

# The Study of Augmented Reality in Education

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**Abstract:** The demand for online education is increasing day by day. This paper represents the development of an educational application for providing easy online learning to students. The aim of this application is to provide with online learning content and an option for the teachers to upload the notes, books and video lectures that can be conveniently downloaded and accessed by students. Till now, all the Educational Institutions such as College, Schools, Universities are following the concept of face to face Education. But the situation of Covid-19 forced everyone to be at home. But it is observed that online learning becomes boring for students and they are not able to focus properly because of which their study suffers. But in the situation of lockdown imposed by government to prevent the spread of Covid-19, the students cannot go to their colleges, schools. This research is an attempt to make the online learning interesting for students by making use of Augmented Reality. If the students are provided education using Augmented Reality(AR), they will develop interest and will be able to grasp the content easily and quickly.

**Keywords** – coronavirus, COVID-19, education, Augmented Reality (AR), technology.

## I. INTRODUCTION

An Educational application is very important for the coming generation. The reason being the increasing cases of coronavirus. Online Education can be made interesting using the latest technology. One of the method implemented in this direction is on what this research is based. Augmented Reality can make online study interesting and make the lectures appear to be real just like Classroom study. Augmented Reality(AR) in general means to embed the digital information into the real world virtually [1]. To make Augmented Reality into work, three technologies are used:

1. Simultaneous Location and Mapping(SLAM).
2. Image processing and Projection.
3. Depth Tracking.

SLAM is a technology which allows the robot or a device to identify its surroundings and create its map and it is used to orient an image, model, or a video in a real world. Depth Tracking is used to measure the depth or distance between the object which is to be placed virtually in the real world and the device used to achieve it.

After SLAM and Depth Tracking, final step involves processing and Projection of the image in the Real World. This research involves the use of these technologies so that the students can place the images, videos and other stuff virtually Infront of them. In this way they can also study different models such as the hardware of a computer system. They can orient that model virtually using an AR device and see each and every minute detail by zooming the model easily. The Educational application is developed in such a way so as to support AR functionality for better understanding in these tough times of Covid-19.

## II. EXISTING SYSTEM

All the Educational Applications developed till now offer online content and other study material to students. The students need to access those things by just staring at the mobile or laptop screen without any real experience. They are not able to focus for a long time in this type of study. Due to this lack of interest, they are not able to study for a long time.

## III. PROPOSED SYSTEM

In the proposed Educational Application, an attempt is made to remove the boredom of the students by implementing Augmented Reality in the field of Education. The application provides a feature to upload the video lectures to students. These video lectures can be viewed using Augmented reality. Implementation of Augmented Reality in the application allows the students to view the video lectures using Augmented Reality. In this way, they will get a virtual experience that everything is happening in front of them. In this way students can place the video lectures, images, models at their own place in a virtual manner. They will also be able to do detailed study of each and every minute detail of a model. This increases their concentration and interest in online education.

## IV. METHODOLOGY

The methodology used involves SLAM, Depth Tracking, Image processing and Projection. Along with it “Generic digital augmentation” is used [1]. Generic digital augmentation is a methodology used for placing a 3D model virtually in the Real World. It requires some device

to project the image such as projectors or mobile devices providing this support.



Figure 1. Implementation of Generic digital augmentation.

The internal working of converting data into Augmented Reality to make it appear real involves storing it in database and converting it into grey scale. The grey scale is used to store the pixels of the image, model or video lecture. A video may contain a number of images which require proper pixel details to be stored and launched properly in a virtual manner so that everything is clear and visible using this technology. During the display of the model, image or videos for the purpose of studying it is very important to focus on important details and try to remove the unnecessary details such as the background photo frames, furniture etc. For this purpose thresholding is used to remove unnecessary details.

The below process is also called as Calvard et al. [2]. This method was also improved later and modifications were made in the field of research. Among those who carried out research involved Yanni and E. [3].

