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Review of an Interactive and Imaginative Holographic Learning Support System

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Abstract

This study develops an immersive and intuitive holographic display learning assistance system with subtle control system that combines 3D holographic display technology with hand- gesture detection technology. The system is intended to help nurses in an educational and instructional capacity. The scanning of a medical instructional model into a 3D digital model is the first step in the process. In order to provide an immersive and intriguing user experience, numerous views of a 3D digital model are created to 3D picture for holographic projection. A hand-gesture recognition system is incorporated to control the 3D holographic picture. This enables people to engage with the holographic display by employing intuitive hand movements to modify, resize, shift, and switch the pictures. The suggested method increases learning in an effective and intuitive manner while also providing the user with an immersive and comprehensive viewpoint. In addition, the proposed approach may be applied in other professional domains to gain a more in-depth grasp of the subject.

Keywords: *3D image, Hand Gesture Recognition, Holographic Projection Technology.*

INTRODUCTION

The paper "An Intuitive and Interactive Holographic Instructional Support System" offers a new way for improving nursing education and instructional performance in the medical industry.

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Medical and healthcare education is a hands-on and simulated learning environment [1]. As a result, information primarily focuses on clinical knowledge and practical abilities. The nurses are supposed to absorb ideas from textbooks and apply their expertise in the field without seeing any real circumstances [2]. The difficult element is bridging the theoretical and clinical practise gaps. There are several established strategies for bridging this gap, one of which is clinical scenario-based simulation [3]. Clinical simulations differ significantly from standard classroom learning experiences.

Today's young learners are becoming more inclined and interested in digital learning [4]. The goal of clinical-based simulations is to provide students with an immersive learning experience. Existing technologies such as 2D, 3D animation, Augmented Reality (AR), and Virtual Reality (VR) are still evolving and cannot be ignored in the future of the medical and healthcare industries [5].

According to the report, "the study materials are turned into 3D animations and models," and users may see and manipulate the 3D visuals on the holographic display using hand gestures. Several drawbacks of typical 2D models are solved by the suggested method [6]. Instructors and users can interact in a multi-perspective, multi-user comprehensive exploration utilising hand gesture recognition to freely move, resize, switch, and rotate pictures in a full 360 degree view using the proposed 3D holographic system.

EXISTING METHODS

2D Animation

In the present time, the 2D animation is still being used in learning and medical applications. The 2D animation creates a movement in a two dimensional artistic environments. The figures can move left and right, up and down. These images do not appear to move towards or away from the viewer perspective thus they don’t provide an immersive and detailed view of the image.

3D Animation

3D Animation is the process of creating movement by generating a series of drawings or photographs through a simulation procedure. The process of creating 3D is divided into three major sections: modelling, layout, animation, and rendering. Modeling is the process of creating 3D objects within a scene. The Animation and Layout phase describes how objects in a scene are positioned and

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animated. Finally, rendering describes the finished product of CGI. With the careful combination of all the sections, the production process is successfully completed. Because 3D is a detailed process involving characters with long life spans, it takes more time to create. 3D visuals require the use of glasses, which can be difficult for some people. To distinguish between 2d and 3d animations, humans always prefer their vision over some glasses.

Virtual Reality (VR)

Virtual Reality is used to create a simulate environment. In contrast to conventional UIs, VR places the client inside a vivid experience. To be able to interact with 3d world screen has to be eliminated. To experience the 3d experience computer is used to simulate touch and sense. Head-mounted display is one of the fastest-recognizable component. As the person moves around in his environment the same is reflected on the display and it simulates a virtual environment. The penultimate purpose is to make a inseparable contact between the individual's head and eye movements. This makes the virtual surrounding extremely real and interesting. This system still suffers from a lack of material. These HMDs might also be heavy due to various mechanics, which can lead to an unpleasant experience.

Augmented Reality (AR)

Augmented Reality is a user-friendly and realistic display environment. It needs a computer-generated display, as well as music and text, to maximise the user's reality experience. It blends real-world and computer-generated pictures and settings to provide a cohesive yet augmented vision of the world. AR operations use animatronics methods and algorithms, picture and speech recognition, and enhanced-power displays to build a virtual environment using images and real-world surrounds.

