Creating And Replacing 3D Object Model in Augmented Reality

Manisha Karande, Shraddha Kapse, Sandip Sagar, Deepti More, Prof.Rupali Wagh
Department of Computer Engineering
Parvatibai Genba Moze College of Engineering, Pune, India

Abstract: *In India, purchasing furniture online consistently faces a quandary regarding how one can comprehend whether the furniture is a solid match to purchase, regardless of whether it will fit in space without really contacting and looking at the furniture in detail. With such a dilemma there are chances for online stores to decline in their business. There is always a good certainty that technology can help to bridge the barrier and help one to overcome the dilemma.This study creates a unique light on how Augmented Reality can help to create and simulate buying furniture an online experience and enhancing customer experience provided uniqueness and mobility with the help of a mobile application. Our application allows users to simulate and experience furniture in 3D simulation using markerless augmented reality. Users can try a piece of furniture in their space supported by gestures and color furniture to try out diverse tints of the same. This research advances a new way of implementing markerless augmented reality for buying furniture products online provided by mobile applications and communicating with virtual objects in a real environment with an easy-to- use user interfaces.*

Keywords: *Augmented-reality, Mark Less-Detection, Rendering, ARCore, 3D models.*

I. INTRODUCTION

Augmented reality has been a hot topic in software development circles for a number of years, but it's getting renewed focus and attention with the release of products like Google Glass. Augmented reality is a technology that works on computer vision-based recognition algorithms to augment sound, video, graphics and other sensor-based inputs on real world objects using the camera of your device. It is a good way to render real world information and present it in an interactive way so that virtual elements become part of the real world. Augmented reality displays superimpose information in your field of view and can take you into a new world where the real and virtual worlds are tightly coupled. It is not just limited to desktop or mobile devices.

We can say that Augmented Reality is basically an interactive experience of the real-world environment where objects that reside in real world are enhanced by computer-generated information.

A simple augmented reality use case is: a user captures the image of a real-world object, and the underlying platform detects a marker, which triggers it to add a virtual object on top of the real-world image and displays on your camera screen.

So for enhancing the user interaction and resolving limitations; we enforced motion tracking that is used to understand the motion of objects and track their movements and accordingly to that the 3D model will simulate to give a better perspective and also environmental understanding that allows the mobile application to detect the surface and according to its size and inclination such as horizontal, vertical or angled surface the projection of the 3D model will alter, and also estimation of light in the environment such as current light intensity and lighting condition so according to that the 3D model will render its projection and be more realistic and dynamic to the real object in the surrounding environment and make customer interaction more efficient. So, we hope to achieve simulation of the furniture object and augment in the real-world environment.

II. LITERATURE REVIEW

The research for augmented reality technology has brought up development of various applications in the field of computer science. In this literature review, it shows how the implementation of augmented reality in various fields using Android Studio.

1.Paper Name: "Marker less Augmented Reality based Interior Designing system".

Markerless Augmented Reality as a basis for enhancing user experience and for a better perception of things. It has advantage of no need of markers in the surface area and disadvantage is Object is aligned with camera so that it moves as we move a camera.

2.Paper Name:"Virtual Furniture Using Augmented Reality".

which is a web-based application where user, have to place the marker in a room where they want to try out furniture items. The user's webcam will be on and through the webcam they will capture the live feed of the room. Application captures the image and passes through predefined marker detection algorithm. Algorithm is based on image processing techniques using color and other properties as the input to detect the marker. User initially selects the furniture to be placed from the given database. The application superimposes furniture on the original image with the center coinciding with the markers center in both directions. Furniture objects are overlaid on to the two-dimensional image frame acquire from webcam. This will appear as if it is actually placed in the real world. And finally, the user can view how the area looks with the furniture present.

3. Paper Name:"Furniture Layout Application Based on Marker Detection and Using Augmented Reality".

to develop an application where user have to place the marker in a room where he wants to try out furniture items. The user's webcam will be on and through the webcam he will capture the live feed of the room. Then application search the marker using fiducial marker detection algorithm. To identify the position of marker using direct linear transformation algorithm. Whichever furniture object the user wants to try out he will select that object from the database. Then the application will superimpose 3D object. In three dimensional objects are overlaid on to the two-dimensional image frame acquire from webcam. This will appear as it is actually placed in the real world. And finally, the user can view the room and object from different angles.

