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PROJECT REPORT
ON

“MOBILE AUGMENTED REALITY: FURNITURELAND”

Abstract:

By selecting the project theme as Mobile Augmented Reality this project is somewhat the future version of the IKEA website. In IKEA the customers are just able to augment the furniture to the desired place so that they can check for the aesthetics and ambience and then choose whether to buy or not the furniture that is very much appropriate for the house. But this project is an advanced version where when the customer clicks on the screen so that the furniture is augmented on the plane ground surface somewhat like a free fall from the sky onto the ground along with the product description in order to gain the customers attention . After some induced delay for few seconds an audio starts playing that gives the detailed description about the furniture like weight, material , texture, width , size, warranty, guaranty, different available colors in the same pattern etc as most of the users don't like to go through the description but would rather have the knowledge about the furniture once it is augmented. For this I have used Unity(2020.1.5) with inbuilt Android SDK and JDK, but installed the Vuforia component externally to the project package . Here I was able to deploy the audio once the camera was rendered and the furniture was placed on the plane ground surface using tracking technology.

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1. Background:

Mobile applications are now really one of the foremost exciting growth spots for handy users. With the limited hardware and software of these mobile phones trying to give actual experience to users has become a major concern. Inorder to gain the same 3d augmenting of objects have come into picture. At a really rapid pace, mobile devices which might support area units have become a lot more economical and fewer expensive. Increased reality possesses the potential to vary however we have a tendency to look. Thus users find themselves in the real /animated world giving the feeling of reality. This 3D augmenting can be done in 2 different ways using Marker-based or Markerless. Certain applications such as Marker-based mainly use predetermined markers or images to augment the new reality or Object. Location-based applications use GPS.

Since I have chosen markerless applications with tracking features there's quite a little description on what markerless primarily based applications are.

1.a. Markerless applications with tracking:

Markerle apps are not supported by image recognition. To augment an element, you have to point the camera on a surface anywhere around you. Using the tracking conditions it will scan the place and see if it is suitable for the object to be augmented, Once the device acknowledges, the mobile application augments the digital knowledge on this surface and the user will be able to see the augmented reality giving a real world feeling.

1.b. ACM Digital Library contents:

There are also an ACM scientific existing literature on

1. "**An Augmented Reality Game using Face Recognition Technology"[4],**
2. **"Scalable recognition and tracking for mobile augmented reality"[5],**
3. **"A UX Oriented Evaluation approach for Mobile Augmented Reality Applications"[6]** ,
4. "**Mobile consumer shopping journey in Fashion retail: Eye tracking mobile apps and websites"[1],**
5. **"Technology meets Fashion"[2],**
6. **"Consumer Fashion Textile researches"[3]**

Etc.

★ Considering all the information from these papers I thought of implementing Face recognition with augmented accessories i.e., something similar to beauty applications such as Sephora, Amazon(beauty section),lenskart but with the tutors guidance it was exceptionally hard to implement in a limited period. Further with the inspiration of IKEA mobile application I thought of implementing the advanced version of IKEA with the title as FURNITURELAND in which the entire description of the product is given by the recorded voice which starts playing once the furniture is augmented properly thus avoiding to go through the product description section and gaining users attention.

2. Project Concept:

With the inspiration of IKEA mobile application I thought of implementing the advanced version of IKEA with the title as FURNITURELAND in which the entire description of the product is given by the recorded voice which starts playing once the furniture is augmented properly thus avoiding to go through the product description section and gaining users attention.

2.a. Detailed Explanation about usage of Application:

I will be explaining in steps how the application should work :

1. Initially the user will download the application from the app Store. The Name of the application is **"FurnitureLand".**

2. Upon opening the application it asks the user to sign in if you are already an account if not create an account by giving details.

3. It prompts you to agree to terms and conditions, accept those and give the application permission of using the phone Camera both front and rear.

4. Finally the person opens the app and the Welcome page(main front page) appears with multiple content such as current offers, most recommended options, current trend, highest purchase , high customer review products etc. Also there are options such as custom-settings, customer account details, it has options to choose different categories etc.

5. The user selects the option called custom-setting on the left above corner, which gives a drop down for the customer to choose such as product type, color selection, category selection such as sofa , TV stand, wooden products etc

6. Upon selecting the wooden products option in the custom setting a different page appears with other options that are related to products such as table, cupboard, dressing stand, kitchen racks etc. Let us consider that the user selects the table section in order to buy a dining set.

