

Teaching Kindergarten Student using Augmented Reality

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Abstract— Our research goal is to develop an augmented reality application to improve the learning experience of the kindergarten students. We are developed an android application which includes augmented reality features which will help kindergarten students learn things in more easy and interesting way. This application scans the environment using device camera and search for markers. If Marker is detected it shows the 3D model corresponding to that marker. OpenCV includes algorithms of feature detection. We used natural feature detection with some improvement. Natural feature detection algorithms help to identify images or markers. This algorithm good for capturing and detecting images with greater accuracy and speeds. This project proposes a method for teaching early childhood kindergarten students by designing augmented reality. With the help of AR technology to generate learning interest in kindergarten students.

Keywords— Augmented Reality, Kindergarten Education, OpenCV, Natural Feature Detection Algorithm

I. INTRODUCTION

Augmented reality is a technology that work on computer vision based on recognition algorithm to augment graphics, sound, video and other real-world objects using the camera of your device. It is good way to sense the real word information in interactive way. In this project we used Augmented Reality technology and digital technology in education system to generate learning interest of kindergarten student. As per the definition of augmented reality to show the 3D object or real word object. By showing real word object or 3D object to improve the capturing capacity and student can easily understand.

In this project we developed an android application which includes augmented reality features which will help us to generate learning interest in kindergarten students. After analyzing current status of kindergarten student, we found several problems including teaching situation, lack of interest and other several problems are faced by kindergarten student. After analysis of such problem we found solution on such problem. We used augmented reality feature in our project to show 3D object or real word object. By showing this real word object or 3D object to kindergarten student can easily capture such real word object .by using such special feature of Augmented Reality technology to improve the student efficiency and speed.

In short, AR is new improving technology with amazing features which will help us to teach students in new interesting way.

A. Kindergarten Education:

In India teaching situation is the methods through which teacher create various situation based on various teaching context. Also, old methods are little less effective as they are mostly verbal and will little pictures, physical objects etc. But those methods are not powerful enough to increase the understanding level of the kindergarten student faster.

B. Augmented Reality:

Augmented Reality is a view of the physical, real world environment that is augmented by synthetic, computer-generated elements. Augmented reality applications use your mobile phone's camera to show a view of the real world in front of you, then adds a layer of information with text and/or images, with that view. Some applications use Augmented Reality for fun also, such as the game Pokémon GO, or they can use it for information like the app Layer. The Layer app can show you interesting information about places you visit, using augmented reality.

II. RELATED WORK

The traditional approach is to teach students using verbally, using books and pictures. There are some applications also come these days which provides some exiting games and drawing like quiz for teaching students. In United States and some other country has developed similar approaches are designed the augmented reality applications for students. This application has effectively student's enthusiasm and initiative. However, research and implementations in India is still at beginning stage. Existing system used different

algorithm which detect and shows the augmented output. They map the markers with the objects. For that they designed some situations and use then to run augmented reality applications. Some different classifications are made based on real world situation and natural situations. Natural situations refer to the natural scenery and natural landscape and its generally used to describe the outdoor scenes of natural world. Life situations refers to daily life and is used to describe the scene of human life. Those situations that reflect the material world of human life can be obtained directly by photography, video and other methods. Knowledge, multimedia materials, interaction and feedback in learning resources can be presented by expression of situation. Also, existing system uses interaction design and feedback design. But, they have some drawbacks. Those systems are leads to failure in some cases. Capturing and detecting the markers is a complicated task and when many different scenarios comes those systems are perform poor. Some parents were also complaining about the mobile usage will affect the health of their children.

III. METHODOLOGY

For detecting image, Natural feature detection and tracking algorithm is used. This algorithm consists of four main steps: Integral image generation, Fast-Hessian detector which is used to generate interest points, Descriptor orientation assignment for achieving rotational invariance and Descriptor generation which provide robust and unique description of an image feature.

IV. PROPOSED SYSTEM

We are proposing augmented reality-based learning application for kindergarten student. Which will help those students to improve their knowledge and performance. We will use different scenarios, scenes, videos, audios etc for much better learning. Students understand things fast if they see them and that's point we are going to hit using augmented reality. Augmented reality applications mainly work on mobile phones. Nowadays, most of the population using smartphones and they are cheaper now. We are using natural feature detection algorithms. Feature detection includes methods for computing abstractions of image information and making local decisions at every image point whether there is an image feature of a given type at that point or not. Those points help us detecting images very faster with great accuracy. Figure 1 shows the system architecture of our learning application using augmented reality.

As shown in fig 1, system requires camera for taking input from the real world as image frames. Later, those frames are converted to grey scale formats using pixel format conversion. Augmented reality tracker is connected to a database which contains some target markers and object to display, also some other information for AR processing.

