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AR Application Using Android OS

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ABSTRACT: Augmented Reality or AR is an emerging technology in which one's perception of the real-time environment is enhanced by superimposing computer-generated information such as graphical, textual, or audio content, as well as objects onto a display screen. The proposed application is an android mobile based application to allow the user to view the virtual object in the real world using a marker based AR system. The images of an object's front, back, top, bottom, left and right side will be placed onto a 3D cube which will make up the complete virtual object. Thus an extended environment will be created through the amalgamation of real world and the generated object will appear as though the real-world object and virtual object coexist within the environment. The advantages of this application as compared to the already existing 2D application are that it would display the object in 3D and allow the user to rotate it virtually.

KEYWORDS: Augmented Reality, Android, Marker, Operating System, Virtual Reality.

I. INTRODUCTION

Augmented reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data. Augmented Reality is a type of virtual reality that aims to duplicate the world's environment in a computer.

Projection: It is the most common type of augmented reality, projection uses virtual imagery to augment what you see live. Some mobile devices can track movements and sounds with a camera and then respond.

Recognition: Recognition is a type of augmented reality that uses the recognition of shapes, faces or other real world items to provide supplementary virtual information to the user in real-time. A handheld device such as a smart phone with the proper software could use recognition to read product bar codes and provide relevant information such as reviews and prices or to read faces and then provide links to a person's social networking profiles.

Location: Location uses GPS technology to instantaneously provide you with relevant directional information. For example, one can use a smart phone with GPS to determine his location, and then have onscreen arrows superimposed over a live image of what's in front of the user and point him in the direction of where you need to go. This technology can also be used to locate nearby public transportation stations.

Outline: Outline is a type of augmented reality that merges the outline of the human body or a part of the body with virtual materials, allowing the user to pick up and otherwise manipulate objects that do not exist in reality.

II. AUGMENTED REALITY

Augmented Reality (AR), also known as Mixed Reality, aims to combine virtual and real scene together to achieve that virtual ones are belong to the real world. Being characteristic of integration of virtual and real scene, many applications of Augmented Reality are emerging, such as in field of education, medical treatment and entertainment.

Goals of Augmented Reality:

- To challenge the impossible.
- To create virtual environment for a more rich user experience.
- To integrate it into daily lives to help the masses.
- To achieve feats which are limited in realworld.

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- To enhance imagination of youths.

Types of Augmented reality:

There are two types of simple augmented reality: marker-based which uses cameras and visual cues, and marker less which use positional data such as a mobile's GPS and compass.

Marker based

Different types of Augmented Reality (AR) markers are images that can be detected by a camera and used with software as the location for virtual assets placed in a scene. Most are black and white, though colors can be used as long as the contrast between them can be properly recognized by a camera. Simple augmented reality markers can consist of one or more basic shapes made up of black squares against a white background. More elaborate markers can be created using simple images that are still read properly by a camera, and these codes can even take the form of tattoos.

SIMPLE MARKER

A camera is used with AR software to detect augmented reality markers as the location for virtual objects. The result is that an image can be viewed, even live, on a screen and digital assets are placed into the scene at the location of the markers. Limitations on the types of augmented reality markers that can be used are based on the software that recognizes them.

Marker less

In marker-less augmented reality the image is gathered through internet and displayed on any specific location (can be gathered using GPS). The application doesn't require a marker to display the content. It is more interactive than marker based augmentation.

MARKERLESS AR

III. PROBLEM STATEMENT

The proposed system aims to provide an environment that will help the users to place artificial 2D as well as 3D objects into real world through the use of AR Markers. The proposed system also allows the user to decide, where to place the object in real world. Once the object has been placed in the scene, it will be displayed accurately according to the perspective in the original scene, which is especially challenging in the case of 3D virtual objects. The proposed system solves the problem of viewpoint tracking and virtual object interaction. The main advantage of the proposed system is that, it is customer oriented and not product or service oriented thus allowing the users to augment a product of their wish.

