

Implementation of Augmented Reality to Develop Smart 3D Brochure/Visiting Card

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Abstract— The Augmented Reality based platform for simulation of three dimension models in real time is limited to large computer systems and custom display systems such as head mounted displays. With the growing market of smart phones and virtual display systems, augmented reality technology is made available to wider range. Aim is to implement augmented reality for mobile displays for generating 3D models of buildings on brochures in real time using Qualcomm's Vuforia which uses image recognition to trace and register image marker, and Rajawali is used to render 3D model on mobile. This paper proposes an application, which makes environment much more dynamic and interactive to user and makes it more understandable. The project results in providing wider use of augmented reality for better understanding of static objects.

Key words: Augmented Reality, Android, Vuforia, 3D Modeling

I. INTRODUCTION

To integrate real world with much more dynamic virtual world, the Augmented Reality (AR) is the latest technology introduced [1]. The process of integrating digitally scanned images of our surroundings, making us think of a new virtual surrounding which is just an illusion or is virtually real. Recent inventions have made this technology available using a Smartphone's camera. AR has three distinguish features:

- It combines real and virtual;
- It is interactive in real time;
- It is registered in three dimensions.

Augmented reality is generally a concept hidden behind marker images and they are published as a medium to display augmented art, as long as the medium is displayed continuously, in a stagnant position for an application to identify and scan it. Depending on the required content, the target image may have to remain visible.

Augmented reality deals with mixing real world with virtual world scenes.

A camera is used with AR software is used to detect augmented reality target images to locate 3D models on it. The result is an image can be viewed; even live, on a scene and digital model are positioned into the marker.

II. EXISTING SYSTEM

There are various projects implemented on Augmented Reality. This existing projects provides single marker scanning. The projects are implemented using Vuforia's Single Target Scanning. These applications use Head Mounted displays which are very expensive. Hence they do not provide a cost effective solution. Vuforia is Augmented Reality Software Development Kit (SDK) for mobile devices.

Google glasses are the most representative products of this kind. In Video see-through system, user sees virtual objects which are overlapped in the image of real world. It is usually displayed by camera's screen display in our system.

III. PROPOSED SYSTEM

According to eMarketer, number of mobile users will reach 7.95 billion all over the world in 2016 [3]. Mobile apps are getting more popularity with the growing market of smart phones and virtual display systems. Using an android application, a Smartphone's camera scans and interprets a marker which is your target image, which is often a barcode image but in our system it can be a colorful 2D image of the model you want to generate.

The mobile application scans the target image and creates a virtual object on the mobile phone's screen, fixed to the angle of the camera pointing to it and fixed to the position. This means the application initializes camera to obtain the angles and position of the device to locate it from the marker.

A Smartphone must render the 3D object of building or other model over the marker, this is possible if Smartphone is on a good network so that Vuforia's database can be accessed quickly. Also camera's clarity should be good so that vision is not blurred up anyhow.

In our app we are trying to reduce gap between real environment and user by creating virtual environment for better understanding of static images. Vuforia's SDK helps in enhancing user's interaction with real life objects by creating 3D objects in real environment. The target image can be more than one and thus marker can be used to generate more than one model to allow multipage brochure. The marker can be 2D images of your 3D model. These models can be apartments and flats which

are created using Autodesk 3DS max. This model is then exported and used in android application. Since the model is 3D, it can use android's Open GL libraries to render and therefore we are using Rajawali [7] framework to render which is built on top of OpenGL ES 2.0 API.

