

Enhancing Travel Experience Using Virtual Reality

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Abstract

Virtual Reality (VR) has enjoyed a noteworthy rise of enthusiasm from researchers and organizations generally but also specially from the travel industry. Be that as it may, subjective research on tourists understanding of VR applications is rare. Travel/Tourism and Virtual Reality (VR) are a optimal match. VR's aim is to enable users to virtually travel to a desired location before their actual travel. VR is a pleasant review of potential outings, and an extraordinary advertising way for organizations in the travel industry space. The purpose of this study is to investigate tourists understanding of VR. This paper proposes to build a virtual environment that permits clients to appreciate travel understanding of their ideal destination. This includes an application that utilises the Unity 3D platform for virtual app creation, GoogleVR SDK support for virtual reality experience and APIs for various purposes. Presenting application via VR was found to play a great role in impressing potential guests who get drenched in the story without being there. Many existing VR apps either have information of a desired location or background sound. This paper incorporates both. Further studies must be made to incorporate haptic responses with VR that will help stimulate all five senses and in turn provide an overall travel experience.

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1. Introduction

"Virtual" signifies counterfeit or computerized and "Reality" what we experience as a human. Virtual reality (VR) is a re-instituted experience that can resemble or be totally diverse from reality. Virtual Reality can be described as a mirror that gives you more than just a realistic simulation of the present world: it can bring the past into the present. Virtual reality usually includes the use of a VR headset, which assists in immersing a user in a computerized environment. Using images, audio and other physical sensations the user is basically placed inside a virtual world, which they can move around and, sometimes, communicate with in different ways. Applications of virtual reality include entertainment, travel and educational purposes. Other kinds of VR style innovation incorporate augmented reality and mixed reality.

Virtual reality offers the travel industry numerous helpful applications that merit more noteworthy consideration. Planning and management, accessibility, education, promoting, entertainment and history

conservation are six fields of the travel industry in which VR may prove to be appreciated [11]. Some portion of VR's potential utility as a safeguarding instrument comes from its capability to make virtual encounters that visitors may acknowledge as an alternative for a real visit to unprotected destinations.

Despite the fact that the opportunities that VR offers the travel industry are important, numerous questions are raised with respect to VR's future roles in the travel industry. For instance, despite the fact that VR technology keeps on developing, it is hard to anticipate the degree of progression that the future advancements might offer. Existing technology grants great visual and audio output, and the precise re-creation of existing places. Notwithstanding, even in these areas there is an immense advancement that is to be made, for example, real-time motion and photorealistic avatars. Also, VR's capacity to stimulate the other three senses remains to some degree underdeveloped, and it isn't clear how much advancement will be possible in these areas. A virtual environment wherein the user is totally or mostly unable

to feel, smell, or taste despite everything offers innumerable utilizations, yet constrained. In spite of the fact that there is no uncertainty that future technological advances will allow VR experiences that are unquestionably more realistic than those that exist, the accessible technology will always restrict what is possible.

Earlier, travellers used to research about places they wished to travel. Through photographs, recordings and movies, they would decide a schedule to visit the places that appeal to them the most. Be that as it may, it was disappointing for them when the places didn't turn out as they had seen in photographs and videos. Virtual Reality is the answer to all such issues. The key advantage of this venture (VR) is to provide a 'Try before you buy' alternative. This empowers users to experience a virtual vision of the desired location. It allows users explore the destination before purchasing a travel package. Thus, a journey becomes more manageable and turns out exactly how enthusiasts want it to.

At present, VR in the travel industry is restricted to a small audience. VR advancements will continue to develop and there will be ceaseless results of virtual reality in the travel industry. Therefore, the early adopters and innovators certainly have an edge over others. Hence, this paper targets at increasing its research and development among students.

This paper depends on the previously mentioned points. We will utilize the Virtual Reality technology to give a real time travel experience to all users. This will permit the users to appropriately plan their travel as well as stay. Based on the information given in the app they can choose and make a schedule and plan all days of their stay appropriately. This paper incorporates the development of an app that shows:

- **Exterior 3D view of required place**

A 360° perspective on the whole place (Eg.: Bangalore Palace) will be observable to the client through an application that will be VR suitable. This will empower clients to ensure the place matches their desires as opposed to really making a trip to the spot and being disillusioned.

