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ALTERED REALITY PLAYER

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Abstract - The following article presents, building an augmented reality-based video player mobile application which allows user to control the video player functions through voice commands. This application will play any video in 3D by scanning and tracking an image called the "Target", where the video will be displayed virtually on the target. This application will use the inbuilt mobile camera to scan and track the target and the access to the mobile microphone to use the voice command functions. This application is developed using the Unity 3D software along with the Vuforia Engine support to develop AR experiences.

Keywords: *Augmented Reality, voice commands, video in 3D, image tracking*

I. INTRODUCTION

Augmented and virtual reality have been booming since the last few decades. These are the technologies that have seen exceptional growth and have been the 2 most developed technologies in the world. Many top companies in the world like Apple, Microsoft, Google etc have taken special interests in taking these technologies to the next level. Virtual reality was seen to have attracted more users and has been more popular over the augmented technology, but since the past few years augmented reality has seen an exceptional rise and has taken over the digital world perhaps even more than the virtual reality technology.

We have seen a lot of video playing applications giving the user a variety of useful functions to make sure they have a nice experience, but considering the advancement of the technologies in this age and day, what if we take this video experience into the 3D world which completely can be controlled through the users voice commands. with the help of the augmented reality technology which helps us interact with virtual objects in the real world, we can build such a video player which plays the video in 3D over a target which is continuously tracked i.e. whenever the target is moved in the range of the mobile camera, the camera detects the target and plays the video on the target even as it is moving.

The main advantage of augmented reality than virtual reality is its development which is way easier and cheaper. The application of Augmented reality is vast and can be used in a wide range of media, as an application in a smartphone. In paper [3] Based on previous studies Marker-based tracking is one method of augmented reality. Marker-based tracking black and white illustration in the form of a square with a thick black border and white background. The computer will recognize the position and orientation of the marker and create a 3D virtual world that is the point (0,0,0) and three axes, namely X, Y, Z. By using marker-based tracking identification of patterns to recognize the target image is easier and faster process.

II. PROPOSED SYSTEM

There is no current mobile application that provides a video player in augmented reality technology through which videos can be viewed in 3D and can be controlled through voice commands.

Unity 3D is one of the worlds most used game development platforms that helps the user create 2D,3D,AR and VR experiences. So to develop the altered reality player we will be using the unity 3D 2019.1 editor along with the Vuforia engine support(Vuforia engine helps the user to create AR experiences).The basic idea of this project is to be able to play any video in 3D controlled by voice commands. So to be able to play the video in AR we need to have a target image or an object on which the video will be played and tracked. We can create a licence key and a target image on the Vuforia development portal and register the target to be scanned and tracked.

We then implement the speech to text function scripts in unity and use them as a reference in a custom script developed by the user. The speech to text scripts have various functions for both android as well as iOS which can be referenced and called as a function in the custom script to use the functionality.

Using unity's event handling system we can create the play pause and speech button and define functionality to it through scripts. Using the speech button we activate the speech to text function and convert the users speech into text according to which the respective functions are executed.

III. IMPLEMENTATION

The following technologies are used to build the altered reality player..

UNITY 3D

Unity3D is a powerful cross-platform 3D engine and a user friendly development environment. Easy enough for the beginner and powerful enough for the expert; Unity should interest anybody who wants to easily create 3D games and applications for mobile, desktop, the web, and consoles.. The Unity application is a complete 3D environment, suitable for laying out levels, creating menus, doing animation, writing scripts, and organizing projects. The user interface is well organized and the panels can be fully customized by dragging and dropping.

C# Programming Language

C# is a simple, modern, object-oriented, and type-safe programming language, and it's the most popular programming language in game development. C# is an innovative, open-source, cross-platform programming language and one of the top 5 programming languages on GitHub.

Speech To Text

Just as it sounds like, speech to text is a technology that listens to a person's voice and transcribes what their words into text. There is absolutely no typing or clicking required. The speech to text technology provides an amazing experience to the user while interacting with the application. As the augmented reality is a technology that deals with interacting with virtual objects in the current reality, adding the speech to text function to operate its functions brings quite a bit of charm to the application as well as an amazing immersive interactive experience.

