



Furniture App for Interactive Interior Design by using Augmented Reality (AR)

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Abstract: Augmented reality (AR) technology has potential to revolutionize the way we interact with and visualize the world around us. One area where this technology has great potential is in the field of furniture design and home decor.

The goal of the Augmented Reality Furniture project is to develop a platform which allows users to virtually preview and interact with furniture in their own home environments using AR technology. Using a smartphone or other AR-enabled device, users will be able to see how different furniture pieces will look and fit in their own living spaces before making a purchase.

The project will involve the use of 3D models of a variety of furniture items, as well as the development of AR software that can accurately place and scale these models in the user's environment. The platform will also include a user-friendly interface for browsing and selecting different furniture items, as well as tools for customizing and arranging the items in the virtual space.

Keywords: Augmented-reality, Furniture, AR core, AR Application, 3D model, AR technology.

I. INTRODUCTION

Augmented reality (AR) is a technology that overlays digital information and images on the real world, providing a more immersive and interactive experience. An augmented reality furniture project involves the use of AR to visualize and interact with furniture in a virtual environment before making a purchase or placement in a physical space.

This type of AR project can be useful for homeowners, interior designers, and furniture retailers. For homeowners, AR furniture visualization can help with decision making and planning for furniture purchases and arrangements. Interior designers can use AR to create virtual mock-ups of design concepts and make changes on fly without the need for physical prototypes. Furniture retailers can use AR application to allow customers for virtually try out different pieces of furniture in their home before making a purchase.

II. BODY OF PAPER

I. LITERATURE SURVEY

There have been a number of studies and projects that have explored the use of AR in the furniture industry. Some examples include:

1. Santosh Sharma, Yash Kaikini, Parth Bhodia, Sonali Vaidya has proposed technique named "Marker less Augmented Reality based Interior Designing system", which uses 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. Snehal Mangale, Nabil Phansopkar, Safwaan Mujawar, Neeraj Singh has proposed technique named "Virtual Furniture Using Augmented Reality"[2] 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.



3. Khushal Khairnar, Kamlesh warKhairnar, Sanket kumar Mane, Rahul Chaudhari has proposed a technique named "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 want 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.
4. "Mark Billingham, Hirokazu Kato, and Seiko Myojin" Augmented Reality (AR) research has been conducted for several decades, although until recently most AR applications had simple interaction methods using traditional input devices
5. "Paul Merrell, Eric Schkufza, Zeyang Li, Maneesh Agrawala, Vladlen Koltun" Presenting an interactive furniture layout system that assists users by suggesting furniture arrangements that are based on interior design guidelines. This system incorporates the layout guidelines as terms in a density function and generates layout suggestions by rapidly sampling the density function using a hardware-accelerated Monte Carlo sampler.

III. PROPOSEDSYSTEM

An augmented reality furniture project could involve the development of a system that allows users for virtually try out different pieces of furniture in their home before making a purchase. Here is a general outline of how such a system might work:

1. The user installs an augmented reality app on their smartphone or tablet.
2. The user opens the app and selects the "augmented reality furniture" feature.
3. The user scans the room where they want to place the furniture using the camera on their device.
4. The app generates a 3D model of the room based on the scan.
5. The user browses a catalog of furniture options and selects the pieces they want to try out.
6. The app superimposes 3D models of the selected furniture onto the 3D model of the room, allowing the user to see how the furniture would look in their space.
7. The user can move the furniture around, change its size or color, and try out different configurations to find the best fit.

IV. WORKING

Augmented reality starts with a camera equipped device such as smartphone, a tablet, or smart glasses loaded with AR software. When a user points device and looks at an object, the software recognizes it through computer vision technology, which analyses the video stream.

The device then downloads information about the object from the cloud, in much same way that a web browser loads a pages via a URL. A fundamental difference is that the AR information is presented in a 3-D "experience" superimposed on object rather than in a 2-D page on a screen. What the user sees, then, it is part real and part digital.

AR core is responsible for detection of surface & placement of object. it uses SLAM algorithm to detect surface.

SLAM (Simultaneous Localization And Mapping) does two things.

- Localizes a device within a space.
- Maps out the space.

