

Efficient Cognitive Skill Based Learning System using Augmented Reality



J.R.Arunkumar, M.SundarRajan, Anusuya Ramasamy, Bhupesh Kumar Singh

Abstract: Augmented Reality provides an interactive experience by imposing virtual objects over real world environment and used in different field in learning, entertainment, or edutainment by developing higher order cognitive and practical learning skills. With the infusion of digital technology, nowadays all the educational institutions adapted the online mode learning environment like smart classroom for content delivery, Webcast Lecture by using AR. AR attracts research attention for its ability to allow students to be immersed in realistic experiences. AR will allow learners too deep about real time and cognitive skill development experiences. Recent scenario in education and academic sectors needs emerging technologies for learning system. In that scenario AR technology will be used to create new type of self-learning and automated application in academic. This technology is used to enhance the teaching and learning for students in effective way and efficient too. Even this technology will attract the students to learn fast and improve the cognitive skill also. This is a new standard, merging features from ubiquitous computing, tangible computing, and social computing. The benefits of this proposed component include inspiring deep and thoughtful education, in real world problems and challenges can be refining the creative problem solving abilities while also as long as exposure/ new perception. This proposed research paper goals to improve present educational system using Augmented Reality.

Keywords: Augmented Reality, Learning, Education, Social Computing.

I. INTRODUCTION

As the emerging technology conditions changes, new interfaces have been acquainted with give HCI. Augmented Reality (AR) is an innovation that gives a Computer created virtualization of original data to be overlaid onto a real time environments, visual, auditory, haptic. [2] Within classroom environments to investigation numerous fields of the technology by supporting the method of knowledge by presenting novel and extra methods and techniques that is augmented reality.

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Capacities of Augmented Reality innovation may make classes additionally attractive and data more understandable. Instructors realize that the learning sequence must to be about imagination and interactive. AR offers a productive method to visualize dynamic ideas and support understudies' interaction with AR

could support consistent communication among real and virtual circumstances and inspire the utilization of a substantial interface similitude for object control [10]. AR allows and interacting with outside except class hours and by producing a learning understanding that is related to the formal teaching space [12]. Furthermore, it permits augmenting physical props with virtual annotations and illustrations which could enhance students' understanding in the classroom [13]. In addition, it permits increasing physical props with virtual explanations and representations which could improve understudies' understanding in the homeroom [13]. Also, AR gives another method of controlling and interfacing with unique ideas in reality which could open up an entirely different distance in learning many subject Augmented reality learning situations have been demonstrated successful for dynamic learning technique because of their capacity to submit instructed substance to long haul memory[1]. In Virtual reality (VR), three dimensional (3D) is utilized to show a perspective on an item, framework. The extra measurement could allude to the showcase the increased encouragement of other human faculties, for example, sight, sound or contact. VR innovation allows a client to communicate with a PC in a more regular way than is ordinarily upheld by the customary PC input gadgets of console and mouse. AR and VR utilizes similar sort of equipment segments and innovation for usage. Both are shares the virtual scenes, 3D articles, and intelligence. The distinction between them is supplant this present reality should be possible by VR. In any case, AR will supplement the truth in individually, and AR retained in the formed condition by involvement the delivered media with the genuine condition. The moderate idea of smart mobile phones has totally used AR and its investigation. The mobile phones are currently seen as a useful advantage that can be sent for both formal and casual learning in science and building. Versatile AR is a youthful innovation that might be portrayed as the use of AR by means of (or to) cell phones. This portrayal reasonably incorporates convenient custom-gear, head-mounted gadgets (HMD), mobile phones and tablets. As indicated by [27], versatile AR gives chances to consolidating learning and diversion in new manners that are particularly appropriate for both research facility and homeroom For instance, AR as a rising patterns and manufactured the new possibility for schools and colleges as a method to interconnect with understudies and build up the training getting condition.



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The essential requirements of AR application a memory and a processor to render virtual components, camera, a screen display for view. Several facts of educational prospects can be providing to students using AR technology. It offers attempts to utilize AR for practice and enlightening purposes.

