Vision of Future: Augmented Reality Vision

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Abstract—Augmented Reality alters the way or process by which the user is able to interact with virtual objects. It is basically an idea of superimposing a certain virtual object, image, texture, video, etc. over an existing marker. Marker is a common point or a junction as per say for the Real world and the Virtual to meet allowing the user to then interact with the virtual object superimposed over the marker (up to some extent.). Due to this ability the concepts of virtual world and real world meet creating a vista of application was based on the internet, Intranet or on the Device of the User itself. The Computer Vision plays a vital role in Augmented Reality, because it actually lets the user device perceive the environment and allow digital manipulation and interaction.

Key words: Computer Vision, WebRTC, Augmented Web, RTP, Video Processing, Object Tracking, Image Tracking, Marker Detection, 3d Model

I. INTRODUCTION

Before jumping in we need to define A.R.Azuma defines AR to be when "3D virtual objects are integrated into a 3D real environment in real time." [1]

Augmented Reality is nothing but the technology, which is used to display the virtual object into the real world through computer interface, where the real world and virtual worlds are connected to each other. Augmented reality is the latest and popular technology in Software environment and there are a lot of researchers working on it and getting attention with the release of product.

There are few products of Augmented Reality like Google class, Microsoft HoloLense and many more. Today Google Glass' price in UK is 1500 USD and in India it is about INR 98130.68. So common man cannot afford the Google class.

The most common electronic device which is used in every household for a variety of purposes is smart-phone. This Smart-phone can vary by specification and design based on the manufacturer. Android OS is observed in most of the smart-phones and as it open-source OS and it provides great freedom and flexibility for all kinds of developer to develop something with an "*oomph*" factor in it. This factor and benefit is leveraged for our Project to take form and make Augmented Reality technology available to the masses at a very minimal expense.

A simple augmented reality's use is: Scanning of certain marker and make a certain 3d mesh or a 3d-model appear on the marker superimposing it which can be viewed by turning the marker according to user desire.

II. BACKGROUND AND PREVIOUS WORK RELATED TO AUGMENTED REALITY

The term ``Augmented Reality" has been around since 1990 but that doesn't mean that it was never there before. At the time when man invented machines which relates the environment based on information and pass to their user's, A.R was present.

At the same time Virtual Reality and Mixed Reality steps ahead with advancement of Technology.

A. *Virtual Reality*

The Virtual Reality is Mixture of both Real World and Virtual World.

In more Technical terms we say, Three-dimensional Computer generated environment which interacts with users. Virtual Reality deals with the human senses and creates the virtual environment where the users experiences the various replications of the physical world and interacts with it as same like real world. Till the current date the virtual environment has been created only on the computer screens and on display gadgets.

B. *Differences between V.R and A.R*

The both concept relate to each other in many ways but the key differences are:

Virtual Reality	Augmented Reality
Projects Virtual Content in Real world.	Projects Virtual Content in a digital representation of real world.
Perceived by all/or some human senses	Perceived by Sense of sight and smell uptill now
3/4 Real World , 1/4 Virtual World	3/4 digital real world representation, 1/4 Virtual world

C. *History of Augmented Reality*

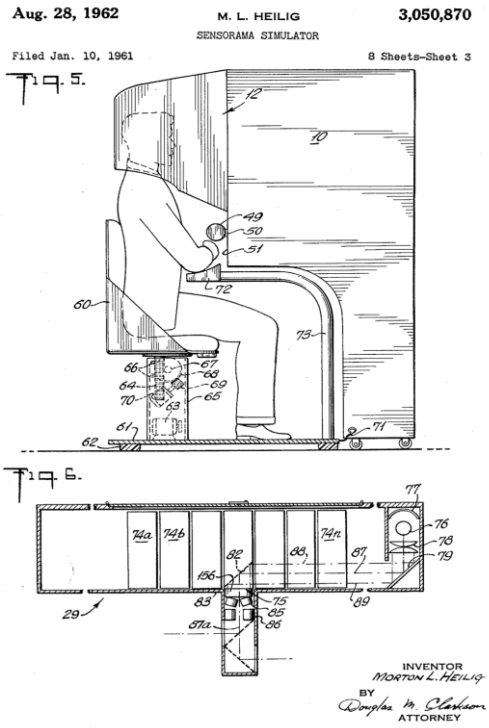


Fig. 1: Image Courtesy: "3050870 - Google Search", Sensorama

The History of the Augmented Reality started with the idea of overlaying data over spectacles by an author L.Frank Baum , named character marker[] .

'Sensorama' a simulator by Morton Heilig which conyes digital information to humans via sense of smell, vibration, sight and sound[]. Depicted in Figure 1.

