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Hologram Based Three Dimensional Projection

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Abstract–-This paper reports an effort to develop the new technology called Holographic Projection (HTDP).It highlights the importance and need of this technology and communications in various application. The paper also discusses the future of holographic technology and how it will prevail in the coming years highlighting how it will affect and reshape many other field of life, technologies and business.
***Index Terms*–-Key Words: Hologram, Three Dimensional Projection, Pattern**

I. INTRODUCTION

Holographic projection is the newwaveoftechnology that change how we view things. It has tremendous effect on all field including business and education. A Hologram is a physical structure that diffracts light into an image. A Holographic image can be seen by looking into an illuminated holographic print or by shining a laser through a hologram and projecting the image on to the screen. Projecting and Reflecting images are often described as holographic or even misleadingly holograms, because they have an optical presence and spatial quality. Holography is a method that we use to record patterns of light. These patterns are reproduced as a Three-Dimensional image called a Hologram.

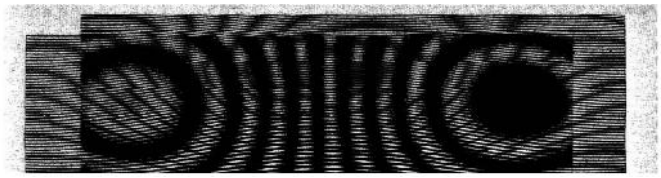

Figure 1.Patterns

Dennis Gobor invented the Hologram in 1947. Today's new technology provides significant features to not only everyday consumers but also large business corporation and governments. Three-Dimensional Holographic projection technology is looselybased on an illusionary technique called Peppers Ghost, and was first used in Victorian theatres across London in 1860s. Peppers Ghost was typically used to create ghostlike figures on stage. Hidden from the audience view an actor dressed in the ghostly costume would stand facing an angle plate of glass. The audience would be able to see the glass but not the actor directly.

II. PEPPER'S GHOST

Peppers Ghost is an illusion technique used in theatre, amusement parks, museums, television etc. It is named after John Henry Pepper (1821-1900), a scientist who popularized the effect in a famed demonstration in 1862. It has a long history, dating back into the 19th century, and remains widely performed today. Examples of concert illusions based on Pepper's Ghost are the appearance of Tupac Shakur onstage with Dr.Dre and Shoop Dogg at the 2012 Coachella Music and Arts Festival and Michael Jackson at the 2014 Billboard Music Awards.

Pepper's Ghost is a special effects technique for creating transparent ghostly images. It works by reflecting the image of a ghost of a sheet of plexiglass. The main background and any live characters are positioned in front of the audience. The ghost is located off to the side where it is not in the direct view. The ghost room can either be black or a mirror image of the main background. A sheet of plexiglass is positioned in front of the audience and set at a 45 degree angle to both the audience and the ghost. At this angle the background

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remainsclearly visible but the glass also partially reflects an image of the ghost . To the audience, it appears through there is a transparent ghost in the scene in front of them.

Figure 2.Pepper's Ghost

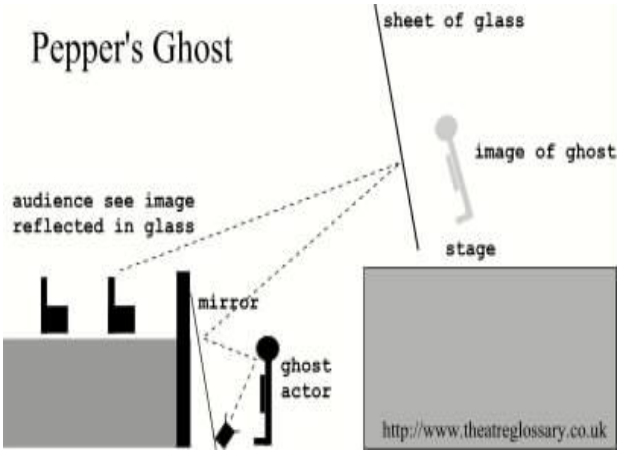

Figure 3.Pepper's Ghost

III.IMPORTANCE AND NEED OF HOLOGRAPHIC PROJECTION

The interest in 3D viewing is not new. The public has embraced this experience since at least 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. Recent developments in computers and computer graphics have made spatial 3D images more practical and accessible. The computational power now exists, forexample, for desktop workstations togeneratestereoscopic image pairs quickly enough for interactive display. At the high end of the computational power spectrum, the same technological advances that permit intricate object databases to be interactively manipulated and animated now permit large amounts of image data to be rendered for high quality 3D displays. Till now, holographic data disks and holo technology drives were just a matter of research.

They were too costly and clumsy to use to be consumer markedly feasible. However, recent improvements in the availability and cost reduction of lasers, digital cameras, and optical encoding substances are helping to turn the long-expected potential of holographic data storage into a commercial reality. The first holographic information disks were marketed consumer markedly in the past year. Thus far, these holographic

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disks are still very costly and only Holographic Read Only Memory (HoloROM) is out. Nonetheless, rewritable holographic disks should come out in the next couple years. Further, manufacturing costs will decrease as product volume grows.

