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ANALYTICAL STUDY ON VIRTUAL TOUCH PERSPECTIVE BY MIXING 7D HOLOGRAPHIC PROJECTIONS WITH TRANSDUCERS

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ABSTRACT

We are using light waves formed using transducers for the projection of 7D holograms. Using this we will be literally touching the 7D virtualization of light waves. By using the concept of ultrasonic transducers the combinations so formed combined with 7D hologram with respect to the angles associated with it will give the resultant touch feel.

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INTRODUCTION

Holographic images can be defined as they can be seen by projecting a laser beam through a hologram into a holographic print and projecting it on the screen. Intrusion of light can be defined as the superposition of light waveforms such that the displacement of sound wave phase is added or cancelled. The proposed system uses sound waves for the projection of holograms. Using this we are able to touch sound or the 7D virtualization of sound waves. Small speakers embedded with transducers continues the bombarding of High-frequency sound waves, which enables us to have the "illusion" of touching and feeling an imperceptible object in middle of the air.

How a 7D Hologram is formed?

The 7D display system allows users to reach into the viewing volume to touch virtual objects, and even feel gradients of haptic feedback as the hands penetrate into virtual objects.

A method for recording a light field with the 7 parameters ($V_x, V_y, V_z, \theta, \phi, t, \lambda$) that describe a 5D plenoptic Function with time and light intensity or chromacity.

Parameters are:

3D (position) + 2D (angle) + 1(time) + 1(light properties) = 7D.

The 5D plenoptic function: The measure for the amount of light traveling along a ray is radiance, denoted by L and measured in watts (W) per steradian (sr) per meter squared (m^2). The steradian is a measure of solid angle, and meters squared are used here as a measure of cross-sectional area, as shown at right.

Adding a touch: Low-energy ultrasound is used to create "pressure fields"—which appears like a burst of stressed air. The ultrasound waves can take on closed, confined figures. An array of ultrasound transducers perceives the capability to simulate the shape of a multi-dimensional objects.

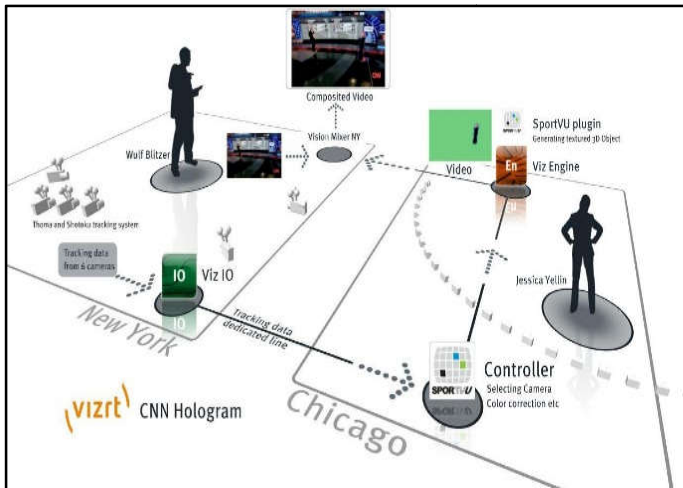


Fig. 1. Hologram interior

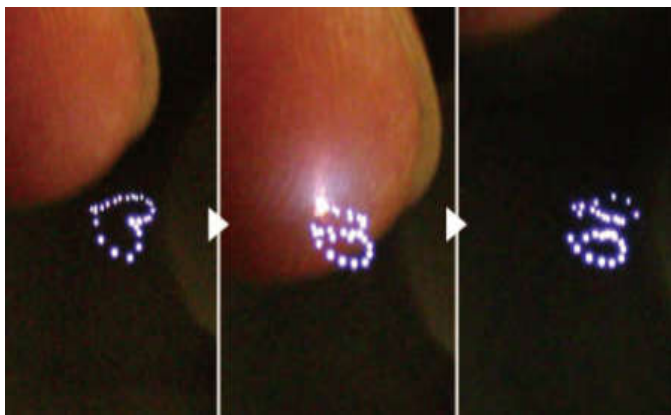


Fig. 2. Fairy laser touchable holographic projections

Construction of the touch: Tokyo University has given the construction idea for the representation of multidimensional holograms including the touch. Original image is produced on an LCD display and after that it is beamed onto a plate called Aerial Imaging Plate (AIP). This plate imitates the actual image into fluctuating image. Any object placed behind this plate gives the impression at the symmetric position in the middle of the air. When a person ‘touches’ the fluctuating image, Transducers create the feeling of tangibleresponse on the user’s finger. This transducer produces a ‘reconfigurable ultrasound focus’, which exerts a force remotely. And this force can be redirected by ultrasonic reflection to be merged with floating images to change the pressure or sensation.

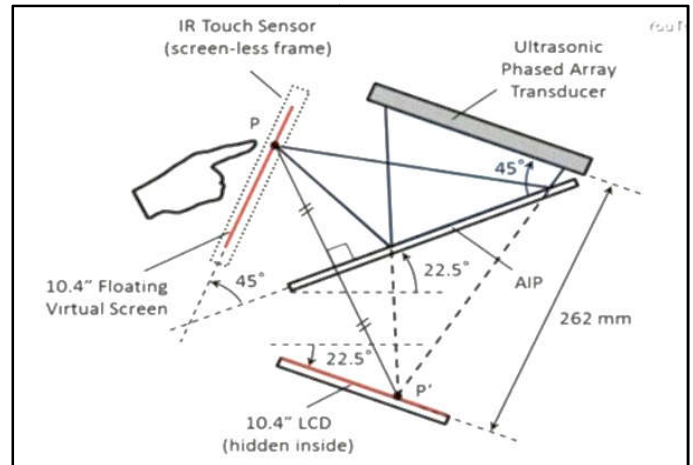


Fig. 3. Construction of touch in a hologram using ultrasonic phased array transducer

Benefits

- It will be a very cost effective solution for the masses to make and to hire for their businesses.
- It stands unique among other methods as it has very high storage capacity.
- It delivers enhanced feasibility of objects including depth.
- While representing itself in very complex patterns hence offers security in wide areas for its applications.
- It offers creation of multiple images on single plate including images.
- Holographic technologies can be easily combined with other technologies.
- It does not require special glasses to view and can be viewed from any angle.

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