

# 3D Holograph Projection - Future of Visual Communication

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**Abstract** - 3D Holographic projection technology is the new sign of future technology and communications. This technology first received attention worldwide in 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 Al Gore launched Live Earth Tokyo in a high-tech, virtual way – as a 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 "Musion Eyeliner." Musion 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 Mpeg2 digital hard disc players, or uncompressed full HDTV video players. This means that production costs 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.

**Keyword** - 3D Holograph, 3D virtual Communication, Holographic communication

## 1. Introduction

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 holography 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 by scientists in both the United States and the Soviet Union. However, 3DHT has advanced notably since the 1980s owing to low-cost solid-state lasers that became

easily accessible for consumers in devices such as DVD players. The way 3DHT operates is by creating the illusion of three-dimensional imagery.

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.



Fig.1.1 Holographic image

A hologram is a 3 dimensional recreation of an image created using light imagery floating in space giving perspective and depth. Unlike a stereoscopic 3D image, which gives perception of depth of a photograph or video, holographic projection is a manifestation of the physical object which can be placed in a theatrical stage space or installation space. Although this is an indication of lack of early adoption of holographic, the technology maturity played a large part in recent adoption and popularity.

Holographic projection is the new wave of technology that will change how we view things in the new era. It will have tremendous effects on all fields of life including business, education, science, art and healthcare. Holography is the method we use to record

patterns of light. These patterns are reproduced as a three-dimensional image called a hologram. Three-dimensional holographic projection technology is loosely based on an illusionary technique called Pepper's Ghost, and was first used in Victorian theatres across London in the 1860s. Pepper's Ghost was typically used to create ghostlike figures on stage. Hidden from the audience's view, an actor dressed in a ghostly costume would stand facing an angled plate of glass. The audience would be able to see the glass, but not the actor directly. 3D holographic projection is a rapidly growing technology. With every business desperately trying to get their product to stand out from the competitors, 3D hologram advertising and promotion is fast becoming an eye catching success. A holoprojector will use holographic technology to project large-scale, high-resolution images onto a variety of different surfaces, at different focal distances, from a relatively small-scale projection device.

## 2. Importance and Need of Holographic Projection

A concurrent continuing need for such practical auto stereoscopic 3D displays that accommodate multiple viewers independently and simultaneously. A particular 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. Yet another urgent need is for an unobtrusive 3D viewing device that combines feedback for optimizing the viewing experience in combination with provisions for 3D user input, thus enabling viewing and manipulation of virtual 3D objects in 3D space without the need for special viewing goggles or headgear. In view of the ever-increasing commercial competitive pressures, increasing consumer expectations, and diminishing opportunities for meaningful product differentiation in the marketplace, it is increasingly critical that answers be found to these problems. Moreover, the ever-increasing need to save costs, improve efficiencies, improve performance, and meet such competitive pressures adds even greater urgency to the critical necessity that answers be found to these problems.

### Hologram properties

- Appears as a real object from different angles
- usually just look like sparkly pictures or smears of color
- Each cut views the entire holographic image.

## 3. Working of 3d Holographic Projection Technology

This is entirely a Latest and vary unique Hi Definition 3D Projection Technology in which a person is captured in 3Ddimensional 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 projected "Virtual" person, without wearing any kind of 3D glasses, as they interact with 'Actual Person'.

### How 3d holographic projection technology works

Holography is a technique that enables a light field, which is generally the product of a light sources 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. 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. It starts with the patented foil, completely invisible to the naked eye. Right at 45° across the stage and the bounce content off a projector screen. This is then reflected upwards, reflects off the foil and give s the impression of a real 3D volumetric image on stage. A hologram is recorded by exposing a light-sensitive sensor (for example, photographic film, or a high-resolution CCD) simultaneously to a coherent beam of light and the reflection of that beam of light from the scene being recorded. The sensor records not an image of the scene, but the interference (typically taking place at the surface of a sheet of film) between the image and the original coherent light. This interference pattern contains all the information in the light field at the sensor.

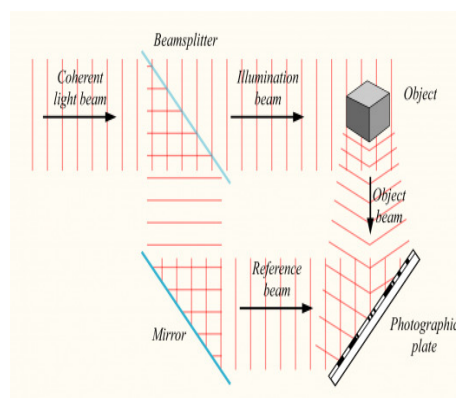


Fig.3.1 Recorded hologram from coherent beam of light

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. The reconstruction beam is diffracted from the interference pattern, and thereby reproduces the 3D image information of the subject of the hologram. For us, a glowing but seemingly solid image suddenly appears floating in space.

