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Augmented Reality 3D Displays with Integral Imaging

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ABSTRACT

In this paper, we present a 3-dimensional augmented reality integral imaging display system by adding conventional integral imaging and an augmented reality technique. Compared with conventional integral imaging, our proposed system has some advantages: it provides 3-dimensional augmented reality display capability and it has a compact design. To validate the feasibility of our proposed method, we experimented with a 3-dimensional scene and used two computer-generated objects for augmented reality. By combining the captured 2D elemental images of the 3-dimensional object and the computer generated virtual objects, we reconstruct 3-dimensional images for the augmented reality micro integral imaging display system. To the best of our knowledge, the first report on a video see-through 3-dimensional augmented reality display has been experimentally demonstrated with a micro integral imaging display system. As one of the promising method in the area of 3-dimensional sensing and display integral imaging offer passive and relatively in expensive way to capture 3-dimensional information and to visualize it optically.

Keywords: 3-dimensional, conventional integral imaging, augmented reality technique.

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I. INTRODUCTION

What is Augmented Reality (AR)?

The basic goal of an Augmented Reality system is to enhance the user's perception of and interaction with the real world through supplementing the real world with 3-diemsional virtual objects that appear to coexist in the same space as the real world. AR is a growing area in virtual reality the world environment around us provides a wealth of information that is difficult to duplicate in a computer. The evidenced by the words used in virtual environments either these worlds are very simplistic. That can create a more realistic environment has a million dollar price tag. An AR system generates a composite view for the user. Wearable displays have advanced rapidly over the past few decades but they are limited in field-of-view due to optical constraints. Likewise, 3-dimesional displays have several technological and viewing discomfort limitations. These limitations result from the missing 3-dimesional depth cues in stereoscopic displays, which are essential for real 3-dimesional and for interactive AR applications. Wear 3-dimesional proposal aims to overcome the 2 fundamental scientific challenges of wearable displays and make them as natural as wearing a pair of eyeglasses: 1. eliminate the relay lenses. We need to overcome the focusing problem of the eyes in order to completely eliminate the large relay lenses. As a result, miniaturization of wearable displays will be possible by taking full advantage of the advancements in micro-technologies; 2. Provide all the essential 3-dimesional depth cues to viewing discomfort. We need to enable the two eyes to fixate at the correct depth of the objects rather than the display panel without losing resolution. so eliminating the conflict between the accommodation, convergence. Overcoming these challenges would enable a display which can provide natural looking and interactive 3-dimesional and very wide field-of-view in an eye-glasses form factor. Such a display goes far beyond the state-of-the-art in wearable displays and the open new research directions for intelligent human-computer interfaces and Augmented Reality. The www is becoming more popular day by day which results in more number of users access the

web all over the world. whenever any user also access a website a large volume of information related to that user such as its an ip address, requested URL, are collected automatically by servers and saved in access log files as the user may access the same web-pages repeatedly. Web access pattern which is nothing but series of all accessed pages play an important role in finding out user behavior. With the help of this behavior, he/she can predict that what will be user future access pattern which will help in reducing browsing time of web and thus reduce load on server as well as save user time. The main objective of this study is to know what research has been done on web usage mining in future request prediction.

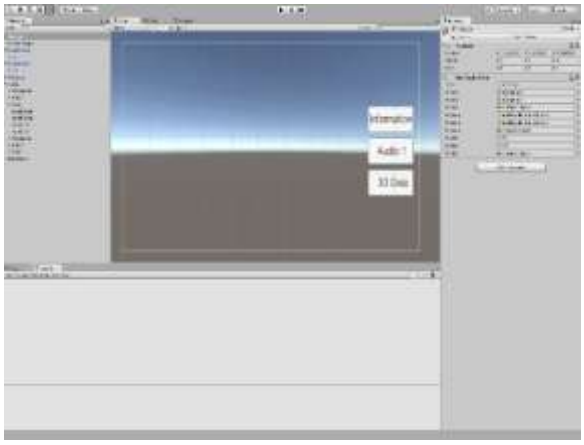
II. EASE OF SETUP AND USE

Most existing Augmented Reality systems require expert users to calibrate and operate them. If SmallSeoTools.com Augmented Reality applications are to become ordinary, then the systems must be deployable and operable by non-expert users. This requires more robust systems that minimize calibration and setup requirements. Some research trends supporting this need include calibration-free and auto calibration algorithms for both sensor processing and registration.

III. PRINCIPLES OF INTEGRAL IMAGING

Integral imaging which was first proposed by prof.G. Lippman in 1908, has been regarded as one of the most attractive 3-dimesional imaging and display techniques because it can provide full-color and continuous-viewing images. In addition, integral imaging does not require multiple observers and multi viewable. Integral imaging technique consists of 2 processes, Pickup and Reconstruction, as shown in Figure 1. In the pickup process of integral imaging, direction and intensity information of the rays coming from a 3-dimesional object are spatially sampled by use of a lens array and 2-dimesional image sensor. The lens array composed of many convex elemental lenses is positioned immediately in front of the image film as a capture device.

In following image 2D object scan and convert it into 3D image.



IV. LITERATURE SURVEY

Stern and Javidi, “3D image sensing”, Proc. IEEE., vol. 94, pp. 591-607, 2006. Integral imaging is a passive multi-perspective imaging technique, which records multiple 2-dimensional images of a scene from different perspectives.