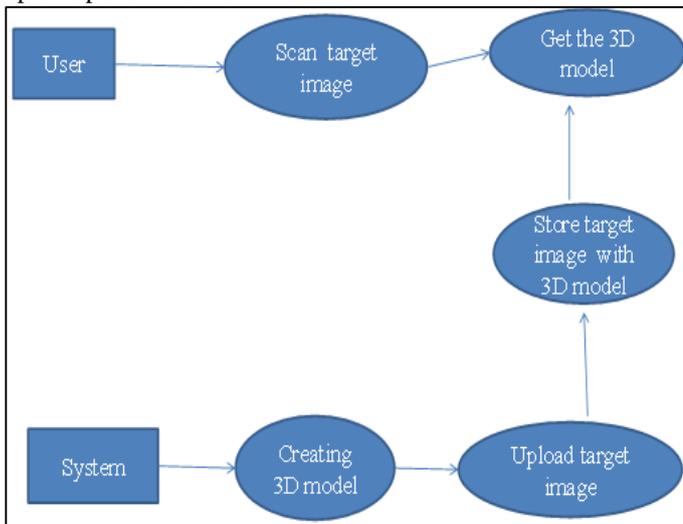


Fig. 1: User & System

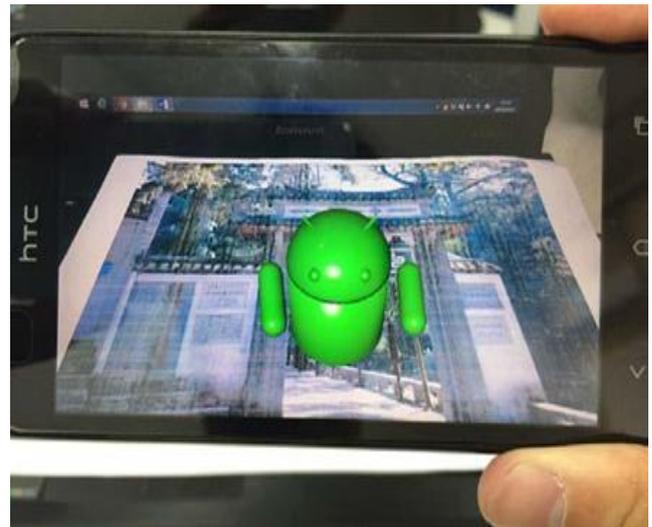


Fig. 2: Screenshot

IV. TECHNOLOGY AND SOLUTION

A. Qualcomm's Vuforia SDK

Mobile Augmented Reality based on Vuforia[6]. It is an Augmented Reality Software Development Kit (SDK) [4] for mobile devices that helps us to create augmented Reality applications [1]. Vuforia is a free software development kit for implementation of Mobile Augmented Reality. It is launched by Qualcomm in 2010, and the latest version is 2.8. With support for iOS, Android, and Unity 3D, the Vuforia platform allows you to write a single native app that can reach the maximum customers with the widest range of smart phones and tablets. Besides the basic function of Augmented Reality, Vuforia also provides various functions such as Text Recognition, Cloud Recognition, Multi-Targets, Frame Markers, Video Playback, Cylinder Recognition and Virtual Button Interactive etc.

The Vuforia SDK enables user to select a range of 2D and 3D target image types including 'marker-less' Image Targets, 3D image target configurations, and other different types of marker which is Fiduciary Marker known as a Frame Marker. Other features that Vuforia provides in the SDK are Occlusion Detection using virtual tactical feedback providers with even runtime marker selection to use marker free reality, and the ability to form and generate target sets sequentially at runtime.[2]

The two recognition methods in Vuforia SDK are: image recognition and text recognition. In this paper, image recognition is used

The process of development with Vuforia can be divided into four stages:

- Create local image target database used for Augmented Reality.
- Define the configuration of image target in XML files.
- Load XML files and start image recognition in program.
- Load 3D models and display them.

The Vuforia renders context and renders simple 3D content (e.g. static, textured models) using OpenGL ES 1.1

B. Rajawali

It is a [8]3D framework for Android built on top of the OpenGL ES 2.0 API. Its main purpose is to make things easy and to complexity that's involved in OpenGL programming. The Framework enables the import and display of various types of 3D models that can be both static (stored in formats OBJ, 3DS, etc..) and animated (stored in formats FBX, MD2 or MD5), support object serialization and compression for optimization, provide material handling, light and fog handling and post processing effects handling.

Rajawali provides a method for serialization to deal with 3D model file. This method consists three steps as follow:

- Read object files at first use.
- Serialize object that is read, generate server files.
- Read relevant server files when it is needed again.