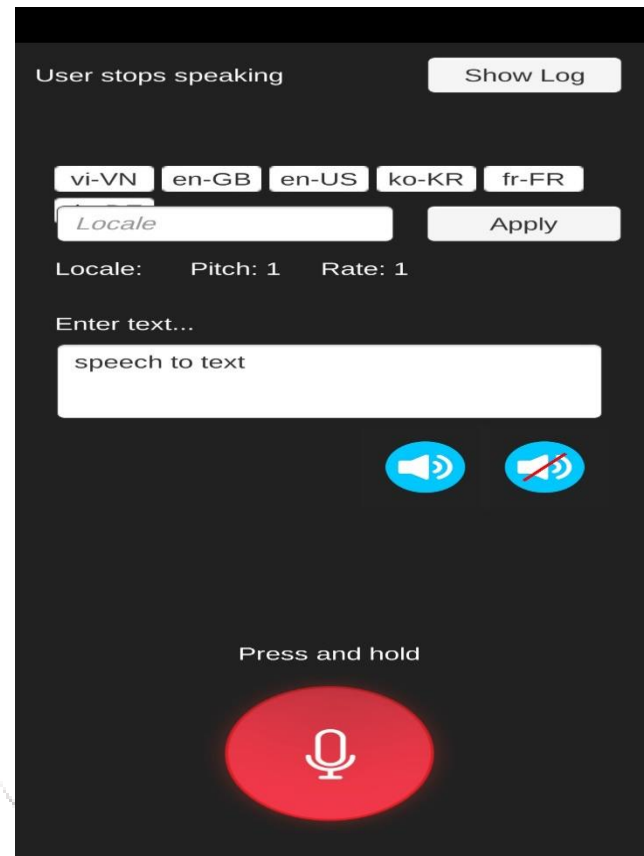


Fig 3.1-A sample speech to text/text to speech application developed in unity 3D.

IV. METHODOLOGY

In the paper [1] it was discussed that, the creation of AR media is capable of displaying sequential frames of graphics and each frame either a still image or motion picture capable of providing attractive optical illusions, audio-visual effects in incorporating 3D objects, animation and sound to the environment with virtual reality, and Enhance user interaction in the real world .

A. Software's to Install :

Unity 3D - any recent or the latest version

Microsoft Visual Studio - handling unity scripts

MonoDevelop - substitute to the visual studio code

B. The Approach

To build this application the first step is to install the unity 3D application. There are various versions of the application, we have used the 2019.1 version. After that a target or a marker in the form of an image is required to upload it onto the Vuforia developer database, it is necessary to log on to an official site of the Vuforia developer, it acts as a key license that the AR camera is ready for use, and then the marker has been registered with the Vuforia developer. After uploading the target onto the database and into the unity editor the video is ready to be displayed onto the marker. To add the voice command function to the video player an event system has to be created along with a speech button whose functionality will be defined by the unity script. The two scripts that contain the functions of speech to text and text to speech for both android and IOS in the form of a plug is used. By making a script for the button and referencing it to the plugin script to access the speech to text functionality, a specific command can be checked and performed accordingly as the output of the speech would return as a text. Using the event handling functions of unity, the role of the button can be defined so as to when the application is ready to take the speech input and when to stop. The final step in this process is building and deploying the project in a .apk extension file. Building an apk (for the android application) would require the Android studio application and its java development kit, software development kit and native development kit tools to set the android version.



Fig 4.1-The target image used.