7. Once the dining set option has been selected a new page appears which contains of multiple options of dining furniture for the customer to select. She/He can scroll upon which new designs will be

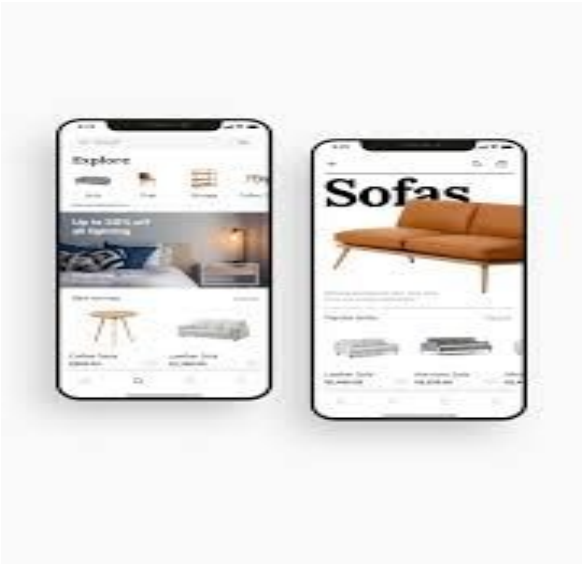
loaded, else a list of pages are given. In the end she can click them and jump to any page which contains sets of dining furniture..

8. There again she has options such as filter and sort to reduce the number of designs according to her preferences.

9. The user finds a perfect set as per their requirement and she selects that. Upon selecting there she has again multiple options such as try-me, customer review, product details, delivery time etc.

10. The user selects the TRY-ME option by which the rear camera of the smartphone is selected and she can see the augmented dining table set on whichever place she is pointing at, she can identify how the table might look in that place when she buys them actually. Thus giving an appropriate exact idea for customers to choose the products that best suits them.

11. Once the TRY-Me option has selected an augmented audio will start to play that gives entire description about the product , thus the user can avoid reading the product description specifically.



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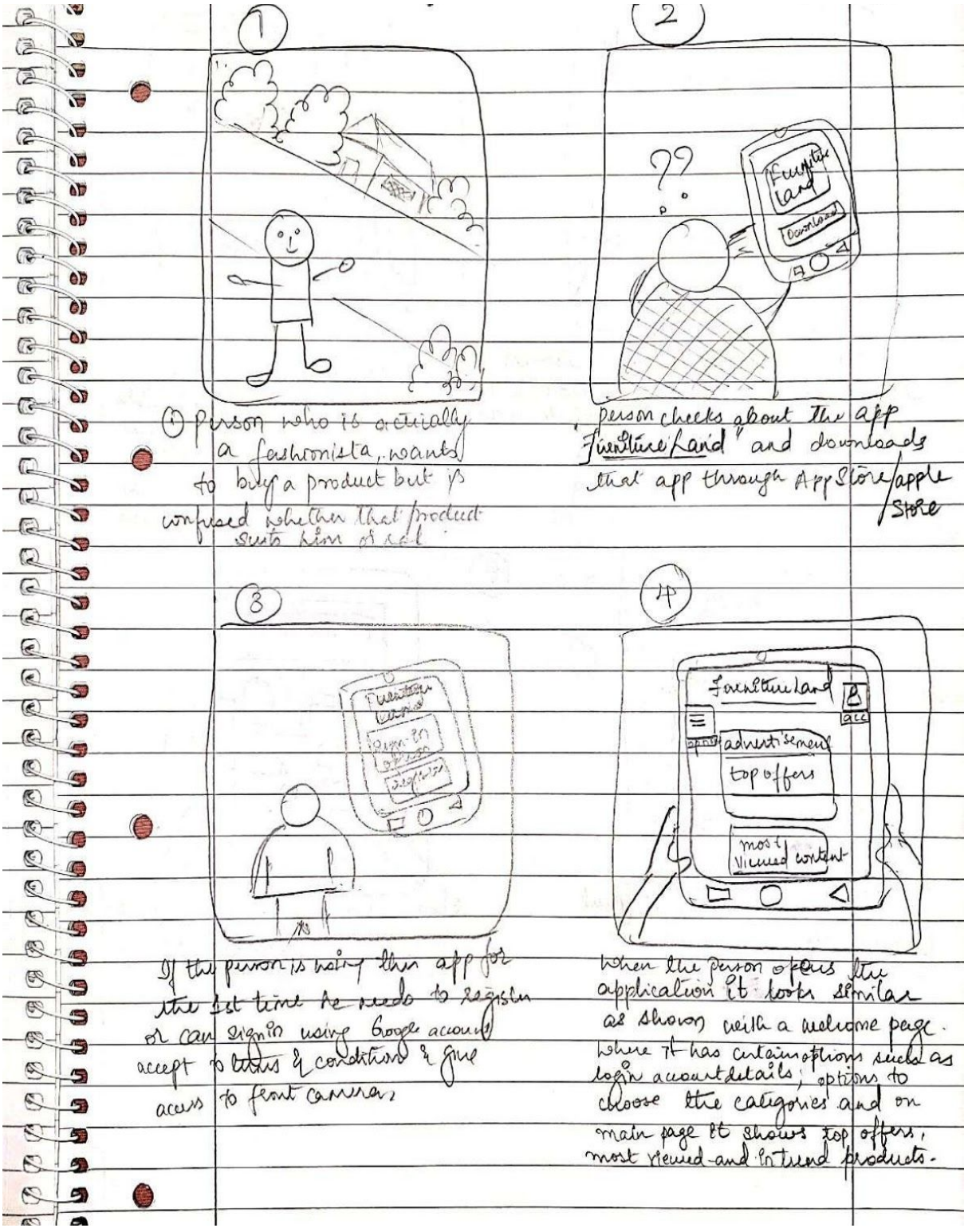
2.b.Storyboard:



