Smart TextBook using AR

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Abstract

For primary school students, in particular, studying and learning various subjects might be a bit challenging. With the modern era of technology and the internet, they are growing. Thus, education must evolve to the technological standard as well.AR technology can be applied to workbooks or flashcards and can be utilized in various fields of study, providing benefits such as enhanced learning outcomes, motivation, interaction, and collaboration. At USIM, students and instructors have extensively leveraged augmented reality, which has been found to facilitate personalized learning. One potential application of this technology is the creation of an augmented reality textbook.

I.   INTRODUCTION

Today technology is growing to a greater extent and the utilization of technologies in any industry has recorded a better result. The use of these technologies simplifies human lives. Every part of our lives involves the use of technology; we use it to communicate with each other ; to increase the efficiency of work; to create better and useful products ; to excel in our life; etc. in short technology provides us ease andspeed in living our life.

In the education sector, nowadays Studying and learning subjects can be a dull experience, and student engagement and interest is one of the biggest challenges in traditional teaching. Augmented reality (AR) offers teachers the chance to facilitate students' comprehension of abstract concepts. Through utilizing the interactive and experimental features of AR technologies, teachers can enrich classroom experiences, impart new skills, spark students' imagination, and foster students' enthusiasm for exploring fresh academic pursuits. The application of augmented reality improves how users see and engage with the real environment. Information that the user is unable to see with his senses is displayed through the virtual objects. A user can carry out real-world actions according to the information that the virtual items offer. Since augmented reality is a cutting-edge technology, there is growing interest in using it in a variety of businesses.

II.   LITERATURE REVIEW

Acquiring knowledge from books is a common and latent loop. The text and pictures in the books are definitely not immersive, which causes the fundamental learning barriers that students search for, such as difficulties understanding hypothetical concepts, a lack of explanations, and straightforward reasoning. Computerized books dominate these areas, yet because of their adaptability and portability, journal article books are frequently preferred over computerized books. In this paper, We present a remarkable arrangement that employs augmented reality to create a more immersive and interactive learning experience. A significant 3- dimensional (3D) model

or movie is displayed on the smartphone screen while the application is focused on text or a picture. By encouraging students to use graphical help to understand new concepts, the programme helps the students in some ways. In addition to being used in education, it can also be used in business, the tourism industry, gaming, and medicine [1].

This study investigates the creation of mobile augmented reality (MAR) applications for learning about chemical bonds. The authors opted to utilize MAR in teaching chemical bonds because of its growing popularity in the education sector. MAR is known to effectively address visualization issues that are commonly associated with understanding chemical bonds, making it an advantageous tool.

To ensure that the learning process works as intended, the authors employed the ADDIE instructional design approach in developing the MAR applications for teaching chemical bonding in a learning environment. The model included five phases to ensure that the process of using the MAR apps before, during, and after it has accomplished the given objectives. This study describes how each stage occurs.[2].

Augmented reality (AR) has seen substantial progress over the last decade and has been implemented in numerous domains, including the field of education. In the laboratory, a number of Ar systems have been created and tested without taking into account the pedagogical resources that students and teachers use in the classroom or the reality of the classroom. Based on a textbook for the sixth-grade natural sciences, we created an AR prototype. This prototype permits the development of additional layers of virtual information while still allowing the traditional textbook to be used. We Outline a Comparison of Using the Augmented Textbook against the Textbook without Ar. 50 students from an elementary school participated in a quasi-experimental study that was used to develop this research. The findings suggest that the AR textbook prototype can enhance student learning and perceptions of understanding, innovation, satisfaction, and emotional induction. These findings also enable us to develop guidelines that can aid in the creation of future augmented textbooks.[3].

A number of studies have highlighted the benefits of using augmented reality (AR) in the field of education. However, understanding the reasons behind its effectiveness and identifying which students benefit most from this technology can create new opportunities for integrating adaptive instruction with AR in the future. In our research, we utilized a quasi-experimental design to recruit six participants, and their behaviour in an AR learning environment was analysed using lag sequence analysis over the course of an 8-week activity. Our findings revealed that AR was particularly effective in enhancing science learning outcomes for students who prefer a kinaesthetic learning style. We believe that this is because of the increased availability of hands-on activities, whichenhances learners' concentration and motivation for learning.[4].

Augmented reality provides fresh prospects for education by adding virtual information to the physical world. The key to successful education lies in emphasizing creativity and interaction. The most productive learning takes place when students can actively engage with the material being taught. To foster mental growth, it is essential to provide students with a platform that enables them to interact with the subject matter. This application serves as a means to accomplishthat objective.[5].

III.   MOTIVATION

The incorporation of cutting-edge methodologies like augmented reality into formal education programmes is now considered to be an essential component of effective teaching.

By integrating augmented reality into the curriculum, technology-student engagement can extend beyond screen watching and mouse clicks to completely new learning environments, improving how students interact with the learning process. The advantages that augmented technologies provide to the learning environment are essentially endless.

