3D Learning App Using Mixed Reality

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Abstract: 3D image model display is used to change the way of learning and visualize the core of study in educational field . But involved some challenges since usage of mixed reality is not yet implemented in visualizing the real time objects and there is no application or gamifications techniques for educational or training purposes. The main motive of this project is to make the students experience the next step in the learning process by visualizing the object in 3D model view by using VR and AR techniques approaches. The virtual data structure and augumented model object is implemented by using unity, blender,3Ds Max software . By developing an application that enables the user to experience the next level of learning. By the application user can experience the scanned object virtually and can see through 3D Models and we consider our results by promising step toward extending 3D model in Mixed Reality to serve real-time applications.

Keywords -3D Model, augumented model object, educational purpose, VR, AR techniques, real-time applications.

I.INTRODUCTION

The merging of real and virtual worlds to produce new environments and visualizations where physical and digital objects co-exist and interact in real time. Our project is to develop a 3D image model using Mixed Reality. The objective is to develop an Application that visualizes the scanned objects into the 3D object. By using the MR (Mixed Reality) the scanned models can be displayed over the target. User can view the 3D models in all the perspectives. They can zoom, see through the objects, functioning to gain the knowledge by seeing them virtually and can see through the 3D models. But involved some challenges since usage of mixed reality is not yet implemented in visualizing the real time objects and there is no application or gamifications techniques for educational or training purposes. The

main motive of this project is to make the students experience the next step in the learning process by visualizing the object in 3D model view by using VR and AR techniques approaches. By developing an application that enables the user to experience the next level of learning. By the application user can experience the scanned object virtually and can see through 3D Models.

II. LITERATURE SURVEY

Since the emergence of mixed and augmented reality, it has been used as a tool in industry. In the case of assembly, two main applications were addressed: The first is presented as a set of instructions on how to assembly a product, this will be named as an augmented reality with instructional focus. The second presents the elements that the user can directly manipulate and assemble, this is will be called a non-instructional focus of the use of augmented reality.

Murakami et al. [10] developed a system of augmented reality with portable haptic devices. The application has a physics engine for collision detection. The authors made an experiment with 10 participants, asking them to assemble a rail vehicle, 10 times with haptic and 10 times without haptics. They found that the use of haptic decreases the amount of errors in the assembly process.

Radkowski et al [8] presents a system that uses a Kinect® camera to identify and locate the user's hand used as a cursor. This system can identify five hand gestures: closed fist, open hand, closed hand, index finger and waving hand with the virtual objects. A menu of buttons is shown to the user in the lower part of the screen allowing the execution of actions such as move, rotate, scale, etc. This system includes a visual guide to perform the assembly task; when the user initiates the assembly of two parts, two small diamonds located at the exact position where the two parts have to be assembled. When a diamond is close enough to the other, a vector is defined, the parts can only be moved along the axis defined by that vector. This prevent incorrect assembly operation to take place.

Hung-Hsu Tsai et al. [4] proposes an interactive virtual reality (VR) application in education for soil and water conservation. An android app

was developed using VR technology, which can be used for reading a picture book for learning concepts in soil and water conservation.

Minghui Weng et al.[13] proposed the Electronic medical record system (EMRS) based on augmented reality is proposed. The application consists of server, Android device and data glove. User can not only check the relevant medical information on the Android device, but also operate the 3D organ model based on AR through gestures.

III. BACKGROUND

A) Virtual Reality Systems

Virtual Reality Systems[5] Hardware consists of Headsets, Controllers and Base Stations. Headset consists of Adjustable straps and interchangeable inserts, Front-facing camera, Eye relief adjustments, Fits most glasses. Controllers are Designed exclusively for VR Intuitive controls and gestures Realistic HD haptic feedback. Base Stations consists of 360-degree play area tracking coverage, Wireless syncing

Fits standard threaded mounting points.

B) Augmented Reality Systems.