The ongoing cell phones make it workable for portable AR conditions to help outside learning improved by PC reproductions and PC created objects with the exertion on genuine circumstances. It will assist understudies with developing their enthusiasm for the introduced material and increment their learning result [5]. Augmented reality causes educators to include computerized substance with parcel of data just as geographic areas about a spot or item. Advanced data shows up on the screen when you examine any article or spot utilizing your tablet, telephone or brilliant gadgets with AR innovation. This advanced data is assembled from 3D models, different site, video, and so forth. Because of progression in versatile innovation, it is presently doable to utilize Augmented Reality (AR) innovation for learning.

This innovation permits any current book to form into an increased reality release after distribution. Utilizing 3D articles and sees, incidental and creative media, recreations with various sorts of collaborations are the most straightforward methods of interfacing the two segregated universes. These advancements assist students with participating in bona fide investigation in reality, and virtual items, for example, writings, recordings, and pictures are strengthening components for students to direct examinations of these present reality environmental factors. As are develops, understudies can partake in intelligently and cooperate with information all the more genuinely. PC produced recreation permit understudies to investigate and learning subtleties of each critical zone with extraordinary information.

II. RELATED WORKS

AR is the new technological evolution in education sector, many papers are defined and illustrated how to integrate AR technology in education and all that we referred papers focuses on the quality of education using AR integration with education sector. Augmented reality has been utilized for concentrates inside classroom environment to explore various regions of the innovation and how well they help with learning. Augmented reality enlivened substance in homeroom exercises could grab understudies' eye in our dynamic day and age, just as persuade them to contemplate. Including additional information, for example a short bio of individual, fun realities, authentic information about destinations or occasions, visual 3D models, would give understudies a more extensive comprehension of points. In advanced education, Construct3D, a Studiers tube framework, permits understudies to learn mechanical building ideas, math, or calculation. Components 4D (Android/iOS) by an application for contemplating science. It permits consolidating various components as the recreation to perceive how they would respond in all actuality. Science applications empower understudies to envision and collaborate with the spatial structure of an atom utilizing a marker object held close by.. • Anatomy 4D (iOS/Android) is the best fit for clinical understudies. By

filtering printed focuses on, the application shows 3D models of a human body and permits them to associate with it. Clients may change and alter any aspect of the human body, become familiar with jobs, joints, capacities, and so on. Virtual exhibitions of how to utilize research center instrumentation Anatomy understudies can picture various frameworks of the human body in three measurements. Utilizing these devices to learn anatomical structures needs to expand the student's information and give characteristic advantages, for example, expanded commitment and student development.

I. Corinth Micro Anatomy, accessible for versatile, is another human life structures application that might be fascinating for clinical staff or on the other hand Human Heart 3D application with less substance, yet more explicit – to investigate the human heart in detail. 3D model of a heart finished with different movements and printed tips about it.

II. AugThat (Android &iOS), planned by a previous educator, is the application that gets AR a class room. AugThat mostly targets understudies who need inspiration with the assistance of 360-degree virtual photographs and various 3D encounters.

III. Canadian tech company CASE changed the mass of the school exercise center into a ball game by adding Augmented Reality layer to it. Children through balls onto a divider to hit gliding shapes thus have a great time physical activities which results to improve the Engagement and association By fusing Augmented Reality

IV. The Magic Book allows the user to augment the normal book by using AR viewer by display that content in 3D models with animation. The Magic Book aimed to teach 9-year old students how to mix primary colors to get new colors and the application was found to be very effective.. Another example is the CREATE AR Project, where a Augmented reality (AR) system was built up that empowers the ongoing development and control of photograph reasonable virtual universes from genuine information sources. As per [33] the CREATE system was utilized for instructing students about cultural legacy, architecture structure, and urban arranging. Additionally, [32] revealed an AR application for mechanical building that permits clients to interface with an online 3D model of a cylinder and piston.

V. For the Engineering students DehAr books used to explain about the spatial skills and very useful for mechanical engineering students. It uses 3D design models and shows the components perfectly in real view clarity.

Another AR application is about the solar system namely, SUNRA. It uses to improve the students understanding about the solar system. Another important and extraordinary application is GEOAR. It uses for geometry applications and explains more about the different geometric shapes. This application makes mark able different in learning system because it simulates real time explains in 3D representation of the objects. This application makes students to learn more deeply and showing interest to learn more also.