This is the same configuration of improved product advancement and affordability that happened after CDs and DVDs were first launched. Modern three-dimensional (”3D”) display technologies are increasingly popular and practical not only in computer graphics, but in other diverse environments and technologies as well. Growing examples include medical diagnostics, flight simulation, air traffic control, battlefield simulation, weather diagnostics, entertainment, advertising, education, animation, virtual reality, robotics, biomechanical studies, scientific visualization, and so forth.

The increasing interest and popularity are due to many factors. In our daily lives, we are surrounded by synthetic computer graphic images both in print and on television. People can nowadays even generate similar images on personal computers at home. We also regularly see holograms on credit cards and lenticular displays on cereal boxes. There is also a growing appreciation that two dimensional projections of 3D scenes,traditionally referred to as “3D computer graphics”, can be insufficient for inspection, navigation, and comprehension of some types of multivariate data. Without the benefit of 3D rendering, even high quality images that have excellent perspective depictions still appear unrealistic and flat. For such application environments, the human depth cues of stereos is, motion parallax, and (perhaps to a lesser extent)ocular accommodation are increasingly recognized as significant and important for facilitating image understanding and realism.

IV.HOLOGRAM PROJECTOR

A hologram projector is a video projector that can display a two-dimensional (2D) image. Light is routed to a specific location, making the device efficient, and the projector has the capacity to produce video frame rates for a realistic hologram. It is a small device and can be integrated into laptops or mobile phones. The technology is mainly used in 2D applications, but models that can produce three-dimensional (3D) images are in development.

Calculations made by a microchip process hologram patterns. The light produced by the device undergoes diffraction, which can be controlled to form a high-quality image, all without a bulky lens. A liquid crystal display is built on top of the chip, on which the pattern looks like a cluster of dots, while laser light provides the illumination to project the image onto a wall or screen.

Various applications can benefit from a hologram projector, such as home entertainment and advertising. It also has potential for many businesses, automotive companies, as well as in the aerospace industry. The device can be mass produced inexpensively because the circuitry is built into a common type of field-programmable gate array, so a relatively new technology can be implemented using components that are already available.3D devices are being designed, and one prototype even creates a tactile sensation when someone puts their finger out to touch the hologram. Ultrasound waves in the air allow a pressure sensation to be felt when the hologram istouched. The visual quality of the hologram is not affected. Video games could incorporate such technology, and there are an enormous number of current applications of holographs in the video game industry.

The idea of a hologram projector is not new, but the concept has been difficult to develop because incorporating holograms into video requires fast processing power. So many mathematical calculations take place that even powerful computers would take a long time to create individual video frames. Images projected this way have been low in quality, and the lasers required for the application have been very high-cost. Several companies have caught onto technologies that can support the processing speed needed. The dynamics of a hologram projector allow for small parts, so it can be small enough to be incorporated into small electronics such as laptops or personal digital assistants (PDA). Video images can be created that, until recently, looked like something seen only in science fiction.

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V. PRINTING HOLOGRAMS

A useful way to think about a printed digital hologram is toconsider it as analogous to an integral photograph. In integralphotography, developed by Lippmann in 1908,a photosensitive material is placed at the focal plane of asheet of tiny convex lenslets, each of which captures adifferent perspective than its neighbors and images it onto a small area of the film. Then, after a replication step that converts a pseudoscopic image to one with correct parallax, the resulting image is viewed through a lenslet array and recreates the discrete perspectives at appropriatedirections, causing the viewer to perceive a 3-D image. In adigitally printed hologram, the refractive lens array of theintegral photograph is replaced by an array of diffractiveelements performing the samefunction, modulated by the scene intensities in each direction. While the diffraction patterns could be computed (as discussed above) and imaged directly onto the photosensitive print material with a spatial light modulator, optical design and computation are simplified if instead an array of perspectives is assembledfor each local area on the print and then interferencewith a referencebeam is used to create the local diffractionpattern through interference.

Gabriel Lippmann claimed to have invented a method of color photographic recording and provided a scientific explanation of how the emulsion structure recorded and then could reconstruct optical standing waves patterns, the particular wavelengths of which comprise a colour image.

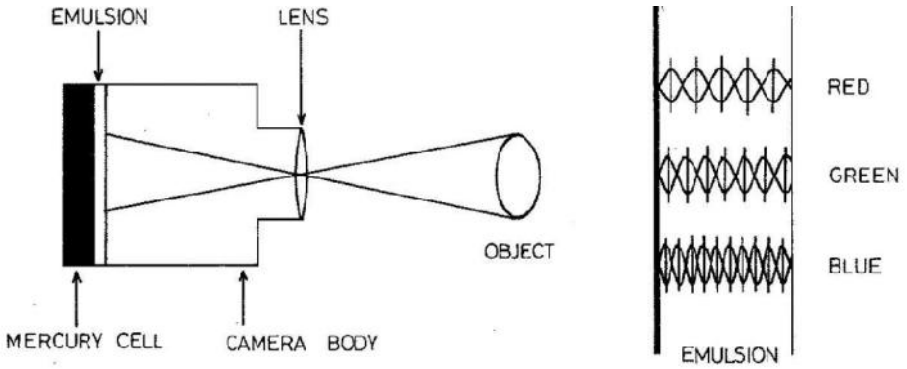

Figure 4.Printing Hologram

In Lippmann recording and the reflection the color of the image is selective only being formed by the wavelengths that resonate with the spacing of the fringes.