IV. PROCEDURE
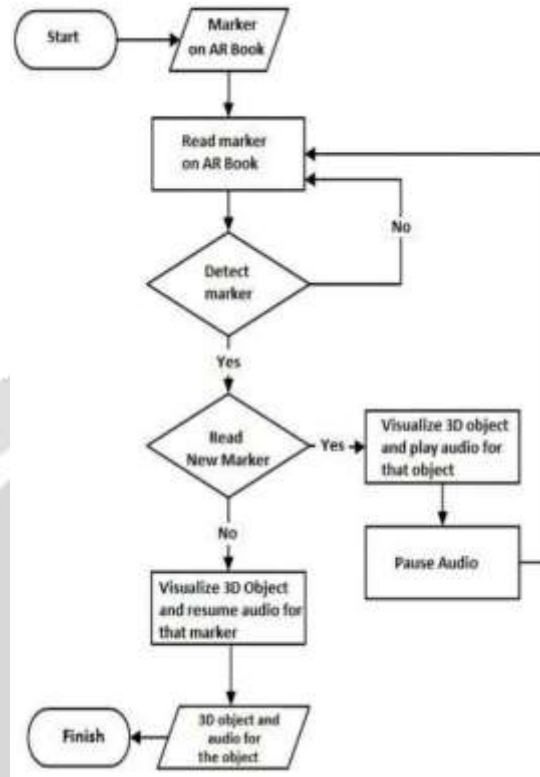
Fig 1: Flowchart

From the start the system will start scanning the target image. And it will check and read the marker on the book if the marker is detected it will check for a new marker. If there is no new marker is present it will display the 3d visuals of the object and resume the audio for that marker, and if there is new marker detected it will visualize the 3d object and play audio for that object and further it pauses the audio and again loops back to the reading markers on the book.

V. PROBLEM STATEMENT

Nowadays Studying and learning for students can be a dull experience, and student engagement and interest is one of the biggest challenges in traditional teaching. Students can't stay focused for a long time while studying; they easily get distracted and bored of studying. Therefore, Augmented Reality (AR) provides teachers with a platform to assist students in comprehending abstract concepts. Through the use of AR technology, educators can foster interaction and experimentation in the classroom, enriching the learning experience. This approach allows teachers to introduce new skills, inspire students to explore new academic interests, and create excitement among students for the learning process.

VI. PROPOSED MODEL
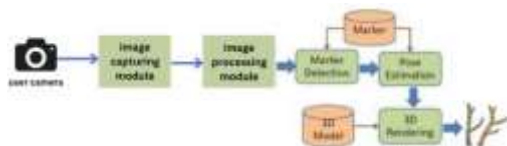
Fig 2: Block Diagram of proposed system

VII. RESULT

As a result, we have implemented the augmented reality based Smart Text Book. In that we have created a multiple 3d models of different images. We have made the Camera available for users to scan the images. With just a smartphone, individuals can scan and view a 3D model and interact with it. The phone's built-in camera captures live footage of the environment and transmits it to an image capturing module, which divides the footage into frames. One of the frames is then transferred to the image processing module, which identifies the marker's location and relays it to the marker tracking module. The module then presents a 3D rendition of the image with audio and text related to that image.

Fig 3: Text Book Image
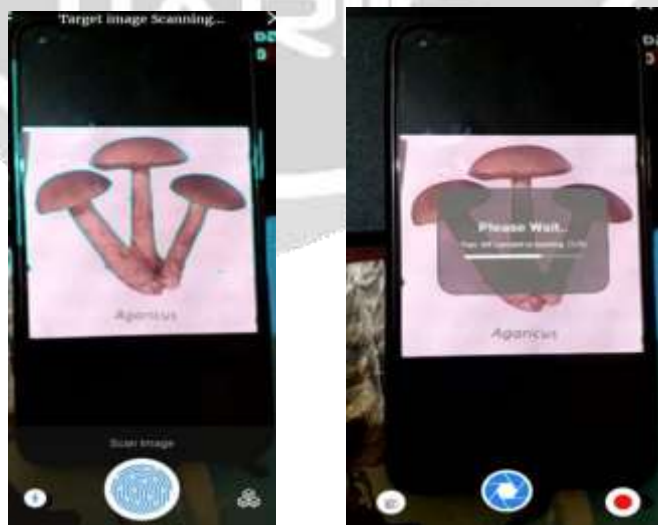
Fig 4 and 5: Target image scanning and markerdetection

Fig 6: 3d view with Audio and Text

Fig 7: Zoomed view of image

VIII.   CONCLUSION

The learning process for students in the curriculum of today is carried out using learning materials that are printed on paper. This technique of teaching and learning has limitations, especially for disciplines needing highly developed spatial abilities (science, nature). One tiny misunderstanding of the issue can cause complete confusion about the topic or perhaps the entire field. Due to them, the teaching-learning process is difficult for both teachers and pupils. This project's goal is to determine how new augmented reality technologies can improve the teaching and learning process with personalized learning using 3d view of modules with audio and text embedded with it for better understanding and visualization.

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