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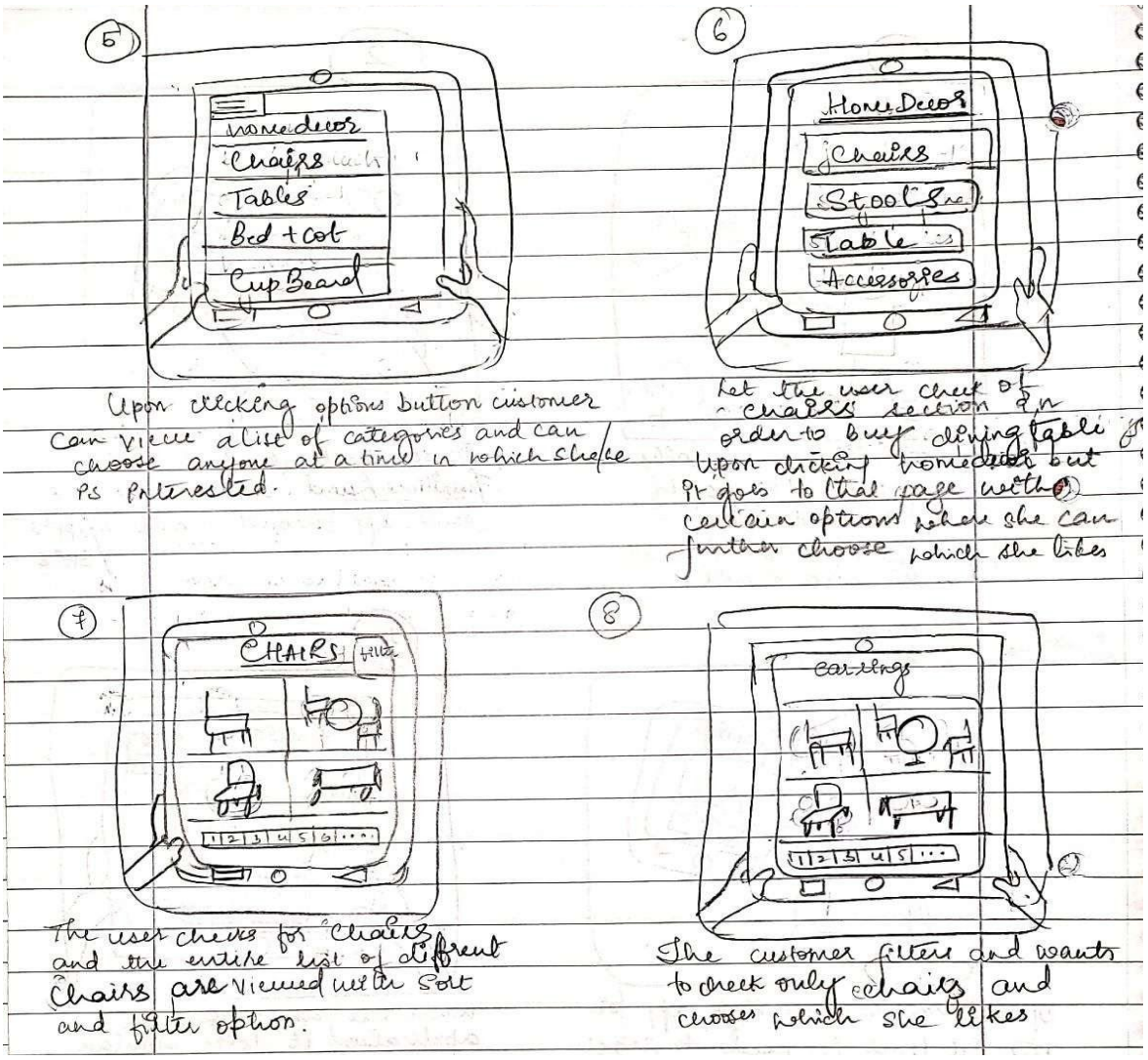