- **Weather conditions prevalent in the requested area**

The place can be seen alongside the atmosphere and changes. This empowers the client to check the climate conditions before really visiting the desired place.

- **Tourist attractions, hotels in the vicinity**

The fundamental explanation individuals go on holidays or visits is to see the celebrated attractions in the zone. This application gives clients data regarding the close by places that merit visiting and also with lodging data to design a stay.

2. Literature Survey

Yu-Min Fang et.al. (2019) [1] have proposed an article aimed at testing the usability of VR in tourism by comparing different VR apps.

Pavan Kumar Katkuri et.al. (2019) [2] have proposed an article that emphasizes on the analysis of different aspects of developing mobile AR applications for the travel industry, that provides the required data regarding the destinations and their attractions.

Dr Thangaraj M. et. al. (2019) [3] proposed an article that describes the ongoing advancements in data and communication technologies (ICTs) that have changed the travel industry quickly, with impacts on all zones in Tourist's interest for the travel industry the executives

Lakshmi Jayendran et.al. (2018) [4] proposed an article that specifies the attributes 4A's accommodation, amenities, accessibility and attractiveness that act as pull factor for customers to decide upon a destination. It also mentions that any VR application must consider these attributes for the best result.

Aldrin Acosta F et.al. (2017) [5] have proposed an article to develop dynamic virtual surroundings with the consumption of real time information which allows the tourist to be immersed in the specified location.

Timothy Jung et.al. (2017) [6] have proposed an article aimed a exploring tourists' VR experience at the Lake District National Park as a case study since quality research on tourists' VR experiences are rare.

Tom Griffin et.al. (2017) [7] proposed an article that aimed at exploring virtual reality and implications for destination marketing.

Leigh Ellen Potter et.al. (2016) [8] proposed an article that explores the applications of VR in tourism sector and provided a well-grounded argument on whether its use in a natural setting can be successful and showed that there is great likeliness for the use of virtual reality in nature-based tourism.

Dan Wang et.al. (2016) [9] proposed an article that examines the persuasive power of VR imagery in destination marketing by evaluating the role of spatial presence in impacting attitude and behavioral intention to visit tourism destinations.

LIU Yuan et. al. (2016) [10] proposed an article that utilized Digital Earth platform as the reason for digitalization in the travel industry and combined the platform with VR innovation to carry out advanced research on the travel industry and related points and has significant hypothetical and functional significance.

3. Proposed Work

We have proposed the model (developed by unity) which has the following advantages:

- Amazing equalization of convenience and force
- It assists 21 or more platforms like PC, web, Mobile, Console etc.

- Eminently powerful resource store has numerous valuable additional items and information, and moreover it is a budding income stream for engineers
- Easy for programmers and designers
- Solid content pipeline makes it practically easy to acquire information from an enormous assortment of devices.
- C# and JavaScript is supported for scripting.
- AI navmesh generation, Occlusion culling, particle systems, content streaming, are some of the unique features provided by unity.
- Out-of-the-case VR support.

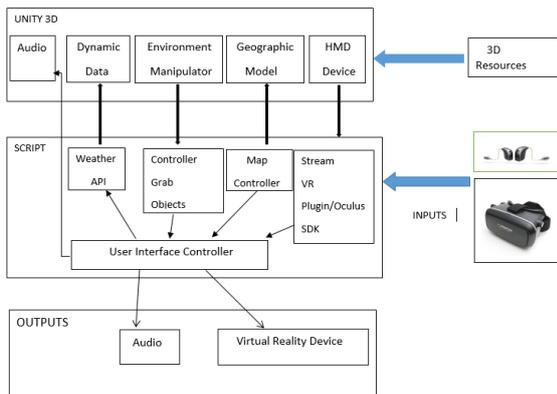


Figure 1: VR App System Structure

There are 3 phases involved in VR app development using unity as shown in Fig. 1. These are:

1. Visualization phase

In this phase there are objects that the customer/consumer views when using the VR glasses. Objects vary from static ones like geographic maps, audio to dynamic items like 360degree images/video, audio etc.