Paper [10] discussed about that SMART application in academic sector. SMART means System of augmented reality for teaching. SMART is an educational system using AR. It uses very basic concepts in school level and like animal, toys, body organs, transport cars, tress, etc.

I. SELF-EDUCATION AR APPS. Google Translate (Android &iOS) is only incredible for considering unknown dialects without a word reference. By utilizing Google Translate uncommon "AR mode" you may quickly exam obscure words. Functions admirably both for understudies and vacationers, to explore in urban areas abroad.

II. Amazing Space Journey, Sky ORB 3D and Star Walk. Every one of them has one reason which is to consider the skies with every one of its insider facts. Get familiar with stars, heavenly bodies, planets of the Solar System, universes, and so on.

Find and learn Visitors of exhibition halls could get to AR through advanced mobile phones and find authentic substance identified with objects. Extra data about what they see, however because of space or spending constraints, not all historical centers and tourist spots can bear the cost of this. Augmented reality application being utilized to save a bit of history is the Bergen-Belsen Memorial, a previous Holocaust camp that was annihilated after the finish of world war two. The region generally takes after woodland without any hints of the camp remaining, however the application utilizes geo-confinement information to show a remaking of the zone and show what it resembled earlier Multimodal Technol. Interface. 2019, 3, 39 7 of 20 to its decimation alongside documentation and verifiable records.

Augmented reality apps for school children (kids), ZooKazam or Bugs 3D. ZooKazam (Android &iOS), clarify practically creature classes, recommendations energized 3D models and various data illustrations about vertebrates, bugs, fish, winged animals, and reptiles. Bugs 3D (Android &iOS) helps children to recognize more about bugs, setting journeys and inquiries concerning them, and demonstrating clarifications and pictures to play for the sake of entertainment exercises, craftsmanship, and drawing, there are Quiver, and Chromville find out about plants and greenery, there are Arloon Plants Android &iOS) For the littlest children, look at Pete the Cat: School Jam application – it serves "pre-education" objectives, as to show compassion for live creatures, just as innovativeness.

Instructive conditions have prerequisites for learning, and for the motivations behind enlarged reality, these were investigated by Bujak et... their exploration on the mental part of the innovation inside a homeroom. By breaking down the mental components of utilizing an enlarged reality framework, the examination found that the innovation giving more self-governance when learning as it was an approach to connect theoretical ideas and physical ones, giving the bit of leeway that a client of the framework can have both individual viewpoint and command over their experience. It additionally takes into consideration cooperation in a common space utilizing a similar instructive substance; clients can cooperate all the while without anybody anticipating their turn collaborating with the substance accessible.

Understudies of specialized resources particularly need practice and hands-on involvement with their regions.

Through cooperation, dissimilar to VR, AR highlights could assist with playing out a virtual practice – with enlarged instructional exercises, computerized demonstrating, and reproductions, and obtain some involvement with the end. It's anything but a mystery that propelled and drew in understudies to comprehend the subject better and learn quickly.

III. PROPOSED SYSTEM

The proposed system has a technical flow-chart for an AR app running on a mobile device or the arrangement of steps achieved by the AR applications. It utilizes a few appropriate and difficult programming providing steps/stages are required in AR applications; these include dealing with an equipment camera device (required for taking a scene on this present reality), image handling/feature discovery (required for perceiving markers), picture delivering/texturizing (required for bringing virtual items into the perspective on this present reality) and a continuous occurrence has driven programming model, which is required for managing user or client input information and interactions between real-objects, virtual-objects and end-user. The Proposed system is divided in to two techniques, namely A) preprocessing Method, B) AR development Method

A. Preprocessing Method

It consist of three modules like 1.Camera 2. Image or video Capturing Module 3. Image or Video frame Processing Module

1. Camera

In the real time, input data from the smart mobile phone and feed this live video or real time object frames like Camera module. Augmented reality takes the input from camera module and produces the true live objects. This live video is given as a input data to the Image or video Capturing Module.