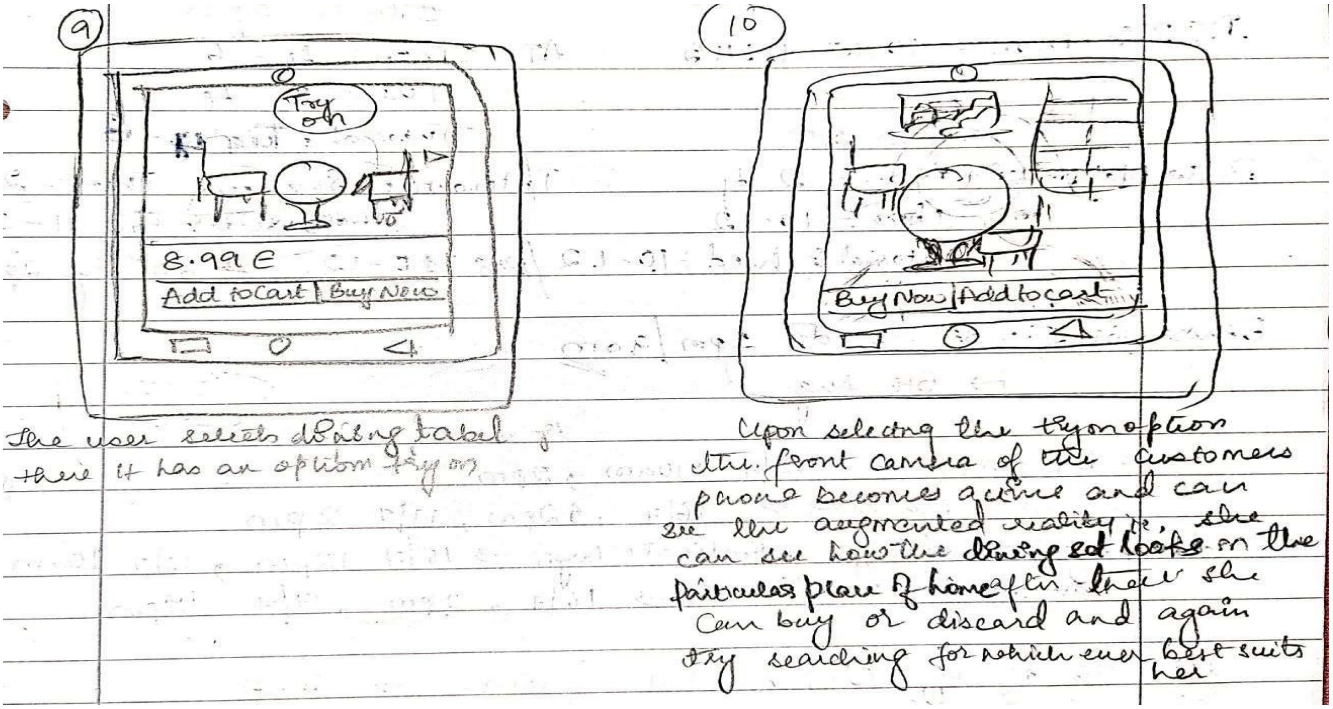

3. Project Implementation:

3.a. Prerequisites and Set-up of Software[9]:

1. Install the latest version of Unity Hub, Upon opening the it sign in with Unity ID if you already have an account else register at Unity registration Page . Select Unity for personal use and send the consent for inorder to get the license.
2. Under the Install section try to download the latest version of the unity(2020.1.5) along with Android SDK and JDK packages.
3. Open the projects tab and select the new button inorder to select a new project along with the 3D option selected then name the project , furthermore give the location where the file has to save in the laptop. Click the create project button to open the new window.
4. Download the new vuforia version v9.3.3 and install that under the new projects package manager folder and active that.
5. Since the Vuforia package is added manually check for Vuforia Engine under Game Object.
6. To add an AR Camera to your scene, just right click on the Hierarchy window. Select Vuforia and click AR Camera.
7. Go to Vuforia Developer Portal and sign in or sign up. Move to the License Manager in the Develop section and select the Get Development Key button in order to open the Add License Key page[10].
8. Once the Add License Key page has opened, enter the name for your app. Accept the terms and conditions, then click the Confirm button to generate a new license key[10].
9. Copy the license key to the clipboard and navigate back to your Unity Project.Select the ARCamera from the Hierarchy window and, in the Inspector window, navigate to the the Vuforia Behaviour component and click the Open Vuforia configuration button.The Inspector window displays a list of Vuforia Configuration options. Paste your Vuforia Development key into the App License Key text box under the Vuforia section and then click the Add License button[10].

Now the Unity is set with a Vuforia component along with the Android SDK and JDK . Since we are building the application for Android mobile phone go to File > Build Settings > Android . Select android option in the Build setting to change the platform.