In early augmented reality systems the users carried a computer and/or some form of Head-Mounted Display (HMD). AR

Quake[3] and AR Pacman[4] are examples of games that use augmented reality technology. Specifically these are

adaptations of augmented reality to popular Quake FPS and Pacman arcade games, respectively. Both game use wearable computers for data processing and require See-through HMDs to show information to the user.

IV. AN INTERACTIVE VR AND MR APPLICATION

Fig.1 draws an experimental environment for the interactive VR application proposed in the paper. Students can see the 3D VR images using smart phones with an android app produced by the MR technique. They can use the interaction sign, a double-circle shape colored by white, to trigger interactive actions such as playing sound for speaking story, going to next page, going to previous page, showing text annotations etc.
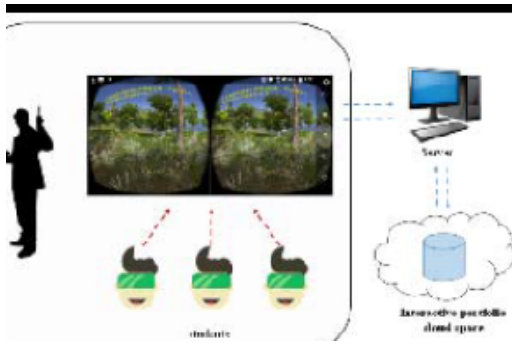
Fig. 1. An experimental environment

Fig. 2. 3D VR objects.

A) 3D VR OBJECTS

In the 3D VR picture book, 3D VR objects are produced by 3dsMax and Blender software first. Then, they are programmed by Unity software to have animation effects. Fig. 2 shows 3D VR objects, Human body, car, brain. Its working behavior likes mouse actions on webpage. Students move the interaction sign by moving their smart phones. Some interactive actions.
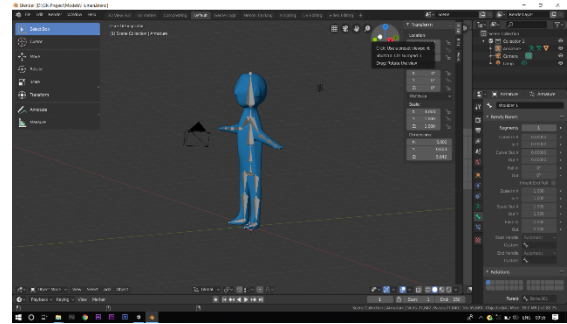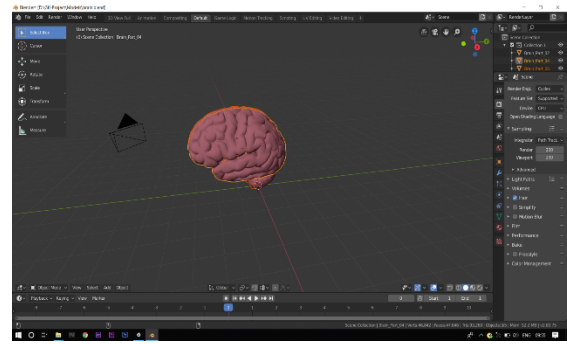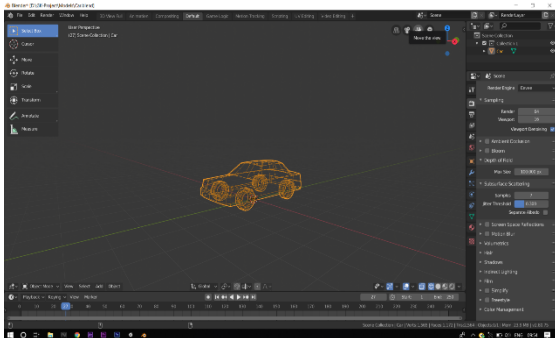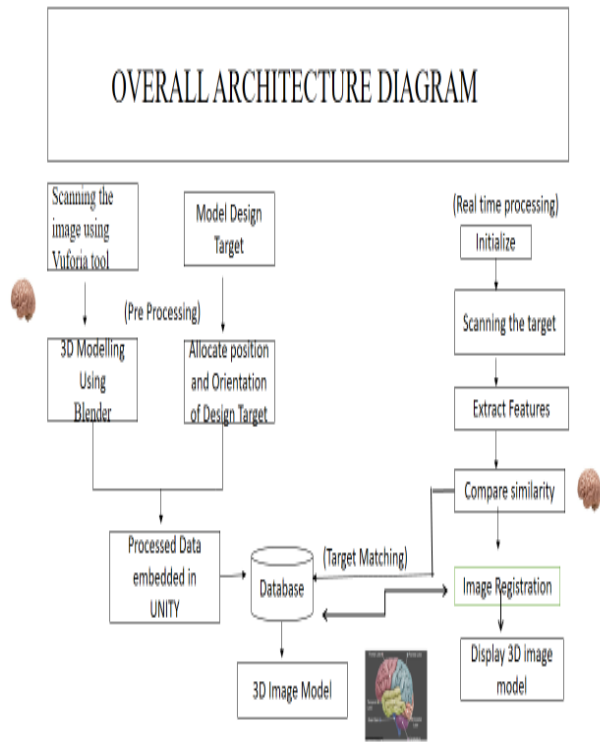

