

Application of Augmented Reality in setting up furniture

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Abstract

Technological developments taking place today are tremendously affecting the way humans are living life. Augmented reality is one of them. Augmented reality, in simple words, is nothing but projecting the desired data or objects in our real life. This field of computer research that is dealing with the computer related data can be applied in interior designing. We often observe that customers found in furniture showrooms are found in confusion that if the piece of furniture that they are willing to buy is going to match their wall scheme and fit their vacant area. So here is where we can apply concept of augmented reality effectively. The end users can try out the piece of furniture virtually in their rooms and accordingly decide if it really suits their vacant area and whether they want to buy it. The main purpose of this project is to come up with an application that will allow users to try different furniture items in virtual way thus eliminating human efforts by physically visiting furniture store that consumes a lot of time.

Keywords : *Augmented Reality, Marker Detection, Rendering, Head Mounted Display .*

INTRODUCTION

Augmented reality is basically a technology that brings the virtual objects into reality. Augmented reality can be termed as a reality-based interface that draws a phase between real world and virtual world. It is often termed as a cousin of virtual reality, a technology that takes the human to an entire new virtual world. Augmented reality can be thought of an emerging technol-

ogy that can bring the revolution to human life; right from shopping experiences to the way education system delivers education. It has wide range of applications. One of them is its use in the world of interior designing. It can be effectively used to decorate our homes and workplaces. This paper will include the details of how it can be implemented. Section 2 contains the purpose of this project. Section 3 contains

the problem statement. Section 4 covers related work and Section 5 & 6 covers existing system and proposed methodology respectively.

PURPOSE

The main purpose of this project is to develop an application for having a look and feel of different furniture items and trying to place them virtually in rooms or desired vacant areas. Besides, this technique can be helpful in online shopping system that will provide users the facility to try out different furniture items in their rooms, offices before buying. This will be helpful for users to visualize their rooms or workplaces where they wish to place the furniture items thus getting the actual feel of how well their rooms or workplace look. Multiple combinations of furniture items can be tried out virtually, without physically moving furniture items. The motivation here is to use this technology efficiently in order to increase the time efficiency thus improving the accessibility of trying furniture since furniture layouts will be created using augmented reality application.

PROBLEM STATEMENT

The outcome of the project aims at an application that will allow users to experience different furniture items virtually in their home structure thus reducing their physical labour of going and purchasing and placing the furniture in their home environment without actual visualization. The project aims to eliminate the basic problem faced by the customer which is to take measurement & check for the proper size of the product that fits their home environment. The application will allow the user to view the product they want to purchase according to their needs & home environment.

RELATED WORK

ARCHITECTURE OF AUGMENTED REALITY SYSTEMS:

The implementation of augmented reality is mainly carried out in four steps, each of which is involved with different methods to implement them. The four steps are capturing the scene, techniques to identify scene, processing scene and visualizing scene. They are explained as follows:

Capturing the scene

Generally, for capturing the scene, physical components are used that recognizes the reality which is later to be boosted. These devices are of two types:

Video-through devices: These devices capture the reality using the cameras that are either stand-alone units or embedded in some other devices. These devices offer different way than the other devices used for the purpose of visualization the augmented reality (for instance, video cameras, and smart phones).

See-through devices: These devices capture the reality and give its picture along with the information augmented in it (for instance, head mounted displays)

Techniques to identify scene: Techniques to identify scene are categorized according to the scenarios. This is considered as one of the main actions taken in reality augmentation.

Basically, there are two types of scene identification techniques which are as follows:

The marker-based: In this approach, markers are used which are usually in the form of visual tags. These markers when contained in the real scene are perceived by the AR system. Figure 1 shows the example of marker.

Non-marker-based: There are AR systems that make use of devices for scene identification. These are typically the ones which do not utilize markers. Example of this can be AR browser which uses tags for the purpose of helping users to envisage and surf digital data in real world envi-

ronment. For instance, you may go around the town searching for your preferred multiplex. Through the video feature that exists in your AR browser, you can easily find the multiplex you search for instead of having a look on a map. Moreover, as

long as you move around, the browser can easily provide information that concerns your place, e.g. the specific point location you are interested in, clinics, restaurants, etc. See figure 2.



Fig 1: Example of Marker



Fig 2: Example of non-marker.

Scene Processing

Considering the inner and outer parameters of the camera, once the calculation of spot of specific marker is done in real space, the system looks for the corresponding virtual model to each marker in the 3D.

Visualization Scene

In case while marker is used, the image of the projected 3D object is produced by the system and the real space is passed on the scene image where mixing of reality and virtuality takes place. Whereas in case of marker less approach, digital information is presented.

EXISTING SYSTEM

Head-Mounted Display

It is a display device which is worn on a head or it can also be used as part of helmet. It contains a small display optic in front one (monocular HMD) or each eye(binocular HMD). Example of how augmentation takes place using HMD is shown in figure 3.

Augmented Reality HMD's, also known as Optical Head Mounted Displays or OHMD's are like glasses that let you experience the objects of another world attracting to be in real world. These devices have transparent displays. The users can see through them while projection of im-

ages and information takes place through their eyes.



Fig 3: Example of a head mounted display

Zooburst

This is an Augmented Reality program which is responsible for creating dynamic pop up books on your computer screen with the help of just a Webcam and an Internet connection.[2]. View of zooburst is shown in figure 4.

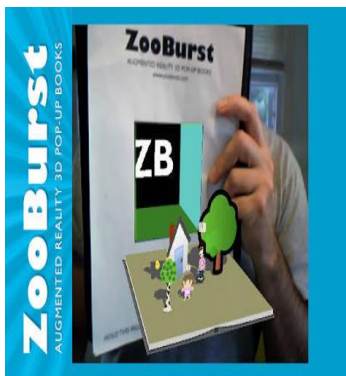


Fig 4: Example of a ZooBurst Book implementing AR

The existing methodologies have the vulnerability of resolution and positioning of objects that are to be overcome in proposed methodology.

PROPOSED METHODOLOGY

In this proposed system, we do not need any Head Mounted Displays as well as

Zoo-Burst kind of books to augment the furniture. All we need is simply a Mobile or a Tablet or a computer with a camera or webcam through which they can capture a live feed of the room. The application captures the image and processes it. User initially selects the furniture to be placed from the given database. Next, rendering of module will be carried out using two steps. First, calculating the position of marker and second, imposing the selected object on the calculated position of marker.

The application is responsible for superimposition furniture on the original image with the centre coinciding with that of markers' centre in both directions. Here, image frame is acquired by webcam where overlaying of furniture objects is done on to the two dimensional image. Eventually, this makes user feel as if the furniture piece is actually placed in the real world and finally the user can view how the area looks like with the furniture present which he/she desires to place. Rough idea of the proposed methodology can be obtained from figure 5.



Fig 5: Augmenting of furniture piece using camera of tablet.

CONCLUSION

This system will be responsible for helping and assisting the customers to view the furniture piece virtually in real environment before actually buying it. With the help of this system, the customers will get

to know how exactly their home/workplace will look like after buying and placing the desired furniture piece. Also, this system facilitates the customers to try out the multiple combinations of furniture pieces without moving them physically eventually helping the customer to determine the setup of furniture their respective home or workplace.

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