Keywords-component; Hologram, Holography, 3D Projection, illumination, coherent light beam

I. INTRODUCTION

Holography is a technique that allows the light scattered from an object to be recorded and later reconstructed. The technique to optically store, retrieve and process information. It preserves the 3-D information of a holographic subject [1][2].

Holography is the science and practice of making holograms. Typically, a hologram is a photographic recording of a light field, rather than of an image formed by a lens, and it is used to display a fully three-dimensional image of the holographic subject, which is seen without the aid of special glasses or other intermediate optics[1][3]. The hologram itself is not an image and it is usually unintelligible when viewed under diffuse ambient light. It is an encoding of the light field as an interference pattern of seemingly random variations in the opacity, density, or surface profile of the photographic medium. When suitably lit, the interference pattern diffracts the light into a reproduction of the original light field and the objects that were in it appear to still be there, exhibiting visual depth cues such as parallax and perspective that change realistically with any change in the relative position of the observer[4][6].

In its pure form, holography requires the use of laser light for illuminating the subject and for viewing the finished hologram. In a side-by-side comparison under optimal conditions, a holographic image is visually indistinguishable from the actual subject, if the hologram and the subject are lit just as they were at the time of recording. A microscopic level of detail throughout the recorded volume of space can be reproduced [2]. In common practice, however, major image quality compromises are made to eliminate the need for laser illumination when viewing the hologram, and sometimes, to the extent possible, also when making it. Holographic portraiture often resorts to a non-holographic intermediate imaging procedure, to avoid the hazardous high-powered pulsed lasers otherwise needed to optically "freeze" living subjects as perfectly as the extremely motion-intolerant holographic recording process requires. Holograms can now also be entirely computer-generated and show objects or scenes that never existed.[4][5]

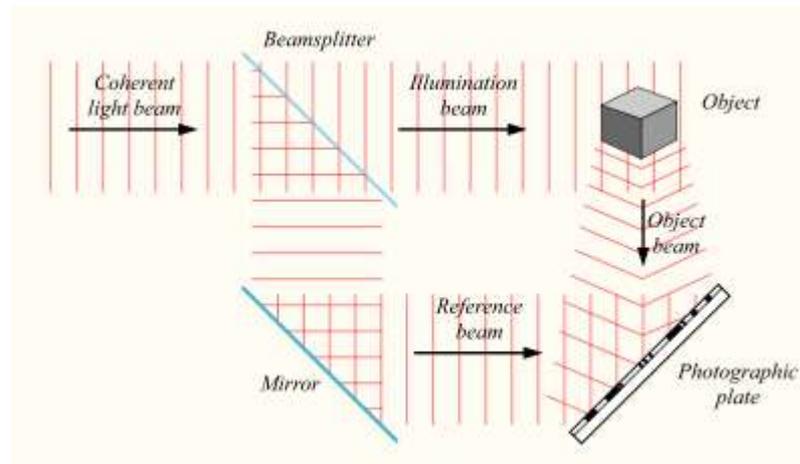


Figure 1. Genration of Holographic Image

This is entirely a Latest and vary unique “Hi-Definition Projection Technology” in which a person is captured in 3-dimensional Aspect with a Sp. Hi-Definition Camera on a specially built Stage and Projected “As Is “at various Distant Locations “At –A – Time”. Viewers at the other end will feel the presence of REAL Person in front of them and also interact with the projected ‘Virtual” person, without wearing any kind of 3D glasses, as they interact with ‘Actual Person [3]

1.1 How 3D Holographic Projection Technology works:

Holography is a technique that enables a light field, which is generally the product of a light source scattered off objects, to be recorded and later reconstructed when the original light field is no longer present, due to the absence of the original objects.[4] Holography can be thought of as somewhat similar to sound recording, whereby a sound field created by vibrating matter like musical instruments or vocal cords, is encoded in such a way that it can be reproduced later, without the presence of the original vibrating matter. A clever reimaging of the Pepper’s Ghost technique lets your magic happen.[6] It starts with the patented foil, completely invisible to the naked eye. Rig it at 45° across the stage and then bounce content off a projector screen. This is then reflected upwards, reflects off the foil and gives the impression of a real 3D volumetric image on stage.

