ENHANCED EDUCATION THROUGH AUGMENTED REALITY

Joshwa Siju Thomas[1], Salman Gaffur[1], Renuka Babu K[1], Joyeal Paul[1], Ann Rija Paul[2]

[1]Student, Dept. Of Computer Science Engineering, Sahrdaya College Of Engineering and Technology, Kerala, India
[2]Assistant Professor, Dept. Of Computer Science Engineering, Sahrdaya College Of Engineering and Technology, Kerala, India

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Abstract - AR (Augmented Reality) is a relatively new field that is rapidly developing. Its goal is to bring the virtual and real worlds together. By incorporating virtual objects into our perspective of the real world, augmented reality aims to improve our perception of it. Since augmented reality (AR) has become more widely used in education in recent years, a study of students' AR learning experiences could aid instructors in implementing AR learning.In augmented reality environments, view management techniques are widely employed to label objects. They can be used in conjunction with image analysis, search space, and adaptive representations to achieve desired labeling objectives. Virtual content such as 3D models, animations, and annotations can be overlaid on top of real-world items using mobile augmented reality (mobile AR).Likewise in this paper we discuss different aspects of Augmented Reality. The findings of this study may provide insights for future AR-related studies to explore the role of cognitive load in learning performance with consideration of motivational factors.

***Key Words*: Models, Virtual, Augmented, Reality , Animation** etc

1. INTRODUCTION

In this era where information can be found instantly by a simple internet search, the didactic method of teaching and memorizing facts is no longer popular. Rather than dividing learning into theoretical and practical sessions, education is now delivered holistically, incorporating various forms of multimedia-rich information to keep the Gen Z learner's attention span from dwindling. By transforming a traditional classroom into an interactive and engaging environment, extraordinary learning and teaching experiences may now be provided through the usage of augmented reality in the classroom.In education, augmented reality gives a visual representation of the learning content, allowing teachers to impart interactive learning through multimedia-rich lessons, and allowing students to see visual information layered on top of their real-world environment.There are a variety of approaches to solving problems in traditional education, as well as several ways to use augmented reality in teaching. This strategy focuses on a method that is easily available, inexpensive, and effective.

2. WHY MOBILE LEARNING

Because learning no longer takes place in conventional settings such as classrooms, the use of mobile devices in education has created a new educational paradigm known as M-Learning. It provides various opportunity for students to exercise their creativity, while also providing an element of motivation and collaboration, especially for children. This definition is in line with the concept of ubiquitous learning. "In essence, pervasive learning refers to the use of a technology that the apprentice has in his or her hands to generate more meaningful and relevant learning situations, written by the student." Furthermore, these devices use open platforms, enabling for the deployment of low-cost educational programme that may be expanded and replicated in several locations.

3. AUGMENTED REALITY

The concept of Augmented Reality is a technology that allows a human and a computer to interact in real time to construct two-dimensional or three-dimensional objects. In its application, augmented reality can give the necessary functionality and information. In this situation, augmented reality (AR) requires only a camera capable of capturing photos without the requirement for marker coordinates from the surrounding environment in order to create genuine 3D objects. Because augmented reality application development is quick and straightforward, it can be used as a promotional tool or for information dissemination. As a result, the idea developed separately develop AR applications that assist the dwelling marketing department in the housing market in displaying a 3D object of the advertised house.

4. MOTIVATION

Why is Augmented Reality such a fascinating subject? Why is it beneficial to combine actual and virtual elements in 3-D? Augmented Reality improves a user's perception of the real world and their interaction with it. The virtual objects present data that the user is unable to detect with his own senses. The data communicated by virtual objects assists a user in doing real-world tasks.

5. EXISTING SYSTEM

D.Roopa,R.Prabha, and G.A.Sentil's article "Revolutionizing education system with interactive augmented reality for quality education" intends to establish an interactive augmented reality experience to encourage situation and experimental learning. They created an augmented reality￾based system to explain how an AC generator works. The working of the AC generator was demonstrated using the Unity 3D engine and the Vuforia developer portal. C language is used for coding, which is required to provide interaction and animation instructions. The Android SDK is used to create the application's APK file. Different pieces of AC generators,such as slip rings and magnets, are mixed utilizing the blender application.The Blender application is useful for creating 3D objects. Buttons and sliders have been provided to interact with the application, e.g. to increase the RPM value of the generator. It helped the students to easily understand the concept and improve their imagination. System has only few form of interaction that the student can perform.