III. METHODOLOGY

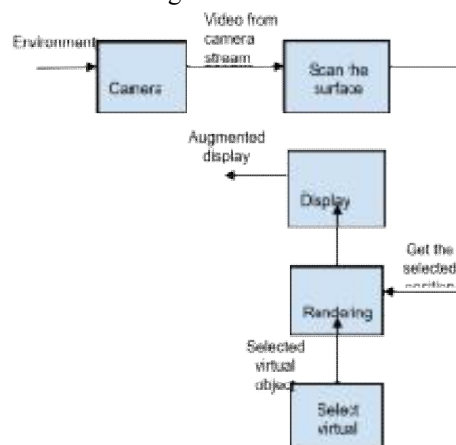The system application work flow shown Below diagram

Figure 1: Normal Workflow of System

The system basically uses mobile phone built-in camera which supports Augmented reality to collect view as the real scene view observed by human eye and stacks the 3D furniture models on the screen displayed. First of all, we need to setup the scenes in Android Studio for User Interface of application like buttons, text areas, background image and virtual object selection. Later we build 3D furniture models by Blender and import the models into Android Studio. Through identifying and tracing the surface area, the camera obtains pointers using Google AR Core and establishes

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projection models, at last stacks the imported 3D virtual model in the Real-world view. Because Android smart phone has touch-screen interface function, we can place the furniture by sliding screen.

IV. PROPOSED SYSTEM

The application has a simple interface that helps in providing clarity and interactivity to the user. It uses the camera of the mobile device which plays a vital role by communicating with the application and the framework that provides augmented reality features. A demo application is created that showcases the demonstration and the capabilities that augmented reality can show. We choose the ARCore SDK provided by Google because it is capable of providing Augmented Reality Experience on cross-platform devices.

The application working is divided into 3 parts:
- Working of the ARCore SDK
- Technical Working of the Application
- Working of the Application from the end-user perspective

AR Core SDK provides three key features that help developers to create a great user-experience in augmented reality. They are as follows:
- Motion Tracking
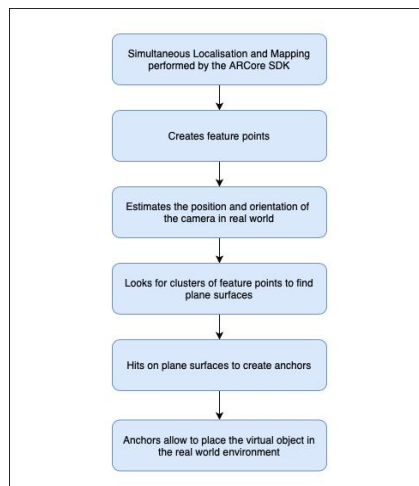- Environmental Understanding
- Light Estimation

Figure 2: AR Core SDK Feature

Figure 2: AR Core SDK Core Functioning to help the app provide the AR Experience

Motion Tracking:

The framework uses a technology called simultaneous localization and mapping (SLAM) for understanding the devices' relative positioning in the world. It then creates points from the captured image by the camera known as the feature points which then help to compute the changes while moving the device around the world. With the help of the feature points, it provides to creates hits on the feature points to place the 3D objects in the form of anchors

Light Estimation: The framework provides the ability to provide lighting to the 3D Objects with intensity and color correction with the help of the given camera captured image. Even in a night/dark environment, it provides the ability to provide lighting and intensity to the virtual object to make it feel in a realistic environment.

The above figure showcases how the ARCoreSceneform SDK works in the application that helps to provide an interactive augmented reality experience with the virtual objects. Firstly, it begins with motion tracking with the help of the camera image, it performs SLAM (Simultaneous Localisation and Mapping) process which helps to understand the environment and creates feature points on the surface it can detect properly.

It calculates and estimates the position and orientation of the camera in the real-world and looks for a cluster of features points to perform hit tests to create anchors that will place virtual objects in the real-world environment according to the position and orientation estimated by the camera. This is how the ARCore SDK core functioning works and helps the application to provide such an experience.This procedure is a readiness procedure to get plant leaf pictures. The RGB shading pictures of plant leaf are captured utilizing a digital camera, with pixel goals 568x1020. There have been gathered 75 information tests. It comprises five types of diseases which affected the plants.
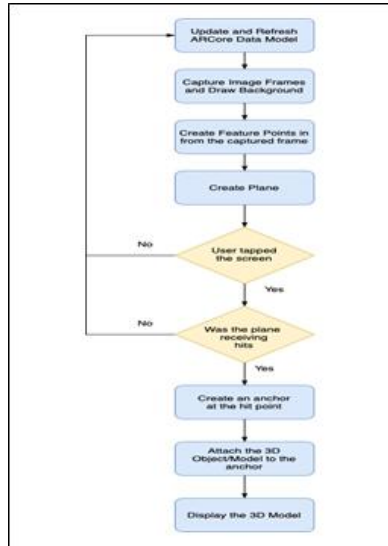

