1. Introduction

Holography is a technique which enables three-dimensional images (**holograms**) to be made. It involves the use of a laser, interference, diffraction, light intensity recording and suitable illumination of the recording. The image changes as the position and orientation of the viewing system changes in exactly the same way as if the object were still present, thus making the image appear three-dimensional.

The holographic recording itself is not an image; it consists of an apparently random structure of either varying intensity, density or profile.

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.[24] 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 hologram can be made by shining part of the light beam directly onto the recording medium, and the other part onto the object in such a way that some of the scattered light falls onto the recording medium.

Corporate: Scientists today are developing a new communications technology that will allow you and your friends to interact inside a simulated environment even if you are thousands of miles apart.

Most of the basic components for this network are already in place to allow the development of **tele-immersion**. Tele-immersion is the scientific community's answer to the holodeck.

By combining cameras and Internet telephony, videoconferencing has allowed the real-time exchange of more information than ever without physically bringing each person into one central room. Tele-immersion takes videoconferencing to the next level. It will create a central, simulated environment that will allow everyone to come together in one virtual room, and no one will have to leave their physical location to do so. Our 3D holographic projection will deliver a truly captivating experience at corporate events.

Education: 3D holographic makes learning magical by letting historic figures talk to students through telepresence or use holographic displays to the imagination.

Politics: Remote or multiple speaking engagement teleconferencing with impact. The technology is used to increase reach, impact and remembrance.

Entertainment: Holography in Entertainment has been pushed beyond its actual capabilities in the past, although the current technology is rapidly approaching the Futurism of the Sci-Fi past. Next will come the Video Gaming in the Living Room, IMAX Style High-Tech Theatres and Extreme Sports Holograms as our Invisible Friends Come Alive.

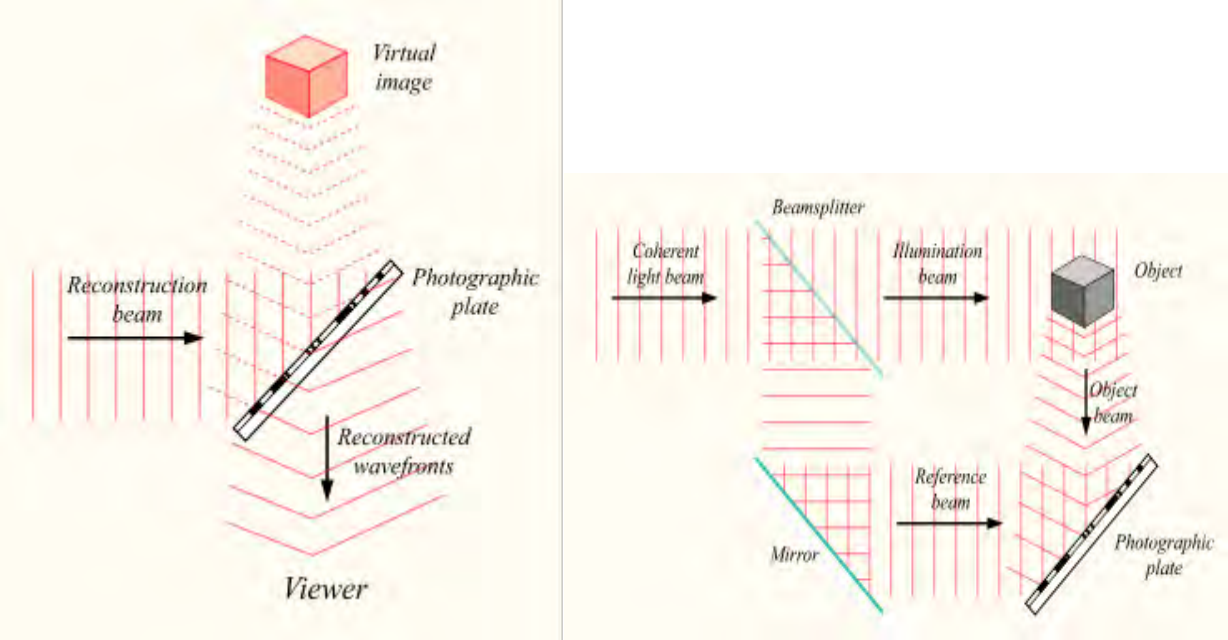

Figure 1.1

1.1 Total Internal Reflection

Total internal reflection is a phenomenon that happens when a propagating wave strikes a medium boundary at an angle larger than a particular critical angle with respect to the normal to the surface. If the refractive index is lower on the other side of the boundary and the incident angle is greater than the critical angle, the wave cannot pass through and is entirely reflected. The **critical angle** is the angle of incidence above which the total internal reflection occurs.

