



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 Issue: IV Month of publication: April 2021

DOI: <https://doi.org/10.22214/ijraset.2021.33611>

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Shopping App using Augmented Reality

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Abstract: Nowadays mobile augmented reality is rapidly getting attention from industries and academics. These days communication and information technologies are supporting the development in human interaction whether it may be virtual, digital or physical for various sectors like banking, education sector or commercial. Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information. 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. We are going to develop an augmented reality based app to visualize and purchase furniture from home without visiting the shop physically. Our main purpose is to visualize the furniture product in the real world wherever users wish to place it via an AR app. This concept will help to eliminate human efforts and save time while providing ease of shopping. In this proposal we propose an AR service platform that can connect both stakeholders (i.e. e-commerce businesses and their customers). We will be developing a web-based application for the e-commerce businesses to register themselves and provide and host 3D models relevant to their products marketed online and a mobile application for their customers to preview and interact with those models. Our focus is for wearable items (out of which a watch and a necklace augmentation will be developed and tested by us) augmentation. The proposed system will detect the human hand or neck and then it identifies the key points and augments the 3D model on the identified key points. Marker less augmentation process is followed in this proposed system (i.e. augmenting the object in the real environment without using external markers). The 4 main components will be integrated together to achieve this objective. Using the live streaming feature the augmentation instance can be shared with another user of choice. **Keywords:** Augmented Reality (AR), Machine Learning (ML), 3D model, Marker less

Keywords: H.5.1-Information Interfaces and presentation, Artificial, augmented and virtual realities , K.5.0-Legal aspects of computing: General, Security and reliability issues in distributed applications

I. INTRODUCTION

The growth of (AR) augmented reality over the past ten years has attracted serious research and development efforts from both sectors, industry and education. Done by continuously embedding virtual objects/items with the real world, Augmented Reality makes it possible to provide users with an auditory experience beyond the reality. Specially, in some recent years, the inventions in the following 3 technologies have further given more power for the development and research of Augmented Reality. The evolution of dedicated AR devices (examples: Microsoft Hololens, Google Glass, etc.) has brought many new ideas for the AR developers. Augmented Reality (AR) is a new technology that includes the overlaying of computer generated graphics on the real world. The best overview of this technology is that it defined the field, described many problems, and summarized the developments up to that point. The favourable news is that several extensions in the technology have been initiated to enter the landscape of Mobile Augmented Reality platform. At first if we talk, the coming networks of 5G have brought new possibilities for Web AR, especially Mobile AR. As they have higher bandwidth (0.1 to 1 Gb/s) and lower network delay(1 to 10 ms), which in result improves the transmission of data on mobile networks. Secondly, with the establishment of new features, such as device-to-device (D2D) communication, multi access edge computing² (MEC), and slicing network, provides us an scalable and adaptive communication procedure that further enables an efficient platform for the promotion and deployment of Mobile Augmented Reality. We are developing a system with the help of augmented reality that lets the user try any object/item directly to the user's real environment before purchasing it from the shopping platform. Particular users will be able to choose any object/item in a much efficient and easier manner. It will remove the constraint to visit shopping places and long look for the particular item which the user needs as per their environment, or use a tape to measure and find out whether the item/furniture would fit him or the customer's room. The main purpose of this project is to develop an application for different furniture items. In furniture stores virtually without using the actual means which is very time consuming activity. By using this application it will be easier for the user to do online shopping of furniture applications.

This will also help the user to try out the furniture items in their room and they are able to see how it will look after placing furniture in it. Users can try out multiple combinations of furniture objects virtually without physical movements of furniture items. Our motivation here is to increase the time efficiency and also improve the accessibility of furniture to try on by creating furniture layout augmented reality.

II. LITERATURE SURVEY

- 1) *Deepak Uplaonkar, Saurabh Saoji, Surbhi Paranjape, Nikhil Andhalkar, Rajni Chorge, Rohit Jainapur* have proposed a technique augmented reality system for the home furniture layout based on fiducial marker detection. In "Virtual Furniture Application based on Augmented Reality" paper: They took furniture objects as a data set. The advantage was that it was easily understood and handled. But the only disadvantage was that it was only useful for single objects.
- 2) *Taiki Fuji, Yasue Mitsukura, and Toshio Moriya* have proposed a technique augmented reality system for home furniture objects based on marker detection. In "Furniture Layout AR Application Using Home Plans Based on Planar" paper: It was very fast for detection and tracking of the marker. Also it was a combination of multiple objects. But it was more costly as it required HMD Goggle and it was only developed for 2D objects.
- 3) *IKEA Catalogue* was released by *IKEA* in the year of 2013: The business people who It comprises nearly the full collection of the company's products. *IKEA Catalogue* incorporates AR technology in their app by utilizing the device's rear camera and gyroscope sensor. The 3D model of the furniture will be displayed at the position of the room being pinpointed as it's there. This helps the users to imagine and arrange the furniture at their place. The *IKEA catalogue* uses a marker-based AR approach in their application. It requires a printed catalogue to augment the 3D model. And without the printed catalogue it is not possible to move the model around the real environment. Which is a significant disadvantage of the application.
- 4) *Augmented Reality: Virtual fitting room using Kinect [3]*: E-commerce personalized A final year research project done by Lan Ziquan from the National University of Singapore, which the purpose is to enhance users' shopping experiences by using the above system. So that the users need to spend less time on queues for fitting rooms. This application also comes with a photo sharing feature which allow users to take photos of their virtual fitting of the item and share their appearances after downloading them. The system takes user's motion as input and converts the user's motion data via Kinect sensor. Together with the input motion data, other virtual environment elements, like user interface components and dress models, are integrated as a virtual scene. Finally, the integrated virtual scene is rendered by the graphic card and is displayed on the screen.