2. SCRIPT phase

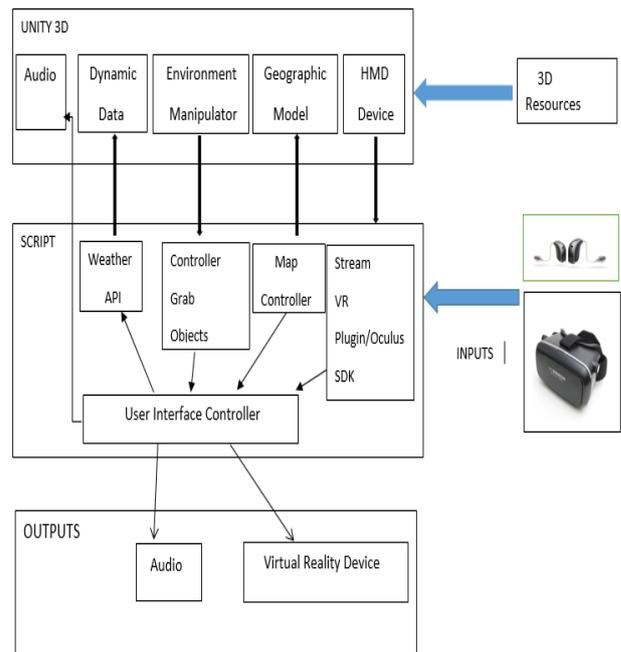
This is the vital phase of the application where we can control the behaviour of the app before the contributions by the customer/consumer.

Management and performing query to the database are done by Data API and TourismVR Data consumption API Blocks. The object controller enables the users to have control over elements like button, sliding menu etc.

The input controller is accountable for the input that flows into the app through user interface. It is also in charge of managing and supporting the hardware. The Map Driver displays directions on map with GPS of tourist location where the content will be showcased.

3. Output phase

This phase shows all the development and response/reaction that were created in VR environment. The output is imparted by displaying 360-degree image/video with audio as well.



There are many VR Travel Apps like Google Street view, VeeR, Sites in VR, YOUVISIT, etc. The main aim is to create an application that combines the advantage of all these apps like its ease of use, information volume, diction, sound, operational diversity etc.

The expected outcome from the Unity based application will be

1. Exterior 3D view of required place
2. Weather conditions prevalent in the requested area.
3. Tourist attractions, hotels in the vicinity

4. Implementation

This paper has been implemented using the Unity 3D platform and the steps mentioned by Adriana Vecchioli in a blog by free code camp.

The Unity 3D platform can be used to create 2D, 3D, VR & AR applications or games that can be compatible with a wide range of devices. It provides an user friendly interface with drag and drop feature to create absolutely spectacular applications. This platform can be used to make apps for PCs, smartphones, wearable devices, etc. These apps can be made such that they are compatible with Android or iOS devices. Also, if they are VR compatible, they can be made compatible with a wide range of headsets like Google Cardboard, Oculus Rift, etc. These apps can be made compatible with haptic sensory devices too. All this can be done with the use of necessary SDKs.

The prerequisites to create a VR app are as follows:

- Smartphone
- VR Headset
- Unity 3D
- GoogleVR SDK for Unity

- 360° image/video

Unlike a normal video that has a rectangular frame, 360 video has a spherical one. So, we first need to make a spherical screen to extend our 360 videos onto. The player (or viewer) will be situated inside this sphere and will have the option to watch the video in any direction.

Step 1: Building a Sphere

To begin with, we open a Unity Project on the off chance that we are beginning without any preparation. A Scene can be envisioned as a part of a video game, and a Project as a full game.

We then insert a sphere object in the Scene, set at its center (i.e., Position = 0, 0, 0), with a radius of 50 (i.e., Scale = 50, 50, 50) as shown in Fig. 2. The camera's position ought to likewise be set to 0, 0, 0. The camera is the viewer's eyes, so we need it at the center of the sphere. Placing it somewhere else would make the video look misshaped.



Figure 2: Sphere building

Step 2: Flipping the Sphere's Normals

In Unity, spheres are actually polygons made with many tiny facets. The external sides of these facets are viewable, but not the internal ones. Thus, we are going to make a program to flip these little facets. This is because the viewer needs to see the inside of the sphere where the 360° image/video will be placed. This program is called a shader.

