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HOME INTERIOR DESIGNING USING AR

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Abstract—Envisioning how a specific object will look in a room before it is decorated is a difficult challenge for anyone. Everyone wants the house to be functional and stylish, room design needs time and expert methods. There are extensive systems for room and layout design. But most of them require users to drag and drop the furniture models into their room modify the furniture features or change the camera position around to see their newly designed room by means of the mobile phone or tablets screen. These complications diminishes the user satisfaction as well as restrict the synchronous collaboration among the multiple users. In this work, We are implementing a system in designing the furniture layout based on the augmented reality technology. Given the room floor plan and target users are able to physically move their furniture around the available space to design their own ideal room. Finally, We demonstrate that our system cannot only reduce the difficulties of existing room design systems but also amplify the users satisfaction of room design application. Moreover, we change the position that it will encourage co-design from simultaneous multiple users.

Index Terms—Virtual Reality, Augmented Reality, Fog Screen,

I. INTRODUCTION

Now a days with high work load and busy life, many professionals face problems that results in the loss of their customers or the certain overheads that spoil the process of satisfying the customers. This software will be used by interior designers or architects. This proposed system most likely acts as an effective tool which can reduce the gap between indus-trial company and customer in addition to other applicable business communities. It will help in viewing architect plans and interior designs. A virtual model of real environment can be developed before its physical implementation, it will allow interior designers to implement their idea in the given work space virtually and then view it in real environment, it will also allow architects and interior designers to view their 3D visualizations on their 2D drawings. Application is based on our findings of user's expectations of an augmented reality interior design service, a service which is a combination of various functionality of social media, augmented reality(AR) and 3-D modelling that encloses the concept of home design.

This study promotes the user-intensive design of augmented reality. The paper provides you the inner depth of how the augmented reality can be implemented to help the architects and interior designers as well it discusses the algorithm which are used to achieve those functionalities. The proposed application provides two types of Augmented reality, Marker less and marker based. The novelty of the project is that it does n39;t require any kind of expensive materials. It can easily be used through smartphones and tablets. It is also operable on any operating system. This is a cost-effective solution that helps to reduce the problems that interior designer and architects confronts on daily basis. This system provides all the features that might be required by interior designers and architects respectively.

In this project we intend to introduce an application which incorporates augmented reality to aid event managers. This application will help the users to efficiently provide the clients with the expected settings of the venue. The clients can approach the manager and communicate their requirements. The manager creates the virtual object, if required, and he

must also obtain the image targets of the venue. These virtual objects are then superimposed onto the image targets using the application. If changes are there in the predicted view, those can be rectified and this process can go on till the client gets satisfied with the predicted view.

II. EXISTING WORK

A. Bare-hand based augmented reality reality interface on mobile phone

This paper proposes an augmented reality interface which provides natural hand-based interaction with virtual objects on mobile phones. Assume that one holds a mobile phone in a hand and sees the other hand through mobile phone's camera. Then, a virtual object is placed on his/her palm and reacts to hand and finger movements. Since the proposed interface does not require any other sensors or markers, one freely interacts with the virtual object Anytime and anywhere one can freely interacts with the virtual object . The proposed interface worked on a mobile phone at 5fps. The methodology used is the steps are hand detection, palm pose estimation, and finger gesture recognition. First, a hand is segmented from an input image through thresholding in color space and distance transform. Second, a palm pose is estimated by comparing the detected hand with a database that includes PCA and gradient histogram of all palm poses. Finally, it recognizes finger gestures using shape decomposition and context-based decision through various optimizations the interface is ported on a mobile phone.

This paper proposes an improved vision-based interface on augmented reality environment. The proposed interface is similar to the one proposed by Seo et al. in the same scenario, but it can more accurately estimate all possible palm poses (covering pitch of -60 to 60, yaw of -45 to 60, and roll of -180 to 180). While Lee and Hollerer paid less attention on providing finger based interaction with an augmented virtual object and Seo et al. offered simple interaction such as opening or closing the hand, the interface offers finger-based complicated interaction, e.g. menu selection using fingers, by adopting the shape-decomposition based finger detection method. For implementing the interface on a mobile phone, the hand shape recognition method is substantially modified, which is a time-consuming process. Finally, obtained a plausible interface working at an interactive frame rate. Figure 1 shows a demonstration on a mobile phone using the proposed interface. To the best of the knowledge, this is the first work that presents a bare- hand based AR interface using palm pose and finger gesture on a mobile phone. The advantages are since the comparison with a database requires repetitive and time consuming computations, the palm pose estimation is run in parallel in the background. This method had a average 83% recognition rate in the experiment with 800 images including 5 finger gestures and 16 palm poses. A few of the drawbacks are Although parallel computing is done during the comparison still the work time is too much due to many comparisons, optimization, decompositions etc. Not all the hand motions were recognized by the system.