A. Existing System

The existing systems i.e. the traditional methods of designing include requirement gathering and assisting customers who are completely dependent upon a combination of verbal communication and visual cueing through online shopping applications. However, this technique of approach is clearly restricted to the limit of explanations provided to customers for the particular placement of a furniture and makes it less efficient and confuses users to buy the furniture. The main drawbacks in this technique of existing system are:

- 1) Static view of design which is unable to convey : The objects are in 2D shape which almost looks like a drawing on a paper which cannot be transitioned by the user. User cannot modify the size and is unable to rotate it and place it to the desired location.
- 2) Cannot determine the furniture will fix to our needs : Due the staticness of objects it is difficult to resize or check whether objects will go through the selected desired location.
- 3) Important metrics of furniture like height and breadth can't be known : Size of the furniture may be specified but still users have to go through measurement tapes to measure the area selected by them because of the lack of auto adjustment. Also the fact is that objects look like a 2D image.

B. Problem Definition

In Today's generation online shopping has become very popular in the last 3-4 years. Everyone has the power in his hands to select and compare the variety of their favourite items to choose from. Online shopping experience has emerged as a great success by providing the customer's great deals and the exact product which they need. But when we try to analyze what are the loopholes in this online shopping concept we analyzed some of the problems which are varying delivery time, wrong product delivery, measurement problem of dresses, lack of organisation of furniture and stuff(if we buy, it may not look suit the looks of room). So after analyzing all these problems we decided why not to make a system for the user where he can experience the real outlook of how anything will appear when he wants to wear it or put anything in any corner of his room.

Which will in result enhance the online shopping experience and grow the sales rate. For implementing it we will use augmented reality to bring any item/object in the real environment with help of mobile devices. We are developing an augmented reality application which will help the customer to enhance the online shopping experience.

C. Purpose

In future our “Shopping App Using Augmented Reality” dataset and scope will be scalable. The user might not only be able to try out different furniture/heavy objects but they can also try out this application by trying on garments, goggles, watches, hair styles etc. It can also be used for various applications in shopping malls, interior designing, Medical Science etc. New technology may come into existence in future that will help in developing 3D models automatically.

D. Goals and Objectives

The main objective of our activity are as follows:

- 1) Detect a suitable plane using ARCore.
- 2) Show the user the Floating Action Button (FAB).
- 3) On click of the button our model will be loaded.
- 4) Use the .sfb file to create a renderable object.
- 5) Attach our renderable object to the scene and display to the user.

E. Features

- 1) Multiple combinations of furniture objects ,heavy electronic gadgets view virtually from your home
- 2) Supports multiple 3D file extensions
- 3) Web QR code scan services (view from browser)
- 4) Detection of different surfaces in a precise way.