In 1968 Sir Ivan Sutherland invented a Head Mounted Display and positions as Window Virtually. Depicted in Figure 2.

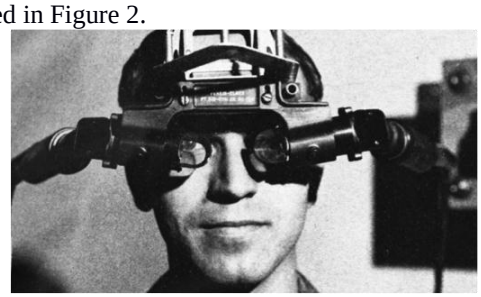


Fig. 2: Image Courtesy: Hololensdevs.com, Ivan Sutherland and his H.M.D

III. Approaches towards augmenting reality

The idea is to augment (make (something) greater by adding to it; increase.) the real vision with the computer vision, that is with the help of a mobile device (eye-wear - future scope) through which we can see the real time image with the help of camera and screen. We have different approaches for this, those are:

A. Marker-based Approach

In this, we will be having an image target or an object target as a ``marker" which will be tracked during the whole process of this application. For tracking the marker various algorithms can be used according to user preferences. Once the target is found there will be 3D model which will be superimposed over the marker on the display. The position, alignment, scaling and rotation of the 3D model will be relative to the marker. The user using this application will also be provided with the options to manage the 3D model according to their need.

B. GPS Based

In this, we plan to have a real time image from camera and the synchronized location with the help of GPS system. With this we plan to get the useful information about the location from the WikiPedia and would give the user an option near the location when the camera is taken over that particular location. On clicking on this option, user would be provided with brief details about that particular location. The user would also come to know about near-by places such as restaurants, movie theatre, etc. Relative example for this kind of application is Lumia Camera.

C. Marker-Less

The Field of Marker-less Augmented Reality is still a far-fetched vision due to limitation of the hardware on the handheld devices however it is not just a vision on the desktops and high end computers which can be affordable by the masses for a decent amount of money. There are still some Possible and decent solutions Out there in the world which haven't been fully explored yet.

IV. System Designs and Proposed Possible Solution

In our proposed idea, we have two types of system designs; those are, stand-alone application and client-server application. We will see both of the system designs in brief

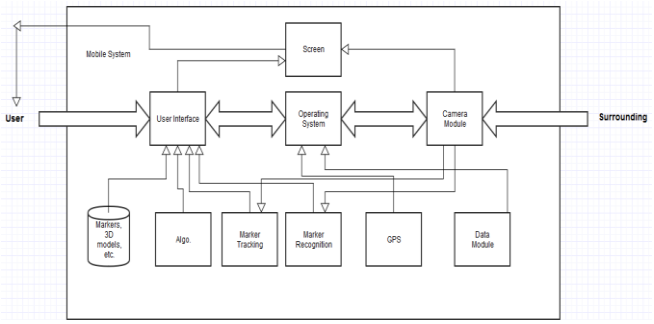
A. Standalone Application and its System Design

The user could have many benefits if they know the proper use of the different application in the smart phone. This kind of application would be pretty handy for the user because the user will be having it with them for all times.

A stand-alone application would be an application in which, the user would be presented with options to select from the marker based method or GPS method. In marker based method, the camera interface would be opened which would be used to scan the surrounding area for detecting the possible marker in it's database. The marker would have some unique features for its detection, which would make the task of detection more easier and faster. On detecting the marker, it will be kept track of for the whole process of camera activity, and there would be a projection of 3D model, whose position will be relative to the marker, in the camera interface.

On selecting the GPS method camera activity would be used again, this time with the GPS system of the mobile system. The GPS system would be used to get the location co-ordinates and search for the information on the web about the current location. The camera would be used to match the scene with the search result, and if found, brief information would be displayed along with a small icon, clicking on which the user would be navigated to a web page showing thee full details about the location. This would also be useful in navigation system where the traffic condition would be informed to the user.

However the main downside of this type of system is the processing load encountered when something high definition model needs to be loaded or a scenario where markers needed be generated on the fly or a scenario where the marker which needs to be tracked is having lots of "features" to detect which consumes System completely and crashes down.



V. Expected results

On execution of the private execution command the program will be executed securely with all data related to the execution being encrypted and stored separately. On termination all the encrypted data will be securely discarded. The process will only run if it is present in the whitelist and can be verified successfully. If whitelist is empty the process will run if it is excluded from the blacklist.

VI. CONCLUSION

With the help of blacklisting and whitelisting we can provide the private execution on any Linux machine. This enables users to execute processes privately in order to preserve their privacy while ensuring that unauthorized applications to not take advantage of private execution so as to hide their footprint.

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