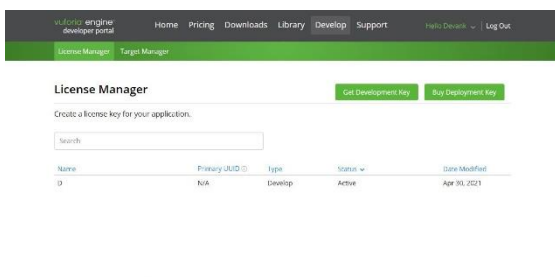


Fig 4.2-Vuforia License Key Registration

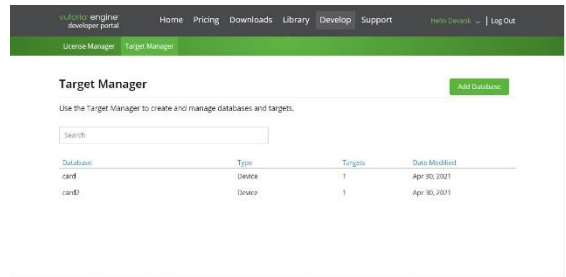


Fig 4.3-Adding Target in Vuforia database

To add the Database, we click on “Add Database” in the target manager and to add the target image into the database, we go into the selected database and click “Add target” and select the target image.

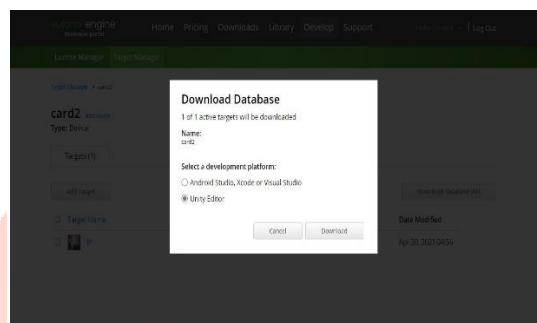


Fig 4.4-Downloading the target to import into the unity editor.

To download the target we select the target and click on “Download” and select the platform as unity so that we can directly import the file into the unity editor.

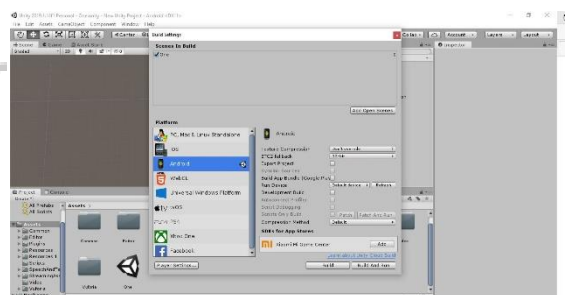


Fig 4.5-Build setting in Unity

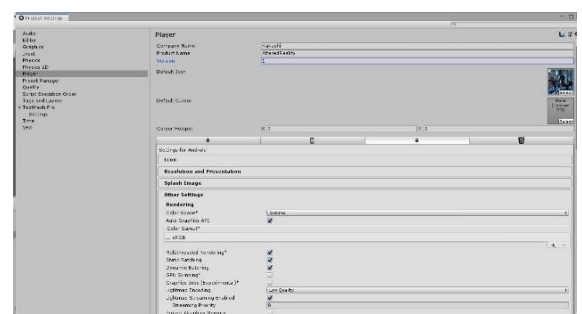


Fig 4.6-Project settings in unity

The final step is to build and run the project, for that we got to "Build Settings" from the file options. Then we click on add open scenes that will add all the scenes ready to build.

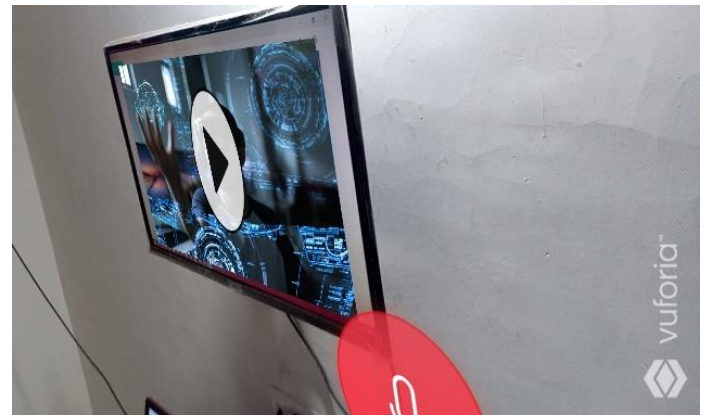
Then we go to the "Player settings" and change the "Company name" and the "Product name" along with the desired version. It is mandatory to make sure that the AR support is selected in the XR settings.