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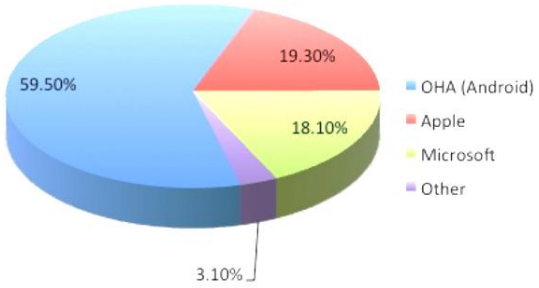
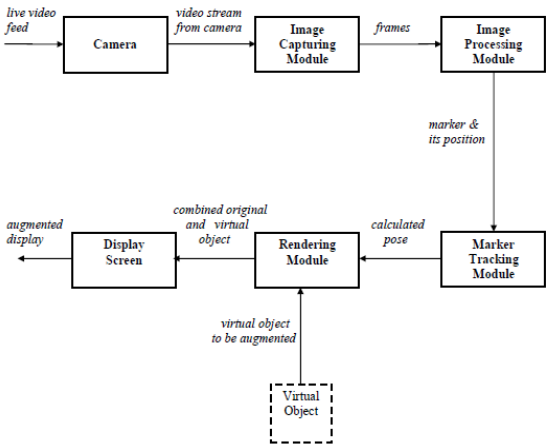
IV. WHY ANDROID OS?

Since the advent of 2013 more and more stress has been given on the usage of Free and Open Source Software (FOSS). Android is leading the current O.S market as shown in below, because it is open source and developed by a consortium of more than 86 leading M.N.C's called Open Handset Allowance (O.H.A). Android also is stated as one the most rapidly growing technologies. More and more applications have been developed and modified by third party user.



Moreover, the Android O.S is user friendly. It has a great performance and processing power. Thus, the proposed system is being developed for the most rapidly emerging and flexible O.S- "ANDROID"

V. PROPOSED SYSTEM ARCHITECTURE



Architecture Block diagram

The proposed system is a marker based system and its architecture as shown in figure 6 contains following modules.

1. Camera
2. Image Capturing Module
3. Image Processing Module
4. Rendering Module
5. Display Screen

1 Camera: A real-
world live video is feed as an input from the Android cell phone camera to the Camera module. Displaying this live feed from the Android cell phone camera is the reality in augmented reality. This live video stream is given as an input to the Image Capturing Module.

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2 Image Capturing Module:

The input to Image Capturing Module is the live video feed from the camera of a mobile device. This module analyses the camera feed, by analysing each frame in the video. This module generates binary images i.e. a digital image that has only two possible values for each pixel. Typically the two colours used for a binary image are black and white. These binary images are provided as an input to Image Processing Module.

3 Image Processing Module:

Inputs to Image Processing Module are the binary images from Image Capturing Module. These binary images are processed using an image processing technique to detect the AR Marker. Detection of AR Marker is essential to determine the position, where to place the virtual object. Once the AR Marker is detected, its location is provided as an input to the Tracking Module.

4 Marker Tracking Module:

The tracking module is "the heart" of the augmented reality system; it calculates the relative pose of the camera in real time. The term pose means the six degrees of freedom (DOF) position, i.e. the 3D location and 3D orientation of an object. The calculated pose is provided as an input to Rendering Module.

5 Rendering Module:

There are 2 inputs to Rendering Module. First is the calculate pose from the Tracking Module and other is the Virtual Object to be augmented. The Rendering Module combines the original image and the virtual components using the calculated pose and renders the augmented image on the display screen of the mobile device.

VI. PROJECT CONSTRAINTS

Augmented reality still has some challenges to overcome. Augmented Reality systems are expected to run in real-time so that a user will be able to move freely within the scene and see a properly rendered augmented image. The application will be built for mobile phones which usually have low screen dimensions and resolution. It also adds additional stress on the O.S because it requires high processing power to augment. Developers of the application are supposed to have a thorough knowledge of Android O.S (Applications developed for) and Windows O.S (Application developed in). Developers are also supposed to be familiar with ADK (Android Development Kit) and Eclipse.

VII. CONCLUSION AND FUTURE WORK

This paper proposes a marker based augmented reality application using Android operating system which will help to combine virtual objects with the real environment facilitating various applications as mentioned in this paper. The main advantage is use of low cost devices as compared to the costly head mounted display devices. Secondly with the help of this project you need not buy product and then see how it will suit your environment. In future images of objects from various views can be fetched directly from vendor's websites; same could be modelled into a 3D objects and augmented. Also multiple objects will be augmented which is currently a major challenge.

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