Holographic information storage systems using Collinear Technologies is proposed by Opt ware Corporation, Yokohama, Kanagawa, Japan, and in which the information and reference beams are modulated coaxially by the same spatial light modulator (SLM).[3][4] With this unique configuration, the optical pickup can be designed as small as the DVDs and can be placed on one side of the recording disk. In a Holographic Versatile Disc (HVD) structure, the preformatted metadata reflective layer is used for the focus/tracking servo and reading address information, and the diachronic mirror layer is used for detecting holographic recording information without interfering with the preformatted information. A two-dimensional (2-D) digital page data format is used, and the shift-multiplexing method is employed to increased recording density of HVD.[2] Experimental and theoretical studies suggest that the holographic material is very effective to increased recording density of the system. As the servo technology is being introduced to control the objective lens to be maintained precisely to the disk in the recording and the reconstructing process, a vibration isolator is no longer necessary. HVD will be compatible with existing disk storage systems, like CD and DVD, and enable us to expand its applications into other optical information storage systems [4]

II. APPLICATION

Holography is a very useful tool in many areas, such as in commerce, scientific research, medicine, and industry. [2][3]

Some current applications that use holographic technology are:

- Holographic interferometers are used by researchers and industry designers to test and design many things, from tires and engines to prosthetic limbs and artificial bones and joints.[2][4]
- Supermarket and department store scanners use a holographic lens system that directs laser light onto the bar codes of the merchandise.[2][4]
- Holographic optical elements (HOE's) are used for navigation by airplane pilots. A holographic image of the cockpit instruments appears to float in front of the windshield. This allows the pilot to keep his eyes on the runway or the sky while reading the instruments. This feature is available on some models of automobiles.[2][5]

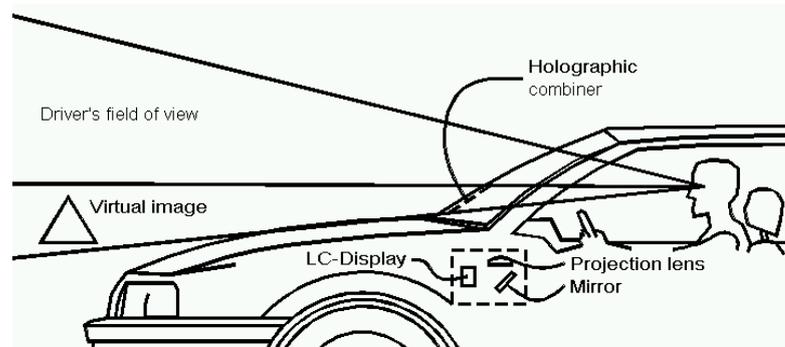


Figure 2. Holography used in automobile sector

- Medical doctors can use three-dimensional holographic CAT scans to make measurements without invasive surgery. This technique is also used in medical education.[2][5]
- Holograms are used in advertisements and consumer packaging of products to attract potential buyers.[2][3]
- Holograms have been used on covers of magazine publications. One of the most memorable Sports Illustrated covers was the December 23, 1992 issue featuring Michael Jordan. Holograms have also been used on sports trading cards.[2][3]
- The use of holograms on credit cards and debit cards provide added security to minimize counterfeiting.[2][4]
- Holography has been used to make archival recordings of valuable and/or fragile museum artifacts.[2][3]
- Sony Electronics uses holographic technology in their digital cameras. A holographic crystal is used to allow the camera to detect the edge of the subject and differentiate between it and the background. As a result, the camera is able to focus accurately in dark conditions.[2][3]



Figure 3. Use of Holographic Technology in Movie

III. CONCLUSION

Holographic Technology and Spectral Imaging has endless applications as far as the human mind can imagine. Holographic Technologies are not just about Art or Business Communication. They are about Safety, Security, Education, Planning and the strength of our civilization here and beyond. Holographic Technology will become a very integral part of human societies and civilizations in the future.