B. AUGMENTED REALITY BROWSERS

Augmenting the real environment with additional infor-mation is an idea prospected about two decades within the augmented reality (AR) research community. When deployed in outdoor environments, virtual information overlays enable a wide range of applications, from tour guides and pedestrian navigation to urban gaming. The number of people aware of augmented reality is increasing, in part due to growing media coverage. Commercially, AR on mobile is experienced primarily through augmented reality browsers that augment the physical environment with digital information associated with locations or real objects by using smartphone cameras, GPS, and compass sensors. While still relatively small in the mobile applications landscape, AR technology has become a noticeable player. AR browsers have got more than 20 million downloads from app stores on mobile, and some are even previously installed on smartphones.

The first example of a mobile AR browser running in an outdoor environment was the Touring Machine, developed in 1997 by Feiner Like the Touring Machine, the first generation of commercial AR browsers that came out in 2008 provided graphical augmentation based on geographic location and viewpoint information delivered from integrated sensors such as GPS, compass, and gyroscopes. The second generation of AR browsers are now able to connect virtual content to phys-ical objects of the daily life (for example, magazines, posters, advertisements) using computer vision-based recognition and tracking techniques. The next generation of AR browsers may use a head-mounted display, which is more better version of Google Glass, which provides new possibilities for personal information systems that move beyond handheld devices. Changes in low level software and hardware will significantly improve user experience. AR browsers helps users to easily relate digital information to real world scenario. Location based services using digital maps and intuitive responses. Improve in access to software components which will improve better AR browser experience.

Many improvements to be made, gap between info on the web and content produced is one of the main disadvantages here. Current AR browsers are mainly used by people who want to try out the technology. For these current users, AR browsers may be more like a gadget. However, as AR researchers, there still is a huge potential and interest in the technology, which is shown by the increasing number of downloaded AR browsers. In this Viewpoint, as discussed some of the issues seen in the current implementations of augmented reality browsers. Some of these limitations such as the lack of rich content can be addressed by the companies of AR browsers and a growing community of users. This will hopefully allow this technology similar widespread adoption as the Web 2.0. Other problems such as energy efficiency or better tracking will affect the usage of the future generation of AR browsers, but are more hard to solve and require the involvement of hardware manufacturers. Finally, further research is needed on how to seamlessly connect any real

object in the environment with digital content to bring us closer to the digital interface to the real world.

C. INFORMATION FILTERING FOR MOBILE AUGMENTED REALITY

Augmented reality is a potentially powerful paradigm for annotating the environment with computer-generated material. These benefits will be even greater when augmented reality systems become mobile and wearable. However, to minimize the problem of clutter and increase the effect of the display, algorithms must be developed to select only the most important information for the user. The paper describes a region-based information filtering algorithm. The algorithm takes account of the current state of the user (location and intent) and the state of individual objects about which information can be presented. It can dynamically respond to changes in the environment and the user's state. The paper also describes how simple temporal, distance and angle cues can be used to refine the transitions between different information sets.

The technology used is the algorithm is based on the spatial model of interaction and utilizes a focus and a nimbus. Described a method for calculating the focus and nimbus which converts objects into objective and subjective prop-erties. Demonstrated the use of this approach in a sniper avoidance system. The disadvantages of the system are an initial implementation of the filtering algorithm has been completed for a single user in a mobile environment. Only considered the problem of working in the medium of offensive capabilities.This paper has described an automated information filtering algorithm that is used to declutter the display of an experimental mobile AR.

It described a method for calculating the focus and nim-bus which decomposes objects into objective and subjective properties. Here it is demonstrated the use of this approach in a sniper avoidance system. There are other areas of further work to be carried out: User studies and detailed analysis need to be carried out to refine domain expertise. This will be used to enhance the structure of the information vector and the evaluation of objects with respect to the criteria. The complexity of the environment model and of the criteria used to develop the focus and nimbus regions will be greatly en-hanced. The current implementation only uses simple geomet-ric descriptions to model the environment and simple queries (box intersections). The proposal to extend the algorithm to incorporate line-of-sight and visibility constraints and to use more sophisticated intersection algorithms. Future research algorithm can be combined with dynamic and flexible view management capabilities. Through the use of mechanisms such as constraint based layout control, new annotations can be combined. The filter could be extended to provide priorities for the types of information which are being displayed.