V. RESULTS

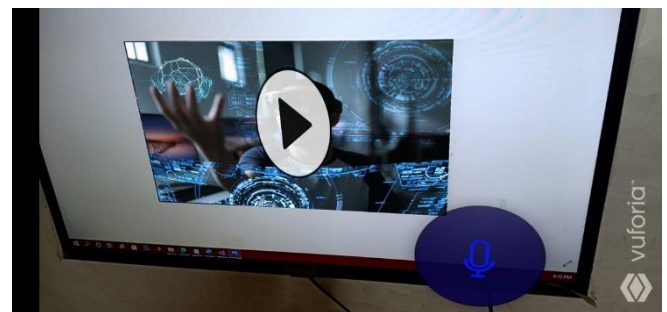
The project was built into an apk and tested on an android smartphone. As the application switched on it asked permissions to access the mobile camera and the microphone as coded in the script.

Once the camera turned on and pointed towards the target image, the video frame was displayed virtually over the target image perfectly fitting the scale of the target.

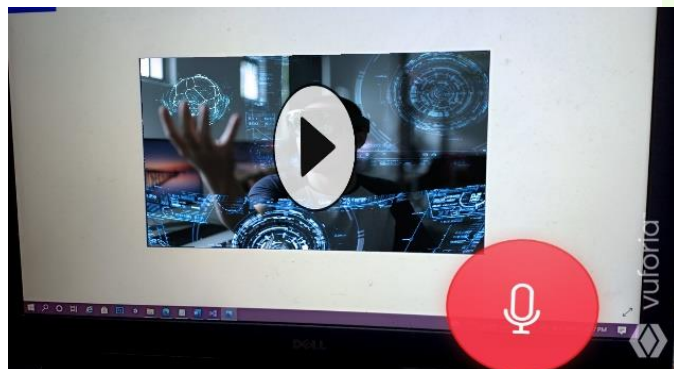
When the speech button is clicked the users command is recognized and the respective action is executed such as "play" "pause" "start" "stop" "exit". When the speech button is clicked the colour of the button changes from red to blue indicating the application is ready to listen to the command.



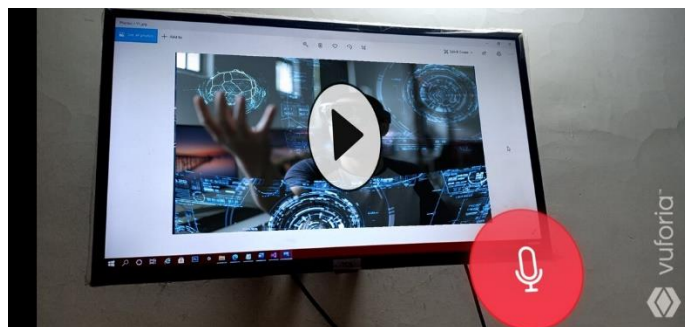
Video player from different angles



Video player when the voice button is clicked.



Video being displayed over the target



Video scaling itself with size

VI. CONCLUSION

In this paper, we have presented the augmented reality video player application which can be controlled through voice commands. In this project we have developed and deployed the application on an android smartphone where we used a sample 2D video and played it in 3D through the application.

Giving the voice commands while holding down the speech button, takes the users voice command as input and executes the command action on the video player. These test runs have been successful on the latest android versions and the voice command recognition has shown decent accuracy in both "while listening" and "after listening" functions.

References

[1] “Augmented Reality (AR) Technology on The Android Operating System in Chemistry Learning”– iopscience,.

[2] “Augmented Piano in Augmented Reality”– nime2020

[3] “The introduction of 3D applications Animal In Indonesia Using Augmented Reality Marker-Based Tracking Method”- Research gate.