Shaders are little scripts that figure the color of every pixel rendered, in view of lighting and data pulled from their Materials. Materials are the aspects that control the appearance of the object within the app.

After the shader is applied the sphere looks like a big white ball (as shown in Fig. 3) that will be viewed from the inside on our screens.

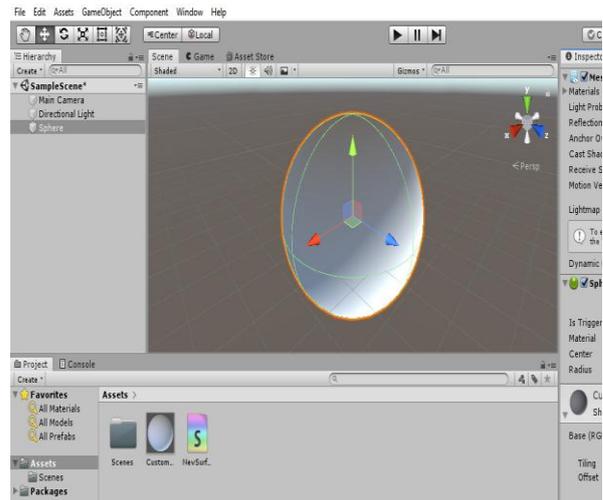


Figure 3: After Shader application

Step 3: Projecting the 360 image/video inside the Sphere

In this step the 360 video/image is imported into the project folder and then dragged onto the sphere. Once this is done a new "Video Player" component is added to the sphere and the video/image can be viewed.

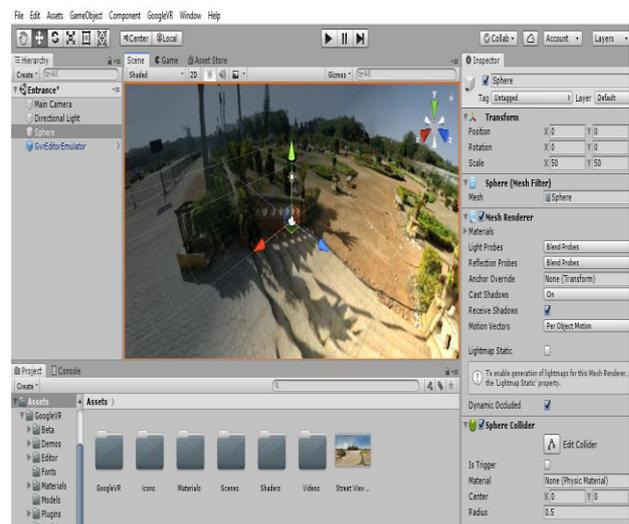


Figure 4: Image within sphere

Step 4: Set up Google Cardboard

Here, we create a "stereoscopic" view (the screen will be split in two, one side for each eye), using the GoogleVR SDK. First, we change the platform of the project/scene to 'Android' after which we enable VR settings. After this we drag the 'GvrViewerMain' element from the GoogleVR\ Prefabs folder onto the screen and like the sphere set its position at 0, 0, 0. This component will control all VR aspects of the project. This induces a fisheye effect after dividing the screen into two which implements a VR effect and makes the experience more immersive. The implementation of this is shown in Fig. 5.

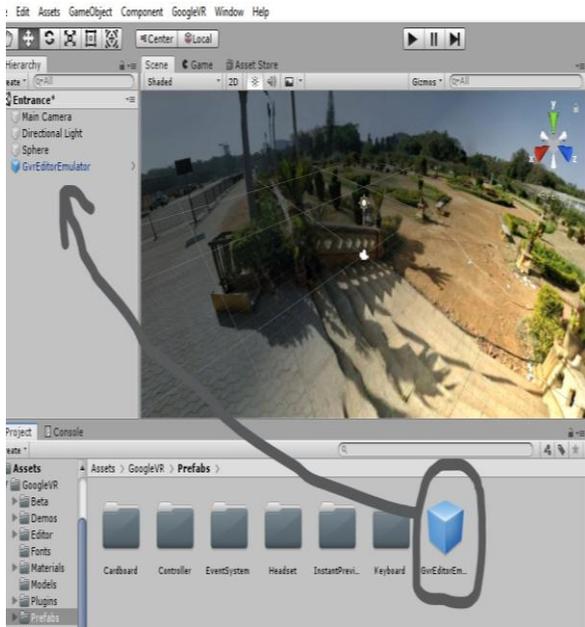


Figure 5: Emulator activation

Step 5: Run the app on Android

This can be done in 2 ways:

- Plug a smartphone to the PC and click on 'Build and Run' in the Build Settings option which is present in the File tab as shown in Fig. 6. This will install the app directly on the phone.