For some users, the details on handheld devices may be insufficient. Users may have difficulty obtaining information. Users must also hold their handheld devices at an angle to get the full experience.

PROPOSED METHOD

The paper proposes a method which gives an immersive and intuitive way for instructional support and learning for nurses in the medical field. The 3D images of medical models are projected on the holographic display and controlled by hand gesture recognition technology. This

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method of overcoming the previous existing methods gives details to the viewer with a 360-degree whole view perspective. It gives a social experience as many viewers can see the graphics at the same time. Among all the existing methods holographs maximize the 3D effect and provide a real life experience. The proposed method can be obtained by a 3D holographic display and a hand gesture technology.

3D Object Modelling and Hologram Production

This is the initial step as this converts 3D object model into a digital model for projection. So, the 3D scanner is used in order to get the final digital image. The digital image is then repaired by Geomagic Studio to retouch the digital image, reduce noise, optimize, remove overlay and edit image vectors to produce the final image. This process is to be done with accuracy as the image should be perfectly modelled in order to get the accuracy and details in the holographic display.

3D Holographic Display Design

Holographic projection is an imaging procedure that records all the data of the reflected light waves when an article is imaged. The various edges of the picture can be shown utilizing pictures taken from various points of view, making the dream of a 3D object. In contrast to regular 3D display strategies, holographic images can be seen without 3D glasses, which is advantageous for watchers in addition lessens cost. 3D images can be introduced to a crowd of people from alternate points of view.

Virtual Holographic projection was used as it uses a highly reflective polyhedron to display 3D models, layer 2D images inside a 3D model. Several aspects like high transmittance rate, superior reflectivity, construction angle and ideal reflective materials were taken care of to maximize display performance. The process of recording and reconstructing details can be expensive making 3D holographic display less economical.

Gesture Recognition Technology

A responsive gesture recognition system should be able to rapidly track and accurately detect the hand gestures in different environments. In the paper, the Leap Motion Senor module is being used for hand gesture recognition. The Leap Motion sensor utilizes an infrared LED and a grey scale camera to recognize movement and produce 3D information, remaking hand movements in a continuous 3D condition. The range in the range of 25

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and 600 mm over the sensor. Unity SDK is used to compose and control program for the Leap Motion sensor in the way the signal control work is fused into the projection stage to control the holographic images. The gesture recognition system developed in the paper can track and detect two types of gestures which are control gestures and continuous movement. Control gestures refers to the comparison of hand features with pre-established hand features. Continuous motion is the detection of hand movement path from a series of images. The movement is detected and analysed, the system converts it into an instruction to control the 3D image.

CRITIQUE

The author investigated and evaluated the issue of nurses' lack of practical expertise in the medical profession. The author's solution is incredibly efficient and user-friendly. It may be used to bridge the theoretical learning and simulation-based learning divide. Holographic Display provides a comprehensive and immersive learning experience to a group of viewers and is made intuitive via the use of hand motion detection technology. The strategy and execution are proper, and the outcomes are likewise satisfactory. The fundamental limitation is that creating holographic displays on a regular basis is challenging. Capturing and processing 3D photos may also be costly. The essay raises a notion in an area that is still in its early stages. To suggest that the notion is entirely fresh would be incorrect; the author has integrated two technologies and synchronised them with one another. The article covers almost all of the essential characteristics and constraints of the area. Holographic displays should be built with precise calculations and angles, as little variations will cause the picture to be distorted. Holographic displays are the future of education and learning and may be used in a variety of different professional domains. However, it is still a pricey feature at the moment. The future of interactive and immersive holographic displays is bright.

CONCLUSION

Nursing situational re-enactment is an educational strategy that may recreate functioning clinical situations in a safe domain to foster learning and prepare students for real-world clinical situations. The holographic projection system with hand gesture technology was created to act as a classroom teaching tool while taking into consideration various restrictions for nursing education. Teachers and instructors may manage the visuals using

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easy hand motions such as scaling, angle adjusting, and switching. This increases learners' motivation and interest, hence improving learning effectiveness. We anticipate that the framework will provide more systemized and dynamic instructional content that students will find appealing, hence boosting learning viability. Finally, the proposed instructional emotionally helpful network may easily be explored into other expert professions to change into a fundamental encouraging guide for instructors to devote substantial time in a variety of sectors.

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