Furniture, Painting and Decor Designing Using Markerless Based AR

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Abstract : The interior decor planning industry has been seeing increase in demand in the interior industry.The applications of Augmented Reality could potentially transform this industry by making it more convenient for consumers to plan their home and office interiors in their own time on their phone or system. This application would help in designing and planning the floor space virtually with a range of options available for selection in real-time mode. The implemented system works by using not just the images captured by the camera on the device, rather by using the orientation of the camera with respect to the ground plane that has to be detected. This gives a more realistic view for the consumer to judge their fit efficiently with the dimensions of items, and save the manual work of moving furniture. The implemented system is evaluated for its deployment time for various models and performance under different distances.

1. INTRODUCTION

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside within the world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory. AR can be defined as a system that fulfills three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects. The overlaid sensory information can be constructive (i.e. additive to the natural environment), or destructive (i.e. masking of the natural environment). This experience is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment. In this way, augmented reality alters one's ongoing perception of a real-world environment, whereas virtual reality completely replaces the user's real-world environment with a simulated one.

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Augmented reality is said to 2 largely synonymous terms: mixed reality and computer-mediated reality.The primary value of augmented reality is that the manner during which components of the digital world blend into an individual's perception of the important world, not as an easy display of data, but through the mixing of immersive sensations, which are perceived as natural parts of an environment. The earliest functional AR systems that provided immersive mixed reality experiences for users were invented in the early 1990s, starting with the Virtual Fixtures system developed at the U.S. Air Force's Armstrong Laboratory in 1992. Commercial augmented reality experiences were first introduced in entertainment and gaming businesses. Subsequently, augmented reality applications have spanned commercial industries like education, communications, medicine, and entertainment. In education, the content may be accessed by scanning or viewing an image with a mobile device or by using markerless AR techniques.

Sr No	Title	Authors	Publications and yeaR	Work done
1	MARKERLESS AR SYSTEM BASED ON PLANAR OBJECT TRACKING	AHYUN LEE	IEEE 2019	IN THIS PAPER THEY HAVE DISCRIBED A REAL TIME CAMERA TRACKING FRAMEWORK SPECIFICALLY DESIGNED TO TRACK A MONOCULAR CAMERA IN A DESKTOP WORKSPACE
2	INTERIOR DECOR PLANNING WITH MARKER LESS AR	SASHANK SHRIDHAR	IEEE 2020	THIS APPLICATION WOULD HELP IN DESIGINING AND PLANNING THE FLOOR SPACE VIRTUALLY WITH A RANGE OF OPTION AVAILABLE FOR SELECTION
3	REAL TIME AND MARKERLESS VISION BASEDTRACKING FOR OUTDOOR AUGMENTED REALITY APPLICATION	DIDIER STRICKER	IEEE 2019	IN THIS PAPER THE CONCEPT PROVIDES A FLEXIBLE AND PRACTIABLE FRAMEWORK AND IS ESPICIALLY RELEVANT FOR OUTDOOR REALITY AUGMENTED APPLICATION FOR WHICH NO TRACKING SOLUTION CURRENTLY EXIST
4	A Reference Image Generation Method for Marker-less AR	Satoshi Yonemoto	IEEE	In this paper, we present a marker-less AR framework which enables virtual graffiti & creation reference image generation
5	MOBILE AUGMENTED REALITY BASED ON INVISIBLE MARKER	HANHOON PARK	IEEE 2019	THIS PAPER PROPOSES AN APPROACH FOR IMPLEMENTING A MARKER BASED AUGMENTED REALITY ON SMARTPHONE
6	Interior Design using Augmented Reality Environment	Kalyani Pampattiwar , Akshay Adiyodl	IEEE 2020	THIS PAPER PRESENTS A APPLICATION OF AUGMENTED REALITY TECH FOR INTERIOR DESIGN