Figure 3: Technical Working of Application

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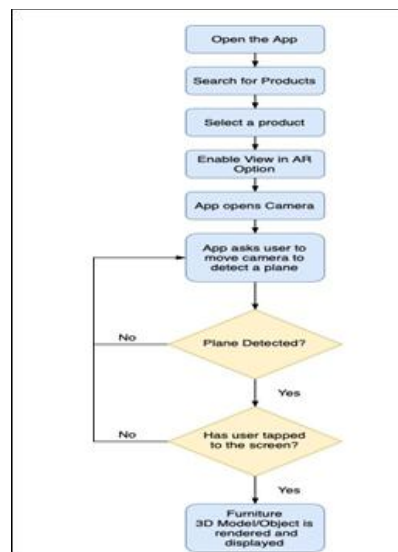

Figure 4: Working of the application fromthe end-user perspective

From an end-user perspective, the app appears to be an e-commerce product and the user searches and selects a product to view the information, the app provides a View-In-AR call to action where the app opens up an AR View and allows user to find a plane and tap on the screen to perform a hit test to place the anchor and interact with the virtual object in the real-world environment, the user can also be able to change the color of the furniture as per convenience and also add multiple models for a better experience.

V. RESULT

Here are some screenshots of the designed of our Proposed system by which our system can be more understandable.
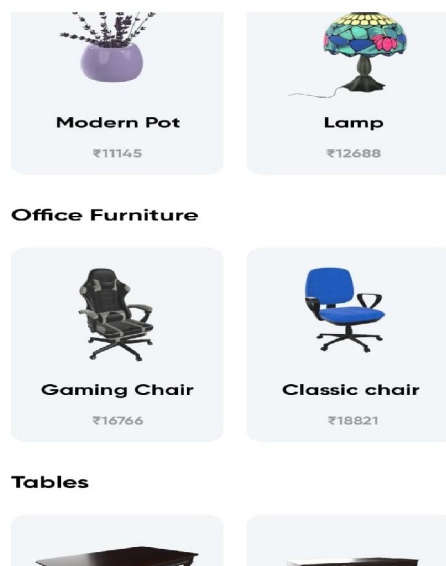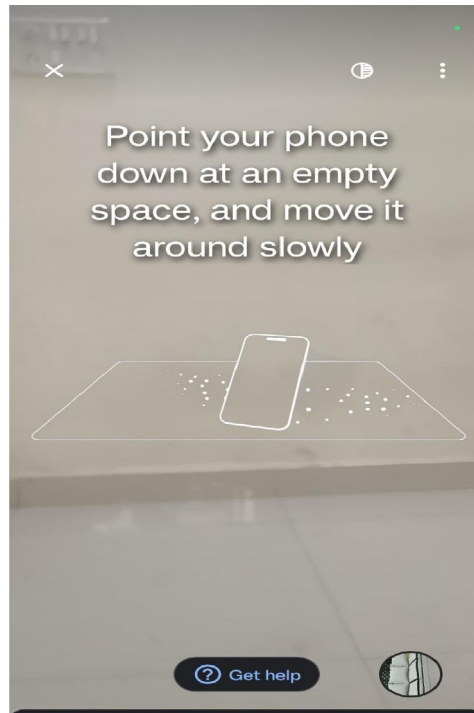

Figure 5: Logo

Figure 6: Home Page

Figure 7: Tracking Object Display

Figure 8: 3D Object Display

VI. CONCLUSION

The research concludes and states how Augmented Reality can not only leverage online shopping ecosystems but also boost user interaction as it provides interaction with products in the real-world environment that leads to catering products with better user experience and mobility. Due to an increase in the adaptation of online shopping in recent years. The application can play a vital role and provide a unique selling point for businesses to grow in their vertical. Many businesses have started to adapt this to their work-related purposes such as interior decoration and design, decoration, and home-planning. As mobile phones are coming equipped with better camera features like depth interaction, there will be huge growth in the adaptation of marker less augmented reality mobile applications and the application is a starting point in product innovation for online e-commerce businesses and providing a noteworthy edge of advancement in this domain of technology.

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