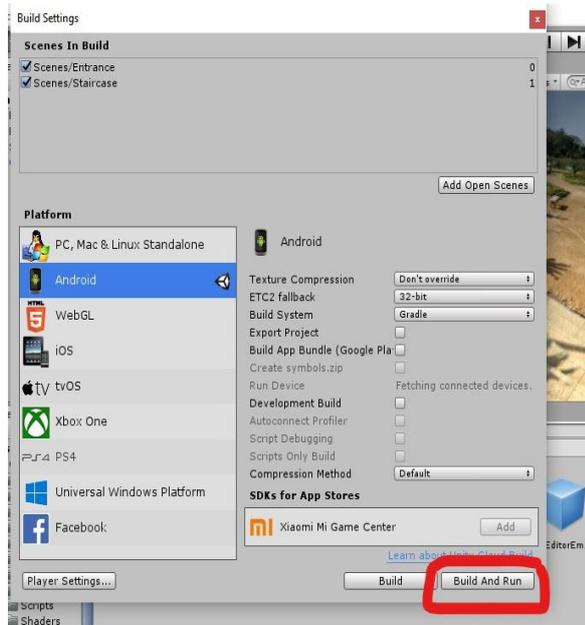


Figure 6: Build and run application on device

- Another option is to click on the 'Build only' option as shown in Fig. 7. This generates an APK file which can be shared with anyone.

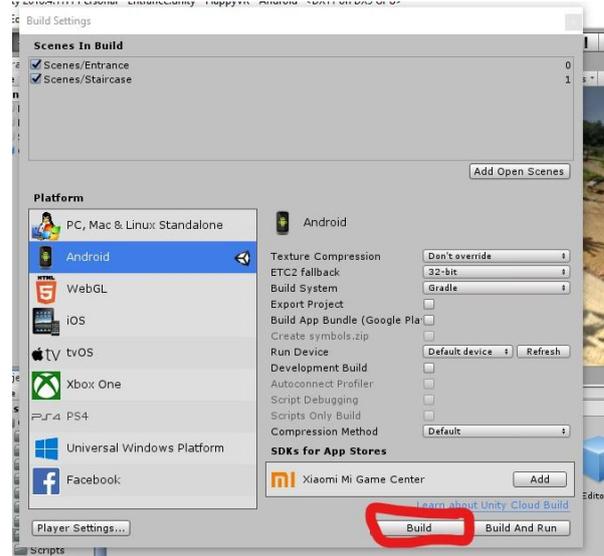


Figure 7: Building APK file

5. Result

After following the above steps, the developed application will look somewhat as shown in Fig. 8. This application provides a 3D view/tour of the desired location.



Figure 8: Resultant VR App

The potential limitation of our work is that not all possible human senses are catered to. This can be achieved using haptic devices. This technology is still being figured out and further research and study may lead to the development of technology that can provide an overall full-body travel experience to the users.

6. Conclusion

Building up the application permits to see perspectives which would otherwise just reside in a table. The convergence of pictures, content, geo-referenced information, 3D landscape in a solitary domain in computer generated reality creates a superior client experience than simply showing tables with content of every visitor point. The communication of the client with the application produces immersion in computerized, digital content, for example, recordings and pictures in

360° view which gives the client sentimental feel of inside environment and simultaneously leaves him with interest to live face to face what he has simply experienced. VR the travel industry research can add practical and direct value to the travel industry area. VR offers various applications in regions extending from arranging and managing amusement. In addition, VR proposes the possibility to make substitute encounters which might be incredibly valuable for legacy protection in some circumstances. When advancements for VR are created, the potential utilizations of VR inside the travel industry segment will increment both in significance and number, so it would be the activity of the travel industry specialists and experts to misuse VR for the extraordinary opportunity it presents.

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