MOBILE APPLICATION DEVELOPMENT WITH AUGMENTED REALITY

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Abstract — Lately, there has been a quick development in the concept of Augmented Reality (AR). AR as been extended to mobile phones drastically. Mobile AR is mainly available to people who require an nformational support for a focused task. An augmented reality system generates a composite view. It is a combination of real world as viewed by the person and a virtual world generated by the machine that augments the event with additional information. Augmented Reality has started a new era by entering into the field of entertainment, military training, engineering design, manufacturing, robotics, and other industries. The objectives of this work include the main aspects of Augmented Reality (AR) for development in mobile applications. It describes how application programs use the concept of AugmentedReality and makes the work of a user more efficient and easy.

Keywords— *Augmented Reality, Scientific Visualization, Virtual Reality, Geo-tagging*

I.   INTRODUCTION

Augmented Reality (AR) is a technology, vanishing away the line between what's real and what is computergenerated by overlapping the computer graphics in the real world. This paper focuses on the basic concepts of Augmented Reality and the mobile applications based on it. In past few years, there has been a drastic growth of mobile application since July, 2008 when the iPhone App Store. Since then other mobile platforms have introduced their own application hub including Windows Store, Google Play, Ovi Store and more. These hubs include all the apps compatible for the particular mobile phones. One more concept similar to AR is Virtual Reality (VR). AR and VR have similar goals but the way of achieving it is different. Back in the 1990s, virtual reality was very famous; also multiple companies tried and failed to make it happen. Nintendo was one of them. Though, it made a notable device back then, but it failed miserably

and the company had it discontinued after a year. [1] Eventually, Augmented Reality was the one which found more success in the consumer space. As it stands, Augmented Reality is way ahead of Virtual Reality, as there are different products on AR already on the market.

II. HISTORY

The term 'Augmented Reality' was given by Tom Caudell, a Boeing researcher in about 1990. There are different theories about the origin of the idea of AR. Some say it to be the early 60's and 70's but for some it all started in 1930's when computers were being introduced. In the late 50s a cinematographer named, 'Morton Helig', who created a simulator called Sensorama that produced vibration, visual, sounds and smell, while it wasn't until 1968, Ivan Sutherland invented a first headmounted display which allows the user to interact with surroundings.

More active participation with virtual objects came in 1975 when 'Myron Krueger' created Videoplace.

Later in 1999, Hirokazu Kato created ARToolkit, software used for developing Augmented Reality applications. [2]

III. BASIC AUGMENTED REALITY CONCEPTS

A. *Augmented Reality is…?*

Augmented Reality (AR) is the duplication of real world by computer generated sensory such as video, sound or GPS data. It can be more easily understood by a simpler concept called ediated Reality. In this, the real environment is modified, i.e. the virtual information can be add or subtract or manipulate or overlapped. AR can also be defined as the process of overlapping digitally rendered images onto our real-world environment, giving impression or imitating or virtual reality.

Augmented Reality in Mobile applications lets the user to interact in real time by overlapping digital information onto the real world. Mobile AR application projects explore utilizing mobile devices which have cameras as platforms for sensor-based, video which shoes real world mobile AR. The projects also scrutinize new and exciting applications enabled by use of AR, and UI solutions and paradigms inspired by the restrictions of the mobile devices. [3]

B. *How Augmented Reality is used.. ?*

Augmented reality is content or information which is hidden behind marker images, they are included in film or printed media, until the marker is exhibit for a particular length of time, in some stable posture for an application to analyze and then identify it. It all depends on the content that the marker may remain visible even after using it. [4]

Nowadays, companies advertise their product by rendering a marker which helps the user to take a look at a 360 degree image of the product. It depends upon the quality of augmentation, that these images could be of accurate size or it allows the user to somewhat 'wear' the product.

Other setups include printing out a marker and holding it before a webcam and this webcam is attached to a computer. The image that is shown on the screen is combination of the marker made on that product and the background as seen by the webcam, enabling the person to place this marker on places such as the forehead (to create a mask) or shift the marker to control most of the things in a game. [5]

In this era, when mobile phones are becoming an important part of a human being, an augmented reality app can make any work easier. From watching a movie trailer, all we need to do is point your smartphone at a page or a poster, to discovering landmarks near you and establishments with your smartphone, all can be done in seconds. Companies like Qualcomm should be thanked for making development on chipsets which are inexpensive enough to put in variety of tablets and smartphones.

"The idea that a mobile device knows where I am and can access, overlay, and manipulate that information on real images that are right in front of me really gets my science

fiction juices flowing," said senior analyst at ComScore, Mark Donovan. "It's just starting now, and it will likely be one of the most surprising trends in mobile phones in the coming years."[6]

C. *How Augmented Reality works..?*

On technical grounds, there are different methods by which AR can be studied. They are categorized as Marker-based and Markerless.

   i. Marker-Based: In this method, physical-world symbols are used as a point of reference for computer graphics and are overlapped. A situation can be considered, when a 2- dimensional marker is placed in front of a webcam. The machine then reads these symbols to overlap an on-screen graphic like it was on top of the marker directly in the real world.

   ii. Markerless: Mainly, this method gave rise to a concept called 'Mobile Augmented Reality', which lately made devices such as tablets and smartphones get into consideration. In this method, machine uses two things; one is a GPS tracker which is in the device which is said to be the accelerometer sensor and second is the device's compass to track the position in the physical world, this is done

to make sure that, at which axis the device is working and in what direction is the device pointing. After this, the location data which is given by the machine is matched to a database by which we can determine what the device looks like, and allowing computer graphics to be displayed onscreen.[7]

AR on Cell Phones: It may be some time when you buy a device like Sixth Sense; earlier ersions of AR are already here on some mobile phones, specifically in applications for the phones with the Android operating system and iPhone. In the Netherlands, mobile phone owners can download an app named 'Layar' that uses the GPS and phone's camera to collect data about the surrounding area. Layar then shows information about hotels, hangout places or other sites in that area, overlaying this information on the phone's screen. You just have to point the phone at that building, and this app will tell you if any companies in that building is offering jobs, or it might be able to find photos or maybe videos of the building on apps like Flickr or to locate its history on Wikipedia. [8] There are apps like Layer. In August 2009, some iPhone users were amazed when they used this application 'Yelp', they found an Augmented Reality "easter egg".

