

AUGMENTED REALITY BASED APPROACH IN EDUCATIONAL FIELD USING AR BOOKS

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ABSTRACT

Technological advances enable the use of innovative tools in education. Augmented reality in education enables interactive way of learning in field of education. Augmented reality (AR) is a technology which combines real world with virtual object in a real 3D .AR made it evolution from virtual reality. A virtual object is augmented into the real world and it interacts with the real world.it is a form of experience where a computer generated virtual object is enhanced in real world. Recent developments in augmented reality explores its impact on society and in education which made a new way of stimulating learning with a computer generated models enhanced in real world and with its animation support explaining tough concepts in easy way which gives an attention-grabbing learning platform for students. This paper mainly focus on generation of AR books which made the learning environment exciting with this new level of technology.

Keywords— *augmented reality, virtual reality, education, 3D, AR books*

I. INTRODUCTION

Augmented reality is interactive form of experience where a real world is enhanced by computer generated virtual object. Augmented reality registered in 3D so that the computer generated virtual object will be in 3d enhanced with virtual object. In simple words AR allows the computer generated image to augment and mixed into real world. It is interrelated to mediated reality and virtual reality .augmented reality has the features of combining virtual and real objects in a real space, registered in 3D and interactive in real time, normally GUI has some Limitations like gap between computer and real world, explicit operations etc.. In order to over-come these problems computer augmented has been evolved

Above diagram shows the different forms of interactions here we can see gui interaction in terms of computer and real world it has a gap between real world and computer world while coming to the virtual reality concept the user will be immersed in virtual environment the interaction will be a human real world interactions such that user can't see real world user will be in virtual world.

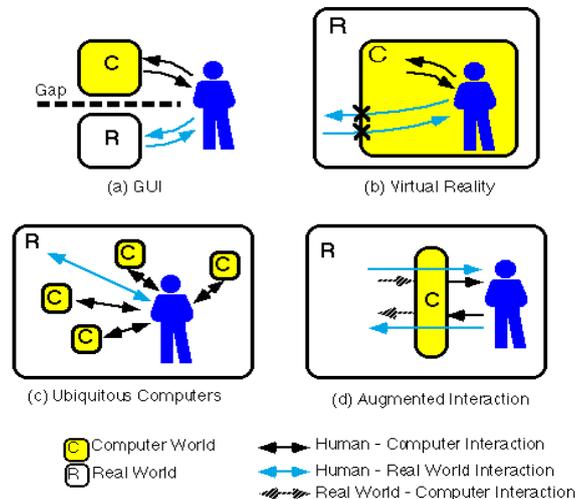


Figure 1. Comparison of HCI styles

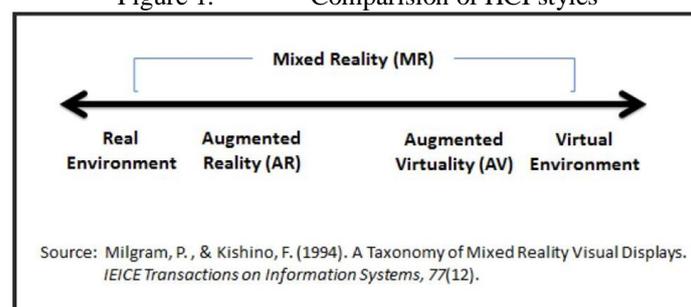


Figure 2. A taxonomy of mixed reality visual displays

In Ubiquitous computers the interactions will be a human computer interactions and a human real world interactions while coming to the augmented reality the real world will be interacted with virtual world here we can see the interaction was human-real world interactions a virtual object is augmented in real world this technology come in three parts display, viewpoint tracking and image generation in simpler words augmented software uses webcam to track the marker wherever it identifies marker it will analyse the 3d model and will present that model at the marker.

II. WORKING OF AUGMENTED REALITY

Augmented Interaction is a style of human-computer interaction that aims to ease computer manipulations by using environmental information as implicit input. With this style, the user will be able to interact with a real world augmented by the computer's synthetic information. The users Situation will be automatically recognized by using a range of recognition methods that will allow the computer to assist the user without having to be directly instructed to do so. The computer's role is to assist and enhance interactions between humans and the real world. Many recognition methods can be used with this concept. Time, location, and object recognition using computer vision are possible examples. Also, we can make the real world more understandable to computers, by putting some marks or IDs. AR is closer to the real world on one end of the gamut with the dominate perception being the real world which is improved by digital data or assets. AV is closer to a complete immersive virtual environment involving systems that are mostly computer generated, but have some real world imagery added. Virtual environments (VE) are environments that are totally simulated by technology. As technologies continues to rapidly advance, it seems possible that the virtual elements and real world elements sharing space in mixed reality environments will become more and more difficult to tell apart.

