Build it Better: A.R Furniture Android Application

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Abstract - *Buying a furniture is not only a significant financial decision, but is also deeply personal and emotional. Introducing an augmented reality component to the furniture buying experience takes the consumer on a personal journey that allows them to see a house transformed into a home-their home.*

Key Words: **Android, Android Studio, Sceneform, ARCORE, Blender, Augmented Reality, GLB, GLTF 2.0**

1. INTRODUCTION

What is AR(Augmented Reality)? AR can be defined as a system that fulfills three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.

Do you remember the time, when you were buying a chair, a lamp, a carpet, or anything else? Remember how excited you were about the fortunate purchase, rushing home… and find out that an item did not fit the room? Argh. And there were only two further options: either return the goods and go back to the start, or leave and live with it. Fortunately, with new tech advances and stuff like Augmented Reality these times are gone. Selecting colors for the interior, creating a drawing or a model of a room, staging it with the furniture – all of this is possible thanks to AR furniture apps.

The Build It Better App uses AR Core by Google brings a furniture's virtually staged images from a flat, 2D screen into the house itself, through the power of augmented reality (AR). This gives prospective furniture buyers the ability to envision the furniture in their personal taste and style, while empowering the seller to present it objectively and neutrally.

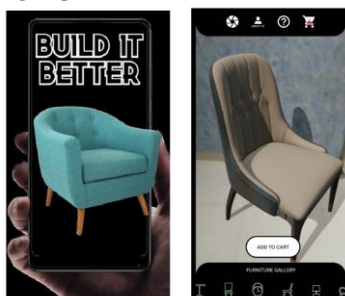Ideology behind this application is to provide good furniture buying experience.

Fig -1: Build It Better Application [5]

2. METHOD

The Build It Better Application consists of four phases:
1. Android Studio and Basic Android Component
2. Sceneform ARCORE
3. 3D Models of Furniture (GLB & GLTF)
4. Database Used in Application
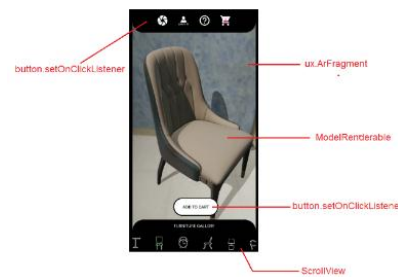
2.1 Android Studio and Basic Android Components

Fig -1: Android Studio and Basic Android Components [5]

The complete "build it better" Android Application is built in android studio. This phase consists of basic android UI components. A button consists of text or an icon (or both text and an icon) that communicates what action occurs when the user touches it. A Fragment represents a behavior or a portion of user interface in a Fragment Activity. You can combine multiple fragments in a single activity to build a multi-pane UI and reuse a fragment in multiple activities. A Model Renderable() is a 3D model that can be placed anywhere in the scene and consists of Meshes, Materials and Textures.

2.2 Sceneform ARCORE

Fig -2: Scenform ARCORE

In this second phase, we add sceneform ARCORE library. Sceneform is a 3D framework that makes it easy for you to build ARCore apps without OpenGL.

2.3 3D Models of Furniture (GLB & GLTF)

In this phase, we first create GLTF 3D model which are further imported in android application with the help of database. glTF™ (GL Transmission Format) is a royalty-free specification for the efficient transmission and loading of 3D scenes and models by applications. glTF minimizes both the size of 3D assets, and the runtime processing needed to unpack and use those assets. We can create glTF 3D models using blender. Blender is the free and open source 3D creation suite. It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, video editing and 2D animation pipeline. [6]. As this model is created it's in JSON (JavaScript Object Notation) format.
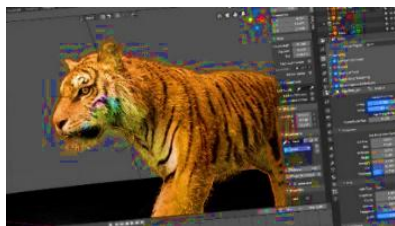

Fig -3: Blender 2.80 [6]

2.4 Database Used in Application

In this last phase, the models we created are in JSON format which can be hosted using a hosting platform. In this case Github Pages are used for hosting of 3D models which are then called in Android Application. As soon as models are downloaded, they get executed in AR format with help of sceneform library. As models are hosted on internet this reduces android application size.
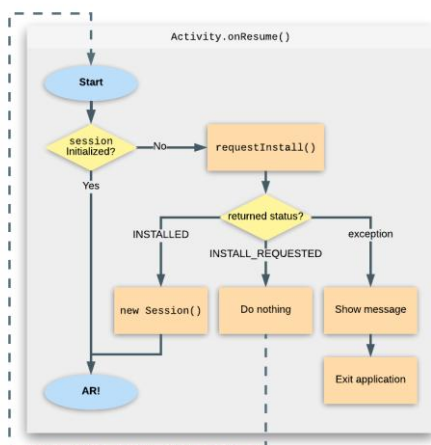
3. BUILD IT BETTER APPLICATION WORKING

Fig -4: Flowchart ARCORE (Status Check) [8]