This app, Yelp is known for its user reviews of businesses and other places like restaurants, coffee shops, but its hidden AR component, named Monocle, move things one step. Just start up the Yelp app, you just have to shake your iPhone three times and Monocle activates. Using your phone's compass and GPS, Monocle will display information about local coffee shops, including reviews and ratings, on your phone screen. You can find a coffee shop just by a 'touch'.

Some major Augmented Reality concepts which are used these days are Gesture based- Computing, Geo-tagging & Geo-location, AR Markers, and Augmented Reality Browsers. Also, researchers are still working on mobile AR research systems operating in well-organised indoor environments for some time. NaviCam, for example, it augments the video clips recorded by a handheld video camera. [9]

IV. FAMOUS MOBILE APPLICATIONS USING

AUGMENTED REALITY
During the past two decades, Augmented Reality is no more a science fiction. It's practical reality now. Essentially, AR simply means displaying information about the places by using the environment or surroundings. With an AR application, user can get a print ad to life, or getting information about a hangout place by pointing your smartphone camera to discover nearby landmarks and establishments with your mobile device. Here are some of the famous applications in the mobile industry which uses the concept of Augmented Reality.

A. Anatomy 4D
It is an Augmented Reality application that provides user a virtual human body. User has to target his\her smartphone camera at the image. This app-Anatomy 4D will now display a 3D image of that organ of the human body. As it provides the user with a 3D image, it can be zoomed in and out. User can also select particular portion of the body for viewing, like user can simply focus on lymphatic, respiratory system or a skeletal. Later, a feature was introduced in this app which gave a 3D image of the human heart. This app is on Android and iOS platforms.

B. Layar
Layar allows the user to view embedded digital content within a variety of sources, such as magazine pages, posters, product QR codes and advertisements. These can lead to a variety of extra content, such as product discount codes, linked videos, movie trailers, websites or alternate versions of poster or a page.

This app includes a feature which can help people for discovering nearby coffee shops, restaurants, events and more.

C. Google Goggles

Google Goggles is an Android visual search app that takes benefit of your phone's camera and looks up the famous landmarks like Starbucks. It also translates foreign language text and scans QR code and bar code for information. All you need to do is, start the app, point your smartphone's camera on a monument, book, building or just anything you want, the app will itself scan and look out what it can find, from either encyclopedia entries or historical facts or even publishing details. Moreover provides the user with related products and reviews. This app is available on Android and iOS.

D. Super Agent

The app was formerly named as 'Mossad'. Israel-based developer GreenShpits recently released its own AR app for Windows Phone 8 called Mossad. This word "Mossad" means "Institute" in Hebrew. It refers to the Israeli identical of the CIA. Super-Agent allows players to travel and playing spy and acting out their own tasks, but some major problems cut into the fun. Mossad has a character customization component which allows player to dress up their own paper doll-style characters as agents. Player chooses between a couple of female and male body types, but not skin color, unfortunately.

E. Ingress

Ingress is a multiplayer game which uses Augmented Reality. This game includes a playing field. Surprisingly, the playing field which the game has is the world itself. Google's Niantic Labs was the one who developed it. In this game, players take control of opponent secret societies which are fighting for control of an inscrutable energy source. Moreover, this app also provides users to travel to real world locations with their mobile phones to collect "XM" and also gain control of portals near landmarks or buildings.[10] This app is available on Android and iOS.

This is not all. There is hundreds of app available in the mobile industry, rather its Google Play Store, Windows Phone Store, or AppStore

V. FUTURE DIRECTIONS

The concept of Augmented Reality started to expand across different fields in the consumer market; researchers have taken their keen interest to look more deeply in this technology. These new concepts offer many other things like learning. In other words, augmented reality is in its initial phase. Also its future scope in mobile application is huge. Some studies show that it's the beginning of an era where information is just at your mobile glance.

Meanwhile, there are people who are working on this technology in a rapid pace offering inventive applications and user-interface. Though, this technology is yet to gain mass awareness in the market. This technology will surely help in high quality learning.

Many of us also think that AR mobile applications provide only visual augmentation using camera. Well, this is somewhat wrong. Augmented smell, sound and touch are the new advances, or in other words are still in development, which, up to certain extent, have established new interests for future development in AR apps. One of the major problems that are faced by AR app user is nonstandardization of AR apps, for eg, user can use any app according to his choice without compromising the functionality, like a user can use IE or Google chrome or Firefox, they all have the same services, and this was not the case with AR apps.

VI. CONCLUSION

Moreover, there are possibilities about this technology that it provides artistic view of education stuff where students can take care of their learning; with this it also provides authentic education and also leading to different learning styles. Consequently, it leads to a quality education. With the increasing rate of smartphones being used by people, it is the right time for the concept of Augmented Reality to create its base and reach out the general public. Development kits like ARToolkit[11], SLARToolkit[12] and many other software are helping people to understand and work on this concept and hopefully, in near future, there will be a fair increase in apps based on Augmented Reality.

ACKNOWLEDGMENT

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