B) SYSTEM ARCHITECTURE

Fig. 3. System architecture

Fig. 3 displays the system architecture of the interactive VR and MR application proposed in the paper. It consists of Designing, Modelling, Scripting phase an android app.

A. Designing phase

- Designing the scenes in Unity with the generated 3D Model.

- The scenes will containing the 3D models created using the Blender and 3DS Max.

B. Modelling phase

- Designing the 3D Models using Blender that are used inside the scenes in Unity.

- Designed objects are to be displayed in the scene.

- Designed sample models are in different genres and different looks.

- The models can be modified for the further scene preferences. i.e properties like scale, rotation, position, colliders can be changed according to the developer preferences inside the Unity scenes.
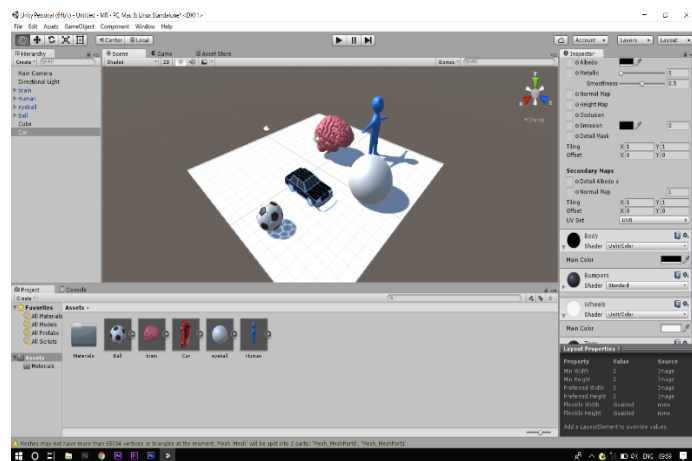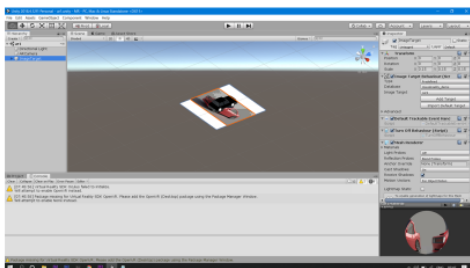

Fig.4. Modelling phase in Unity

C. SCRIPTING PHASE

Scripting the scene objects, camera's and models that are embedded in the scenes of Unity and

Vuforia Tool. The scripting is done by using the Unity Mono Development tool and Visual Studio.

Fig.5. Scripting phase using Vuforia Tool

SCRIPTING PHASE

D. AN ANDROID APP

The app is produced by Unity software. Students view the 3D images by using scanning the images by using this android application in the smartphones.

V.CONCLUSION

In this paper a brief overview of 3D learning app is explained. By this application students can learn things eagerly with reality. A mixed reality represents a new and digital experience to the user. It will be important to learn lessons and incorporate from mobility, VR, AR into overall experience of blending the visualization of complex data with physical world.

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