

# Virtual Reality Based Remote Place Explorer Application

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## ABSTRACT

Virtual Reality is implemented by a combination of technologies that are used in order to visualize and provide interaction with a virtual environment. These environments often depict three-dimensional space which may be realistic or imaginary, macroscopic or microscopic and based on realistic physical laws of dynamics, or on imaginary dynamics. A key feature of Virtual Reality is that it allows multi-sensory interaction with the space being visualized. Virtual Reality ideally suited for effective learning and try to explain this effectiveness in terms of the advantages afforded by active learning through experiences. In this project we used finger print authentication helper which is an android library to simplify the authentication with finger print process. This will provide a common platform for finger print authentication for all the android versions. For authentication purpose Kerberos authentication protocol is used. Implementations of Kerberos exist in Apple OS, Android OS. Kerberos has made the internet and its site more secure, and enables users to do more work on the Internet and in the office without compromising safety. Used Google virtual reality library to implement virtual reality concept with available software development kit to make cardboard apps. There are three different SDK (Software Development Kit) to make Cardboard apps. This includes Android SDK, Apple iOS SDK and a Unity SDK. The underlying standard is OpenGL, which is widely accepted popular high performance industry standard. The Android app is made using Java language corresponding to JDK (Java Development Kit) 1.7, using Android SDK version 24. We used (Bring Your Own Device) BYOD approach for the phones to be used inside Cardboard. Set up a system that uses Virtual Reality to aid and improve the knowledge transfer process. For achieving this, the system has to be cost effective so that it can be used individually by everyone in any field. It facilitate continued usage without being a preventing to normal flow of class work or specific to any location.

**Keywords:** Virtual Reality, SDK, JDK, BYOD.

## 1. INTRODUCTION

The Virtual Reality comes, naturally, from the definitions for both 'virtual' and 'reality'. The definition of 'virtual' is near and reality is what we experience as human beings. So the term 'virtual reality' basically means 'near-reality'. This could, of course, mean anything but it usually refers to a specific type of reality emulation. Everything that we know about our reality

comes by way of our senses. In other words, our entire experience of reality is simply a combination of sensory information and our brains sense-making mechanisms for that information. It stands to reason then, that if you can present your senses with made-up information; your perception of reality would also change in response to it. You would be presented with a version of reality that isn't really there, but from your

perspective it would be perceived as real. Something we would refer to as a *virtual reality*. So, in summary, virtual reality entails presenting our senses with a computer generated virtual environment that we can explore in some fashion.

Virtual Reality is implemented by a combination of technologies that are used in order to visualize and provide interaction with a virtual environment. These environments often depict three-dimensional space which may be realistic or imaginary, macroscopic or microscopic and based on realistic physical laws of dynamics, or on imaginary dynamics. A key feature of Virtual Reality is that it allows multi-sensory interaction with the space being visualized. Here we look at how this combination of multi-sensory visualization and interactivity make Virtual Reality ideally suited for effective learning and try to explain this effectiveness in terms of the advantages afforded by active learning through experiences.

In this project we used finger print authentication helper which is an android library to simplify the authentication with finger print process. This will provide a common platform for finger print authentication for all the android versions. For authentication purpose Kerberos authentication protocol is used. Implementations of Kerberos exist in Apple OS, Android OS. Kerberos has made the internet and its site more secure, and enables users to do more work on the Internet and in the office without compromising safety. Used Google virtual reality library to implement virtual reality concept with available software development kit to make cardboard apps.

There are three different SDK (Software Development Kit) to make Cardboard apps. This includes Android SDK, Apple iOS SDK and a Unity SDK. The underlying standard is OpenGL, which is widely accepted popular high performance industry standard. The Android app is made using Java language corresponding to JDK (Java Development

Kit) 1.7, using Android SDK version 24. We used (Bring Your Own Device) BYOD approach for the phones to be used inside Cardboard.

Set up a system that uses Virtual Reality to aid and improve the knowledge transfer process. For achieving this, the system has to be cost effective so that it can be used individually by everyone in any field. Apart from this, the setup has to be portable to facilitate continued usage without being a preventing to normal flow of classwork or specific to any location.

## 2. LITERATURE REVIEW

### A. Existing work on Virtual Reality for Education

VR is an intriguing technology. When to use it and when not to use it are some of the confusions surrounding it. Pantelidis, V. S. (2010) suggested a model describing when and where to use VR. [7] The author suggests VR is helpful in any scenario that requires simulation, realism and immersion. An extensive survey of research and educational uses of virtual reality, conducted by Youngblut (1998) presented a very positive picture of the potential. [4] Youngblut found that there are unique capabilities of virtual reality, and the majority of uses included aspects of constructivist learning (1998, p. 93). The majority of the teachers in the studies reviewed said they would use virtual reality technology if it were affordable, available, and easy to use for students and teachers (1998, p. 101). But the practical questions bring forth the drawbacks in three main areas namely cost, hardware support and lack of proper software development tools (1998, p. 104). The estimated cost of hardware starts from \$10,000 to \$25,000, which is beyond most elementary, middle and high school budgets. The instability of VR hardware market at that time was also a concern for acquiring devices and continued after sales support for hardware (1998, p. 105). Software compatibility and availability of proper unified development tools were another major roadblock. From

software viewpoint, there has been a number of significant VR environments that were developed for various educational purposes. Some notable works are Vicher [8] and Mass Effect. [9] But once again, there exists major roadblocks in their everyday usage. These systems are highly subject oriented with static content. Moreover, the hardware cost and portability problems mentioned above is applicable to these systems also.

