

HOME RENOVATION USING AUGMENTED REALITY

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Abstract: Home renovation is an imaginative and indecisive task. Choosing from catalogs provided by decor companies can be confusing and time consuming if the user isn't sure whether the furniture or wall frame will fit properly in the living room, match the curtains or floor. This might lead to frequent unnecessary visits to decor showroom. In order to resolve this problem, it became necessary to come up with a user friendly mobile application which uses markerless augmented reality so that customers have a clear perception and idea about how their house or place of work would look aesthetically after the chosen wall frames, floor tiles and furnitures are applied. The following proposed system uses ARCore, unity and android tools, which will help customers to visualize all the designs provided by decor companies.

I. INTRODUCTION

Home plan designs, floor designs and home renovations are important aspects for every customer who desires to do any of the three. Majority of the decor companies use catalogues for the designs and floor. Customers have to visit showrooms frequently to make sure to select the best design plan and furniture. However, it is difficult for customers to imagine and visualize how the selected design would look or whether the furniture would suit the floor and curtains. For example, person X wants to select a sofa set. The person has to go through a catalogue having numerous models with different features. Few of the models are quite similar. It is very difficult to visualize the difference between colours of models such as geyser blue, ice blue, powder blue and turquoise. Additionally, furnitures are more difficult to visualize as compared to floor designs because of three dimensions. It is strenuous to verify space occupied by the cupboard, the colour and whether the cupboard suits the wall. Floor design, furniture and wall paint are features of home that always have to go side by side.

This paper guides you through the implementation of the application which uses augmented reality which gives solutions to the problems faced by customers as well as decor companies. The application will provide users the interface to select desired furniture, floor designs and wall paintings. After selecting the models, all users have to allow camera permissions which will be used by the application. Desired ambience will be visible through smartphone's camera. AR's unique ability to work within the world around us makes it easy to integrate digital versions of wall paintings and furniture right in front of human eyes. It makes use of full 3D space, letting users see them at exact size and dimensions of real size [3,5].

II. PROPOSED WORK

A. Feature detection:

ARCore understands the user environment through a process called meshing. It understands the environment by generating horizontal and vertical planes with clusters of feature points called point clouds which helps in detecting unique features and helps determine the boundary provided. These points are identified by making use of the device accelerometer and its orientation sensors. This provides the benefit of tracking multiple points that ARCore identifies as object points.

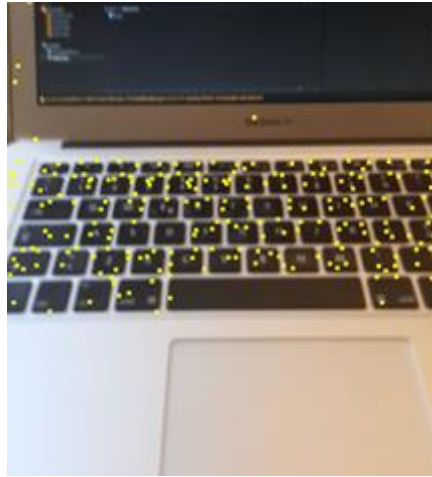


Fig 2.1 Feature Points

B. Plane detection:

Environmental understanding is ARCore's process of seeing, processing and using information about the physical world around an AR device. The ARCore uses the phone's camera to capture clusters of feature points along a surface to create a plane. ARCore's awareness of those planes is what allows it to properly place and adjust 3D assets in physical space, such as on the floor or on a table, otherwise objects would just float. This process enables the user to place furniture models on the floor. Once the plane is detected, hit a test or raycast to see what plane the user is tapping on. This allows the user to place objects on top of the floor making them follow the same rules of physics as real solid objects. Gyroscopes and accelerometers combined with smartphone's camera and the ARCore's unique software, all add up to the discovery and detection of planes. Smart phones use inside-out tracking i.e it uses camera and sensors located within device itself to track its position in real world space. This method requires more hardware in the AR device, but offers more portability. In order to seem real, an AR object has to act like its equivalent in the real world. Immersion is the sense that digital objects belong in the real world. To achieve realism the object should be placed and scaled i.e sofa model once placed, should stay where you've put it and respond the way they should to the device's movements and orientation. It means if you turn around, the sofa stays on the floor where it was placed. Motion tracking needs to be combined with environmental understanding to provide realism to virtual objects in scenes.