III. METHODOLOGY

The print media (images, panaflex, print outs) influence is not capable and sufficient to satisfy designers and archi-tects to visualize their ideas and complicated stuff in their desired way in the real-world environment. The application should convert 2D maps into 3D by scanning (specifically for architects) and end users can maintain their schedules and set the reminder, share their work among the community (blog) and will also have accessibility of understanding other designers work which will provide them with new motivation. The users can maintain their profile. And can also upload their own customized models too. Only authorized users can access this application (as we have provided sign up and sign in functionality). The user can interact with the virtual 3D models of the furniture using an Augmented Reality by altering the color of walls and furniture, style, or covering of furniture in a real time environment. Therefore, this permits complex and innovative designs to be explored and envisioned, making AR technology for interior designer and Architects accessible to both pros and amateurs. The applications aim to integrate two types of augmented reality and associated it with a specific discipline. This application is a complete package for designers and architects, our intention was to reduce the overhead of paper work and expenses consumed by them while dealing with the ambiguity of their client. This will also help them in maintaining their work schedule at the same time promote their work to gain recognition.

This application will also act as an opportunity for beginners to learn new skills from qualified veterans. As it will help interior designer to learn some important things from architects that are often learned by trial and error. While previously, the applications were only focused on providing brand of home furnishing with retail business by promoting their products. There has been no other application that has introduced the two distinguished types of augmented reality on one common ground.

A. MODULE FOR ARCHITECTURE

Marker based augmented reality which enables the function-ality developed for architects. A marker is required to view the rendered 3D object. An image or a representation that can be perceived by an image tracking module using methods con-sisting of pattern recognition, image processing and computer vision techniques can be defines as a marker. It defines the correct size and position of the camera once detected.. Using this feedback, the application calculates the position of the 2D image. The tracking module comprises of two main phases. First, the application detects the marker and evaluates the co-ordinates of the marker. Hence, implements it on the available space. Then, the tool will provide an automatic arrangement of the building according to the 2D image. Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units. At last,the plan of the building will be rendered into the real scene. It is the heart of one part of an application. This module starts after the AR camera is launched. After the calibration of the camera and it gives feedback to the AR camera in real time. The camera evaluates every image in the scene and detects the markers. The marker coordinates are tracked and further marker's position are calculated which is

sent to the AR camera. The coordinates are sent to the Image rendering module where the object is rendered on it.

B. MODULE FOR INTERIOR DESIGNING

Marker-less AR is where location and mapping is simul-taneously done that allows you to place your AR experience as much as pretty wherever you want. This technique is the heart of another part of an application, specifically designed for interior designing. In this Module, Camera calibrates and the co-ordinates of the area is then calculated. The end-user selects an object. When the end-user desires to change the objects pose and size. Their fingers gesture on the selected object is analyzed if the gestures are identified where the camera is calibrated which is further displayed in real time. This application allows the users to interact with multiple virtual object in real-time. The user can also delete the object on its selection if it is not needed and later can capture its image for safe keeping.

C. CAMERA TRACKING MODULE

The system has to deal with dynamic scene changes too. Therefore, it estimates the scene for instance, certain features especially in interior design module. The module is designed to Architects for detection of the tracking point on the 2D image which it calibrates by itself.

IV. REQUIREMENT ANALYSIS

This project aims to help furniture dealers and home inte-rior designers.Furniture dealers can make use of this project for selling their furnitures.Through this app the customer can identify that the furniture is suitable for their room or not.This app also help the interior designers.Through this app the interior designers can show their customer how they design that room.So before doing interior designing the customer get a view of that room.Our data set consists of sofas,chair,dining table,bed etc.It consists of the interior de-signs of four bedrooms,two dining rooms,washroom,dressing room,showcase,five living rooms and four kitchens.Through this app we get a 3D view of all the designs.

In this paper fig 1 is the set of 3D models of furnitures and fig 2 is the set of 3D models of home interior designs.

V. PROPOSED SYSTEM

Augmented Reality is a technology which combines the virtual world and real world into one platform . This is the new way of manipulating how we interact with that world. Without replacing the real world this technology will augment the virtual world into the real world . It provides a mixed view for the user with a combination of the real images viewed by the user and computer generated virtual images. This is an augmentation of real world by engaging an ordinary place, space, thing or event in a way that is partly unmediated.This new technology enhances the effectiveness and attractiveness of teaching and learning and also we can implement this approach to many area's .Augment reality can be effectively used in the medical fields,military,event management etc.

Augmented Reality brings virtual information or images to any indirect view of user's real-world environment to increase the effect of the user's perception and interaction with the real world.Augmented reality try to augment virtual scenes on the real ones for maximizing natural user experience in real time. It is an effective environment where a real world is enhanced by virtual objects real time. According to Azuma
(1997), Augmented Reality must have three characteristics: mixing the real and virtual worlds, having real-time uses, and is being converted into 3D space. Augmented Reality allows the user to see the real world at the same time the virtual world is attaching to the real environment.

