

SMART LEARNING SYSTEM USING AUGMENTED REALITY

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Abstract – In the last few years Augmented Reality Technology is growing much faster than other domains. Learn a complex structure with 2D images or diagrams are most complicated one. Introducing an Augmented three-dimensional models to respective two dimensional images are cool factor. Now a days Augmented Reality is used various fields such as Medical, Construction, education and etc..., Learning with Augmented Reality is most excited compare than normal way of learn. In the Modern days all the books and Papers are having QR codes and Bar Codes for to learn with scan. On top of QR or two-dimensional image displayed respective three-dimensional objects to learn virtually with interactive behaviour. A fully functional android application named AR Learn. It was the basic idea we are generated and deployed successfully to open the gateway for future of learning experience.

Keywords: complex structure, 2D images, QR Code, Android app, AR Learn

1. INTRODUCTION

Augmented Reality is the well-known technology with more scope in future for talented consumers. It has the digital elements or three dimensional objects in real time or real world. We can able to visualize the augmented reality models or objects using any electronic devices that must be camera enabled. User can experience the real environment with digital elements such three-dimensional objects. The AR algorithms work on the gathering of data from the real word and then converting it into

electronic form for the user [1]. Augmented Reality elements delivery objects, sounds and visuals using camera enabled smartphones and smart glasses only created for experience the AR three-dimensional models and interactive visuals. It can increase learners' perception, attention, and understanding of proportional details of reference models since they could interactively view a reference model in 3D [2]. AR having different interfacing techniques for implementation. It classified into marker based, marker-less and projection based. Marker based AR is more effective to communicate with real world objects. Marker based AR displaying the 3D models or respective three-dimensional objects on top of pre-defined image target or markers. A large number of people will be gaining access to a deeper and broader understanding of the amazing benefits AR can offer to all industry and individuals [3].

2. LITERATURE REVIEW

Smart learning based on Augmented Reality with android platform

Augmented reality is a fast and an emerging research field of computer science and technology. The word augmented reality came into existence in 1990 by Tom Caudel. Head mounted displays play a vital role in the field of AR. In Augmented Reality technology, the information of real world is incorporated with the virtual word in a manner that the integration of these two shows no indication of disparity and incongruity. If there is discrepancy, the end user may get puzzled. The AR algorithms

work on the gathering of data from the real word and then converting it into electronic form for the user. There are numerous AR techniques; some of them make use of conventional input systems. The appropriate AR technique can increase the acuity of human being in various conditions and creating a delusion between virtual and real world.

Development of AR Learning Assistance

Learning is a method of translating and transferring knowledge and skills. Learning methods and materials are important to facilitate a learning process. There are many techniques that could be used, including documents, slides, videos, music and games. Each technique has its own characteristic and strength.

In this early year, technology has become a part of human life. The mobile device is a technology that is easy to access. Thus, the rationale behind this research is to address a difficulty to learn sculpting 3D model, using Augmented Reality (AR). AR is widely known and has been used in many fields. By this method, the learner will only require a smartphone or a device that has a camera, so that the full render 3D model can appear on the screen. AR can also provide the dimensional model, in which users can see the model in every direction. The users can easily learn and understand the shape of a 3D model.

Also reviewed the book entitled as “Augmented Reality Where We Will All Live” by Jon Paddie, this having lot information and features about Augmented Reality.

3. PROPOSED SYSTEM

In this project, we are introducing Augmented Reality in familiar and one of the leading platform Android. The traditional way of teaching style on blackboard with deeper details about respective parts or elements are not most interactive between students. The teachers and students learn more interactive and much smarter than existing way of learning environment. It provides completely different environment to Learn. In the case of deployed system having smartphones or camera enabled devices that supports android platform applications to detect the actual 2D images of hard or soft copy. The following figure shown the entire physical process of this project.



Fig 1: Process flow

Followed by Fig 1, Detected image targets or 2D images are Recognized using respective SDK. At the end actual 3D models or Media will be played on top of image targets.

The Image targets are generating 3D models or media based on quality of detecting medium or image target copies. User Interface having two options for QR recognition and normal 2D image target Recognition. Splash screen or main menu contains Initial start option to begin. It two categories are similar in process phase.

4. SYSTEM REQUIREMENTS

The Process of developing an android application including many built in packages and open source libraries. It has particular hardware and software requirements to deploy the complete user-friendly application based on android platform.

3.1 System Specification

The following specifications are used to create and deploy entire development process,

Operating system – Windows (8, 10, 11), Linux Distros, Mac OS.

Hardware – Minimum 4GB RAM and 20 GB of disk space is required.

Graphical Interface – OpenGL 3.2 or Vulkan Capable or Nvidia and AMD.

3.2 Software Specification

The following is the list of development kits and software components required to build fully functional android application,

Development Environment – Unity 3D Engine 2021.3.22f1 or any latest version.

Image Target Database – Vuforia Engine 10.14 and base Vuforia SDK package.

Development kits – Java Development Kit (JDK), Native Development kit (NDK) and Android SDK tools.

Packages – Unity Built-in AR libraries and Android Build Support

The Unity is the game development engine more effective to create a 3D models and image targets-based media. Vuforia libraries are the key factor to development. It has image targets to detect and recognition of actual 2D images. Android SDK is used to deploy the Android package (APK).