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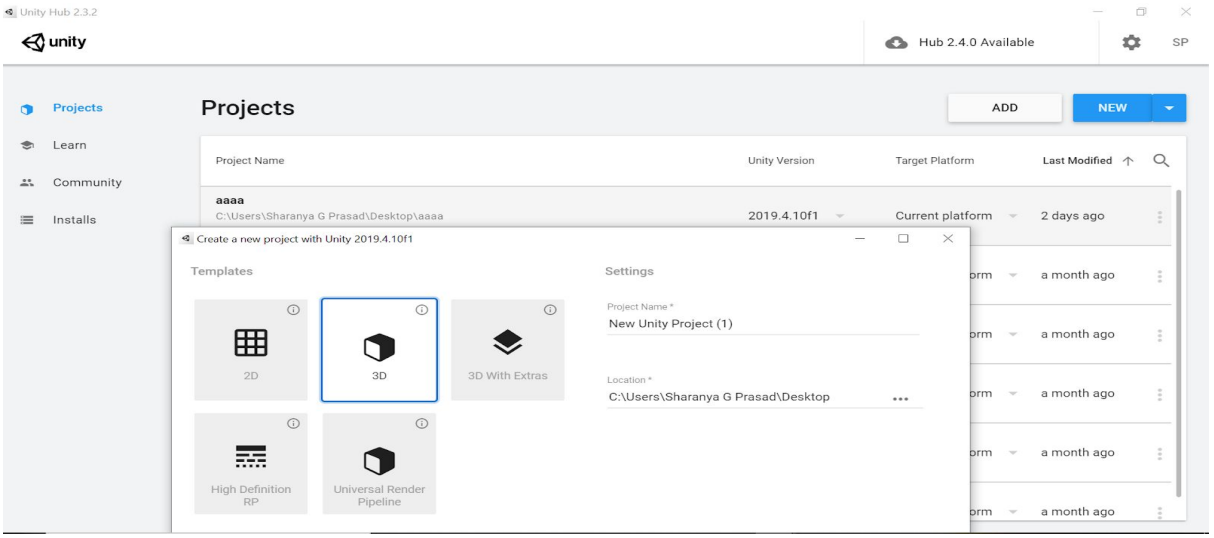


3.b. Steps to create this application:

1. As mentioned in " Prerequisites and Set-up of software " download and Install Software.
2. Since we tend to don't seem to be making a complete application as however Amazon, Sephora and Nyka works we tend to simply gap the app that has access to each front and rear camera and take a look at to trace the objects and place the increased things.
3. The technology of object tracking permits exploitation of real objects as targets, you would like to give a 3D knowledge of your target. The app ought to be able to scan not simply second pictures however conjointly 3D images too freelance of their size.
4. Here Objects are pre-mapped as targets i,e., Camera capture or Photos. It ought to be able to determine the face of the client and place the accessories consequently

3.c. Overview: Steps

1. Start a new project.

2. Open Build Settings from File> Build Settings

3. Click Android to modify the Platform

4. Open Player Settings and browse to XR settings Tab and choose the Vuforia Augmented Reality

5. Add Vuforia AR camera to scene(by doing this Unity will import packages for Vuforia)

6. Add Database marker created in Vuforia developer portal.

7. Setup Vuforia Configuration.

8. Add License key and check for marker database.

9. Check the application and AR camera.

10 Add an image to hold the marker image and set up the image target.

11. Click the scene area and hit the "F" key in order to focus the selected image.

12. Right click on ImageTarget and choose the shape you would want to add, this shape will be added as a child of ImageTarget.

13. you will be able to layout and change the dimension of the augmented object.

14. Testing : Hit play button to start the camera(playmode), when you bring the marker in front of the camera you will the augmented object on that marker.

3.d. Code snippet :

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class FLController : MonoBehaviour
{
    private bool soundplayed = false;
    // Start is called before the first frame update

    // Update is called once per frame
    void Update()
    {
        if (!soundplayed && transform.localPosition.y < 0.05)
        {
            soundplayed = true;
            GetComponent<AudioSource>().Play();
        }

    }
    public void Movefurniture()
    {
```

```
        transform.localPosition += new Vector3(0, 10, 0);
        soundplayed = false;