The method used for achieving Augmented Reality is "Iterative-based methods"[4] which can be achieved by the following steps [5] :

1. The value of initial threshold (T) is chosen.
2. After that the image or video lecture to be augmented is segmented into background and foreground content as per the initial threshold chosen in the previous step.  
 $P1 = \{ g(a,b) : g(a,b) > Q \}$   
 $P2 = \{ g(a,b) : g(a,b) \leq Q \}$
3. Now find the average for every set. Let m1 be the average of P1 and m2 be the average value for P2.
4. Find the value of threshold T' with the help of the values of m1 and m2.
5. Continue the step 2 until the difference between the value of T and T' is very small.

## V. RESULTS AND ANALYSIS

Augmented Reality has been implemented in the field of Games. Everyone involving children find it interesting to play these games which gives them a virtual experience as everything is in front of them.

This research focuses on this thing and is aimed to implement AR technology in the field of education. This is done by providing AR videos, images, models and other content to students so that they can imagine everything in front of them virtually. Instead of just staring at the mobile or laptop screen, they will be able to explore the things and to grasp everything quickly and in an interesting way. It has been observed that students can concentrate in online studies only for ten to twenty minutes. They find it boring sitting in front of a screen and just listening to someone from a far off place. However making use of Augmented Reality using Generic digital augmentation made the studies fun for them.

As now they will no longer be sitting at one place to listen to someone or trying to understand an image. This research showed that students started developing interest in online studies using AR as now they are able to imagine just like they are in their classrooms by virtual orientation of the teaching videos. Even the labs are possible using this technology virtually.

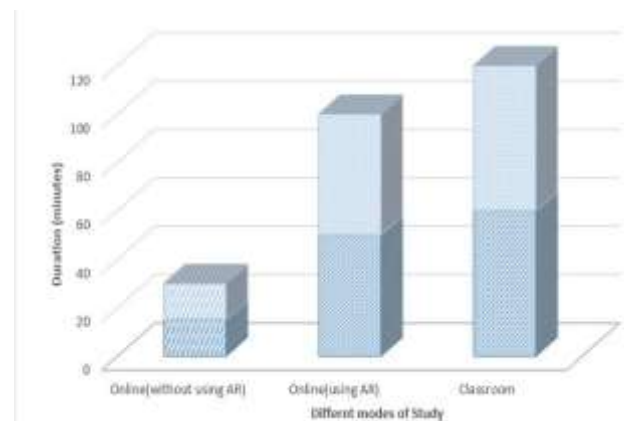


Figure 2. Graph showing the duration for which the students are able to focus during different modes used for studying.

The analysis showed that the duration for which the students can focus in online studies without classroom study increases when Augmented Reality is used to increase their understanding. As seen in Figure 2, the interest of students and their duration of focus has increased much more by using AR and it has reached very close to actual face to face studies.

## VI. CONCLUSION

An educational application is very effective for tough times like Covid-19 due to which everyone is forced to be at home. It was a big challenge to conduct classes online. Due to network issues these classes suffer a lot. A solution of this problem is that the teachers can upload the video lectures whenever its possible and then students can clear their doubts later from them. This will prevent the wastage of time due to various network issues. Also to make online study more effective and interesting Augmented Reality(AR) can be used. This will give a look and feel to students as if they are viewing everything in reality.

Educational Application is developed to make it easy for students to get learning material online as well as to make it easy for the teachers to upload the content and lecture videos for the students which will be very beneficial in tough times like Covid-19 and with the help of SLAM, Depth Tracking, Image processing and Projection, Generic digital augmentation the image, videos, models related to practicals, labs etc can be studied virtually and efficiently. This Educational Application is very useful to provide education while being at our homes. It saves our lives as we don't need to go out and risk our lives in the situation of Covid-19. After the finish of this situation also, it will help the students to learn at their own pace and wish. All this is possible because of technological advancements that we are able to learn and increase our knowledge while being at home.

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