### B. Existing works on Google Cardboard

There is no significant research work where Cardboard is exclusively used as a hardware platform. The only notable use is found in Expeditions Pioneer Program. [10] This is a pilot program undertaken by Google in very

few cities around the world where selected schools are provided Cardboard viewers, smart phones and tablets to set up a virtual guided journey consisting of various archaeological or important places like Coral Reefs, space journey, galleries and museums, etc. The students wear their viewers and look into the 3D scenes while the teacher guides them using a tablet device, highlighting various details and editable notes embedded in the scenes. But being a proprietary and closed access program, the research details available from it are almost zero. Moreover, the program is carried out in few cities in western countries and there is no sign of it extending into developing countries.

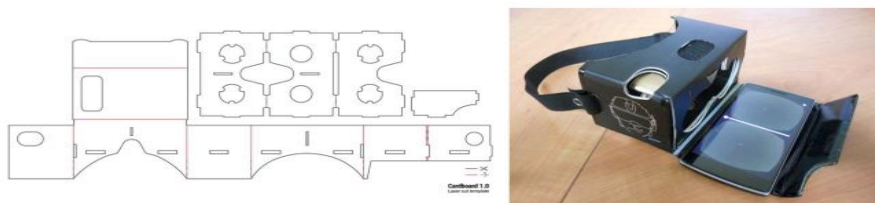


Figure 1: Schematics of Google Cardboard [5] and an assembled Cardboard setup used in experiment

### 3. PROPOSED APPROACH

Cardboard viewers are either procured from market or cut out of cardboard. In case they are bought, prices are around only Rs.200 per piece. During classroom teaching, whenever teacher wants to display content, the students are asked to put on their viewers and browse to the corresponding content inside the app. When the content is displayed on screen, each student can individually look around the scene and its details in own pace and own perspective irrespective of how others are viewing.. The applications are as follows:

Virtual reality is most commonly used in entertainment applications such as video gaming and 3D cinema.

In robotics, virtual reality has been used to control robots telepresence and telerobotic systems

In medicine, simulated Virtual Reality surgical environments under the supervision

of experts can provide effective and repeatable training at a low cost, allowing trainees to recognize and amend errors as they occur.

Virtual Reality can simulate real workspaces for workplace occupational safety and health purposes, educational purposes, and training purposes.

It can be used to provide learners with a virtual environment where they can develop their skills without the real-world consequences of failing.

It has been used and studied in primary education, military, astronaut training, flight simulators, miner training, architectural design, driver training and bridge inspection.

### 4. IMPLEMENTATION

The system is a combination of hardware and software components. The viewer frame is provided by Cardboard which holds the

smart phone. The viewer has a magnetic button or capacitive ribbon on the side. It is used to give simple input signals to the smart phone to select objects on screen. The viewing screen and processing power is entirely provided by the smart phone. A minimum requirement of 1GB RAM, 4 inch + screen and capable GPU is fulfilled by

almost all smart phones nowadays, even costing as low as Rs.6000. The third component is the Cardboard compatible app that splits the display into two and applies distortion correction to produce a stereoscopic 3D scene. It displays various contents such as 3D models and panoramic photos and videos with spatial sound.



Figure 2: User wearing a Cardboard viewer with attached smartphone.

## 5. PLANNED IMPLEMENTATION

Google provides three different SDK (Software Development Kit) to make Cardboard apps. This includes Android SDK, Apple iOS SDK and a Unity SDK. All three platforms are equally popular and there is no lack of support and compatibility. The underlying standard is OpenGL, which is widely accepted popular high performance industry standard. The Android app is made using Java language corresponding to JDK (Java Development Kit) 1.7, using Android SDK version 24. The user is required to open the app on phone and then put the smart phone inside cardboard viewer. After that the viewer can be held in front of eyes or worn on the head using a strap. A cursor like reticle is present inside the scene which moves along the direction user is facing. Navigation inside the app is handled by head tilting or pressing virtual buttons by positioning the reticle and clicking the external input mechanism in Cardboard viewer.

## 6. CONCLUSION

Virtual Reality is now involved everywhere. You can't imagine your life without the use

of VR Technology. In this paper we define the Virtual Reality and its history. We also define some important development which gives the birth of this new technology. Now we use mail or conference for communication while the person is not sitting with you, but due to technology distance is not matter. This technology gives enormous scope to explore the world of 3D and your own imagination. It has many applications from product development to entertainment. It is still very much in the development stage with many users creating their own customized applications and setups to suit their needs.

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