5. SYSTEM DESIGN

The system is designed in a simple and basic visual diagrams and process flow charts. Each component is having different phases in each stage,

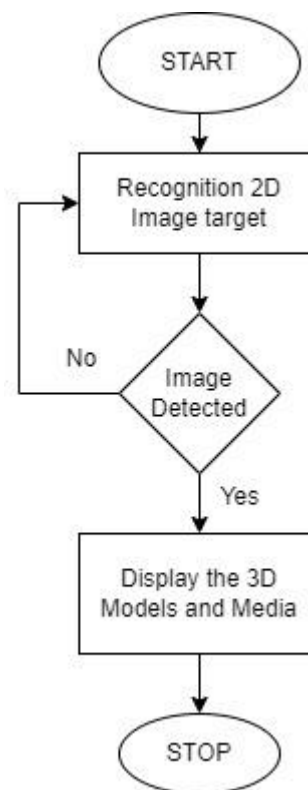


Fig 2: Detailed Flow Diagram

Followed by figure 2, It explaining the flow of process in every stage as soon as possible executing factors are visualized using flow diagram.

Fig 3, It has Stage chart with each and every process between stage in very briefly. It contains major components designed to solve particular task. The following components are present in the block diagram,

- User Interfaces
 1. Main Menu
 2. Choose Options

These are the main two interfaces used to allow user select his choose based on targets.

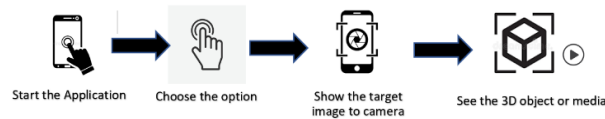


Fig 3: Stage chart

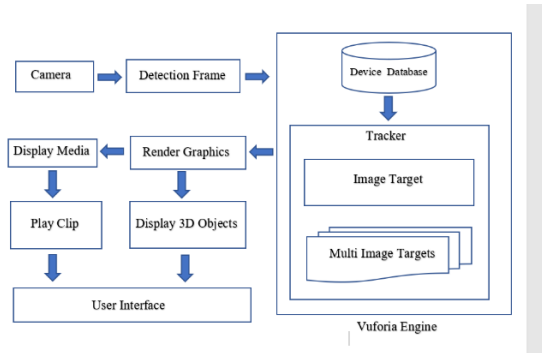


Fig 4: Block Diagram

6. DEVELOPMENT PHASE

The Development phase consists following three major stages to deploy the fully functional android application. The stages are,

- Creating a User interface (main menu) to interact with users.
- Generating Image targets using Vuforia SDK and Image target database.
- Collecting 3D model dataset and also media dataset, with the help of Unity engine concatenating respective image target and 3D models or media.

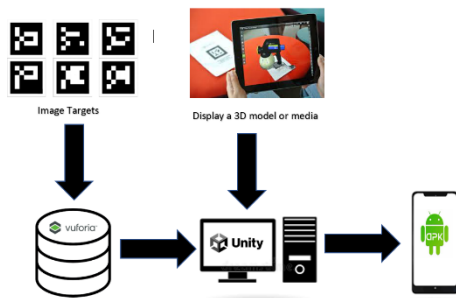


Fig 5: Development Architecture

In the case of developing system must consider the camera resolution and Image length to detect in meters. These factors are

key to develop error free user interface to generate 3D model or media.

7. APPLICATIONS

In the modern days Augmented Reality having many applications in various fields. It dominating the environment compare than other domains in the world. In the following domains AR is used to increase the interaction between users,

7.1 Astronomy

Usage of this technology in astronomy is extremely out of the box thinking, because 3D simulations of the objects in the universe in computers and android devices will encourage the wish to know deeply and definitely increase the curiosity of the reader.

7.2 Medical

It offers a new approach for treatments and education in medicine. AR aids in surgery planning and patient treatment and helps explain complex medical situations to patients and their relatives.

7.3 Education

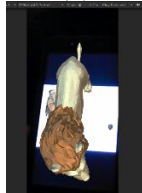
Classroom education can be extraordinary and more interactive, as AR can enable teachers to show virtual examples of concepts and add gaming elements to provide textbook material support. This will enable students to learn faster and memorize information. AR in education can turn out to be a very exciting and useful intervention that will change the education system. It made the future ready talent through learning and experience.

8. RESULT

Single Image Recognition



(a)



(b)



(c)

Multi Image Targets



QR Recognition and Play Clip



9. CONCLUSION

At the end Augmented Reality through smartphones and camera enabled devices are more helpful for students and teacher to learn every elements and parts in depth. Furthermore, It most effective among students because of less requirements. It needs basic smartphone with better camera quality to visualizing the AR experience.

Generated 3D models are creating good impact and new way of learning experience to make future ready talent. Every lesson is bored when studying with two dimensional images, this project gives you to different immersive experience.

10. FUTURE IMPLEMENTATION

In Future, we are combining the machine learning models with Augmented Reality applications for more effective way of learning and creating fully functional Virtual classrooms for complete interaction between students and teacher.

References

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