Fig 2.2 Plane Detection

C. Block Diagram of System:

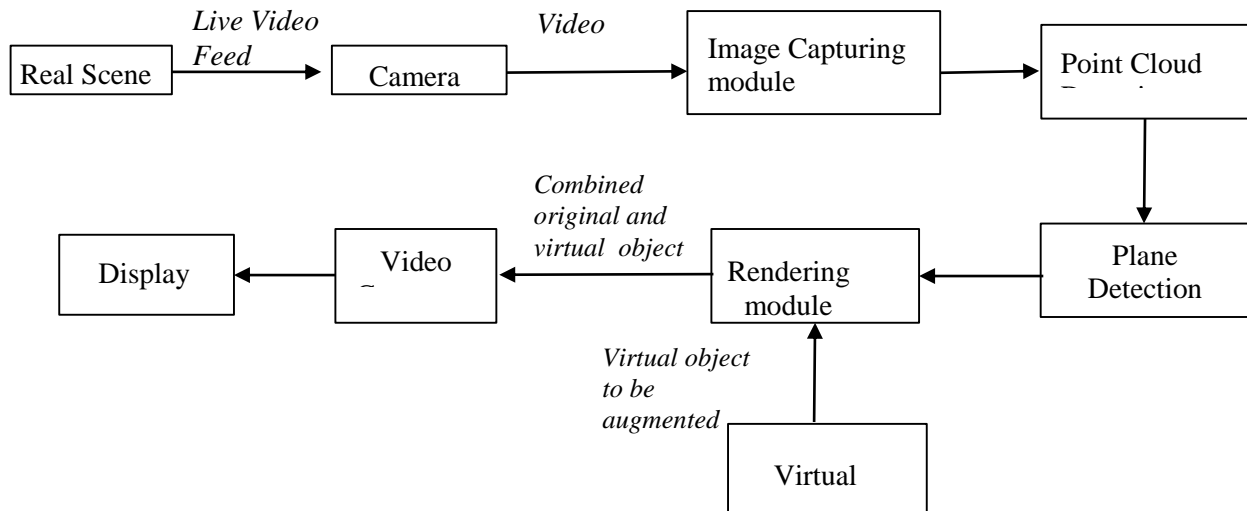


Fig 2.3 Block Diagram of Proposed System

After horizontal plane detection, the virtual objects like sofas and chairs are augmented in the real world by a rendering module. Similarly, frames are placed on vertical planes and tiles on horizontal planes.

III. RESULTS



Fig 3.1 Tile Model



Fig 3.2 Frame Model



Fig 3.3 Furniture Model

IV. CONCLUSION

This proposed application has achieved the target to bridge the gap between customer and retailer successfully. It closes the gap between imagination and reality by providing an experience of realism to users by allowing them to place, move, rotate and scale models to the required size. Thus allowing them to design the room space according to their wish. The application can be used only on an android phone that supports the ARCore unity packages thus limiting our audience. It is built keeping the single retailer in mind, so that it gives users access to limited models. The accuracy of the project varies due to the upcoming in the ARCore packages and limited computing power of android phone which varies from user to user. The application can be expanded for multiple retailers in future.

ACKNOWLEDGEMENT

We would like to express our deep sense of gratitude towards our mentor, Dr. R. C. Jaiswal for his constant support and guidance throughout our research. He gave this paper the insight and the expertise it needed for making it a presentable one. His advice, professional acumen, and encouragement proved to be a valuable guidance.

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