AR is quite similar to virtual reality (VR). Both are interactive, immersive, and include information sensitivity. In VR, users' frame of reference is completely tied to a virtual world, whereas in AR users' perception is still centred within the real world, but with virtual objects superimposed, such that real and virtual objects seem to coexist in the same space (Azuma, 1997). Second Life, by Linden Lab, is probably the best known example of VR. On the other hand, popular gaming consoles such as the Nintendo Wii, the PlayStation 3, and the Xbox 360, have all released sport-centred games, and other games, where the players' real-world movements control a virtual avatar within a virtual environment.

When a marker is held in front of a webcam, those using AR applications through a computer or console can view digital content superimposed over their real environment (the paper in their hands), as shown by the display screen (which simply shows the room as the webcam sees it, augmented by the AR content). Usually, when the user moves or rotates the marker image, the digital content moves and rotates as well. Another viewing option is to use a head mounted display (HMD). While wearing a HMD (which covers the eyes), users can see digital content on the HMD screen and their real environment through the screen (or displayed on the screen by an attached camera).

Today, many mobile AR applications are location based. To utilize these AR applications on a mobile device or a smartphone, the phone must be equipped with several necessary tools: (a) GPS technology; (b) an accelerometer, and (c) a digital compass (magnetometer). Using mobile AR applications, users may view the world through smartphone cameras in order to see digital content mixed with the real environment.

III. AUGMENTED REALITY IN EDUCATION

Education system is updating day by day with the use of recent trends in technologies starting from normal board room teaching to projector presentation. Right now teaching field depends on PowerPoint presentations with animations to make students interesting and to understand concepts more effectually. Using the concept of augmented reality we can create markers of 3d models and we can project them to students. Recent trends in technology made new gadgets like iPhone, iPad, android devices, tabs made a eBooks as a part of their educations in some colleges and schools encouraging eBook reading. In china and japan iPad are used for studying. Now usage of gadgets increasing day by day it mark up for augmented reality in the field of education. We can operate augmented reality using this gadgets so many companies are making augmented reality apps for games and advertising. The birth of AR in education take place at 2002 in which hitlab made an augmented reality method of storytelling. The work carried out in different phases starting with sketching the animation the story is divided into different modules and in which a document is prepared on that story with basic requirements and sketching is done for each scenario so step 1 is creating a story board roughly sketching out what was going to be shown on each page of the book. These sketches showed important things such as who the characters were in each scene, what they were doing, and where they were placed relative to each other. The storyboard was drawn several times before the final sets of pictures were selected. Second step was 3d modelling the process of modelling involves making a 3D model from picture. They used special computer modelling software to create and colour 3D objects they worked particularly hard to make sure that the virtual images looked exactly like sketched pictures. This was helped by using scans of parts of the pictures and



applying these scans as textures on the virtual images. The final result was a set of computer generated 3D scenes that looked very similar to sketched illustrations. Moving on to the step three the completed 3D models animated using some animation software's according to the story and it's just like making an animation movie of storytelling and step four nature feature tracking makes the animated computer model to be augmented in a book animated using augmented reality software. It projects the model in 3D such that we feel the real story experience in 3 dimensional view of approach finally a finished project is viewed by handheld devices or head mounted displays. Getting basic knowledge from this so many companies starting making apps on this technology recent trends in mobile computing made augmented reality more expandable such that we can use mobile based augmented reality for studying purpose and understanding the tough concept very easily



Figure 3. An augmented reality powered story telling by hitlab(2003)

IV. USING AR BOOKS

With reference to augmented reality so many come up with different models in education. Preparing a AR books is an innovative approach to solve major problems in education. So many technologies are explained in board teaching which is so complicated and couldn't reach students. So this animation based augmented reality approach can make the things clear with small effort from the teachers side for interactive learning. The basics need for it was a 3D model, AR software and a marker. This marker will be printed in the textbook in middle of the book and the entire content in the book was animated in 3D model. When the student placed his hand held display or head mounted display or a mobile enabled AR device he can see the concept in 3D animations. So we come up with an idea of publishing an AR TEXTBOOKS for mind-blowing method of teaching. So that make a student a learning with augmented reality environment. Normally it can be done by using markers let's see how we can prepare an augmented reality application for an educational concept. Starting with the basic concept requirements. In this technology the basic requirements are 1) marker, 2) camera (integrated or connected with computer) 3) computer running with AR software and 4) an output device it can be an AR glasses or a projector, or monitor for viewing virtual object at first we have to prepare a marker model and specify to the software running in the computer after that we must generate a 3D model of the concept with animation and integrate with the AR software. When we run the software our webcam will turn on automatically searches for the marker. We will print the marker in a textbook such that if we point the textbook software recognizes the marker and virtual image will be augmented showing the entire description of the concept