C. Autodesk 3DS Max

Formerly known as 3D Studio Max, is a professional 3D model and graphics creator program for making 3D arts such as game sprite art, models and images. It is professionally developed by Autodesk Media and Entertainment. It has various modeling capabilities and thus we are using it to create model of building and inner layouts of building in our project. It has a flexible

plug-in architecture and produces extension which can be imported on different platforms. It is most commonly used to develop 3D models for video games and create TV commercial visualization and animations for professional purposes. It is also used for adding extra effects in movie and generating movie pre-visualization. 3DS max is well updated and latest version support higher version of pixel shaders which improves the quality of our model. In below example the brown triangle and blue vase is created in 3DS max and generated on table through our app in real time.

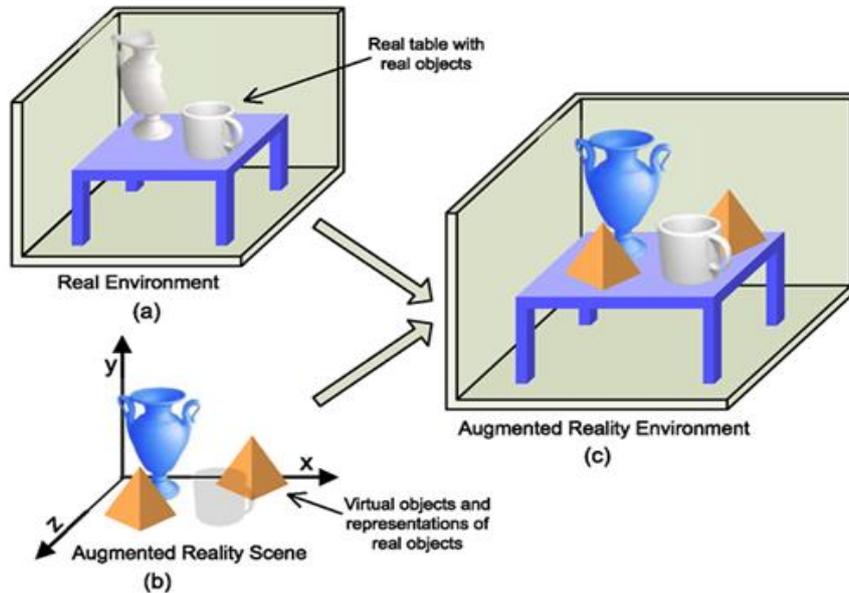


Fig. 3: 3D Model

Therefore using these three systems mentioned above an application can be developed to use augmented reality. Its android architecture is given in below figure.

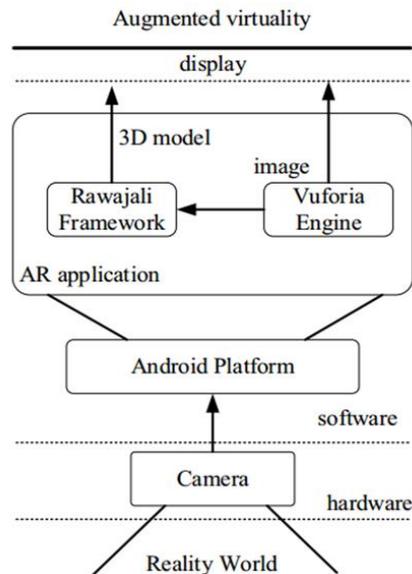


Fig. 4: Android architecture

Here user will scan target image using Smartphone and will get 3D model of inner layouts of buildings. System with 2D static image of the model which is nothing but target image will be uploaded on Vuforia's developer portal. So when target image is scanned corresponding 3D model is retrieved from database and is displayed and rendered using Rajawali framework in real time.

V. CONCLUSION

The purpose of this project is to create a smart brochure which will give 3D view of flats and buildings. It will help user to choose their preferred flats by viewing 3D model by using concept of augmented reality. It will create a virtual world which will help user to visualize inner layout their flats. Thus giving a confident decision to invest in a property that is being bought.

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