3d Modeling for Advertisement using Augmented Reality and Artificial Intelligence

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Abstract - Online shopping has become one of the major trends today, there is no doubt that people are adapting this new way of purchasing goods with a rapid pace. But what this kind of shopping experience lack is interaction with the products. This often leads to delivery of products which are far from one's expectation. This problem can be solved by Augmented Reality. By building a platform where populous can view 3D model of products we can not only make e-shopping realistic, but we can also give a technological touch to the field of advertising thereby revolutionizing it. Augmented reality is an interactive experience of a real-world environment in which computer-generated perceptual information is used to augment the items in the real world, sometimes spanning many sensory modalities such as visual, aural, haptic, somatosensory, and olfactory. AR is defined as a system that combines real and virtual worlds, allows for real-time interaction, and allows for accurate 3D registration of virtual and real items. Mixed reality and computer-mediated reality are two phrases that are increasingly familiar with augmented reality. 3D-Advertisement means with the help of 3D objects like a 3D model of mobile phone or air conditioner we can map and advertise the product. The mapping is the mode from which the product will be spawned in the virtual environment and this will be accomplished via Artificial intelligence. Without using the same mapping AI will help determine how exactly the product will be spawned in the virtual environment.

Keyword – AI, AR, 3D-Modelling, Haptic, Vuforia, Object detection.

I. INTRODUCTION

Motivation - If a customer wants to buy a product and if he/she can't visit the store to experience the product which he/she wants to buy or is considering to buy, it creates a problem. To overcome this problem we are making an interactive application by which they can experience the product from their home.

There are very few applications which do the same, but they tend to focus only on a single product and have only one mode, for example- If a customer wants to buy a mobile phone and wants to see whether the mobile is giving the look-and-feel that the customer is expecting, then he can use AR feature to spawn the 3D model of the mobile into real world. Thus able to experience the physical features of the phone. The applications which are already in use do the same work but mapping of an object is not good and also they've limited resource.

Problem Statement in context:

We want to make online shopping experience more dependable where people can get a better grasp of physical features of the product. Furthermore, we want to make advertising livelier.

Online shopping has become one of the major trends today, there is no doubt that people are adapting this new way of purchasing goods with a rapid pace. But what this kind of shopping experience lack is interaction with the products. This often leads to delivery of products which are far from one's expectation. We want to devise a software that can eliminate this problem by establishing interactive advertisement.

For this purpose, we are going to make use of Augmented Reality. By building a platform where populous can view 3D model of products we can not only make e-shoppingrealistic, but we can also give a technological touch to the field of advertising thereby revolutionising

it.

II. AUGMENTED REALITY (AR)

Augmented reality (**AR**) is an interactive experience of a real-world environment in which computer-generated perceptual information is used to augment the items in the real world, sometimes spanning many sensory modalities such as visual, aural, haptic, somatosensory, and olfactory. AR is defined as a system that combines real and virtual worlds, allows for real-time interaction, and allows for accurate 3D registration of virtual and real items. The overlaid sensory information can be constructive (i.e., additive to the natural environment), or destructive (i.e.,masking of the natural environment). This experience is so well integrated with the physical world that it is viewed as a fully immersive part of the real world. Augmented reality modifies one's continuing view of a real-world environment, whereas virtual reality totally replaces the user's real-world environment with a simulated one.

Augmented reality is a type of technology that is used to improve natural environments or circumstances by providing perceptually enhanced experiences. The information about the user's surrounding actual environment becomes interactive and digitally modified with the use of modern AR technologies (e.g. adding computer vision, putting AR cameras into smartphone applications, and object identification).

III.   ARTIFICIAL INTELLIGIENCE

Artificial intelligence (AI) includes computer vision various type of interdisciplinary learning which is a broad range in itself. There are various approaches in solving real world problem with the help of AI. AI does process like "Thinking Humanly, Rationally and Acting Humanly, Rationally". Many of these artificial intelligence systems are based on machine learning, while others are based on deep learning and yet others are based on mundane things like rules.

Basically, Artificial intelligence (**AI**) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term can also refer to any machine that exhibits human-like traits such as problem-solving and learning.

