Interior Design Using Augmented Reality

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Abstract: In this paper we are going to represent an application of Augmented Reality technology for interior design. Along with the time and growth of digital technology, virtual techniques are required . We know that nowadays , people are busy with their work and thus it's very time consuming to visit various stores to buy furniture for their everyday use. There is difficulty to fulfill the customers wish of decorate their room without imaginary view of how the furniture will look like actually in the room. We propose to use AR for implementing a new design approach for interior design. This AR environment will allow the user to select from a range of furniture and then display or render the virtual furniture selected on the real environment.Along with it , Utilizing the latest ARtechnology, users can place 3D models of virtual objects as e.g., chairs or tables on top of a layout plan and interact with these on their mobile devices . In this paper, we present our research on utilization of augmented reality for interactive and personalized furnishing that the actual user wants in these busy wolrd. The psychology says that , the average person learns better by observing and listening something as compared to by simply reading something. We will be using this specific property of the human mind to accelerate the real time problem.

I INTRODUCTION

The interior designing system using augmented reality is an android application that overlays the virtual environment furniture in a physical environment. The markers are placed on the area (for example floor or wall) for tracking purpose to define the scale and coordinate system of the room which actually it wants. The user selects virtual furniture on the screen from the application and places it into the design space. So , here the concept of AR is used to integrate that selected virtual furniture. Along with is , the user can also manipulate the location of the selected furniture and view it in various angles and dimensions. All the operations are performed in real time. It is implemented for android devices where the mobile camera is an important component for scanning the surface where we want to display the model. Smartphones are very popular and it is hoped that the proposed system will allow a large range of users. Also the most difficult challenge of decision making can be easily resolved when the user gets to choose the desired layout for a particular room. Thus this saves time and efforts by avoiding the need to physically go to the store and select furniture. Home furnishing with new furniture is often a challenging task due to several drawbacks between selection of furniture in a shop which we want and its composition in a desired location of the room. Amongst these pitfalls , one is the lack of imagination in relation to the desired room and to other furniture when an item is seen in the shop. Another problem in home furnishing is to ensure that selected furniture has correct dimensions for the desired room. Additionally, once the furniture is purchased, a home owner may want to try multiple spatial configurations in the desired room and the location which is physically demanding and time-consuming[8]. So these problems can be addressed by utilizing augmented reality (AR) technology. AR allows visualizing the desired furniture directly at home with correct dimensions. Therefore, AR supports imagination, virtualization and cures the size measurements in the real space. Due to this problem of expensive and time-consuming process of Professional interior design for home furnishing , many homes are designed by the owners themselves without any ideal insight and the professional interior design insight. We address this problem by mobile interior design system which provides users with automatically generated interior design models that can be easily rendered o the floor or walls wherever the user wants. Along with it , users can then manually and easily adjust the proposed position of items and delete or exchange the unwanted ones. Head-mounted displays and monitors require hardware implementations and are mainly designed for professional users. [3] Since it is an android application, it is supported by all android devices or smartphones which are easily accessible to the users.

II KEYWORDS :

interior design, augmented reality(AR), 3D content generation , ARCore;

III PROPOSED SYSTEM

The proposed system is an augmented reality for interior designing by covering the virtual furniture from the application in a physical environment based on a regular smartphone or any device with android operating system. So , the markers are placed on the floors or walls wherever the user wants to track the model and define the scale and coordinate system of the desired room. By lining up the pose of the virtual camera that renders your 3D content with the pose of the device's camera provided by ARCore , developers are able to render virtual model in the application from the correct perspective. Next, the user selects virtual furniture on the screen. The 3D virtual furniture is displayed into a real environment that is floor or walls and can be arranged alongside real furniture.[2] The basic prerequisites is smartphones with android operating system and a printer. So it is expected that the proposed system will allow a broad range of users the system proposed in this paper includes additional functions for the user interface and an improved and optimized implementation
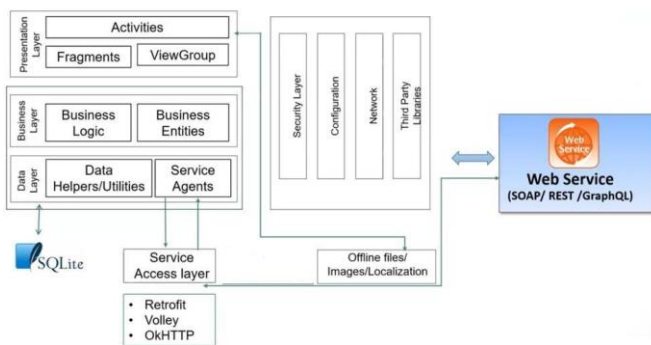
IV SYSTEM ANALYSIS

Fig. System Architecture

A system architecture is the conceptual model that defines the structure, behavior , and more views of a system.An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. A system architecture can consist of system components and the sub-systems developed, that will work together to implement the overall system.We will be using Firebase Realtime database along with Firebase Storage to store our 3D models as well as user information. [5]Presentation layer will be containing activities which user will be interacting with and as per his/her choice logic will be triggered so that object can be seen in real space.

V LITERATURE REVIEW

Augmented reality helps the user to see environment and products. It can help in the making and testing of any category of product design to be tested, or to enable the user to participate in certain categories of product health, such as assisting in the decision process during the purchase step. In other words, the unpopularity of tax collectors we see is true considered a custom application inside your tablet or almost identical phone a live view of the physical world.[7] In this paper we present a mobile augmented reality (MAR) application supporting teaching activities in interior design. The application supports students in learning interior layout design, interior design symbols, and the effects of different design layout decisions. Utilizing the latest AR technology, users can place 3D models of virtual objects as e.g., chairs or tables on top of a design layout plan and interact with these on their mobile devices. Students can experience alternative design decision in real-time and increases the special perception of interior designs. Our system fully supports the import of interior deployment layouts and the generation of 3D models based on design artefacts based on typical design layout plan design symbols and allows the user to investigate different design alternatives. We applied John Keller's Attention, Relevance, Confidence, and Satisfaction (ARCS) learning motivation model to validate our solution to examine the students' willingness and verify the ability of students to improve learning through MAR technology.[8]

VI MATHEMATICAL MODEL

ARCore uses a process called simultaneous localization and mapping, or SLAM, to understand where the phone is relative to the world around it. It basically detects visually distinct features in the captured camera image called feature points and uses these points to compute its change in location. So , by aligning the pose of virtual camera that renders your 3D model with the post of devices camera which is provided by ARCore , developers are bale to overlaid on top of image . It makes it appears as if it is virtual content which is the part of real world**.** SLAM is a computational problem. It's a concept of computational geometry and used in odometry for augmented reality. It includes several components like environnmental understanding , depth understanding , light estimation , user interaction , oriented points , anchor and trackables , augmented images. Given a series of control ut and sensor observation ot over discrete time steps t , the slam problem is to compute an estimate of the agent's state xt and a map of environment mt . All quantities are usually probabilistic , so objective is to compute. [11]

$$P(mt + 1 , x1{+}1 \mid ot1{:}1 , u1{:}t)$$

VII CONCLUSION

AR technology opens up many new research fields in engineering and architecture. For the interior design application

created in an AR environment, design work can become more lively, convenient, and intelligent. The results of this application showed that furniture were rendered on the marker

and scaled accordingly. The size of the object depended on the size of the marker and the distance from the camera.The users could manipulate the objects and place them according to the scene. Also, the user interface is simple allowing beginners as well as professional users to use the application.

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