

Interior Design using Augmented Reality

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ABSTRACT

People always have problem with the interior designing of their house. They get confused which furniture to be purchased that will be best suited for their room. Also they don't get an idea about the suitable furniture colour or design for the room. Sometimes after purchasing furniture they may feel that the purchased furniture is not much suitable to the environment. Then it is problematic for many people to choose furniture for interior designing of their house. Thinking upon such problem we came up with the solution as our project which will help people to have virtual view of furniture in the real world before purchasing it using a technology augmented reality.

General Terms

Technology, android

Keywords

Augmented Reality, Marker based, Image Capturing Module, Image Processing Module, Tracking, Rendering

1. INTRODUCTION

Augmented reality is a technology which allows user to have an interactive experience with the real world. Augmented reality technology is categorized into two types – marker-based and marker-less. Marker-based system is inexpensive and easy to use.

The project is an android mobile based application which will be compatible with all the existing and upcoming versions of android handsets. The user has to install the application on the android handset or tablet. Then place the markers on the floor at required positions. Start the application which will allow to start the camera. Project the camera on the marker. The marker will be detected, the co-ordinates of marker will be calculated and 3D objects will be created dynamically. This application can detect multiple markers and create multiple virtual objects.

The objects are viewed virtually in the real world and the user can rotate it virtually. Also user can resize the object and select different colors for the object to select the best suitable

furniture design for the house.

2. MOTIVATION

The main motivation behind this project idea is to allow people to have virtual view of furniture design before purchasing it.

3. RELATED WORK

Various existing systems are:

3.1 Head Mounted Display [8]

Head Mounted Display, abbreviated as HMD, is a wearable device as a part of helmet. It is used to display just a computer generated image as a part of real world. The disadvantage of HMD (Head Mounted Display) devices are too big, heavy and expensive.

3.2 Zooburst [4]

Zooburst is a digital storytelling tool which is used to create a 3D pop-up book. The books created using this tool are web based. It works with the augmented reality. It makes the use of a webcam. The book can have maximum 10 pages. It uses either images created by own or vector images created by open source tool that can be sized, rotated and coloured. To sign up for an account you'll have to give your name, and email and explain why you would like to try Zooburst.

4. PROPOSED WORK

4.1 System Architecture

The system architecture of marker based system consists of 6 modules :

Camera

Image Capturing Module

Image Processing Module

Marker Tracking Module

Rendering Module

Display Module [2]