    }
}
```

3.e. Steps to build this application:

1. Download Unity hub and install Unity 2020.1.5 version by checking in Android SDK and JDK.
2. Create a new project with the same Unity version and give the appropriate location to save the file.
3. Download Vuforia package v9.3.3 manually from their website and install it into the newly created unity project;s package manager.
4. Start with a Vuforia Enabled project
5. Create a new Vuforia Target Database
6. Import 3D image into the asset folder or from any other website which should be in obj format.
7. Check for the Vuforia Engine under the GameObject tab.
8. Delete the Main Camera and Set the AR Camera
9. Drag and drop or import the 3D image(obj format) into the assets
10. Record the audio that gives the description of the product and convert it into the WAV format and import it to the assets.
11. Import 3D numbers , Euro symbol and discount symbol into the assets.
12. Click on AR Camera and set the Vuforia Configuration by giving the License number and setting Web Camera on.
13. Then add the Furniture image into the Samplesence and change its scale, position and orientation if needed.
14. Click on the furniture image in the Project tab below and change the location under materials tab in Inspector to Use external Material Legacy. Materials > Location > Use external Material Legacy
15. Upon selecting each component of the furniture in Hierarchy you colour that component under the inspector window in the Shader tab.
16. In the Furniture Inspector Add Rigidbody component and set the gravity on.
17. Add sound track to the object by selecting add component and drag and drop the recorded product description audio file into the Audio clip tab.
18. Insert a box collider component and change its scale so that the entire furniture fits into that.
19. Under the assets create a c# file which should enable the play of the audio once the furniture is augmented on the ground surface.
