

# 3D Hologram and Laser Technology: A Review

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**Abstract:** The holographic projection is a kind of 3D technology of without wearing any glasses, and viewers can see the three-dimensional virtual character. This is a new technology of Holographic Projection. It highlights the importance and need of this technology and how it represents the new wave in the future of technology and communications, the different application of the technology, the fields of life it will dramatically affect including business, education, telecommunication and healthcare. The paper also discusses the future of holographic technology and how it will prevail in the coming years highlighting how it will also affect and reshape many other fields of life, technologies and businesses. We can often see the three -dimensional holographic communication technology in science fiction movies, using the principle of three dimensional computer graphics, and the distant person or thing can be projected in the air in the form of three-dimension.

**Key words:** *Holographic, Projection*

## I. INTRODUCTION

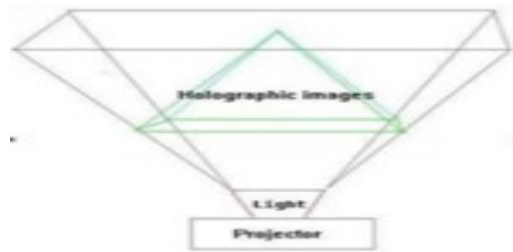
It can often see the three dimensional holographic communication technology in science fiction movies, using the principle of three-dimensional graphics, and the distant person or thing can be projected in the air in the form of three-dimensional. With the development of science, all the equipment are miniaturization and precision, while the display device cannot match, and people have a demand for a new display technology to solve the problem. The 3D holographic projection is precisely as this role. The word hologram is composed of the Greek terms, 'holos' for 'whole view'; and gram meaning 'written'. A hologram is a three -dimensional record of the positive interference of laser light waves. A technical term for holographic is wave front reconstruction. Dennis Gabor, the Hungarian physicist working on advancement research for electron microscopes, discovered the basic technology of holography in 1947. However, the technique was not fully utilized until the 1960s, when laser technology was perfected. 3D Holographic Technology (3DHT) created in 1962. Holography, means of creating a unique photographic image without the use of a lens. The photographic recording of the image is called a Hologram, which appears to be an unrecognizable pattern of stripes and whorls but which when illuminated by coherent light, as by a laser beam organizes the light into a three dimensional representation of the original object. 3D Holographic projection technology is the new sign of future technology and communications. This technology first received attention worldwide on 2008 when Prince Charles addressed the World future energy summit and made his first appearance as a hologram in a bid to reduce the royal carbon footprint. In past , American leader AI Gore launched Live Earth Tokyo in a high-tech, virtual way hologram using Holographic Projection. This technology has been used widely to launch the products and create fun. The 3D holographic projection technology is also known as "Mission Eyeliner" – is a variation on the Pepper's Ghost stage illusion. Here, the images used are three -dimensional images, but projected as two- dimensional images(2D/3D) into a 3D stage set, therefore the mind of the audience create the 3D illusion. Subjects are filmed in HDTV and broadcast on to the foil through HDTV projection systems, driven by HD Mpeg 2 digital hard disc are minimal, needing only the single camera lenses for filming and a single projector for the playback hence the phrase, "Glasses-free viewing". With the different application of this technology, it will dramatically affect all the fields of life including business, education, telecommunication and healthcare.

## IMPORTANCE AND NEED OF HOLOGRAM:

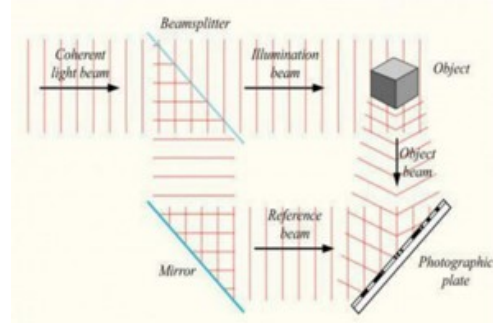
The public has embraced this experiences in atleast the days of stereoscopes, at the turn of the last century. New excitement, interest, and enthusiasm then came with the 3D movie craze in the middle of the last century, followed by the fascinations of holography, and most recently the advent of virtual reality. The increasing interest and popularity are due to many factors. In our daily lives, we are surrounded by synthetic computer graphic images both in principle and on television. We also regularly see holograms on credit cards and ventricular displays. The holographic projection is a kind of 3D technology of without wearing glasses, and viewers can see the three-dimensional virtual character. This technology is more in some applications.