Workflow of application

Algorithm:-

Step 1: Start

Step 2: splash screen

(Application introduction with icon)

Step 3: Home screen

(Categorized pieces of furniture)

Step 4: Object Detail screen



(Description about selected furniture)

Step 5: Augmented Reality camera start
(Calling AR core)

Step 6: Object placement on surfaces
(Retrieving model from the cloud)

V. HARDWARE AND SOFTWARE COMPONENTS

Software Requirements

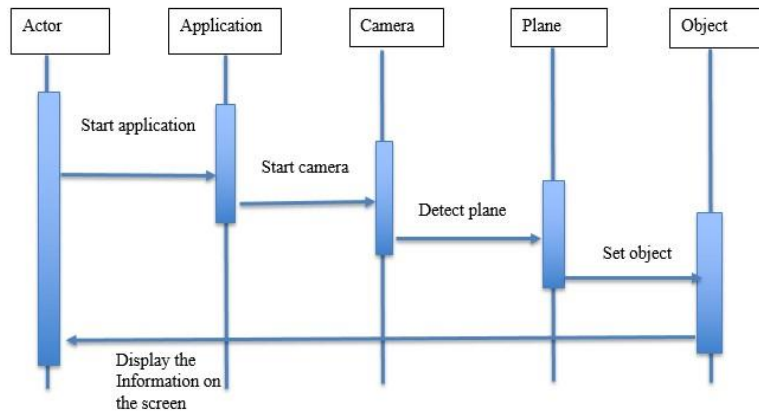
- Operating system : Android 8.0
- Android Studio
- Flutter

Hardware Requirements

- RAM Capacity: Min. 4GB
- Graphics Card: 1 GB
- Accessories: Smart phone with AR support

VI. DESIGN

- Sequence Diagram



- Data flow diagram

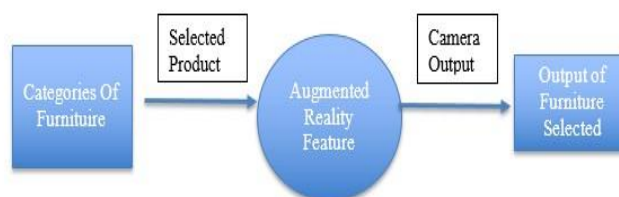


Fig.DFD Level 0

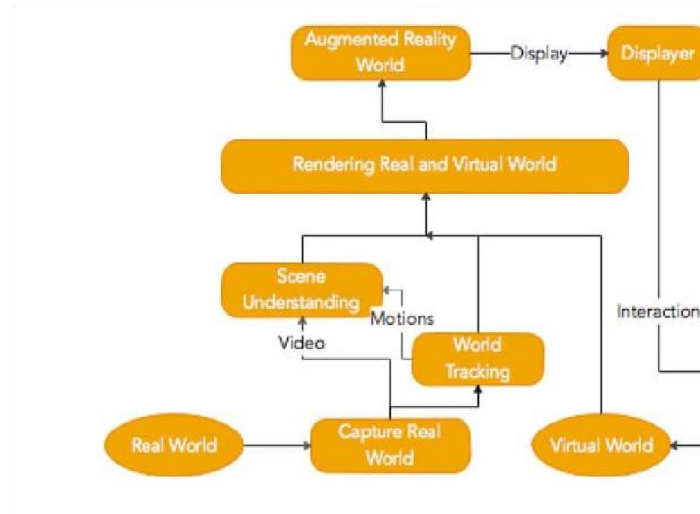


Fig. DFD Level 1

• Use Case Diagram

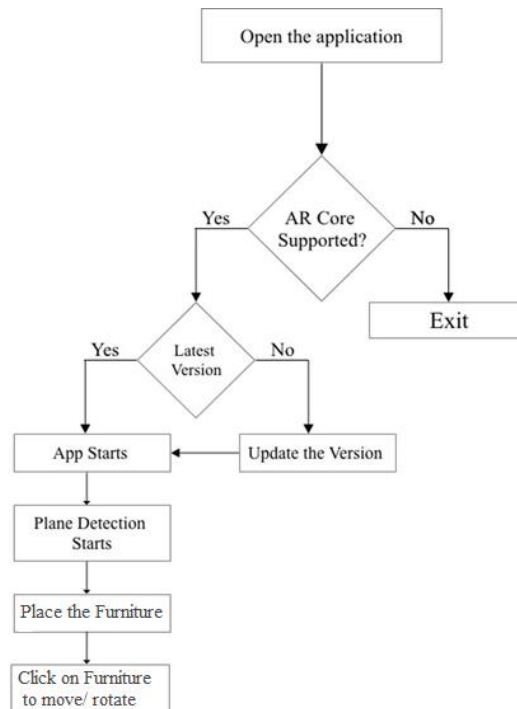


Fig. Use Case Diagram

VII. DESIGN DETAILS

The popularity of mobile devices and advent of immersive technology such as AR (augmented reality) are believed to provide new opportunities for increasing multimodality, richness of information and place independency of retail.