This flowchart illustrates the logic in the preceding code. If requestInstall() returns INSTALL_REQUESTED, the current activity pauses and the user is prompted to install or update ARCore from google play store.
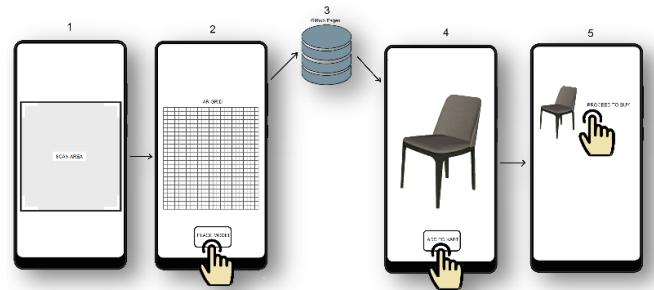

Fig -5: Working of Application

First, we when the application is turned on, we scan for the area. As soon as the area is detected a grid is formed on that particular area. After that we have an option for selecting furniture. All furniture models are bonded in a scrollable activity. We can select any furniture according to our needs. When furniture is selected it pings the github pages where model is stored and in response bring back that particular model. When we tap on the screen, we can see that particular model being placed in real world.

4. GESTURE USED IN APPLICATION

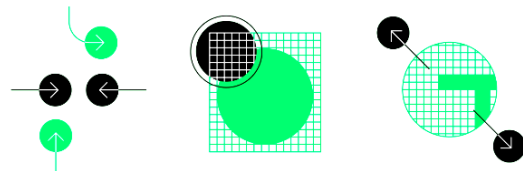Gestures help users perform tasks rapidly and intuitively using touch.

Fig -6: Basic Android Gestures [2]

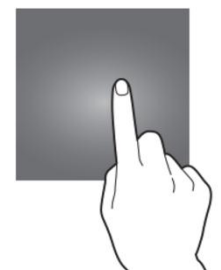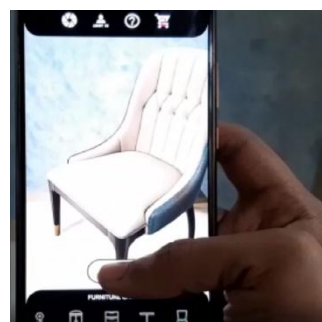Gestures used in Build in Better Application are as follows: -

Fig -7: On-Tap Gesture [5]
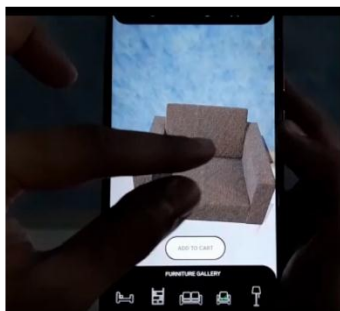
Fig -8: Slide Gesture [5]

Fig -9: Pinch In or Out Gesture [5]

On tap gesture in this application is used to place the model. Slide gesture is used to move the model on that particular AR grid & Pinch in or out gesture used to zoom in or zoom out that 3D model.

5. LIBRARY USED IN APPLICATION

```
// Provides ARCore Session and related resources.
implementation 'com.google.ar:core:1.15.0'
// Provides ArFragment, and other UX resources.
implementation 'com.google.ar.sceneform.ux:sceneform-ux:1.15.0'
```

This library provides AR core structure in an Android studio application.

6. PERMISSIONS USED IN APPLICATION

```
<uses-permission android:name="android.permission.CAMERA" />
<uses-feature android:glEsVersion="0x00030000" android:required="true" />
<uses-feature android:name="android.hardware.camera.ar" />
```
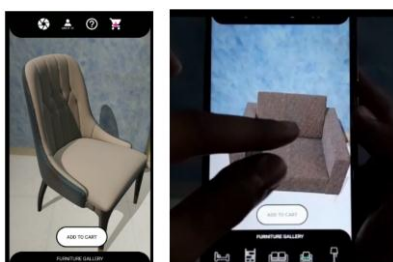
7. ANALYSIS AND RESULTS
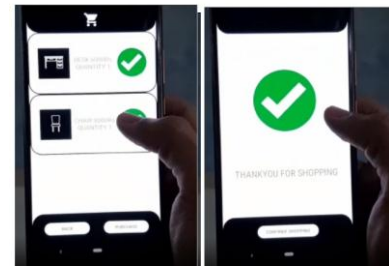

Fig -10: Object placing and Resizing [5]

Fig -11: Adding to Cart and Placing Order [5]

Whenever a new piece of furniture to be added in application as the code for the application is dynamic as we update the main json file and place a new 3D model GLTF(Json) it automatically gets added in the application as it is connected to database.

8. CONCLUSIONS

The proposed system demonstrated makes the whole process of virtual ecommerce with help of augmented reality. It shows how the Augmented Reality can be used in this pandemic time in ecommerce. Buying a furniture is a big decision. Staging helps buyers make this decision more easily, as they can picture themselves living with it.

REFERENCES

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[5] Youtube Video (Result): https://www.youtube.com/watch?v=Bj26F97cfgQ
[6] https://www.blender.org/
[7] https://pages.github.com/
[8] https://medium.com/@aks.akshaykumars/enable-arcore-ar-required-in-ar-apps-part-1-588bf51c3a1a

BIOGRAPHIES

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