Proposed Architecture

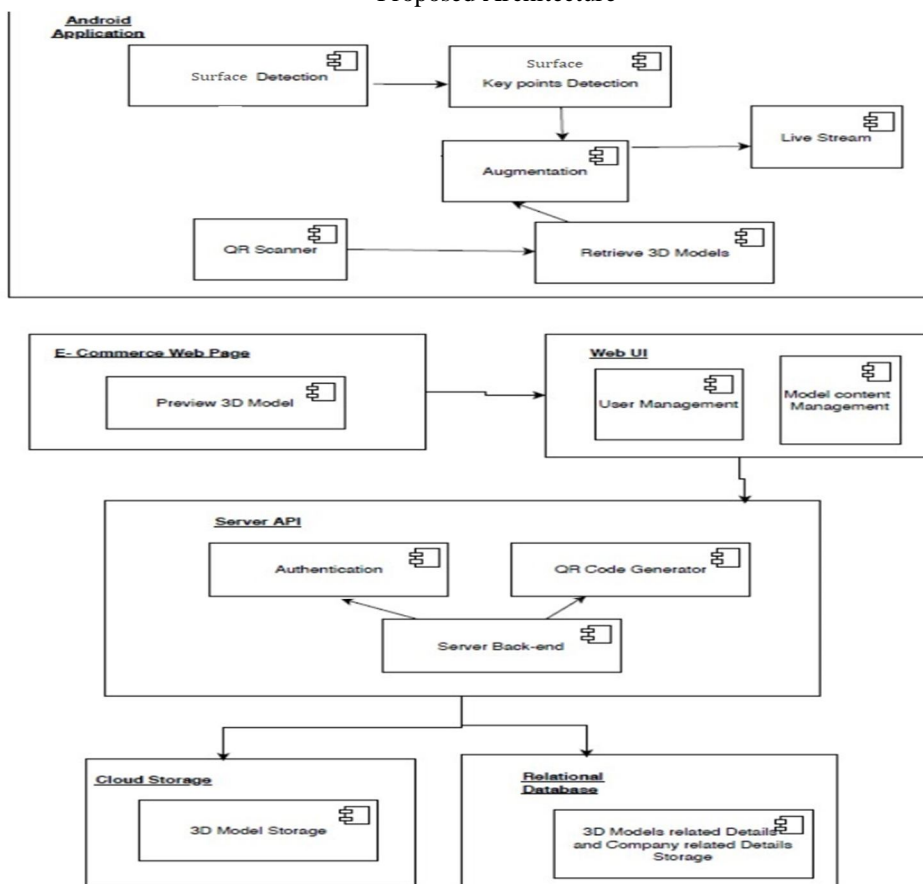


Fig . Proposed Architecture

III. METHODOLOGY

The solution introduced for the AR platform mainly consists of a web application and mobile application. The aim of the web application is to provide a platform for the e-commerce businesses to interact with the system. And the mobile application is created for the customers of the ecommerce business to analyze the Augmented Reality feature. Looking at the features of the components included in the product separately, it contains the following as,

A. Web application

- 1) e-commerce business details management portal.
- 2) 3D models related details management portal and hosting of them.
- 3) QR code generation for the mobile application to download the model from cloud storage.
- 4) Generation of a dynamic link which will be generated by scanning the QR code for each specific product of the respective ecommerce website, in order to connect the e-commerce website with the AR Platform. This is a fully-featured web application that has the ability to display augmented reality content .It makes it easier for adding augmented reality content to the web applications in a platform and technology-independent way and endomn rses the real-time AR capabilities of Browser.

B. Mobile Application

- 1) Marker less tracking using Artificial Intelligence(AI).
- 2) Augmentation of the 3D models.
- 3) Live streaming of the augmentation.

C. Software Required

- 1) *Programming Language:* Java, Kotlin
- 2) *Libraries:* Google ARCore, Java libraries
- 3) *Tool:* Android Studio
- 4) *Database:* Firebase, SQL Lite
- 5) *Web:* HTML, CSS, XML, Bootstrap

D. Hardware Requirement

- 1) CPU- 2 GHz, intel i3 6th Gen
- 2) RAM- 4 GB ,DDR4

E. Area of Project

Augmented Reality, Android Application, Database

F. Advantages

- 1) You can try before a buy.
- 2) Avoid waste of time
- 3) Reduce customer rush.
- 4) Anytime and anywhere access to the application.
- 5) Maintain social distancing in this covid-19 pandemic.

G. Limitations

- 1) If devices which do not meet minimum requirements as per mentioned below will not be able to run the application.
- 2) Heavy softwares is used to develop such kinds of applications.
- 3) The AR technology involves extremely high costs of development, implementation and maintenance.
- 4) Low performance level of AR devices

IV. CONCLUSION

These systems will help the customer to view the furniture object virtually in real environment before buying the object and the Covid-19 the pandemic has accelerated the shift to digital shopping by roughly five years.

Augmented Reality (AR) applications have been on the rise with virtual “try-before-you-buy” experiences ranging from previewing furniture and products in your home with everyday brands like IKEA and Home Depot, to virtually trying on luxury products like furniture. Once a nice-to-have feature, AR has quickly become an essential technology for retailers and customers. These proposed systems would let the user try multiple combinations of objects virtually without physical movement of furniture objects. These will help the buyer to determine how to set up furniture in his house.

In the age of social distancing, AR is a powerful tool for people to escape human efforts. It makes it possible for consumers to engage with products almost as they would in physical stores, and that higher engagement translates to higher sales. However, the pathway to AR victory can be complicated if you don't know what you're doing. When in doubt, always seek help from professional people like developers. Developers are pioneers in extending AR technology for e-commerce brands. We can help your customers see how a product looks in their space with remarkable detail and accuracy.

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