The application's initial stages will be identical to that of any other e-commerce site. Amazon, Flipkart, and eBay, for example. When a user chooses a product that he or she likes and uses the augmented reality function, the 3d model for that product is retrieved from the database. The AR system will begin detecting the plane and displaying a marker on the detected plane. Once the model has been retrieved from the database.



The 3d model will be spawned in location of the marker once the user clicks it. After that, the user could scale or rotate the model to his or her preference. The application uses Google's AR Core to implement these augmented reality features using flutter for e-commerce application development.

VIII. RESULTS

An augmented reality (AR) can be powerful tool for furniture retailers, allowing customers to visualize how different pieces of furniture would look in their homes before they make a purchase. There are a few different ways you could approach a furniture app project based on augmented reality:

1. AR try-on: Similar to how some clothing apps allow customers to "try on" different outfits, you could use AR to allow customers to "try out" different pieces of furniture in their home. This would allow them to see how the furniture would fit in their space and how it would look with their existing decor.
2. Virtual furniture showroom: You could use AR to create a virtual showroom, allowing customers to browse and interact with different pieces of furniture in a virtual environment. This could be particularly useful & best way for customers who are unable to visit a physical store due to distance or other constraints.

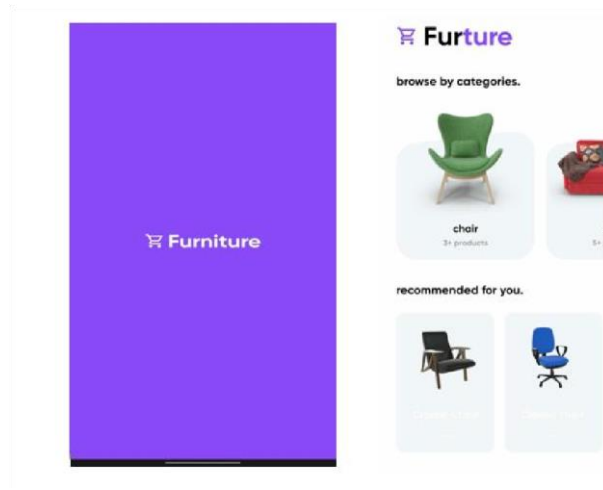


Fig.splash screen, Home screen

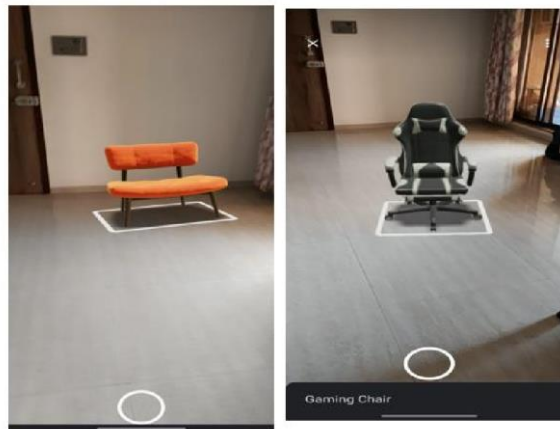


Fig. 3D Model Virtuulization

IX. FUTURE SCOPE

Augmented reality (AR) technology has the potential to revolutionize the way people shop for and interact with furniture. Here are a few ways that an AR furniture app could potentially be used in the future:

1. Virtual furniture showroom: With an AR app, customers could visit a virtual showroom to browse and try out different pieces of furniture in their own space before making a purchase. This would allow them to get a better sense of how a piece would fit into their home and how it would look with their existing decor.



2. 3D room planning: An AR app could be used to help customers plan out the layout of their room and visualize different furniture arrangements. This could be particularly useful for people who are moving into a new space and want to see how different pieces of furniture would fit before making any purchases.
3. Virtual try-before-you-buy: An AR app could allow customers to virtually try out piece of furniture in their own home before committing to a purchase. This could be especially useful for large or expensive items that may be difficult to return if they don't work out.

X. CONCLUSIONS

The main objective of this "Furniture Layout Application Using Augmented Reality" is to analyze the use of augmented reality to render the furniture model in real world. Augmented reality technology that allows the customers to decide and interact the furniture with the real world, offering new possibilities for furniture online shopping. It helps the customer to view and understand the furniture for his requirements. Due to this customer will come to know how their home structure would look after purchasing and placing the furniture object with multi-color option. These helps the buyer in determining how to setup the furniture in their home structure. Augmented reality support for furniture help in creating many new opportunities for future research to anticipate new ideas in the field of online shopping as customer will get benefit with these types of applications and gives a better understanding and decision making for purchasing a furniture in an efficient way. Augmented reality is new evolving technology in the field of computer science and will make us much more helpful than the traditional technologies.

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