First we have to create a new project in unity. Now that we have new project in the unity we have to import the vuforia unity interfacing package into the unity setup. On importing this we get assets from vuforia to unity which contains the AR components which are used to develop AR applications.Now that we have assets we have to remove the main camera from the scene in unity and add the AR camera. After adding AR camera, we need to add Image target file to the scene now can change the positions of the target.we have to create a database for all 3D images.Each images have their own individual code and licence. After creating the database target can be selected as the customer preferences.The target will be detected and converted into 3D image in the play window.

After completing the project by placing all the 3D objects, scripts and other components on the image target. We convert this into an app. As unity is cross platform software and supports multiple platforms. We convert this into Android platform for our convenience. We need to have Android studio for converting into android application. This unity uses the Tools present in Android studio to convert the project into the android application.First we need to switch the platform to android and add current scenes to the scenes in build and then change builder settings such as product name and company name. We can also change the default screen mode and minimum required android version to run this application. This settings are very important as failing to change these settings results in failing to build the application.

VI. RESULT AND DISCUSSION

In Augmented Reality the main concept is that the object will be converted into the real world by using AR Cam-era.According to the requirements of the user the object will be viewed and it will display through the app the actual object in 3D view in the space where the user wants the object to be placed in the environment.The target is already set to display the 3D view according to the dimensions.So here as specified in the requirement analysis first of all the requirements are specifically given by the user in order to develop the real world objects accordingly.Then the targets are developed and after that the images are imported into Vuforia and after that the images are viewed as 3D objects using the camera.Since the furniture is to placed at a particular place accordingly the environment for that object also must be developed and the app is developed by setting the environment for the 3D object

Fig. 1. Furnitures

Fig. 2. Home interior

to be displayed and accordingly when the app is shown at a particular spot the required furniture will be displayed.

VII. Conclusion And Future Work

The Augmented Reality Technique has become a hot issue in the field of computer vision technology,with its different user experience, slowly and deeply changing people's life, which includes many different fields such as education, medi-cal, advertising and soon. The study on Augmented Reality is mainly divided into two phases, one is implementing camera 3D registration by identifying the targets in scene, the other is updating camera pose by doing 3D reconstruction to the unknown scene, rendering the virtual objects in real-time. Here we used the second method to research, realize the augmented reality can support auxiliary information to people when furniture in the home helps users make the best possible use of the limited space .We demonstrated that by utilizing the AR technology, the proposed system will mitigate the complication of the existing systems and encourage the collaboration of simultaneous multiple users.With advancements in computer vision technology and cheaper hardware, AR can only flourish. AR has its unique advantages and is very good at tackling especially visualization problems. In an AR environment, buying furniture could be convenient and easy while saving costs by completely lowering the risk of product returns. In this project, we proposed how a marker-less AR could be used for online furniture sales. We proposed a mobile application that enables users to visualize furniture in virtual reality.

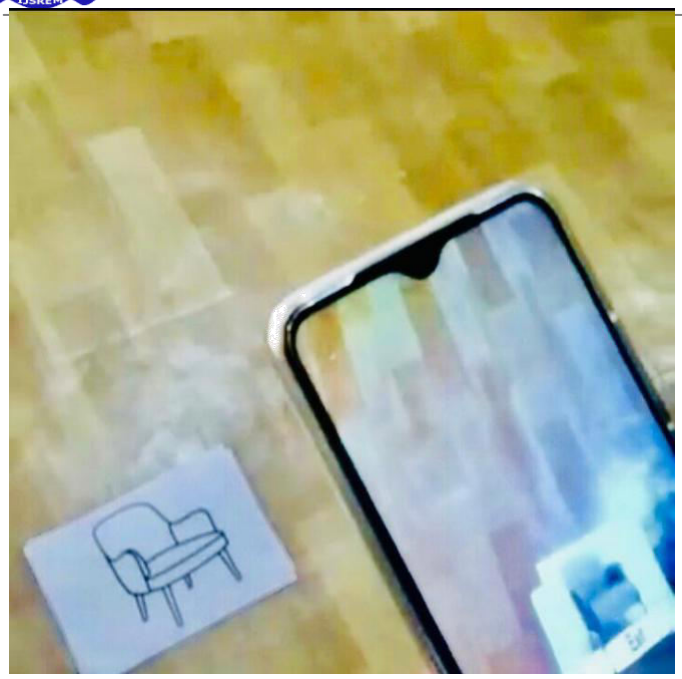

Fig. 3. Result

There are several future directions to extend our work: 1) allow users to customize the furniture models or add new categories. Then, an image of the new model can be passed through the image search engine to find the most similar existing model from a furniture store which will facilitate the users experience to access their desired product in the real world,2)optimize the performance to support markers simultaneously which would allow users to put more furniture into their room and finally 3) allow users to capture an image of their actual room and use it as a virtual room in the application. With this function, the users will be able to assess the compatibility of the new furniture in the context of their actual room.

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