Total internal reflection of light can be demonstrated using a semi-circular block of glass or plastic. A "ray box" shines a narrow beam of light (a "ray") onto the glass. The semi-circular shape ensures that a ray pointing towards the center of the flat face will hit the curved surface at a right angle; this will prevent refraction at the air/glass boundary of the curved surface. At the glass/air boundary of the flat surface, what happens will depend on the angle, where θ_c is the

critical angle measurement which is caused by the **sun** or a **light source** (measured normal to the surface):

- If $\theta < \theta_c$, the ray will split. Some of the ray will reflect off the boundary, and some will refract as it passes through. This is not total internal reflection.
- If $\theta > \theta_c$, the entire ray reflects from the boundary. None passes through. This is called total internal reflection.

This physical property makes optical fibers useful and prismatic binoculars possible. It is also what gives diamonds their distinctive sparkle, as diamond has an unusually high refractive index.

The critical angle is the angle of incidence *above* which total internal reflection occurs. The angle of incidence is measured with respect to the normal at the refractive boundary (see diagram illustrating Snell's law). Consider a light ray passing from glass into air. The light emanating from the interface is bent towards the glass. When the incident angle is increased sufficiently, the transmitted angle (in air) reaches 90 degrees. It is at this point no light is transmitted into air. The critical angle θ_c is given by Snell's law,

$$n_1 \sin\theta_i = n_2 \sin\theta_t.$$

Rearranging Snell's Law, we get incidence

$$\sin\theta_i = \frac{n_2}{n_1}\sin\theta_t$$

.

To find the critical angle, we find the value for θ_i when $\theta_t = 90°$ and thus $\sin\theta_t = 1$. The resulting value of θ_i is equal to the critical angle θ_c.

Now, we can solve for θ_i, and we get the equation for the critical angle:

$$\theta_c = \theta_i = \arcsin\left(\frac{n_2}{n_1}\right),$$

If the incident ray is precisely at the critical angle, the refracted ray is tangent to the boundary at the point of incidence. If for example, visible light were traveling through acrylic glass (with an index of refraction of approximately 1.50) into air (with an index of refraction of 1.00), the calculation would give the critical angle for light from acrylic into air, which is

$$\theta_c = \arcsin\left(\frac{1.00}{1.50}\right) = 41.8°$$

Light incident on the border with an angle less than 41.8° would be partially transmitted, while light incident on the border at larger angles with respect to normal would be totally internally reflected.

If the fraction n_2/n_1 is greater than 1, then arcsine is not defined—meaning that total internal reflection does not occur even at very shallow or grazing incident angles.

So the critical angle is only defined when n_2/n_1 is less than or equal to 1.

1.1 Virtualization of Environment

In computing, virtualization means to create a virtual version of a device or resource, such as a server, storage device, network or even an operating system where the framework divides the resource into one or more execution environments. Even something as simple as partitioning a hard drive is considered virtualization because you take one drive and partition it to create two separate hard drives. Devices, applications and human users are able to interact with the virtual resource as if it were a real single logical resource. The term virtualization has become somewhat of a buzzword, and as a result the term is now associated with a number of computing technologies. virtualization refers to the act of creating a virtual (rather than actual) version of something, including (but not limited to) a virtual computer hardware platform, operating system (OS), storage device, or computer network resources.

Virtualization began in the 1960s, as a method of logically dividing the system resources provided by mainframe computers between different applications. Since then, the meaning of the term has broadened.

Desktop virtualization is the concept of separating the logical desktop from the physical machine. One form of desktop virtualization, virtual desktop infrastructure (VDI), can be thought of as a more advanced form of hardware virtualization. Rather than interacting with a host computer directly via a keyboard, mouse, and monitor, the user interacts with the host computer using another desktop computer or a mobile device by means of a network connection, such as a LAN, Wireless LAN or even the Internet. In addition, the host computer in this scenario becomes a server computer capable of hosting multiple virtual machines at the same time for multiple users.