IV. FUTURE

Future color liquid crystal displays (LCD's) will be brighter and whiter as a result of holographic technology. Scientists at Polaroid Corp. have developed a holographic reflector that will reflect ambient light to produce a white background Holographic night vision goggles [4][5][6]

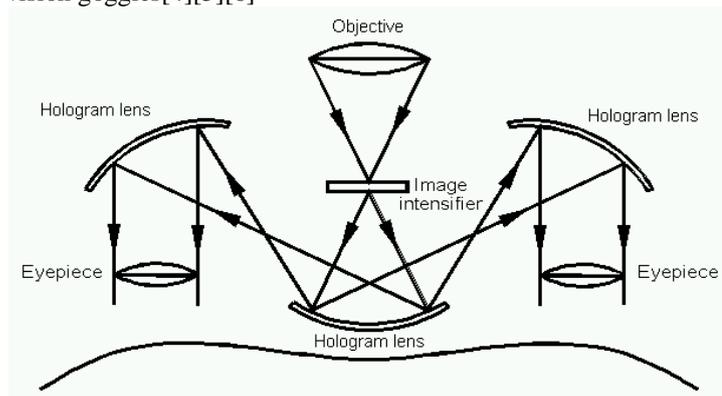


Figure 4. Holography night vision Goggles

Many researchers believe that holographic televisions will become available within 10 years at a cost of approximately \$5000. Holographic motion picture technology has been previously attempted and was successful in the 1970s. The future of holographic motion pictures may become a reality within the next few years. [4][5][6]

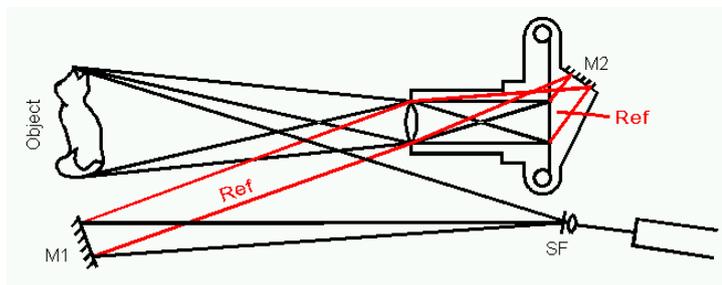


Figure 5. Holographic motion pictures

Holographic memory is a new optical storage method that can store 1 terabyte (= 1000 GB) of data in a crystal approximately the size of a sugar cube. In comparison, current methods of storage include CD's that hold 650 to 700 MB, DVD's that store 4.7 GB, and computer hard drives that hold up to 120 GB. [2][3]

Optical computers will be capable of delivering trillions of bits of information faster than the latest computers [3]

In general, all displays like televisions, mobile phone displays, projector displays will be replaced by holographic displays. [4]

REFERENCE

- [1] Ahmed Elmorshidy, "Holographic Projection Technology: The world is Changing." ;Journal of Telecommunications, Volume 2, Issue 2, MAY 2010
- [2] Thomas J. Naughton " Capture, Processing and display of Real-World 3D Objects using digital Holography", IEEE invited Paper, 2010
- [3] Takayuki Hoshi " Touchable Holography", The university of Tokyo, 2009
- [4] Stephan Reichelt, Ralf Haussler, Norbert Leister, Gerald Futterer, Hagen Stolle and Armin Schwedtner " Holographic 3-D Displays – Electro-Holography within the Grasp of Commercialization", 2010
- [5] G. Eason, B. Noble, and I. N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. (references)
- [6] J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.