6. METHODS

For most vision-based, marker-less hand gesture recognition systems[1], the stages in the back-end system are similar. The hand gesture and hand position are the back-end system's outputs, which are utilized to manipulate a 2D virtual item in an AR scenario.The main steps involved are: 1) Image Thresholding: For picture segmentation, the suggested system employs Thresholding as the principal method. Image thresholding is the process of separating the intended object from the image backdrop based on their gray-level distribution and picking an ideal gray-level. In HGCARS, the video stream of the hand gesture is captured by a secondary camera (webcam). Thresholding is applied to each frame (or image) of the resultant video feed. Simple thresholding converts all gray-level pixels below a certain threshold into binary pictures.Set the threshold value to zero and the value of all pixels above it to one. 2) Hand Contour Extraction: Extraction of the Hand Con￾tour In image processing applications, this (also known as edge detection) is a fundamental stage in feature extraction. The edges of a picture frame are the points where the bright￾ness abruptly changes. The largest contour in the image is considered the hand contour in most hand gesture detection systems. The hand contour is extracted from the set of contours generated after processing the image using this assumption. The collection of continuous points in Euclidean space that are connected to contours yields the convex hull or convex envelope of the given points. A group of hand contour points is included within the convex hull created around the hand contour. It maintains convexity properties by employing the fewest amount of variables.It maintains convexity properties by forming the hull with the fewest number of points possible, allowing all contour points to be included inside or on the hull border. Convexity flaws are formed in the convex hull as a result of this method in relation to the hand contours. The greatest circle engraved on our hand is formed by joining these convexity flaws together. The engraved circle's centre is utilized to track the movement of the hand. 3) Hand- Gesture Recognition: The depth of the hand is approximated using the radius of the inscribed circle obtained in the previous step. The palm centre positions are utilized to determine if the hand is motionless or making any motions. All of the template gestures are compared to the list of points. The template motions are saved as a set of points on a curve that roughly approximates the gesture. Because the monitored gestures will also be a list of points, a distance-based mapping of the recorded gesture points can be performed to determine which of the template points they belong to. An mistake can be deduced from this relation. The gesture with the smallest inaccuracy will be regarded genuine at that point. 4) Overlay the Virtual Object in AR: An IP camera is used to capture the real world. The simulated two-dimensional objects are integrated into the camera stream. The following are the steps involved in the procedure: The frame rate of the IP camera's video input is determined and saved. Each frame is retrieved from the video stream – Using the hand centre location, the virtual item is inserted into each frame – Each frame is displayed on the window at the determined frame rate. X. Liu, Y. Liu, and Y. Wang [2] propose an augmented reality-based real-time visualisation method for 3-D magnetic fields that can visualise magnetic flux lines in real-time. It allows students to move the magnets about in 3D space while simultaneously watching the magnetic flux lines. With the suggested method, which visualises the invisible variables in a 3-D magnetic field, students will have a real-life reference for learning electromagnetic. They first calculate the number of magnetic flux lines and their approximate sparse distribution in the high field region, then calculate the magnetic flux intensity using the derived analytical expression of the 3-D magnetic field, and finally use the particle tracking method to simulate the calculated spatial trajectory of the magnetic flux line. To build the magnetic flux line visualisation method, they employed Unity 3D, a 3-D engine that can create augmented reality applications with the support of the Vuforia AR SDK. Vuforia AR SDK captures real-time video with a web camera, from which it can swiftly locate photographs and objects in the real environment, as well as duplicate electromagnetic field ambient content. When the magnetic flux lines are visualized in real-time with the movement of the magnets, learners may easily investigate the electromagnetic phenomenon. By flexibly moving the two magnets around, the geometry of magnetic flux lines can be modified in real-time. In short, the application draws two magnets and their associated magnetic flux density on a piece of paper based on where the camera is pointed. The mechanism allows the user to move the magnets, which vary the flux density. The employment of a web camera in a laptop is a key disadvantage of this method. Switching to portable devices like mobile phones or AR headsets will be a suitable alternative because laptops and desktop PCs are not easily portable. Only touch interaction is used in this manner. More types of interactions, such as voice input and gaze technologies, will improve the user's experience. It will be more engaging to users if the augmented magnet and magnetic flux can be accompanied by sound effects. Qualcomm Connected Experiences, Inc. produced QCAR (Vuforia)[3]. QCAR is a software framework designed for augmented reality applications that take place in a real-world setting. QCAR makes it possible for mobile apps to see augmented reality. QCAR is excellent, stable, and technically efficient programme for introducing computer-based image and making it easier for developers to identify the features and capabilities without the technique's restrictions. The QCAR programme is compatible with a variety of mobile platforms, including iOS, Android, and Unity3D [4]. QCAR Vuforia uses Computer Vision technology to recognize and track the target and three-dimensional objects, allowing the user to alter the position of virtual items using real-world photos displayed in real-time on the smart phone screen. The virtual object will track the image's position in real-time so that the object's and environment's views correspond to the user's perspective in the programme that produce virtual objects that seem like the actual world.

7. RESULT

The field of augmented reality is wide. AR is defined as a system that combines real and virtual worlds, allows for real-time interaction, and allows for accurate 3D registration of virtual and real items. The information about the user's surrounding actual environment becomes interactive and digitally altered with the use of modern AR technologies (e.g. adding computer vision, putting AR cameras into smart phone applications, and object identification). Over a live video feed of a sporting event, immersive perceptual information is occasionally integrated with extra information such as scores.

8. CONCLUSIONS

In education, augmented reality technology can be beneficial. It can, for example, boost user interaction by just making things more interesting. It encourages a learner's greater participation by allowing him or her to access content via a mobile device.It can save money because it makes content generation, revision, and deployment easier and less expensive than traditional printing.There is also contextual relevance since the course creator can include augmented reality into education, allowing him to employ technology to create and deploy 3D visuals that are interactive to the touch of the students.Teachers may demonstrate how a machine operates in real life thanks to contextual relevance, which eliminates the need for learners to make assumptions.

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