2. Image or video Capturing Module

This module investigation the input data from the smart mobile phone, by developing down each frame input data. This module creates binary pixels for example a computerized picture that has just two possible properties for every pixel. Normally the two colors utilized for a black [0] and white [1] and binary pictures are given as a contribution to Image or video frame processing Module.

3. Image or Video frame Processing Module

The main input data to Image processing module are the binary pictures of Image or video frame processing Module. These parallel pictures are prepared using a picture processing procedure to differentiate the AR Marker or position Identification of AR Marker is straightforward to choose the position of the marker, where to place the virtual element. When the AR Marker is illustrious, its area is given as an input to AR Development Module.

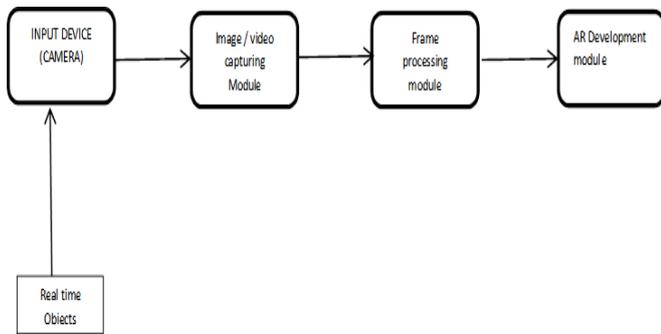


Figure 1 Preprocessing techniques

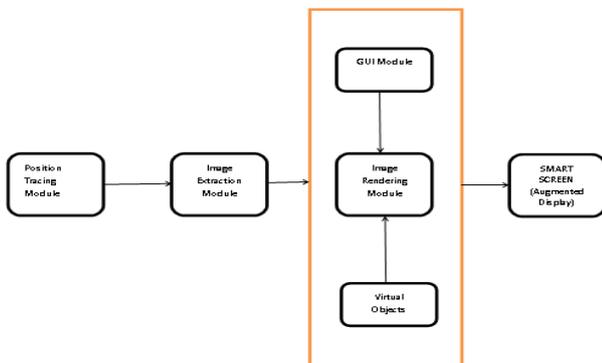


Figure 2 AR Development techniques

B. AR Development Method

It consists of three modules like 1. Position or Marker Tracing Module 2. Image Extraction Module 3. Image Rendering Module.

1. Position or Marker Tracing Module: It is a core of the augmented reality framework and technology, it figures the overall position of the camera progressively. The term present methods the six degrees of freedom (DOF) position. i.e the 3D area and 3D direction of an object. The determined posture is given as a contribution to delivering module.

2. Image Extraction Module: Extract the features of the input image from the preprocessing techniques.

3. Image Rendering Module: Image rendering Module consist of two input 1) Virtual objects 2) Graphical user Interface. First is the compute position from the position tracing module and the other is the virtual element to be increased. The Image rendering module joins the first picture and the virtual parts utilizing the determined position and provides the expected real augmented image on the display or projector. Presently at whatever point the client communicates with the virtual items then as needs be the reaction is produced and reaction is appeared on the screen.

It utilizes different techniques for communication with virtual items which empower client to comprehend the examination materials all the more plainly. Sorts of association incorporate sensor based, motion based and speech based communications. We intend to utilize later and quicker picture preparing calculation for speedier marker location. We will utilize high realistic computers and a high goal digital camera for lesser odds of unsettling influences and quicker picture delivering. We will make pictures that have high differentiating types. We intend to make exceptionally point by point 3D model or activity, to stay away from contortions in augmented feed.

IV. CONCLUSION

This research paper is proposed a position based augmented reality which will help to combine virtual objects with the real environment, which will be integrated with combination of virtual objects and real time objects in class room environment and this research proposed the AR implementation module used for active and attractive based self-learning education system. This will provides the flexible and more interaction in the teaching and learning approach. Position based augmented reality is low cost and very easiest method to practice this in education both by the teacher and students. Teaching through position based augmented reality offers great possible effect on the future of education in technical fields. In the emerging technologies, AR plays vital role for new teaching and learning system to make efficient cognitive skill for students.

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Dr. J.R. Arun Kumar has contributed a lot in higher technical education in India and Abroad. He is recognized for his excellent academic/Research/Innovative events. He has served more than 15 years in

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