20. Furthermore add the 3D numerals and discount symbol which shows the price of the product and the percentage of the discount available .
21. Change the scale, position and orientation of these numerals depending on how best it looks.
22. Keep saving the scene frequently.

23. Check the game view and orient the object.
24. Upon click of the play button the webcam of the computer should switch on.
25. In the scene window you should be able to see the object.
26. Enable USB debugging mode on your mobile device.
27. Connect your mobile device to the computer using USB cable.
28. Build and run procedure : File > build settings > refresh the run device and connect to your mobile device > click build and run button.
29. Upon clicking the build & run the apk starts transfering to the mobile device , open and check for the application.

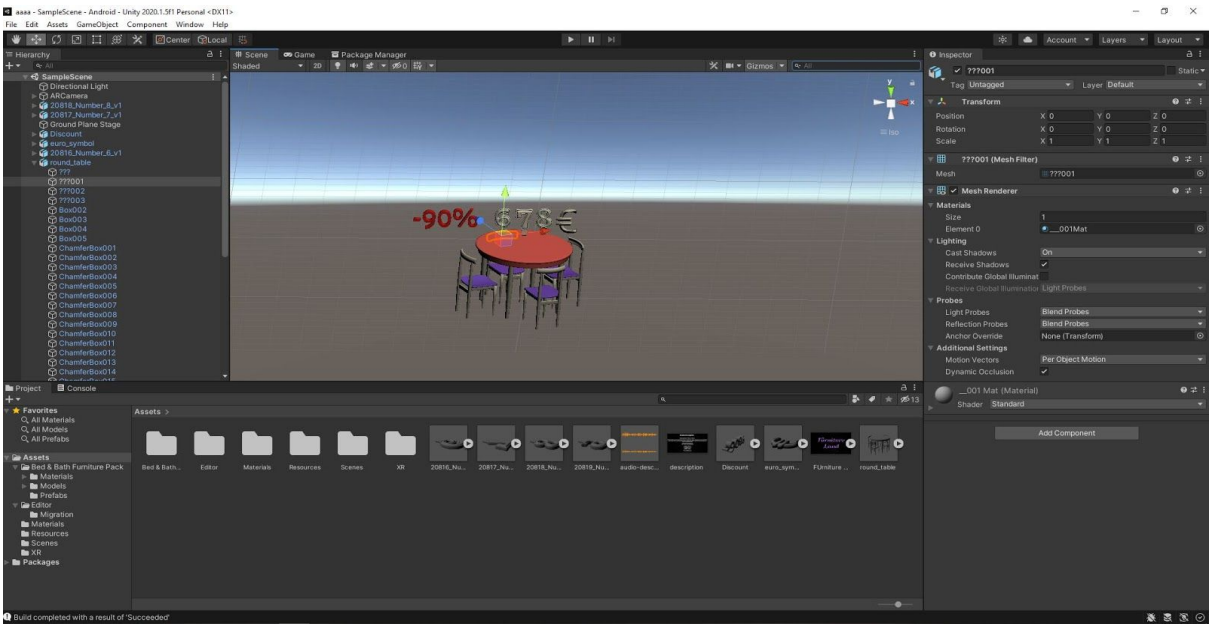
3.f. Software needed:

- ★ **Unity** : Version used Unity 2020.1.5
- ★ **Vuforia**: Version used v9.3.3 package was manually downloaded and installed into the project packages folder.
- ★ **Visual Studio**
- ★ **Android studio(android sdk)**: Inbuilt along with Unity
- ★ **JDK**: Inbuilt along with Unity
- ★ **Vuforia Database to store Furniture pictures**: By logging into vuforia website and under developer portal we can create our own database with stored images and can export and use in the working project in Unity.

3.g. Hardware needed:

The hardware needed would be a phone, a notebook, pen and paper for more sketches and planning. But also real life products for example make up products for referencing and a smartphone for implementation.

3.h. Implementation Screenshots:



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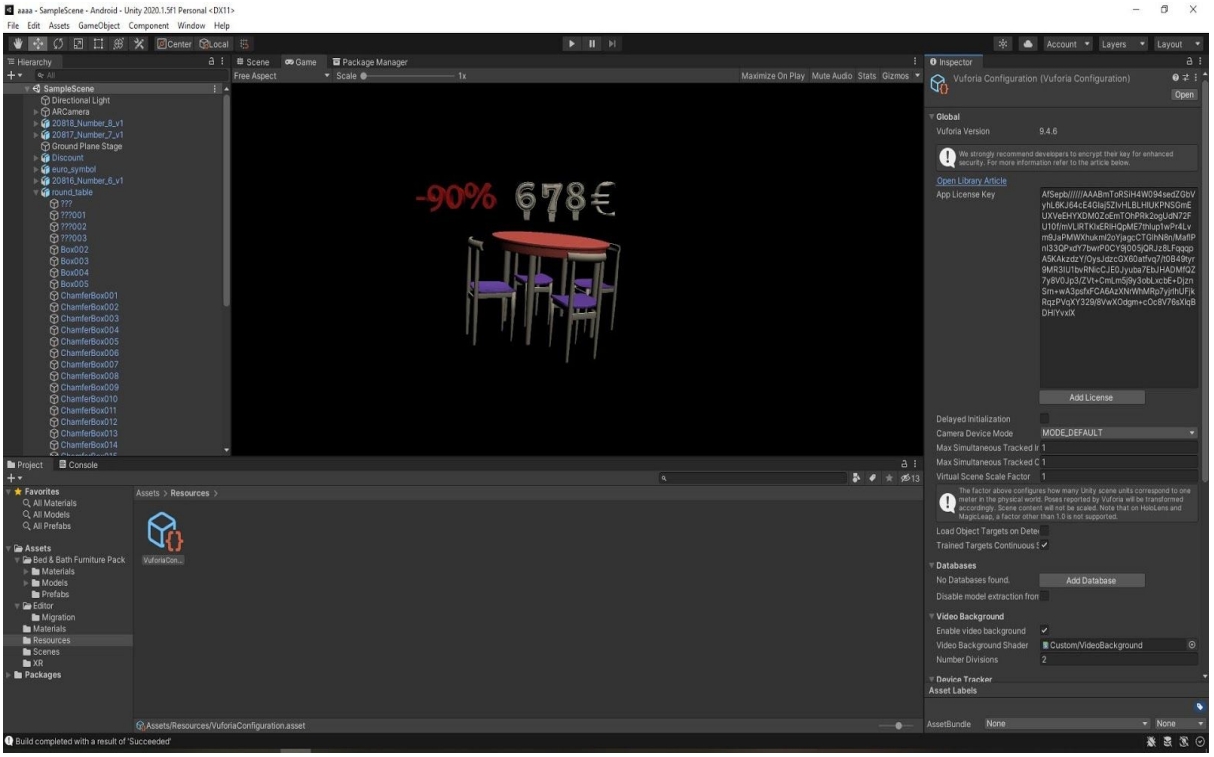

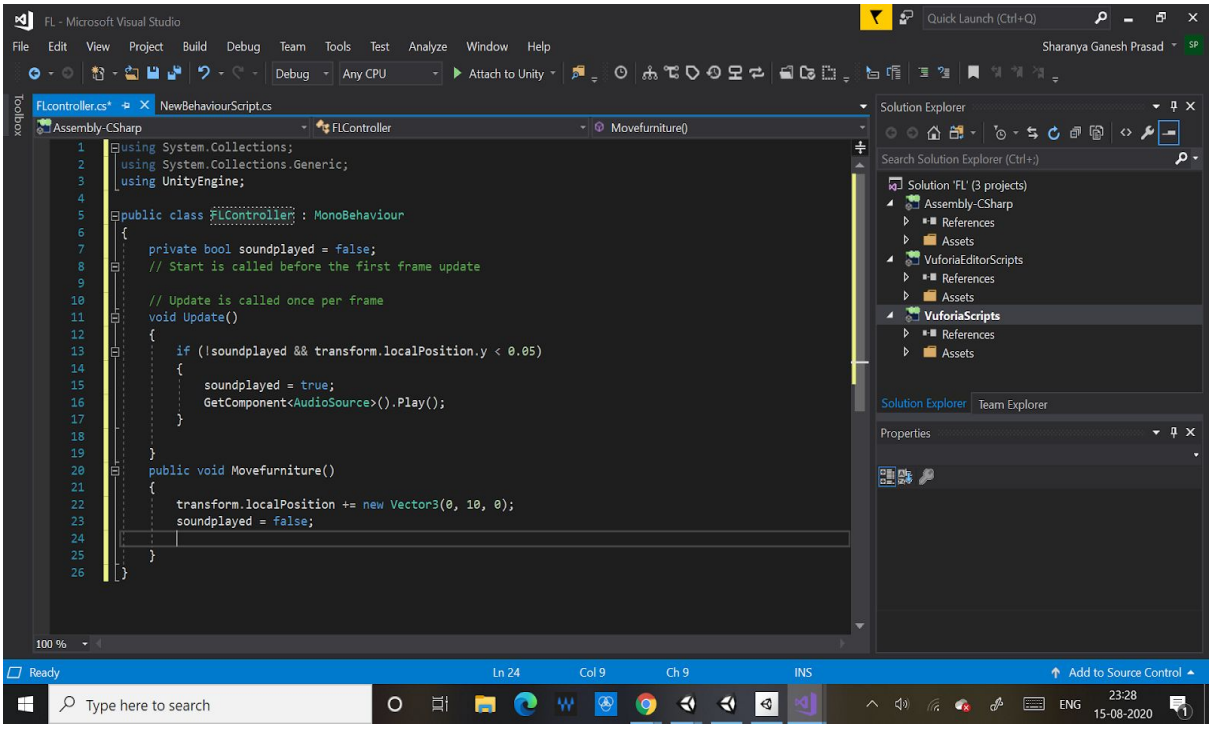

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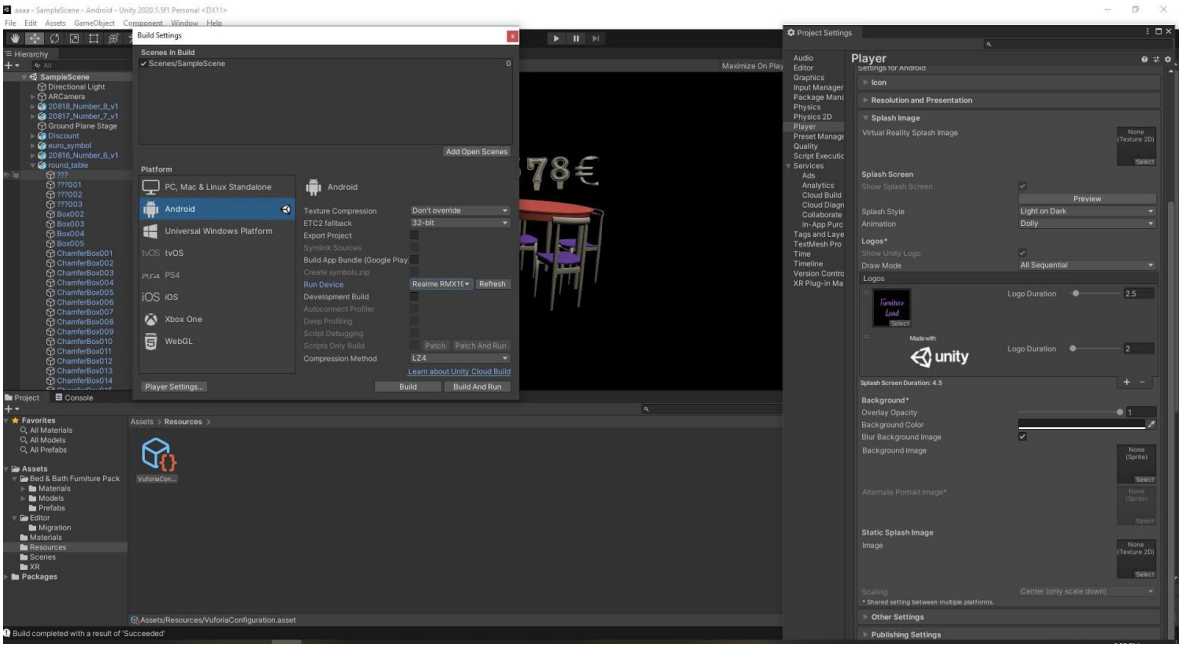

Lessons Learned:

- I tried to install the latest version of **Unity(2020.0a/0b)** in UnityHub that does not have inbuilt Vuforia for which I had to download another package and then place it in the same folder as Unity and then run the project.