Let's see an example from arined website a concept for fire engineering. Enclosure in fire dynamics is the concept its bit tough to explain in other means. Here we took a 3d models from Google sketch up and started with animations. For this we create six scenes explaining this concept

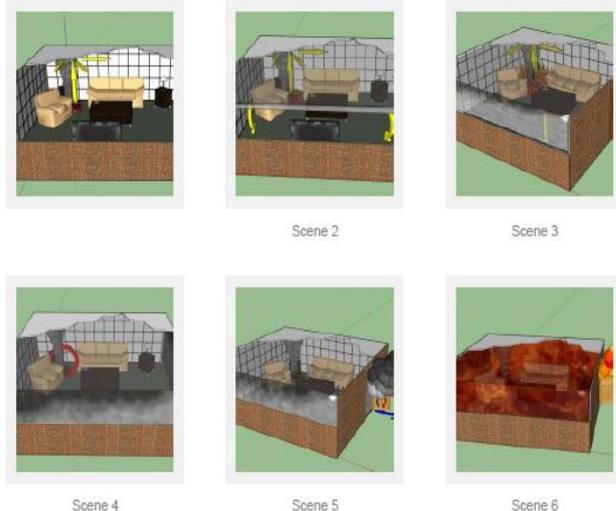


Figure 4. No of scenes for explaining enclosure in fire dynamics



Figure 5: AR book prototype

First scene depicts a 3d model of room with several fuel packages as the smoke raises upwards since it's a closed room the smoke will hit the ceiling and spread all over the room Scene 2 gives us a model of larger flames and redirection of smoke from ceiling and interactions with walls. Direction of the smoke is animated eventually such that we can analyse the smoke direction and spreading it in the room with different directions after scene 2 the model for scene 3 as the upper layer starts to form and descend from the ceiling, we start to see more and more smoke developing. Since the door in this compartment is closed, the pressure inside of the compartment will increase. As the ceiling layer begins to develop, we start to see involvement of additional fuels after scene 3 if that smoke has nowhere to go then Upper layer is slowly descending and starting to interact and interrupt with the combustion process. After scene 4 due to increase in pressure when the cooler air enters in the scene the incoming cooler air and outgoing heated gasses filled with hydrocarbons and carbon monoxide. That mixing allows for flammable limits to start forming. As soon as we have flammable limits, and those flammable limits reach the ignition source, we begin to see the backdraft event. This event will start near the ignition source and will start to propagate the flame when the flammable limits are met from the incoming rush of air and the mixing of the hydrocarbons, one can see the combustion reaction within the suspended fuel in the air. That is also called a propagating flame a hot air balloon is seen in the last scene

These scene is held by tracking a marker where ever the marker appears 3d model will augmented and all scenes are animated by order it makes the presentation effective as we are viewing the concept in 3d model.

Our idea was to prepare ARBOOKS with the models of subjects or concepts such that a student can study the subject and he can view augmented model using gadgets like iPad, android devices which are available with help of AR software's

V. CONCLUSION

Use of technology is not limited to one field augmented reality has so many uses in field of education and making an AR textbooks can enhance the present education system and use of recent trends in technology and by publishing AR textbooks and providing AR software's in mobile phone based on android, ios etc. enables the augmented learning platform to the students in any subject and make an mind blowing presentation about the concept. The future of the world depends on the education. Finally augmented reality can be used in education field and making AR books enhance its involvement in education field

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Augmented reality holds an important promise for improving the educational system as a whole: it makes learning a far more engaging experience. Check out the BEST 15 AR apps that are changing the education system. Valeria Maslova, the lead IT specialist for Essay On Time, explains: "Augmented reality uses the existing environment and overlays it with new information. That helps students understand the reality that surrounds them. They realize how everything they learn at school is important for their understanding of the real world. Let's see: what AR apps can you use in the classroom? We'll list 15 options for educators to explore. 1. Star Walk: Constellation Finder. Using virtual reality in the classroom, it can give students a comprehensible experience of learning. Also, AR learning can enhance the learning process and let students delve into complex science easily. Read about mixed reality use in education. Therefore, many software development companies are creating augmented reality and virtual reality educational apps, Cleveroad also contributes to this process. The demand for such apps is growing, and you will see now why. What you should start with or why AR is a solution. AR-based app will help immerse children and elder students in learning process much faster. Using 3D color objects of historical heritage or geometric figures, you will let your students delve into a specific subject much better. Expensive equipment is not required.