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7	Approach to the Interior Design Using Augmented Reality Technology	Jian hui	International Journal of Recent Technology and Engineering (IJRTE) July 2019	This study proposes a new method for applying Augmented Reality technology to interior design work, where a user can view virtual furniture and communicate with 3D virtual furniture data using a dynamic and flexible user interface
8	Interior Design using Augmented Reality Environment	Kalyani Pampattiwar, Akshay Adiyodi, Manasvini Agrahara, Pankaj Gamnani	International Journal of Recent Technology and Engineering (IJRTE) December 2018	This paper presents an application of Augmented Reality technology for interior design. Along with the growth of digital technology, virtual information techniques are required in architectural field
9	All Reality: Virtual, Augmented, MIXED(X), Mediated(X,Y), and Multimediated Reality	Steve Mann , Tom Furness, Yu Yuan, Jay Jorio, and Zixin Wang	arXiv: 1804.0838v1 [cs.HC] 20 april 2018	The contributions of this paper are: a taxonomy, framework, conceptualization, etc., of the "Realities" (Virtual, Augmented, Mixed, Mediated), etc. and some new kinds of "reality" that come from nature itself, i.e. that expand our notion beyond synthetic realities to include also phenomenological realities
10	Blended-Keyframes for Mobile Mediated Reality Applications	Yu Xue, Diego Thomas, Frederic Rayar, Hideaki Uchiyama, Rin-ichiro Taniguch, Baocai Yin	2019 IEEE International Symposium on Mixed and Augmented Reality Adjunct	In this paper, we present a method to mediate 2D views of a real environment using a single consumer-grade RGB-D camera and without the need of pre-scanning the scene. Our proposed method creates in real-time a dense and detailed keyframebased 3D map of the real scene and takes advantage of a semantic instance segmentation to isolate target objects
11	Augmented Reality and its effect on our life	Riya Aggarwal, Abhishek Singhal	Amity University, Uttar Pradesh, Noida, India	This paper gives information about Augmented Reality and how it started. It analyses various types of augmented reality, its applications and its advantages and disadvantages.
12	Innovations in Tourism Industry & Development Using Augmented Reality (AR), Virtual Reality (VR)	Pavan Kumar Katkuri, Archana Mantri, Srilakshmi Anireddy	2019 IEEE Region 10 Conference (TENCON 2019)	This paper emphasizes on the analysis of scientific & technical aspects of developing mobile AR applications in smart tourism, which provides the necessary information about the destinations and their attractions.

FIG : 1.1

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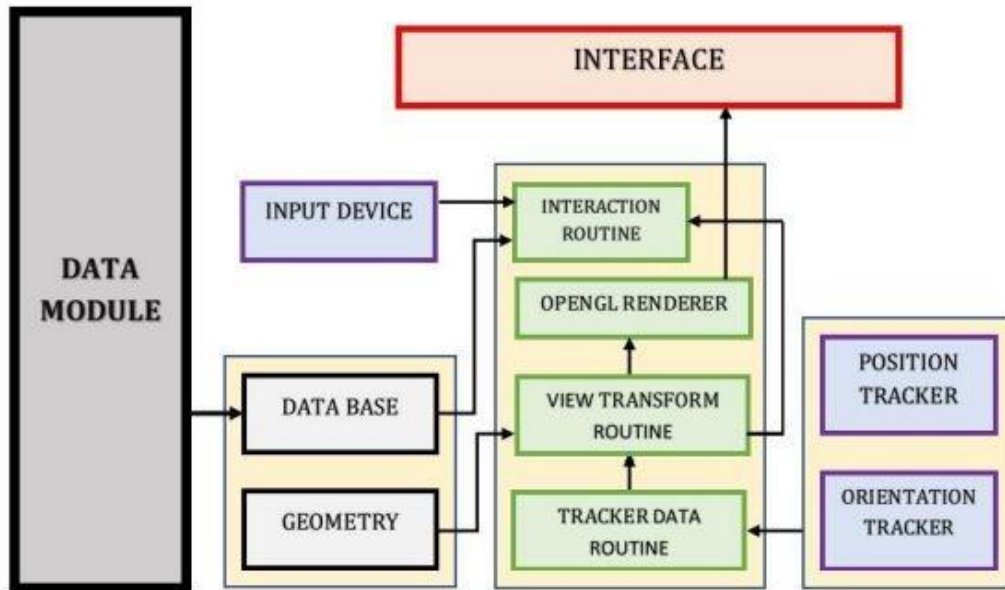
2. METHODOLOGY

FIG 2.1

Application works as follows:

1. A video of the real world is captured by the camera and sent to the application.
2. Application searches through each video frame for any distinct features in the image or a marker.
3. If the features are detected, the position of the camera is decided with respect to the marker.
4. The position of the camera is known and a computer model is drawn from the marker coordinates.
5. This furniture model is overlaid on top of the video of the real world and it is linked to a particular marker
6. The final arrangement is shown back in the camera feed. The user sees objects overlaid on the real scene.
7. Real time video feed is captured and given to the camera. The markers are selected by the user and objects are linked to it. Upon detection of markers, objects are rendered on it.
8. The objects can be moved, rotated and changed by the user in real time and finally placed at the appropriate position.

   The Data module consists of the markers and the 3D objects required for the use of the application.The Position tracker and orientation tracker finds the coordinates of the marker. The tracker data routine contains coordinates for the 3D objects which the user selects from a furniture database.OpenGL renderer renders the 3D furniture and the users interact with the selected furniture using the interaction routine which is displayed to the user through the internal camera of the device in real time. The system block diagram in figure 4 consists of two modulesthe data module and display module. The data model contains markers and objects whereas the display module consists of a camera and various sub modules which are useful for marker detection, object rendering, object tracking and object transformation.