## 3D HOLOGRAM SYSTEM WORKING AND PRINCIPLE

360 degree phantom imaging is a three-dimensional screen that imaging is suspended in mid air imaging in the real, creating magic and real atmosphere, and the effect is peculiar, with a strong sense of depth. 3D holographic projection is the technology that record and reproduce objects in real 3D image with using of interference and diffraction theory. Holographic projection schematic is been shown in fig:



Basic tools required to make a hologram includes a red lasers, lenses, beam splitter, mirrors and holographic film. Holograms are recorded in darker environment; this is to avoid the noise interference caused by other light sources. The recording of hologram is based on the phenomenon of interference. It requires a laser source, a plane mirror or beam splitter, an object and a photographic plate. A laser beam from the laser source is incident on a plane mirror or beam splitter. As the name suggests, the function of the beam splitter is to split the laser beam. One part of the split beam, after reflection from the beam splitter, strikes on the photographic plate. This beam is called recording.



Reconstruction Basic tools required to make a hologram includes a red laser, lenses, beam splitter, mirrors and holographic film. Holograms are recorded in a darker environment; this is to avoid the noise interference caused by other light sources. The recording of a hologram is based on the phenomenon of interference. It requires a laser source, a plane mirror or beam splitter, an object and a photographic plate. A laser beam from the laser source is incident on a plane mirror or beam splitter. As the name suggests, the function of the beam splitter is to split the laser beam. One part of the split beam, after reflection from the beam splitter, strikes on the photographic plate. This beam is called the reference beam. While the other part of the split beam (transmitted from the beam splitter) strikes on the photographic plate after suffering reflection from the various points of the object. This beam is called the object beam. To play back a

hologram, the interference pattern of the original hologram is reproduced, and a coherent beam of light (typically having the same wavelength as the original laser illumination source) is directed onto the pattern along the same direction as was the reference beam. This construction beam is diffracted from the interference pattern, and thereby reproduces the 3D image in formation of the subject of the hologram. For us, a glowing but seemingly solid image suddenly appears floating in space.

#### TYPES OF HOLOGRAMS:

A hologram is a recording in a two- or three-dimensional medium of the interference pattern formed when a point source of light (the reference beam) of fixed wavelength encounters light of the same fixed wavelength arriving from an object (the object beam). When the hologram is illuminated by the reference beam alone, the diffraction pattern recreates the wave fronts of light from the original object. Thus, the viewer sees an image indistinguishable from the original object. There are many types of holograms, and there are varying ways of classifying them. For our purpose, we can divide them into two types: reflection hologram, and transmission holograms.

#### REFLECTION HOLOGRAM

The reflection hologram, in which a truly three-dimensional image is seen near its surface, is the most common type shown in galleries. The hologram is illuminated by a "spot" of white incandescent light, held at a specific angle and distance and located on the viewer's side of the hologram. Thus, the image consists of light reflected by the hologram. Recently, these holograms have been made and displayed in color their images optically indistinguishable from the original objects. If a mirror is the object, the holographic image of the mirror reflects white light.

#### TRANSMISSION HOLOGRAMS

The typical transmission hologram is viewed with laser light, usually of the same type used to make the recording. This light is directed from behind the hologram and the image is transmitted to the *observer's* side. The virtual image can be very sharp and deep. Furthermore, if a diverged laser beam is directed a real image can be projected onto a screen located at the original position of the object. backward (relative to the direction of the reference beam) through the hologram, a The advantage would be afforded if the need could be fulfilled to provide such simultaneous viewing in which each viewer could be presented with a uniquely customized auto stereoscopic 3D image that could be entirely different from that being viewed simultaneously by any of the other viewers present, all within the same viewing environment, and all with complete freedom of movement therein. A high resolution three dimensional recording of an object. Another feature is that these are glasses free 3D display. This 3D technology can accommodate multiple viewers independently and simultaneously, which is an advantage no other 3D technology can show. The 3D holographic technology does not need a projection screen. The projections are projected into midair, so the limitations of screen are not applicable for 3D holographic display

#### HOLOGRAM PROPERTIES

Appears as a real object from different angles. Usually just look like a sparkly picture or smears of color. Each entire holographic image.

#### CONCLUSION:

Holography may still be in its infant stage, but its potential applications are aspiring. Holographic Technology and Spectral Imaging has endless applications, as far as the human mind can imagine. Holography being the closest display technology to our real environment may

just be the right substitute when reality fails. With holography, educational institutions may become a global village sooner than people thought, where information and expertise are within reach. Knowledge sharing and mobility will only cost a second and learning will become more captivating and interactive. First, there is an urgent need to address the infrastructural deficiencies limiting the application of holography in education.

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