IV.   WAYS IN WHICH WE CAN MAKE AI AND AR WORK HAND-IN-HAND

When AI is included into an AR application, it can make it more useful.. The way by which bridging AR with AI enable mobile developers to build application more interactive and efficient. AR can

interact with the physical world in several dimensions thanks to AI. It lets you use your words, eyes, and hands to manipulate 2D and 3D virtual things.t. Though they are a very different kind of application but they can be combined in various

ways to give intriguing result. There are some of the practical ways in which we can sync AR with AI.

Image recognition and image tracking: It enable users to visualise how an item might seem and fit in a specific place. Users can transfer still photographs of goods into a still image of a room using AR and AI technologies, which helps them make decisions..

Human pose estimation: It's a method for detecting human figures and postures. In a picture or video, it predicts the positions of a person's joints. This might be used to manage AR material.

Recognizing and labeling: When the camera is directed at a scene or an image, the AR app recognises the object or item and displays a label that denotes it.

Object detection: The AR-AI combo can be used to learn and detect the position and extent of objects in an image or video automatically. This mobile-friendly approach allows physical and digital things to connect more easily.

V.   WORK STUDY

Image Target:

At the root of all Image Recognition AR experiences lies a target. As a result, working within the Image Target criteria is critical for achieving the optimum Image Recognition & Tracking AR results.

Images that the Vuforia Engine can recognise and track are referred to as Image Targets. By comparing extracted natural features from the camera image against a known target resource database, the Engine detects and tracks the image. Once the Image Target is detected, Vuforia Engine will track the image and augment your content seamlessly using best in market imagetracking technology.

Recognizing and supplementing printed media and product packaging for marketing campaigns, gaming, and viewing products in the environment where they were intended to be utilised are all common uses of Image Targets.

Ground mapping:

Digital material can be displayed on horizontal surfaces in your environment, such as floors and tabletops, using Ground Plane. It supports the detection and tracking of horizontal surfaces, as well as the use of Anchor Points to deploy content in mid-air.

Use cases for ground plane: ***Product Visualizations***

Place 3D product models in everyday settings, such as the home or office, while rendering them at their correct size

Games:

Create augmented reality games that interact
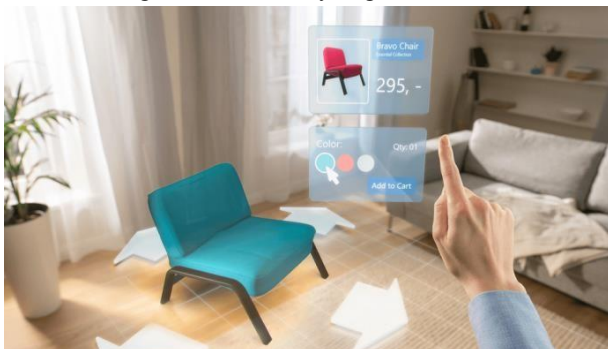
realistically with real-world items and environments. Ground Plane makes it simple to create immersive and enjoyable ad-hoc AR games for consumers.

Mid Air:

Mid Air allows content to be shown in the air rather than on horizontal or vertical surfaces. Visual markers on the Mid Air Stage indicate that it is 100cm square. These visual cues are only visible in the Unity Editor, and they are used to establish real-world size.

VI. UNITY ENGINE

Unity Technologies has created a cross-platform game engine. Three-dimensional, two-dimensional, virtual reality, and augmented reality games, as well as simulations and other experiences, can all be made with the engine. Outside of video games, the engine has been utilised by industries such as cinema, automotive, architecture, engineering, and construction. Unity allows users to create 2D and 3D games and experiences, and the engine includes a core scripting API written in C# for both the Unity editor and the games themselves, as well as drag-and-drop capability. Prior to C# becoming the engine's principal programming language, it supported Boo (which was discontinued in August 2017 with the release of Unity 2017.1) and UnityScript (which was discontinued in August 2017 with the release of Unity 2017.1).

VII. VUFORIA ENGINE

Vuforia is a mobile augmented reality software development kit (SDK) that allows developers to create augmented reality apps. It recognises and tracks planar pictures and 3D objects in real time using computer vision technologies. When virtual things, such as 3D models and other media, are viewed through the camera of a mobile device, this image registration functionality allows developers to position and orient them in respect to real-world items. The virtual object then tracks the image's position and orientation in real time, ensuring that the viewer's viewpoint on the object matches that of the target. As a result, the virtual object appears to be a part of the real-world scene. The Vuforia SDK supports a number of 2D and 3D target types, including Image Targets with no markers, 3D Model Targets, and a VuMark, which is a type of addressable Fiducial Marker. 6 degrees of freedom device localisation in space, localised Occlusion Detection utilising 'Virtual Buttons,' runtime image target selection, and the ability to construct and alter target sets programmatically at runtime are all included in the SDK.