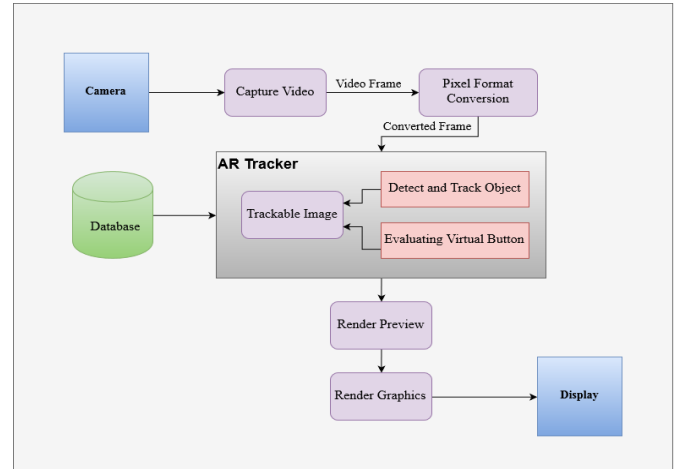


Fig.1 System Architecture

This block will detect the trackable objects from image frames and give associated objects. And after rendering output as a 3D object, virtual buttons etc will display on the screen. This is just a basic flow of marker-based system. Some other function will also be there like marker-less and GPS based augmented reality as per the use in application.

Some parents were complaining about the augmented reality applications. According to them, if their child is using app for long time it might affect their health, and it is true that, over usage of mobile might affect on the human eyes. As a solution for this problem we are going to add monitoring system. Teachers and students have to register on the application before use and application will monitor the usage of every register students and also keep their progress. System will give report to teacher or parents about their daily usage, so they can control them.

V. SYSTEM INTRODUCTION

This system is an Android application with support of Augmented Reality. This application is designed in such a way, so it can be easily understood by children. Currently our system contains support for marker based augmented reality, in future other function will be added. After starting an application student registration and login is done so we can track his/her process. Then menu with different functions are shown. When camera is start it scans each frame and looking for marker in it.

VI. SYSTEM IMPLEMENTATION AND DEVELOPMENT

In the Implementation of this augmented reality-based application, we go through some different steps

1. Create Markers
2. Create 3D Models and Videos
3. Develop application using Unity API

1. Create Markers:

Markers are images that we scan for showing objects on them, object might be any 3D model or video etc. Markers must contain uniqueness, so they can be identified easily and correctly.

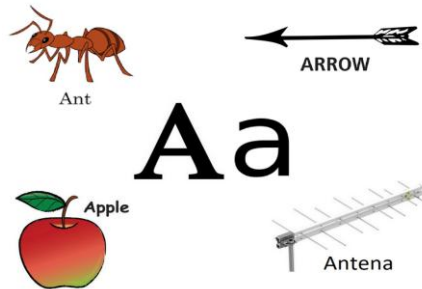


Fig.2

2. Create 3D Models and Videos

For creating 3D objects, we used software like blender, 3ds max. Created 3D objects contains less polygon shapes so they can be get render easily as mobiles have limited resources.



Fig.3

3. Develop application using Unity API

Unity is a great tool with highly optimised rendering pipeline and the rapid iteration capabilities. Unity provides different tools which are really helpful for developing augmented reality application.



Fig.4

VII. RESULTS

At the current stage we added functions for showing 3d models and videos when we scan any marker. We can expand the application by adding some quiz games or other interesting things. Scan marker for showing 3D model for that marker, take an example of alphabet A, we scan marker of A and it shows 3D object of Apple.

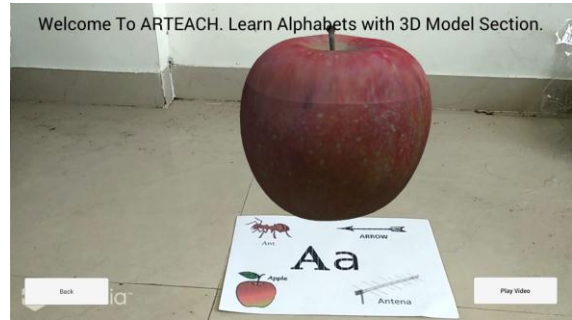


Fig.5

With 3D model, we also added video learning functionality as shown in below image. When we click that play icon video will start to play and if we click again or marker is lost video will pause.



Fig.6

VIII. CONCLUSION

Augmented Reality is a view of the physical, real world environment that is augmented by synthetic, computer-generated elements. It is emerging technology and very helpful in visual learning. Kindergarten learning is base for children’s future education. We use augmented reality to generating interest of kindergarten students in learning. For tracking and detecting images we are using natural feature detection algorithms with some improvements for better working. This application will help kindergarten student to learn in new way and generate interest in learning.

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