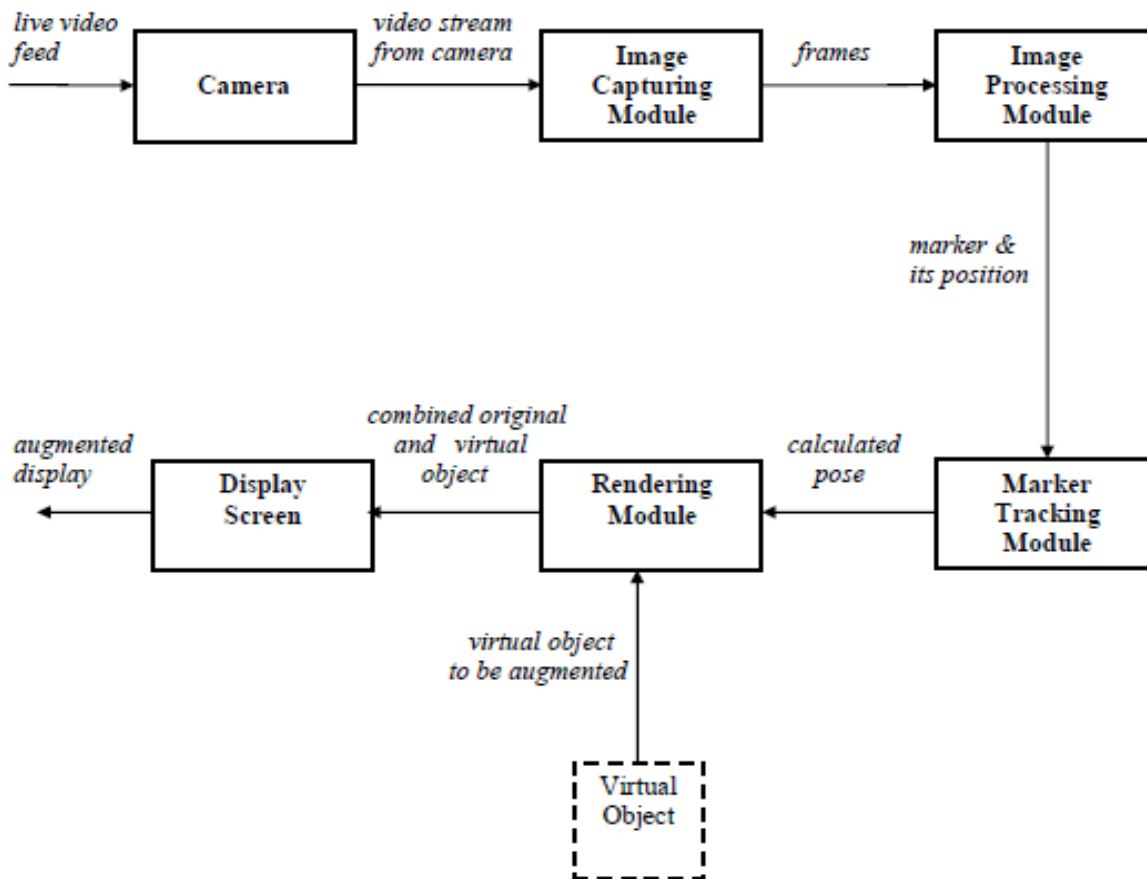


Fig 1. System Architecture

a) Camera:

A continuous video frame is given as input to the camera of android handset.

b) Image Capturing Module:

The input to Image Capturing Module is given via camera i.e. live video frame. This module analyses each frame in the video and generate the binary image consisting of only two values for each pixel i.e. 0 for black and 1 for white.

c) Image Processing Module:

The binary images generated by the Image Capturing Module are input to the Image Processing Module. This module process the binary images and detects the marker using image processing techniques. To place the object in the real world,

marker position is determined.

d) Tracking Module:

The location of detected marker is provided to the Tracking module which is the heart of augmented reality system. It calculates the relative pose of the camera in real time.

e) Rendering Module:

The Rendering Module has 2 inputs. First is the calculated pose from the Tracking Module and other is the Virtual Object to be augmented. This module combines the original image and virtual components. It displays the augmented view on the screen of android handset.

4.2 Use Case

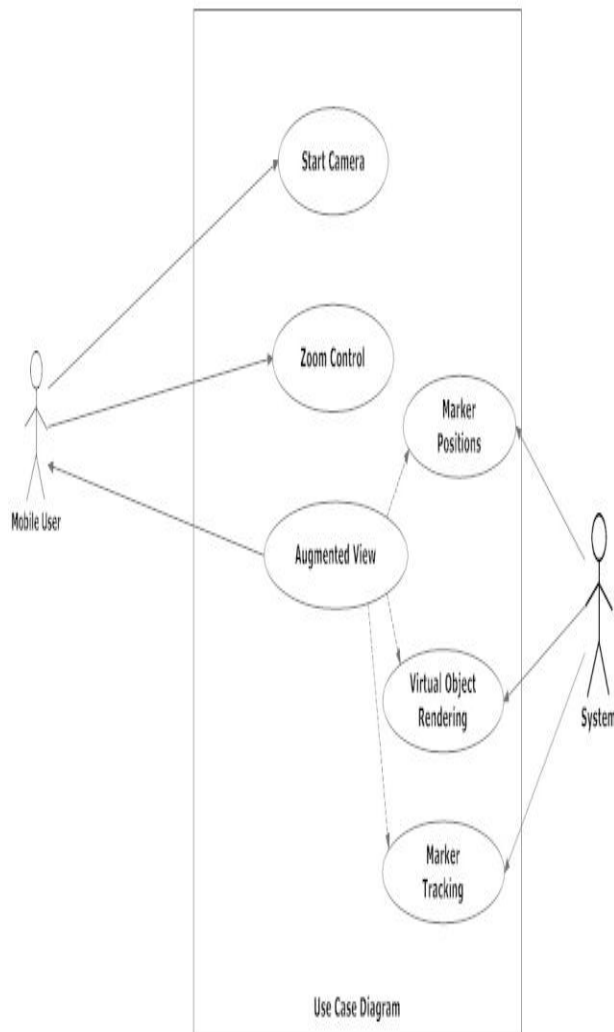


Fig 2. Use case dig

5. MATHEMATICAL MODEL

1. Let S be the Virtual Furniture

Set S is divided into 6 modules

$S = S1, S2, S3, S4, S5, S6$

S1= Camera

S2= Image Capturing Module (ICM)

S3= Image Processing Module (IPM)

S4= Tracking Module (TM)

S5= Rendering Module (R)

S6= Display Module (D)

2. Identify the inputs.

Inputs = X1, X2, X3, ..Xn

X1= Video frame with marker

X2= Video frame without marker

3. Identify the output as O.

Outputs = Y1, Y2, Y3, ..Yn

Y1= 3D Augmented View

Y2= Table View

Success Conditions:

Virtual object is created in the real world

Failure Conditions:

1. Marker is not detected

2. Marker do not match

6. CONCLUSIONS AND FUTUREWORK

Considering the problem faced by the people while selecting the furniture for interior design we have proposed the marker based Augmented Reality application. This application can be used by all the users having android handset or tablet.

7. ACKNOWLEDGMENTS

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