VI. REACH OF HOLOGRAPHIC TECHNOLOGY

Hollywood makes this type of technology look easy, but in the real world, holographic technology has usually resulted in relatively primitive designs.Major development in holographic technology is making headlines. A new device has been created that can transmit Three-Dimensional images in close to realtime. This could result in major advances in holographic tele-presence technologies.

A small group of researchers from the University of Arizona have unveiled the fastest 3D motion hologram. What makes this different than say watching “AVATAR” in an IMAX 3D theatre is one word: glasses.This group of researchers havesuccessfully demonstrated a display screen which presents an image which is viewable from all sides without 3D glasses. They have done all this with the use of 16 cameras allowing them to create a 45 degree dimensional image. Each camera takes a different snapshot (360 degrees) and the more cameras that are used, the more refined the resolution of the image. In the past, there have always been issues with the refresh rates of the image. The group’s previous version only was able to render a new image about every four minutes. The new system refreshes every two seconds. All of the images that each of the cameras record is played back to the observer using fast-pulsed laser beams which then create holographic pixels “hogels” which show up on the special photo refractive polymer.

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VII. ENTERTAINMENT OF HOLOGRAM TECHNOLOGIES

Researchers say, an Iron Man like 3D hologram controlled by leap motion may be possible through Three.js. The leap motion is a very cool part of technology. It is a small $80 box that you can put on your desk to control an ordinary computer using hand motions. It's extremely accurate, allowing for very fine motor control using all of your fingers. The movie IRON MAN, has shown the future technology how world could change using Artificial Intelligence and Holographic leap motion technology.

Figure 5.Iron Man Hologram

VII.LEAP MOTION

After Elon Musk(CEO of SpaceX)[8] announced plans to past a video of himself using a computer interface inspired by the one Tony Stark uses in the film Iron Man, it looks like the Tesla CEO and inventor has delivered. In the video[9], which you can see after jump, Musk shows a rocket part with hand gestures and then prints it using titanium. The video shows Musk rotating a 3D object on screen using just one hand, zooming in and out and manipulating the view using a Leap Motion controller- a device that turns gesture into digital commands. He then demonstrates a cool-looking technological innovation featured in Iron Man that manipulates a freestanding glass projection using the Oculus Rift visual reality headset. The demonstration ends with 3D printing with titanium.

Although the video doesn't seem to show a new object being designed using the 3D hologram technology, it is existing to see the sci-fi movie technology being brought to reality. It could be the beginning of a technological revolution that could make holograms an everyday experience.

VIII. RESULTS

The holography video calls can be implemented through implementing micro hologram projectors in the mobile display through LBO projector models in the way of computer generated holography. The image will be visualized in 3D model. Their originality will be viewed by peaks and depths of each holographic images set into the video frames.

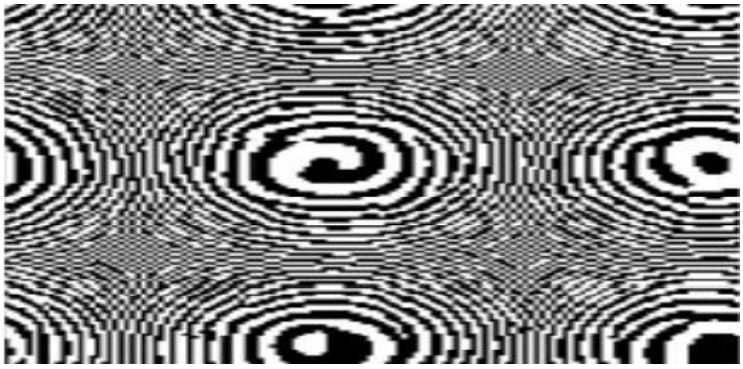

Figure 6.3D Pattern

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IX. CONCLUSION

3D [video] technology moving into the cell phone, which will have the ability to transmit information off the cell phone to create a 3D hologram, projecting the hologram on any surface in life size With a cell phone hologram, a user would be able to walk next to a hologram of a friend, or a worker could project an enlarged 3D image of a product needing repair to walk inside it and detect problems. IBM is already working on the cell phone hologram concept in its labs, and Bloom predicted that a prototype should be ready in five years. The cameras that are being used to create early versions of holograms still need to be miniaturized, and software needs to be written to for receiving input from those cameras. Based on how much 3D video has caught on in recent months in gaming and other areas, we expects people will want holograms on their cell phones. "I definitely want a hologram on my cell phone, to be able to say, 'Beam me up, Scotty,' even though it would be a virtual and not a real person".

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