Flow Diagram
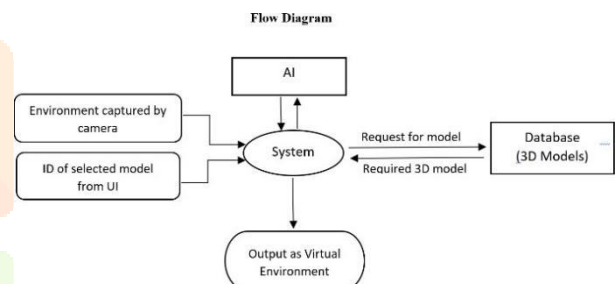
VIII. LITERATURE SURVEY

Study [1] We have research paper named "Pokémon Fight Augmented Reality Game" as our main paper.

In this paper, how the concept of AR can be used is mentioned. They proposed a model of Pokémon

Game in AR, where they are using Unity Engine and Vuforia Plugin for the same.

Study [2] from the paper whose title is "Projects using AR-toolkit" from author is Michael Haller.

From this paper we learn how to use AR-toolkit. In this paper they present Music AR as a first application.

Study [3] For mapping purpose we choose third paper named "Environment Mapping for Objects in real world".

We use this paper for understanding how the virtual world objects are mapped in real world environment.

Study [4] Next paper we choose for how the mapping Algorithm will be required for hand and motion tracking for better results. It is for interactive mobile Augmented reality system for image and hand motion tracking.

Study [5] How to rotate, resize and move AR objects is given in the paper titled "Design and Implementation for Interactive Augmented Broadcasting System".

Study [6] Augmented Reality Applications-We study many real time applications of AR like Agmenty, UniteAR, AR-watches, etc. But in every application, there are certain limitation so we tried to overcome this limitation in our project.

Findings:

After searching for applications of augmented reality related to advertisement we didn't come across any applications. But there were few applications whose domain was not specifically advertisement but they were using AR to represent product in real world environment. After using those application, we came across several points that they were lacking. Here is what we found:

Sr. No	Application Name	Disadvantage	Advantage
1	Agmenty	1. Augmented Reality is not supported on all devices. 2. Products are only related to interior designing	1. Shows pricing for all kind of interior products 2. Live chat option available 3. Directly connect sellers and buyers.
2	UniteAR	1. Shows all kind of AR models but doesn't show pricing. 2. Limited products (cannot call an advertising platform). 3. Building an AR model is complicated.	1. User can create their own AR models.
3	Pepperfry	1. Mapping of AR model is not proper. 2. Application is for furniture and related products only.	1. Directly connect sellers and buyers. Basically, a furniture shopping platform. 2. Products are segregated into various departments.
4	ARWatches	1. Watches are the only products.	1. Mapping is good. 2. Product can be seen in the form of 3D model.
5	Houzz	1. Products are related to interior designing only. 2. Mapping is not good. AR model cannot be seen from different angles.	1. Pricing for all the products is shown. 2. Has a social media kind of feel?

IX.   CONCLUSION

In the recent event of pandemic, the economy all over the world was hit by a major blow. One of the main reasons behind this was the lockdowns ordered by the government of different nations. Due to these markets were shut down and people weren't able to get their hands on the new products that arrived during this period, which in turn made it difficult for the public to make their decision about the purchase of the product. To deal with this problem this paper discussed the building of an application that uses the basis of augmented reality to represent the product in a real-world environment using its 3D models, thereby, making it easy for the customer to take a proper decision for their purchase. By using such an application people can view a variety of products from their home without necessarily going out.

X.   FUTURE SCOPE

Though the application allows the user to view the physical features of the product, it is not a complete "one-stop shop" platform. It only gives a detailed description of the product and displays its 3D model without giving any purchase option to the user. This application can be made much more efficient by inclining it towards e-commerce. This will not only make it a complete application, but also it will be convenient for the customer. Along with this, improving user experience by making the better user-interface and adding different categories of products is also the main

focus.

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