R. Martinez-Cuenca, Raul, G. Saavedra, M. Martinez-Corral, and B. Javidi, “Progress in 3-dimensional multi - perspective display by imaging,” Proc. IEEE., vol. 97, pp. 1067-1077, 2009. 3-dimesional AR integral imaging display system by combining conventional integral imaging and an AR technique. Compared with conventional integral imaging, our proposed system has two advantages: it provides 3-diemesional AR display capability and it has a compact design.

C. Myungjin, M. Daneshpanah, and B. Javidi, ”3-diemesional optical sensing, visualization using integral imaging,” Proc. IEEE., vol. 99, pp. 556-575, 2011. This technologies have been researched extensively for different applications in fields as diverse as entertainment, medical sciences, robotics, and defense.

X. Xiao, B. Javidi, and A. Stern, “Advances in 3-dimensional integral imaging: sensing, display, and applications,” Appl. Opt., vol. 52, pp. 546-560, 2013.Three-dimensional sensing and imaging technologies have been extensively researched for many applications in the fields of robotics, manufacturing, security, and defense due to their diverse and significant benefits.

M. McCormick, and N. Davies, “Discussion of the optics of a new 3-dimesional imaging system,”Appl.Opt., vol.27, pp. 4529-4534, 1988. The geometric optics of a new 3-dimesional imaging system, which has several innovative features. The principles governing the primary design of the system are considered in some detail, and the calculation method employed in achieving the basic design parameters is presented.

C.B. Burckhardt, “Optimum parameters and resolution limitation of integral photography,” J. Opt. Soc. Am. A., vol. 58, pp. 71-74, 1968 Integral photography offers an interesting alternative to holography for recording and displaying 3-D information. In this paper derives the optimum size of the lenslet in the lenticular screen, derives a resolution limitation for integral photography which for conventional objects is comparable to the resolution of a TV pic.

L. Yang, M, and N. Davies, “Discussion of the optics of a new 3-dimesional imaging system,” Appl. Opt., vol.27, pp. 4529-4534, 1988. The geometric optics of a new 3-dimesional imaging system, SmallSeoTools.com which has

several innovative features, is given. The principles governing the primary design of the system are considered in some detail, and the calculation method employed in achieving the basic design parameters is also presented.

H. Hoshino, H. Isono, and I. Yuyama, "Analysis of resolution limitation of integral photography," J. Opt. Soc. Am. A., vol. 15, pp. 2059-2065, 1998 The resolution limitation of integral photography (IP) is analyzed. Estimating the resolution of IP measured at the viewpoint, we derive the optimum width of the lens. It is also shown that the resolution of aperture-plate IP is lower than conventional 2-dimensional displays, even with an optimum design. When the ideal lens is utilized and however, lens-array IP can provide a three-dimensional display that is free from any discontinuous change of images that occur with the observer's movement and with the same resolution that conventional 2-D displays feature.

S. Manolache, N. Davies, and S.Y. Kung, "Analytical model of a 3-dimensional integral image recording system that uses circular- and hexagonal-based spherical surface," J. Opt. Soc. Am. A., vol. 18, pp. 1814-1821, 2001 A mathematical model for a 3-dimensional omni directional integral recording camera system that uses either hexagonal-based spherical surface lens arrays is derived. The geometry of the image 3 formation and recording process is fully described.

F. Okano, J.and M. Kawakita, "Wave optical analysis of integral method for 3-dimensional images," Opt. Lett., vol. 32, pp. 364-366, 2007 We analyze by wave optics an integral image method that produces 3-dimensional images. The point light source is given at the pickup stage, the light wave passing through each elemental lens is obtained at the display stage.

V. PROPOSED SYSTEM

In previous integral imaging in a passive multi-perspective imaging technic, which records multiple two-dimensional images of a scene from the different perspective? It is also helpful for the image processing but the user cannot see the info of the image at the same time, so in our Augmented Reality 3-dimesional Displays with integral imaging, this will recover by using AR technic. After analyzing the previous AR system technology we are proposed a new technique. In this technology, we are developing a new system which can detect scan the 2-dimensional image and will convert that 2-dimensional image in 3D along with information related to that 2-dimensional image. Along with this system, we are developing a new system which shows the information of 3-dimesional object with speech and this 2 system technique will join together we are developing this system using android, java and some part of c#. We are developing this system for various application. This system will work with the mobile camera which will continue scan the 2-dimensional objects or images and display the image in 3-dimension along with related information of that object or image. In this system, we provide the map of the museum which is helpful for tourist.

SYSTEM ARCHITECTURE

Propose system design is shown in blow diagram. Which show the contained modules. Architecture shows the involvement of application framework in the project, also the relation of the user with the main modules. In the architecture the connection between analyst, our system and admin will shown so that it will be understood easily. SmallSeoTools.com.

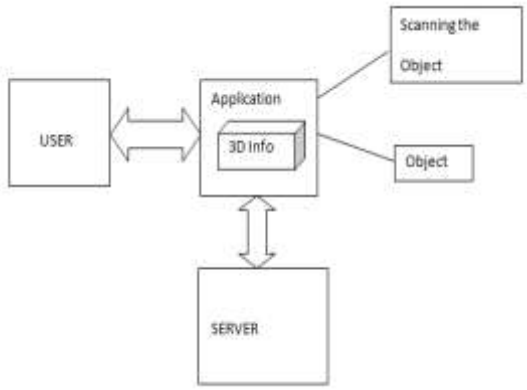


Figure 2. Architecture diagram

VI. CONCLUSION

Augmented reality is another step further into the digital age as we will soon see our environments change dynamically either through a Smartphone, glasses, car windshields and even windows in the near future to display enhanced content and media right in front of us. This has amazing applications that can very well allow us to live our lives more productively, more safely, and more informatively.

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