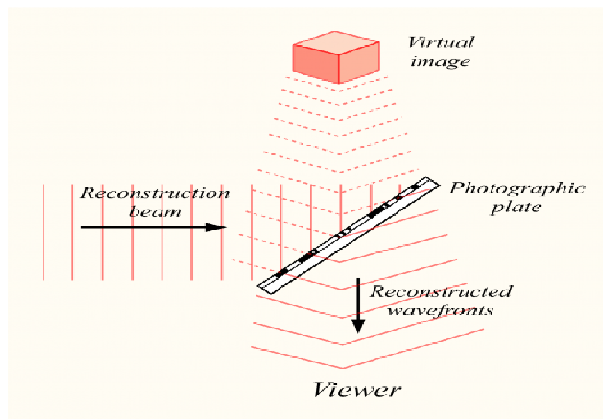


Fig.3.2 Appearance of Virtual Image through reconstructed waveforms

With video displays being of considerably greater value than static 3D picture frames, a dynamic substitute for photographic film has long been sought, with varying degrees of success. An active holographic display is based on a spatial light modulator (SLM), a device that changes the intensity and/or the phase of a beam of light. A simple example is an overhead projector, wherein the transparency acts as an SLM.

#### 4. Display Setup

Display setup need ideally minimum height of 9 ft and footprint of 10 ft square to show full size human figure.

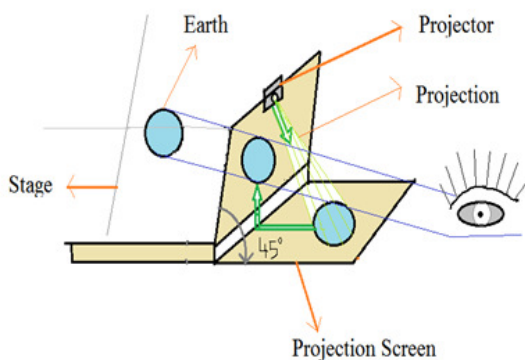


Fig.4.1 3D Holographic projection

#### 4.1 Components Required

The primary components of projecting the subject are; A video projector, preferably DLP with an HD card/minimum native resolution of 1280 x 1024 and brightness of 5000+ lumens, for smaller cabinet installations, a high quality TFT Plasma or LCD screen, a hard-disc player with 1920 x 1080i HD graphics card, Apple or PC video server, DVD player, a specialized foil + 3D set/drapes enclosing 3 sides and lighting and audio as required and who controller (on site or remote) Subjects are filmed in HDTV and broadcast on to the foil through HDTV projection systems, driven by HD Mpeg2 digital hard disc players, or uncompressed full HDTV video/Beta-Cam players.

#### 4.2 The Importance of 3dht

We can see the importance of 3DHT in many areas, such as marketing and advertising, society, environment and education.

#### 4.3 The Importance of 3DHT on Marketing and Advertising

3DHT clearly has a powerful future. As this audiovisual display continues to get high profile credibility, more companies advertising their products or marketing business in this way. In July 2009, marketing statistics show that using 3DHT contributed significantly to increasing the number of the UK customers.

#### 4.4 The Importance of 3DHT on the Society

The importance of 3DHT on the society lies in the interdependence of human relations. For in-stance, the Pentagon wants to create computerized hologram-like moms and dads that can talk with the kids when their parents are deployed far from home. Another example on this issue is the virtual assistant. For instance, the virtual holographic assistant can help you to prepare a meal in the kitchen, or stand beside you and talk about different topics.

#### 4.5 The Importance of 3DHT on the Environment

The importance of 3DHT on the environment lies in reducing the air pollution caused by aircraft, which burn hydrocarbon fuels, something which is considered one of main reasons for global warming. The scientist was keen to prove his green credentials by noting that if he had chosen to appear in person, his long-haul flight would have emitted around 15 tons of carbon dioxide, the greenhouse gas which is causing global warming.

#### 4.6 The Importance of 3DHT on Education

In this area we can take advantage of 3DHT in different forms. For example, holograms now allow students to be taught by a "virtual teacher" who could be many kilometers away. The process goes a step beyond video conferencing in that the hologram teacher appears to be in the classroom, and can see and speak to the pupils as if they were all in the same room.

### 5. Conclusion

Holographic Technology 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. This technology has recently been created to bring live holograms from one location and beam them into any location in the world.

From the current evidence it is unlikely that holographic technology will have the same fate as Stereoscopic 3D as there is no requirement for glasses and 3D holograms can be placed in real physical space interacting with performers and audience alike. Although augmented reality can overlay digital imagery into the physical world, it also suffers from having to have a display or glasses to look through. The popularity of 3D holographic performances and the significant investment in such technologies by technology companies and Governments makes 3D holographic technology a strong future proposition. 3D holograph projection can be used for virtual audio and video communication which provide real virtual environment as people conversation in front of each other.

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