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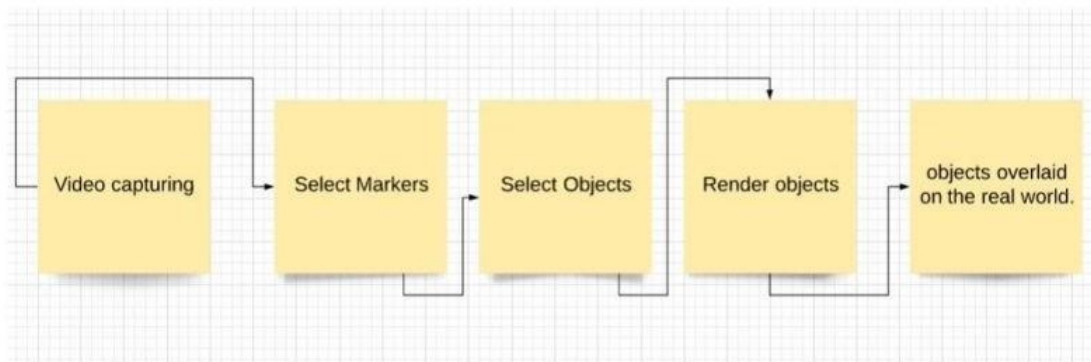
3. IMPLEMENTATION

FIG 3.1

1. First the user downloads and prints the markers from the interface. The size of the marker may vary depending on the area of the room and the nature of objects which overlays.
2. The user launches the application and places the marker in the appropriate position near the
3. area which he wants the object to render. Every marker is correlated with objects and stored in the application internally.
4. The next step is furniture arrangement. Objects are rendered on the marker and can be viewed to the user in real time.
5. The furniture set is shown to the user. Furniture which the user does not want to appear in
6. the scene can be removed by simply sliding the image out of the scene.
7. First, On the marker coordinates the objects are rendered. The user can manually manipulate the objects. Dragging the object will change the position of the object.
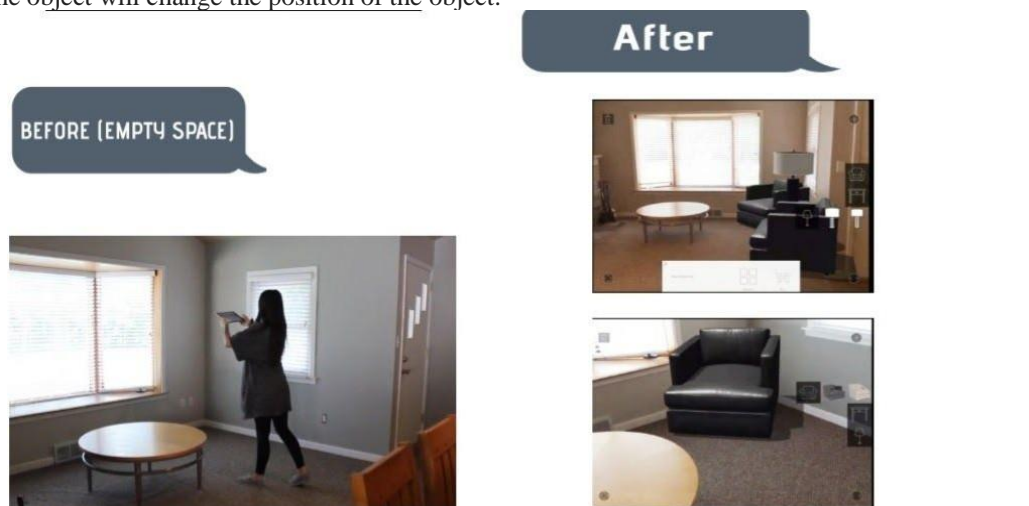

FIG 3.2

FIG 3.3

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4.   CONCLUSION

By the end we will digitally overlay images onto the physical word using a phone or tablet.Colour Configurator – whether it's the walls, furniture, or even cushions, all colours can be edited in order to choose the right scheme for the interior Placement – place products anywhere in a room to see how it best fits. Easily move objects around, add, delete or alter them to suit .Multiple proposals – To present a number of options it is possible for clients to utilize due to the nature of the software coupled with the speed of use.. Share Designs – the software is usually on a device with internet access. This meansdesign/concepts etc can easily be shared with colleagues and clients at the click of a button Project speed – By creating a very "real" picture of a design AR can really help speed up projects. This not only means it is quicker to build but also approvals and sign offs are increased and quicker

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