- In Spite of every possible try the Vuforia Augmented reality option did not pop up in the XR -setting because of which I again had to download the old version **Unity2018.4.2** which has inbuilt Vuforia, but in this camera rendering has problems.
- Under the package Manager list of packages are visible out of which I tried to download the AR **Core XR plugin** but it was showing error as it did not support my current version of Unity so I had to uninstall that.
- Under the **Player settings** select **OtherSettings** an error popped up saying Vuforia does not support **Android TV Compatibility** option.
- I tried to Build and Run the project and kept on asking for the location of the Android SDK because of which till now I could not run the application.
- How to add a GameObject to the C# script.
- Unity 2018.4.25 /26 has a bug and in this vuforia initialization is highly not possible as the object will be deployed in the scene window but in play mode and also in build the object is not visible at all. Also if we try to use Ground Plane detection the same problem occurs.

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Vision and Outlook:

This project is similar to that of IKEA with extra features embedded , such as when ever a customer tries to locate the position and wants to check on the augmented furniture certain effects can be deployed such as Rigibody(free fall of the furniture from the sky on to the ground) Audio Source (a clip can be inserted which gives details about the furniture like the material , texture, size, weight , durability, guarantee or warranty). Thus by applying such features in the application there are high chances to gain customers appreciation and to attract them because people are attracted to sound and audio than reading the text to gain knowledge and information.

Resources:

Github link renewed

Video :

Project video link

References:

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